ICCS: INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS

Energy-Economy-Environment Modelling Laboratory E3M - Lab

# "PRIMES modelling for the Impact Assessment of the Commission's 2014 assessment according to Articles 24 (7) and 3(2), (3) of Directive 2012/27/EU on energy efficiency"

## Final Report for (ENER/C3/2013-1000)

**E3Mlab**

**24th July, 2014**

***This report is the revised version of the Final Report for (ENER/C3/2013-1000) which was originally submitted on 22nd May 2014; it is now resubmitted following comments from the European Commission received on 16th July 2014.***

# Contents

1. Introduction ..... 3

2. Scenarios runs ..... 3

2.1. Summary ..... 3

2.2. Main Tasks and scenarios ..... 4

2.3. Sensitivities ..... 4

2.4. Binding targets ..... 5

2.5. Costing approaches ..... 5

2.6. Complete list of scenarios and their variants delivered ..... 6

3. Scenarios of Energy Efficiency beyond 2020 for the EU ..... 11

3.1. Introduction ..... 11

3.2. The reference plus scenario ..... 12

3.3. Reference plus with higher linear reduction factor for EUA (Reference plus LFR2.2 scenario) ..... 13

3.4. Definition of energy efficiency policy scenarios ..... 17

3.4.1. Efficiency values in the energy efficiency scenarios ..... 23

3.4.2. Discount rates in the energy efficiency scenarios ..... 25

3.4.3. Eco-design regulations and modelling of technology choice in the residential and tertiary sectors in the energy efficiency scenarios ..... 28

3.4.4. BAT in industry ..... 34

3.4.5. Penetration of district heating and CHP ..... 35

3.4.6. Grid losses ..... 37

3.4.7. Additional measures for the transport sector ..... 38

3.5. Main scenario results ..... 40

3.5.1. Cost reporting and discount rates ..... 40

4. Comparison to National projections ..... 48

Annex A: F-gas emissions reduction in the reference plus scenario ..... 53

Annex B: EU28 Summary results of the scenarios presented in section 3 ..... 54

# 1. Introduction

This project was carried out in close collaboration with the Commission Services, with the deliverables adapted to the Commission requests.

Within this project the following were delivered to the Commission Services:

- Standard PRIMES output for all scenarios runs delivered (see below): delivered to dropbox as agreed with the Commission services
- Additional REPORT_scen.xlsx file including a large number of explanatory graphs and tables for all scenarios delivered: delivered to dropbox as agreed with the Commission services
- Additional outputs (not available in standard output) related to renovation rates: delivered to dropbox as agreed with the Commission services

A report analysing the scenarios and the underlying methodology: delivered on several occasions in electronic format and finalised taking into account all comments from the Commission services received; the report was originally prepared for the scenarios of Task 3, but the final version contains as main scenarios the scenarios of task 4Further throughout the course of the project E3Mlab provided the Commission Services with full support in the form of emails and teleconferences in which substantial additional information and explanations were provided.

This report contains:

- a list of all the scenario runs delivered (section 2);
- the final version of the analysis report -based on scenarios of task 1 and 4- (section 3)
- a comparison of the Reference scenario 2013 –as published- to the National projections (section 4);
- the EU28 summary files for the scenarios of task 4 (appendix B).

This report together with all the scenarios delivered are submitted electronically (1 copy in DVD) to the EC (DG ENER) with this final report and with the most important results reproduced in paper copy and annexed to this report (2 copies).

# 2. Scenarios runs

## 2.1.Summary

A total number of 48 scenario variants- instead of the originally planned fourteen (14) variants- were delivered to the Commission Services via dropbox; these have been created following revisions of the scenario specifications by the Commission Services. In total 130 different scenario variants were delivered to the Commission services when including the different cost reporting variants which were prepared for the purpose of this project. The scenarios have received approval by the Commission Services. The modelling results for all scenarios have been delivered to dropbox as agreed with the Commission Services and are also included in the DVD accompanying this final report.

## 2.2.Main Tasks and scenarios

The tasks carried out within this project and the relevant scenarios are summarised in the following table:

| Task | Task description | Scenarios | Settings |
|---|---|---|---|
| Task 1: | Modelling runs based on PRIMES (2012) **reference projections** | REF2012tplus | As specified in the kick-off meeting this scenario contained:<br>• an update on EE regarding: (i) eco design on water and space heater, (ii) EED (especially Art. 7 notification) and (iii) EPBD; s<br>• it further took into account the comparison between national projections and Reference 2013;<br>• update on transport sector; |
| | | EEREF2012tp | Reference_plus and EUA applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 |
| Task 2: | Modelling runs based on model run described in Task 1 with **modifications of the modelling assumptions** | EEMDRREF2012tpR<br>EEAREF2012tpR<br>EEMDRREF2012tpR<br>EEMDSREF2012tpR<br>EEREF2012tpR<br>EEVAREF2012tpR<br>EEVVAREF2012tpR | • Adjustment of assumptions and reference setting (adjustment of discount rates for the behaviour of economic actors and for the animalization of capital expenditures) to reflect specific economic considerations for energy efficiency;<br>• Revised versions of the scenarios of Task 3 with new assumptions about discount rates and the considerations of the developments of the energy efficiency policies in the time period beyond 2030 |
| Task 3: | Modelling runs based on described in Task 1 and 2 with **tightened energy efficiency measures** | EEMDRREF2012tp<br>EEAREF2012tp<br>EEMDRREF2012tp<br>EEMDSREF2012tp<br>EEREF2012tp<br>EEVAREF2012tp<br>EEVVAREF2012tp | Various tightened energy efficiency measures in different sectors as suggested by the EC and agreed with the Commission Services |
| Task 4: | Modelling runs with **binding energy efficiency targets** in the Member States | EE25DEC<br>EE28DEC<br>EE30DEC<br>EE32DEC<br>EE35DEC<br>EE40DEC | • RES and ETS targets as in Task 1<br>• Binding energy efficiency targets in the Member States: the target was set at EU level and the modelling proposed a split of the target by MS (see section 3.4) |

## 2.3.Sensitivities

Further to the main scenarios several sensitivities were requested by the Commission services and delivered to the Commission services:

- Sensitivity of 2030 GHG emission reduction target (**5 variants**): sensitivities of Task 2 and 3 including the 40% GHG emission reduction target in 2030 in addition to the initial scenarios without the target i.e. set 1 and set 2. The first set (noted as S1) does not

assume the achievement of specific GHG emissions reduction post 2020. The second set (noted S2) incorporates a GHG emission reduction target for 2030 of ca. 40% for the first four scenarios, and higher than 40% for the most ambitious scenario. Scenarios of S2 include additional hypothetical policies which impact further non-$CO_2$ emissions towards achieving the 40% overall emission reduction target in 2030. The cost of these additional non-$CO_2$ emissions reductions is determined through the same cost curves that have been used for the scenarios of the Impact Assessment for the 2030 framework for climate and energy policies. Each of the energy efficiency scenario within S2 assumes the same intensity of energy efficiency policies as the respective scenario of S1 and achieve the same level of energy savings.;

- Sensitivity with F-gas regulation (**7 variants**): after the introduction of the F-gas regulation all scenarios of tasks 1, 2 and 3 not compatible with the F-gas regulation were re-run in order to ensure full compliance to the newly adopted regulation.

## 2.4.Binding targets

Six different scenarios were undertaken with binding targets (task 4). As there is currently no indication and no policies for the distinction of binding energy efficiency targets by Member State the scenarios were constructed in a different way by assuming EU wide targets which result in proposals for Member State targets. The Commission services requested scenarios with EU wide binding targets on Primary Energy Savings compared to the Baseline 2007. These scenarios were undertaken with the PRIMES model and fully quantified; these scenarios, as all PRIMES scenarios, include detailed Member State results and therefore include an initial proposal for possible Member State targets depending on the overall EU target. A total of six such scenarios were quantified.

## 2.5.Costing approaches

Additionally to the tasks as described in the proposal a further task was undertaken within this project. Four different costing approaches of the scenarios were agreed upon with the Commission and all scenarios were finally delivered with two to four different cost approaches. The preparation of the cost approaches required the programming of new routines in the modelling in order to obtain the reports which was additional work not originally foreseen in the contract. A description of the cost approaches can be found in section 3.5.1.

## 2.6.Complete list of scenarios and their variants delivered

This table replicates the structure of the dropbox folders through which the scenario variants and different cost reporting were delivered.

| | Scenario Name | Delivery Date | Scenario Description | Enabling Settings | Cost Approaches Delivered | |
|---|---|---|---|---|---|---|
| | | | Version 20-MAY-2014 | | | |
| 1 | EE25DEC | 20/5/2014 | 25% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| 2 | EE28DEC | 20/5/2014 | 28% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| 3 | EE30DEC | 20/5/2014 | 30% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| 4 | EE32DEC | 20/5/2014 | 32% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| 5 | EE35DEC | 20/5/2014 | 35% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| 6 | EE40DEC | 20/5/2014 | 40% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A and D | 2 |
| | | | Version 09-MAY-2014 | | | |
| 1 | EEAREF2012tpS1R | 8/5/2014 | EEREF2012tp and efficiency policy package of ambitious intensity, discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 2 | EEAREF2012tpS2R | 8/5/2014 | EEREF2012tp and efficiency policy package of ambitious intensity, 40% emission reduction in 2030,discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 3 | EEMDRREF2012tpS1R | 9/5/2014 | EEREF2012tp and efficiency policy package of moderate intensity, discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 4 | EEMDRREF2012tpS2R | 8/5/2014 | EEREF2012tp and efficiency policy package of moderate intensity, 40% emission reduction in 2030,discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 5 | EEMDSREF2012tpS1R | 8/5/2014 | EEREF2012tp and efficiency policy package of modest intensity, discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 6 | EEMDSREF2012tpS2R | 8/5/2014 | EEREF2012tp and efficiency policy package of modest intensity, 40% emission reduction in 2030,discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 7 | EEVAREF2012tpS1R | 8/5/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | EEVAREF2012tpS2R | 9/5/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, 40% emission reduction in 2030,discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 9 | EEVVAREF2012tpS1R | 8/5/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 10 | EEVVAREF2012tpS2R | 9/5/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, 40% emission reduction in 2030,discount rates modification-stability of EE policies beyond 2030, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| | | | FourAddScen (Version 07-MAY-2014) | | | |
| 1 | EE25DEC | 7/5/2014 | 25% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| 2 | EE28DEC | 7/5/2014 | 28% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| 3 | EE30DEC | 7/5/2014 | 30% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| 4 | EE32DEC | 12/5/2014 | 32% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| 5 | EE35DEC | 7/5/2014 | 35% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| 6 | EE40DEC | 13/5/2014 | 40% energy savings, EE policies, enabling settings 2030 onwards, adjustment of non-$CO_2$ emissions | YES | delivered with cost reporting A,C and D | 3 |
| | | | Version 11-APRIL-2014 | | | |
| 1 | EEAREF2012tpS1 | 16/4/2014 | EEREF2012tp and efficiency policy package of ambitious intensity, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 2 | EEAREF2012tpS2 | 16/4/2014 | EEREF2012tp and efficiency policy package of ambitious intensity, 40% emission reduction in 2030, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 3 | EEMDRREF2012tpS1 | 16/4/2014 | EEREF2012tp and efficiency policy package of moderate intensity, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 4 | EEMDRREF2012tpS2 | 16/4/2014 | EEREF2012tp and efficiency policy package of moderate intensity, 40% emission reduction in 2030, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 5 | EEMDSREF2012tpS1 | 16/4/2014 | EEREF2012tp and efficiency policy package of modest intensity, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 6 | EEMDSREF2012tpS2 | 17/4/2014 | EEREF2012tp and efficiency policy package of modest intensity, 40% emission reduction in 2030, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 7 | EEVAREF2012tpS1 | 16/4/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 8 | EEVAREF2012tpS2 | 16/4/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, 40% emission reduction in 2030, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 9 | EEVVAREF2012tpS1 | 16/4/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |
| 10 | EEVVAREF2012tpS2 | 16/4/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, 40% emission reduction in 2030, F gas regulation, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A,C and D | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | EEref2012tpF | 14/4/2014 | reference achieving 27%RES energy savings , 2.2% linear reduction factor, F gas regulation | NO | delivered with cost reporting A,C and D | 3 |
| 12 | REF2012tplusF | 11/4/2014 | reference scenario , F gas regulation | NO | delivered with cost reporting A,C and D | 3 |
| | | | Version 28-FEBR-2014 | | | |
| 1 | EEAREF2012tp | 3/3/2014 | EEREF2012tp and efficiency policy package of ambitious intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 2 | EEMDRREF2012tp | 3/3/2014 | EEREF2012tp and efficiency policy package of moderate intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 3 | EEMDSREF2012tp | 3/3/2014 | EEREF2012tp and efficiency policy package of modest intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 4 | EEREF2012tp | 3/3/2014 | Reference_plus and EUA applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 5 | EEVAREF2012tp | 3/3/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 6 | EEVVAREF2012tp | 3/3/2014 | EEREF2012tp and efficiency policy package of third level ambition intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| 7 | REF2012tplus | 3/3/2014 | Reference with updated policies in transport sector, fine tuning and update of Version 18-FEBR-2014 | NO | delivered with cost reporting A,B,C and D | 4 |
| | | | Version 18-FEBR-2014 | | | |
| 1 | EEMDRREF2012tp | 20/2/2014 | EEREF2012tp and efficiency policy package of moderate intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A | 1 |
| 2 | EEMDSREF2012tp | 20/2/2014 | EEREF2012tp and efficiency policy package of modest intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A | 1 |
| 3 | EEREF2012tp | 20/2/2014 | Reference_plus and EUA applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A | 1 |
| 4 | EEVAREF2012tp | 20/2/2014 | EEREF2012tp and efficiency policy package of more ambitious intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A | 1 |
| 5 | EEVVAREF2012tp | 20/2/2014 | EEREF2012tp and efficiency policy package of third level ambition intensity, applying the 2.2% rule for linear reduction after 2021 and 27% RES-share in 2030 | NO | delivered with cost reporting A | 1 |
| 6 | REF2012tplus | 20/2/2014 | Reference with updated policies in transport sector | NO | delivered with cost reporting A | 1 |
| **48** | **Total scenarios delivered** | | | | **Total scenarios including cost reporting thereof delivered** | **130** |

The following table includes a list of all the additional files which have also been delivered to the European Commission in order to support effective presentation and explanation of results.

| File name | Delivery date | Description | Additional comments |
|---|---|---|---|
| | | **Version 20-MAY-2014** | |
| Balances by fuel | 20/5/2014 | Energy Balances by fuel type for each scenario | delivered for all 6 scenarios (EE25DEC, EE28DEC, EE30DEC, EE32DEC, EE35DEC,EE40DEC) |
| AverageRenovation_EEDECv20-MAY-2014 | 20/5/2014 | Renovation rates for buildings at EU level by scenario | |
| EEperformance_with ETSV20-MAY-2014 | 20/5/2014 | Energy efficiency indicator by country including industry, residential, tertiary by scenario | |
| EEperformanceV20-MAY-2014 | 20/5/2014 | Energy efficiency indicator by country by scenario | |
| REPORT ON EE_DEC FILES (one file for each cost reporting) | 20/5/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,C and D |
| | | **Version 09-MAY-2014** | |
| Balances by fuel | 9/5/2014 | Energy Balances by fuel type for each scenario | delivered for all 6 scenarios (Refplus and 5 EE variations) |
| AverageRenovation_EEv09-MAY-2014 | 9/5/2014 | Renovation rates for buildings at EU level by scenario | |
| EEperformance_for ETSV09-MAY-2014 | 9/5/2014 | Energy efficiency indicator by country including industry, residential, tertiary by scenario | |
| EEperformanceV09-MAY-2014 | 9/5/2014 | Energy efficiency indicator by country by scenario | |
| REPORT ON EE FILES SET 1 case (one file for each cost reporting) | 9/5/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,C and D |
| REPORT ON EE FILES SET 2 case (one file for each cost reporting) | 9/5/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,C and D |
| | | **Version 11-APRIL-2014** | |
| Balances by fuel | 17/4/2014 | Energy Balances by fuel type for each scenario | delivered for all 6 scenarios (Refplus and 5 EE variations) |
| EEperformanceV15-APRIL-2014 | 25/4/2014 | Energy efficiency indicator by country by scenario | |
| REPORT ON EE FILES SET 1 case (one file for each cost reporting) | 25/4/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,C and D |
| REPORT ON EE FILES SET 2 case (one file for each cost reporting) | 25/4/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,C and D |
| | | **Version 28-FEBR-2014** | |
| EEperformanceV28-FEBR-2014 | 6/3/2014 | Energy efficiency indicator by country by scenario | |
| AverageRenovation_EEv28-FEBR-2014 | 27/2/2014 | Renovation rates for buildings at EU level by scenario | |
| REPORT ON EE FILES case (one file for each cost reporting) | 6/3/2014 | Analytical graphs illustrating the performance of a great variety of energy system indexes by scenario (including GIC, GHG Emissions, Elec Prices etc.) | delivered for cost reporting A,B,C and D |

| Version 18-FEBR-2014 | | |
|---|---|---|
| EEperformance | 18/2/2014 | Energy efficiency indicator by country by scenario |
| AverageRenovation_EEv21022014 | 21/2/2014 | Renovation rates at EU level by scenario |

# 3. Scenarios of Energy Efficiency beyond 2020 for the EU

*Quantified by E3MLab using the PRIMES model*

## 3.1. Introduction

The present report describes the assumptions, the methodology and the results of a group of scenarios[1] which mirror different degrees of energy efficiency promotion effort in the time period after 2020.

The scenarios are full-scale energy demand and supply projections for each of the EU Member-States and for the Union as a whole. The projections cover the period up to 2050, by 5-years steps, starting from 2010 which is considered as the base year.

The PRIMES model, version 2012-2013, is used for quantifying the scenarios. This version of the model includes the data-base and the calibration data developed during the preparation of the Reference 2013 scenario, which has been endorsed by the European Commission and for which assumptions and data have been consulted with Member-State experts, representatives and stakeholders. The statistical update has been performed around end of 2012 when year 2010 statistics were fully available. Projection of exogenous variables to PRIMES, such as world fossil fuel prices, GDP, population and production by sector of activity, has taken place in the last quarter of 2012, reflecting views and data available at that time. Similarly, the assumptions about future evolution of costs and performance of various energy demand and supply technologies have been consolidated in the beginning of 2013.

The present study also draws on the experience of quantifying scenarios using PRIMES in the context of the 2030 policy exercise for energy and climate targets which has been carried out from July 2013 until end of 2013. This exercise has also built on the PRIMES model and data version 2012 -2013. In the context of this exercise, some of the scenario assumptions have been organized in two groups, one called reference settings and the other enabling settings. The former group assumes that actors in the energy sectors do not anticipate strong GHG emission reduction commitments in the time period after 2020 and so they do not necessarily take all actions that are necessary to achieve optimal levels of infrastructure, technology learning and market coordination. In contrast, the enabling settings mean that because of good anticipation of future GHG emission reduction commitments, all conditions are met in infrastructure, technology learning and market coordination so as to enable – maximize the effectiveness of policy instrument which aim at driving strong GHG emission cuts. In simpler words, GHG emission cuts are more difficult, hence more costly, under reference settings compared to enabling settings. Ensuring that enabling settings do happen in reality is of course part of the policies to put in place, but by definition the actual policy instruments which are conceived for driving GHG emission cuts effectively are not included in the settings, which include only the

[1] This current report is the fourth update of the report submitted to the Commission on the 13th of March, and describes the scenarios that have been developed following updated Commission specifications provided in May 2014, and delivered on May 20, 2014.

background and basic actions which are meant to facilitate the actual drivers of GHG emission cuts.

It is reminded that the European Commission's communication for the 2030 energy and climate targets has proposed 40% GHG emission reduction by 2030 and an EU-wide target of 27% measured by the RES-share indicator. According to the GHG40 scenario quantified using PRIMES, this is achieved assuming the enabling settings and by increasing ETS carbon taxes and equal non-ETS carbon values above Reference scenario levels.

## 3.2. The reference plus scenario

The purpose of the reference scenario in the study context is to serve as a basis projection from which to build scenarios which add policy assumptions that are subject to assessment.

The reference scenario follows the logic of including only policy measures which have been adopted until a certain cut-off date, without including new policies not yet officially adopted. In the reference 2013 scenario, which has been published in December 2013, the cut-off date was spring 2012.

The reference plus scenario is conceived as a variant of the Reference 2013 scenario. The update consists in including a few additional policy assumptions, which are listed below:

- Transport sector: additional initiatives in the field of transport adopted by the Commission end of 2012 and in 2013 (New EU rules for safer and more environmental lorries; Clean Power for Transport package; Forth railways package; Single European Sky) and few measures at MS level (road charging for Hungary, Belgium and UK and a bonus system for silent wagons for rail freight in the Netherlands and Denmark) as they were specified by DG MOVE in December 2013.
- Small revisions of assumptions for the assessment of the national obligation schemes and alternative measures that the MS notified under art. 7 of the EED, as follows:
    - Sweden does not exclude the energy consumption of the transport sector while calculating the energy savings for 2014 – 2020.
    - Denmark does not use the 25% exception and even goes beyond the obligations of art. 7 EED.
    - France intends implementing 75% of the 10.5%
- Update in regard to eco-design and labelling using an updated bottom-up evaluation of potential savings. The PRIMES model resolution is lower than that followed by eco-design engineering studies. We have checked for a few aggregate consumption categories the energy savings in 2020 of the Reference 2013 scenario relative to a hypothetical scenario without these measures. We found that roughly the savings are in the same order of magnitude as in the new eco-design study. To accommodate small differences, we have slightly modified parameters which induce earlier market penetration of more advanced, hence more efficient, technologies for space heating, including boilers.
- The reference plus scenario reflects the recently agreed revision of the F-gas regulation, adopted in March 2014. The expected F-gas emissions reduction from the regulation has been included for every MS following the Commission's guidance (the applied reduction is presented in Annex A).

The changes from the Reference 2013 projection are small; they mainly show small reduction of energy demand in Reference plus relative to Reference 2013. The impacts on ETS are also small and the modelling found no justification to modify the equilibrium ETS prices which are maintained as in Reference 2013. The additional measures (slightly lower demand in transport, notably in aviation, and slightly lower demand in non-ETS including for electricity) imply very few changes in EUA surplus by 2020 (66 $MtCO_2$ above reference 2013 levels) and a little higher surplus by 2030 (124 $MtCO_2$ above reference 2013) which are projected to be maintained until 2050. The additional amounts in the EUA surplus are small and are not likely to perturb the ETS carbon price projection as projected in the context of the Reference 2013 scenario.

In terms of the overall RES share indicator, the reference plus scenario achieves 20.96% by 2020 which is practically equal to the 20.88% achieved by Reference 2013. In terms of the ratio of energy savings[2] as percentage of 2010 consumption, the reference plus scenario achieves 5.1% by 2020 which is a little above the 5.0% shown in the reference 2013 projection.

In terms of the rate of savings in primary energy consumption relative to PRIMES 2007 projection, the reference plus projection achieves 17% in 2020 and 21% in 2030, which are quite similar to the 16.8% in 2020 and 21% in 2030 ratios projected in the Reference 2013 scenario.

The inclusion of the F-gas regulation in the reference plus scenario leads to higher reduction of non-$CO_2$ emissions post 2020 relative to the Reference 2013 scenario. In particular, in 2030 the non-$CO_2$ emissions reduction in the reference plus is 42% relative to 1990, with the respective figure being 38% in the reference 2013 scenario. The difference in total GHG emissions reduction is however small (33% instead of 32% in 2030), as non-$CO_2$ emissions constitute a small percentage of overall emissions.

So, reference plus is a projection very similar to the Reference 2013 scenario; the only noticeable differences are a very small reduction of energy demand in 2020, which is a consequence of updated assumptions regarding the implementation of the energy efficiency legislation and also of a few additional policies considered for the transport sector, and the reduction of non-$CO_2$ emissions due to the implementation of the F-gas regulation.

## 3.3. Reference plus with higher linear reduction factor for EUA (Reference plus LFR2.2 scenario)

The main assumption of the "reference plus LFR2.2 scenario" is to use reference plus and add the changes in future ETS allowances as envisaged in the recent European Commission's communication on 2030 policies and targets.

In the aim of reflecting the assumptions of the European Commission's communication on 2030 policies and targets, DG ENER/C3 specified a time series of EUA cap for the time period 2021-2050 which applies a 2.2% rule to determine the linear reduction amount. The new calculation finds a linear reduction amount of 47.68 Mt $CO_2$ to apply yearly after 2021 and a total cumulative cap in the period 2008-2050 of 64810 Mt. This is to compare to a linear reduction amount of

[2] The savings are calculated as the difference of energy consumption in the industrial, residential and tertiary sectors in the projection from energy consumption in a hypothetical scenario which does not include the energy efficiency policies.

37.66 Mt in the reference plus scenario (and in reference 2013) and to a cumulative cap of 69473 Mt in the period 2008-2050 (which implies a reduction of 6.75% of EUA cap in cumulative terms).

It should be noted that in the GHG40 scenario quantified using PRIMES for the 2030 policy analysis the assumptions of linear reduction amount was 56.36 Mt, determined according to a 2.6% linear reduction factor, and the total cumulative cap was 60777 Mt. These assumptions have been adopted also for the energy efficiency policies scenarios that are analysed in this report. Table 1 summarizes the allowances trajectories for all scenarios.

The Reference plus LFR2.2 scenario builds on the reference plus scenario, which implies that all assumptions reflect the reference scenario context. This contrasts the GHG40 scenario which was reflecting the enabling settings set of policy assumptions. The enabling settings refer to infrastructure (grids, smart systems, recharging of car batteries, etc.), the pace of technology progress as possibly accelerated by positive anticipation of future strong emission cutting commitments, to the potential of RES which are assumed to be facilitated by grids, permitting procedures, better acceptability, etc., to the potential of CCS, to the better functioning of the internal market enabling maximum use of enhanced grids, and in the long term to advanced storage systems etc.

No reduction targets for overall emissions were considered in the definition of the Reference plus LFR2.2 scenario; it is reminded that the GHG40 had adopted the target of 40% emission reduction by 2030 and 80% by 2050. Similarly, no carbon value was assumed to apply in non-ETS sectors under the "Reference plus LFR2.2 scenario"

**A short description of the simulation of the ETS in PRIMES**

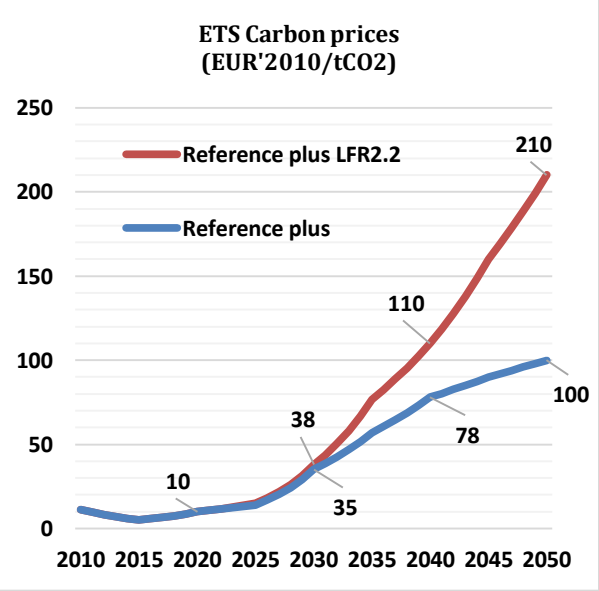
The PRIMES model simulates the current structure of the ETS legislation. EUAs (allowances) are issued every year according to a pre-determined schedule, for example reducing by a linear factor every year (2.2% in the Reference plus LFR2.2 scenario or 2.6% in the EE policies scenarios). The coverage of ETS is currently according to Phase III for the projection years of PRIMES; allowances are given for free to some sectors at certain proportion until a given year and are put on auction for all others who are subject to ETS. Pan-European auctions lead to a single EU-wide market clearing price every year. Emissions can be justified by allowances just purchased or banked; but borrowing allowances to be issued in the future is not permitted. The mathematical problem to be solved is therefore to find a time trajectory of ETS prices such that cumulative emissions are justified by cumulative allowances without borrowing from future. The mathematical problem is a typical optimal control problem resembling to exhaustible resources (cumulative cap of allowances) subject to an extraction cost function which increases with volume extracted and decreases with technology progress as a function of time. Emissions will depend on the ETS prices as emission abatement exhibits decreasing returns to scale (increasing marginal costs with abatement volume), but on the other hand emission abatement possibilities increase over time driven by technology progress. Essentially actors who need allowances to justify emissions compare expected ETS prices with expected marginal cost of abatement which increases because abatement amount increases over time with the increasing rate being moderated by technology progress. Currently the ETS has a large surplus of allowances derived from the lower emissions during the economic crisis. The ETS price trajectory in PRIMES assumes that there is full legislative certainty perceived by all involved actors implying that actors will use their surplus gradually over time. Within the modelling effort is undertaken to maintain a surplus that is consistent with a behaviour where actors maintain a small stock to hedge against price volatility. Within scenarios with high energy efficiency (such as the scenarios within this report) surplus may increase beyond such levels to avoid extremely low ETS prices- with the very high levels of efficiency in the EE35 and EE40 the ETS prices are however very low 13€/t $CO_2$ and 6€/t $CO_2$ respectively.

assumptions[3]. Along the same lines as Reference plus, the "reference plus LFR2.2 scenario" assumes no additional RES or EE policies after 2020. The only direct carbon policy in the "reference plus LFR2.2 scenario" is the increase of the EUA linear reduction factor compared to Reference Plus assumptions; this change has consequences for sectors belonging to ETS which will have to meet a reduced allowances cap until 2050. The electricity sector will have to reduce emissions in "reference plus LFR2.2 scenario" which with the implied changes in electricity prices and costs influencing demand for energy, hence energy supply and emissions.

**Table 1: Overview of assumptions about future ETS allowances**

| Issuance of ETS allowances (EUA) (in million tons of $CO_2$ equivalent) | Scenarios in this study | | | | For comparison |
|---|---|---|---|---|---|
| | Reference 2013 | Reference plus | reference plus LFR2.2 | Energy Efficiency scenarios | GHG40 scenario (2030 policy study) |
| Year 2015 | 2232.63 | 2232.63 | 2232.63 | 2232.63 | 2232.63 |
| Year 2020 | 2044.32 | 2044.32 | 2044.32 | 2044.32 | 2044.32 |
| Year 2021 | 1892.66 | 1892.66 | 1882.63 | 1873.96 | 1873.96 |
| Year 2022 | 1855.00 | 1855.00 | 1834.94 | 1817.60 | 1817.60 |
| Year 2050 | 800.48 | 800.48 | 499.65 | 239.45 | 239.45 |
| Linear reduction amount 2021-2050 | 37.66 | 37.66 | 47.69 | 56.36 | 56.36 |
| Cumulative cap 2008-2050 | 69472.66 | 69472.66 | 64809.68 | 60776.68 | 60776.68 |

**Figure 1: ETS Carbon prices in EUR'2010/t CO2 – PRIMES modelling results**

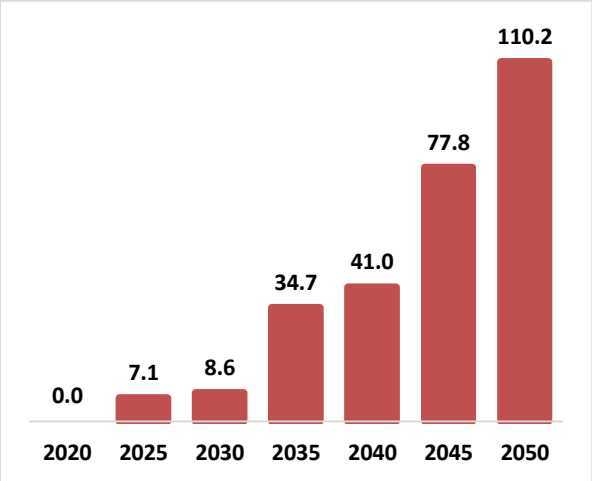



ETS prices are endogenously derived in PRIMES so as the cumulative ETS cap is met; driven by the reduction of the allowances cap, the projection shows a steady increase of ETS carbon prices after 2020, in the "reference plus LFR2.2 scenario" compared to the reference plus scenario. However, the increase in carbon prices is small in the period up to 2030 and prices are shown to escalate only after 2030. The modelling approach in PRIMES assumes risk-averse behaviour of the market-agents and perfect foresight of future high ETS prices; this in combination with the fact that no borrowing from the future is permitted, results in the surplus of allowances remaining at high levels, above 2 billion EUA, until 2030. This is the main reason explaining the small impacts on prices until 2030 even with the assumption of lower allowances. A further increase of prices before 2030 would increase the surplus and

[3] The same applies for the Reference 2013 and Reference plus scenarios.

thus would increase uncertainty about future returns from banking of allowances. Overall, the reduced cap implies less than 10% increase in ETS prices before 2030.

**Figure 2: Percentage change of ETS carbon prices due to lower cap in the "reference plus and EUA" scenario – PRIMES modelling results**




Consequently at market equilibrium surplus of EUA in 2030 is maintained roughly at 2.1 bn $tCO_2$ and at that level carbon prices increase only slightly compared to reference plus. The EUA surplus levels have to decrease in the period after 2030, as it is assumed that the surplus has to vanish up to the horizon of 2050. So banked allowances have to be used but at the same time the issuance of new allowances is reduced every year. Consequently to maintain market balance, ETS participants have to reduce emissions and this requires significant increase in carbon prices. The escalation of carbon prices is more pronounced in the period after 2030. Carbon prices increase by 40% in 2040, above reference plus prices, and more than double in 2050.

Another requirement for the "Reference plus LFR2.2 scenario" is that the indicator measuring renewables as percentage of gross final energy consumption (i.e. the overall RES share) gets a value not below 27% by 2030. Both Reference 2013 and Reference plus projections show a value for RES share which is 24.4% by 2030. These scenarios assume phase out of RES supporting policies after 2020 and they project an increasing, but slowing down, trend of RES development based only on competitiveness of RES in the markets which dynamically builds up due to technology learning. The "Reference plus LFR2.2 scenario" projects higher ETS carbon prices than the reference plus scenario, because of lower ETS cap. Higher carbon prices drive higher RES development in the power sector. Nonetheless, the results indicated that the projected carbon prices in the "Reference plus LFR2.2 scenario" are not sufficient to drive RES share up to 27% by 2030.

Under the assumptions of the GHG40 scenario (quantified in the context of the study for the 2030 policies and targets) the RES share got a value slightly below 27% in 2030 because that scenario has assumed enabling settings, which include RES facilitation through grids and better access to remotely located resources, and has also applied carbon values (equal to ETS carbon prices) in the non-ETS sectors.

In order to obtain a RES-share above 27% in 2030 under the assumptions of the "Reference plus LFR2.2 scenario", it was then necessary to increase the RES value[4] both in power sector and in

[4] RES-value is a modelling technique to impose a certain RES target as an obligation. It applies by sector or on the entire energy system and can be differentiated by country or apply at EU-wide level. It acts as a shadow price of the RES target and enters the actors' optimization problems as a marginal benefit of using RES. The RES-value does not imply any direct payment but may entail incremental costs indirectly compared to a scenario with lower RES-value. A RES-value can be interpreted as a policy instrument when

heating/cooling sectors; the increase was applied uniformly on all Member-States, proportionally to the country specific allocation of RES targets for year 2020. On average, RES value increment of 14 EUR/MWh, above level in reference plus, were necessary to achieve the 27% res-share in 2030. In GHG40 scenario there was no need to increase RES values compared to Reference 2013 and the 27% share was achieved mainly as a result of drivers acting directly on emission reduction (carbon prices in both ETS and non-ETS).

## 3.4.Definition of energy efficiency policy scenarios

**Short overview of demand side modelling in PRIMES**

For each sector a representative decision making agent is assumed to operate, who optimizes an economic objective function. For households and passenger transport a utility maximisation function is assumed, whereas for industrial, tertiary and freight transport sector a profit maximisation (or cost minimisation) function is assumed. The consumers need to maximise utility from energy services (useful energy); saturation effects are taken into account in the functional forms for utility and marginal utilities are decreasing functions of volumes. The consumer has an operational budget constraint, based on income and uses that money to purchase energy commodities, to maintain and to replace equipment and appliances; the decision is therefore represented as a nested budget allocation problem. Investing for improving the specific energy characteristics of thermal integrity of the building (renovation, new constructions, etc.) is a separate decision which depends on the anticipated average cost of energy consumption (including the effect of carbon values or carbon prices) and on the eventual energy efficiency obligations (mirroring policies such as those in the EED).

The choice of investment level for improving thermal integrity implies comparison of annual capital costs (this is annualisation of investment expenditure using a discount rate) and saved variable operating costs. The modified thermal integrity implies lower requirements for energy consumption but also a rebound effect on useful energy needs. At this stage, the model soles a dynamic cost minimisation problem to meet final energy demand by selecting the optimal mix of fuels and the optimal choice of equipment type. This choice is

The energy efficiency policy scenarios aim to reflect escalating levels of energy efficiency efforts after 2020. A set of six scenarios was quantified; the six scenarios assume a stepwise increase in the intensity of energy efficiency achievements. Measured as primary energy demand savings in 2030 relative to PRIMES 2007 projection, the six energy efficiency scenarios were defined so as to achieve primary energy demand reductions in 2030 within a range of 25% to 40%. These levels compare to 21% projected in the Reference plus scenario which is retained as a basis for comparison. As there was no indication of MS targets from the Commission services the target was set at EU level and the resulting split of the target by Member States is a modelling result.

All energy efficiency scenarios, analysed in the present report, are decarbonisation scenarios, meaning that they incorporate an 80% GHG emissions reduction target in 2050 and a carbon budget constraint, as well as assuming enabling settings: this means that there is good anticipation of strong GHG emissions

the RES obligation is achieved through tradable certificate systems, in which case the RES-value is the certificate price at market equilibrium. It can be seem also as an indicator of marginal intensity of non-identified RES supporting policies of bottom-up nature which lead to a RES amount achievement which has the RES-value as shadow price.

constrained by the existing stock of equipment which is however considered to be replaced prematurely if economic optimality suggests it. When it comes to buy a new equipment (e.g. a boiler) the consumer has various choices which represent different types classified according to energy performance (higher performance implies higher acquisition cost). The choice is simultaneous with choice of fuel type, the possible replacement of old equipment and the rate of use of the equipment (which is lower when thermal integrity improvement is high). As it is a dynamic optimisation, the model has to aggregate present upfront costs for the purchasing of equipment with future variable costs over the lifetime of the equipment, in order to compare alternative choices which have different upfront costs and different variable costs.

This comparison requires present value calculations which use a discount rate. The model considers 10 year anticipation by actors in the demand sectors. The unit costs of alternative choices (equipment types) include factors which reflect uncertainty and perception by the consumer which are associated to the technology type. Such subjective costs are higher for advanced technologies when they are not mature in the market. When they become mature such costs vanish. Policies may decrease these subjective costs, such as through campaigns, technology push measures and standards, such as the eco-design. The model takes the view that the consumers are rational but they behave in a context of uncertainty and lack of information so they can make choices which are sub-optimal compared to a situation where all imperfections are removed. The discount rate reflects opportunity costs of drawing private funds in the presence of uncertainties and a risk aversion behaviour -for use of different discount rates for the decision making and for the cost accounting in the reporting please see section 3.5.1. Limited access to cash flow or eventual funding based on equity or private savings, obviously increase opportunity costs and also the premium of risk reflecting risk aversion.

reduction commitment and that infrastructure, technology and market coordination develop accordingly. This assumption renders emission reduction actions, including energy savings, economically more attractive relative to the reference scenario context and thus induces additional energy savings.

In this context, all scenarios assume the achievement of 40% GHG emissions reduction target, and the achievement of at least 27% RES share in 2030. The trajectory of the ETS allowances as well as carbon leakage assumptions are assumed to be the same as applied for the GHG40 scenario of the 2030 policy analysis (see Table 1). The assumed implementation of energy efficiency policies facilitate the achievement of the required emission reductions; in scenarios where $CO_2$ emission reductions from energy and processes are not sufficient, additional non-$CO_2$ policies are assumed,[5] to cover the gap to achieve the 40% GHG emission reduction in 2030. The only scenario which considerably overshoots the 40% GHG emission reduction target is the EE-40 scenario where the intensity of EE policies results in approx. 5 percentage point overachievement of the target.

The assumed structure of energy efficiency policies is similar to the current set of legislation including the Energy Efficiency Directive; it is assumed that in the context of the energy efficiency scenarios the legislation continues after 2020 and further

[5] Sufficient policies to cover the remaining gap are assumed. The related cost of the additional non-$CO_2$ abatement is determined through the same cost curves, from the GAINS model, that have been used for the 2030 policy analysis scenarios.

intensifies in terms of saving obligations until 2030. The intensity of saving obligations is defined in each energy efficiency scenario, so as to obtain approximately the degree of achievement in terms of primary energy consumption as shown in Table 2. The aim is to explore the range up to 40% for year 2030. The energy efficiency assumptions imply reduced demand for energy by end-users of energy and also reduced demand for electricity. For each scenario the model simulates a new equilibrium in energy markets and also in ETS market taking into account the reduced demand.

The following table summarizes the scenarios that are quantified and the achieved energy savings:

**Table 2: Primary energy savings (% change to the respective year value of PRIMES 2007 baseline projection) – PRIMES modelling results**

| **Primary energy consumption savings – excluding consumption for non-energy purposes (% change to the respective year value of PRIMES 2007 baseline projection)** | **2030** |
|---|---|
| Reference 2013 | -21 |
| Reference plus | -21 |
| Reference plus LFR2.2 | -22 |
| EE – 25 | -25 |
| EE – 28 | -28 |
| EE – 30 | -30 |
| EE – 32 | -32 |
| EE – 35 | -35 |
| EE – 40 | -40 |

In order to achieve the above energy savings, we varied the intensity of policy instruments (which correspond to a number of exogenously controlled modelling parameters) in the model which drive energy efficiency. Among these policy instruments, the most important regard investment to improve thermal integrity of buildings (efficiency values) and the degree of uptake of best available techniques (BAT) in the industrial sector. The variation of the numerical values of the controlling instruments in every scenario resulted in the energy saving figures shown in Table 2.

The controlling instruments used to drive energy savings are summarized below (following sub-sections describe in more detail the way these controls are varied in every EE scenario):

a) **Energy Efficiency Obligations for Houses and Buildings**: Increasing energy efficiency obligations related to thermal integrity of dwellings is simulated by varying the energy efficiency values, which apply by country and also for the EU as a whole. Energy efficiency values escalate by scenario and drive a faster pace of investments in renovations, as well as increasing deepness of renovations from an energy perspective. New buildings codes are invariant by scenario, however demolishment rate and enforcement of building codes slightly vary by EE scenario (they however have smaller effects than renovations, as building codes are assumed to be very strict already in the reference scenario). National policies towards stronger renovation (mirrored by the efficiency values at national scale) increase gradually across the EE scenarios, and are more harmonized across the EU in the ambitious cases. The energy efficiency values (EUR/toe saved) act in the model only in the sectors of residential and office buildings and exert effects on energy efficiency investment and

behaviour as shadow prices associated to a virtual energy saving obligation. In the context of a scenario building, the modeller has in mind a certain energy saving target (by year, by sector and by country) and varies the numerical value of the efficiency value until the model results are sufficiently close to the hypothetical target. In a more concrete policy perspective, this process is equivalent of having a guess-estimation about the degree of achievement under Article 7 of the Energy Efficiency Directive by country and over time, assuming that EED is implemented and enhanced beyond 2020; this guess-estimation is then mirrored in the model projections by varying the energy efficiency values. It is worth mentioning that there is no direct relationship between the energy efficiency value and the energy saving indicator which is used to monitor implementation of Article 7. This ratio uses total final energy demand excluding transport, and so it depends on all factors and instruments which influence energy consumption. However, because the largest part of energy consumption in these sectors is taking place for heating/cooling purposes, the energy efficiency values and the ensuing investment to improve thermal integrity constitute by far the main driver of increasing energy saving performance measured according to Article 7.

b) **Reduced interest rates due to policy implementation**: Subjective discount rates used by consumers for decision making are modified downwards in the EE scenarios. Discount rates are already lower than default values in the reference scenario due to the assumption of the implementation of the Energy Efficiency Directive (EED), which is expected to promote utilities and ESCOs as carriers of efficiency investment in customer premises, thus reducing the perception of associated (technical for example) risks by potential clients and by easing access to financing (thus decreasing shadow interest rates reflecting potential difficulty of fund raising by individuals). The discount rates decrease in a stepwise manner in all energy efficiency scenarios and get values below reference scenario levels. The decrease of discount rates increase profitability of energy efficiency investment and make possible cases which otherwise would have been rejected by energy end-users. Consequently, houses and buildings are renovated more intensively and energy saving performance increases in absolute terms and also in relative terms as measured against application of Article 7 of EED.

c) **Eco-design regulations**: Regulations that promote or impose energy efficiency standards such as eco-design regulations are included in the EE scenarios but their intensity does not vary between scenarios; in all scenarios eco-design regulations are the strictest possible and are assumed to be implemented. The degree of dynamic uptake of advanced technologies is endogenous in the model and among others it depends on perceived risks of using advanced technologies in early stages of their commercialization. Anticipation factors also influence the perceived risks; for example anticipating strong enforcement of eco-design and strong policy commitments towards ambitious energy efficiency progress incite consumers to believe that technology maturity will be achieved and thus they tend to uptake the advanced technology earlier and more massively than otherwise. This in turn allows learning to be achieved more quickly. In other words, the anticipation of the energy efficiency policy context enables more effective coordination between uptake by consumers and learning/maturity ensured by suppliers; such coordination makes possible to achieve higher levels of energy efficiency at earlier stages. The model parameters which tune this process are assumed to take varying values in every energy efficiency scenario so as to mirror higher degree of technology progress associated to the policy intensity level of each scenario.

d) **BAT techniques in Industry**: The industrial sectors are simulated with detailed decomposition by process. Technology categories which are candidate for choice when

investing for equipment by process type reflect technology progress, hence efficiency increases when investing; in addition early selection of more advanced, hence more efficient technologies, implies more accelerated energy efficiency progress. Such selection depends on expected relative cost and prices of technologies, including costs of fuels and emissions, and on the expected growth of industrial sector's output. In technology selection perceived risk factors influence profitability of advanced technologies: good anticipation about future emission cut commitments and generally the context of a process towards low carbon help removing uncertainties related to advanced technologies and both early uptake and technology maturity are facilitated. Parameters in the model control the influence of anticipation and the low carbon context on uptake of advanced technologies and the related learning degree for technologies. These parameters vary across scenarios reflecting the increasing intensity of the energy efficiency ambition.

e) **Horizontal BAT for energy savings in Industry**: The candidate technologies for investment in industrial equipment have characteristics which are aligned to best available technique (BAT) information. In addition, the model includes horizontal possibilities of investment for the purpose of saving energy; these horizontal technologies are not the same as the technologies for the equipment associated to the various processes. Such horizontal possibilities mainly include energy control systems and heat recovery systems. They also follow BAT specifications. The model database includes engineering estimations of potential amounts of energy savings due to deployment of horizontal BAT, such as control systems and heat recovery. The degree of exploitation of this potential depends on relative costs and prices and also on exogenous model parameters which reflect the degree of anticipation of future emission cutting commitments, the degree of enforcement of BAT promoting policies and generally the intensity of the policy context enabling such savings. The values of the parameters controlling the pace of uptake of BAT technologies in industry for horizontal energy saving purposes is escalating across the EE scenarios, so as to mirror the assumptions about increasing energy efficiency ambition across the scenarios.

f) **DH and CHP**: Promotion of district heating and highly efficient CHP are part of the energy efficiency policy package. They are assumed to be promoted in the reference scenario but the time horizon is limited to 2020. In the energy efficiency scenarios the policy continuous in the long term and for district heating it consists in promoting investment which allows higher number of users to have access to networks. This varies by country depending on saturation factors and spatial possibilities. The parameters expressing expansion of networks slightly escalate across the energy efficiency scenarios. Cogeneration of heat and electricity is a cost effective option which is significantly exploited already in the context of the reference scenario. Small additional developments are foreseen in the energy efficiency scenarios; as these scenarios reduce demand both for heat and electricity, return to scale factors counter-act further development of CHP; this however differs by country depending on specific conditions related to total demand for steam, which further depends on industrial development in the future, the technology mix in power sector and others.

g) **More efficient grids**: Grid losses are semi-endogenous in the model depending on technology progress and on the load factor[6]; a low load factor generally implies higher losses in electricity grids because of higher tension in peak times. It is assumed that in the context of energy efficiency policies also smart metering and grids develop which by allowing higher

[6] The load factor is the ratio of total electricity generated within a period of time over maximum potential generation based on net power capacity.

demand response to time-of-use prices help to smooth out variability of load and thus increase the load factors. This further implies lower losses in the grids. However, there exist limitations on the potential of grid loss reductions depending on load variability, which are captured in the modelling by assuming small variation of grid loss progress across the energy efficiency scenarios.

In the reference scenarios, improvement towards higher energy efficiency is assumed to occur as a result of the EED and are mirrored in the model by the above mentioned controlling instruments (a), (b), (c), (f) and (g) only, which means that BAT in industry was not included as a result of policy push in the context of the reference scenarios. Moreover, these controlling instruments are assumed to act mainly to the horizon of 2020 in the reference scenarios and to gradually phase out thereafter. On the contrary, all EE-scenarios assume continuation of these controlling instruments after 2020, inclusion of additional controlling instruments for industry, such as (d) and (e), and most importantly, intensification of their magnitude after 2020, at varying levels across the scenarios.

It is reminded that the PRIMES model is a complex model and all controlling instruments described above are implemented contemporaneously in all the scenarios analysed within this report therefore acting simultaneously on improving energy efficiency. The reduction of discount rates induces higher investment in efficient (more expensive) equipment and higher renovation rates for buildings as reducing discount rates facilitates more capital intensive investments. The energy efficiency values also act in the same direction driving a faster pace of investments in renovations, as well as increasing deepness of renovations from an energy perspective and are used to simulate policies aiming at increasing energy efficiency obligations related to thermal integrity of dwellings. The change in perceived cost is used to simulate the eco-design directive and applies to energy equipment: more advanced technologies are more expensive than conventional technologies and are often (when the base technology changes) met with reluctance to adopt them from the side of consumers – which in PRIMES is simulated by adding a perceived cost to the technology cost; the eco-design directive as well as the eco-labelling directive aim at improving the perception of the advanced and new technologies from a consumers perspective therefore reducing the perceived cost of technologies. Together with the reduction of discount rates the reduction of perceived cost increases the adoption rates of advanced and new technologies at the decision making level in the model.

Apart from the intensification of the above instruments that impact stationary uses of energy, energy savings are achieved in the EE scenarios through measures for the transport sector. These measures are additional to the measures included in the reference scenarios and contribute to energy savings mainly beyond 2020. These additional measures draw on the 2011 White Paper on Transport and imply that the scope of the EED (Art 7) remains unchanged in relation to transport. The particular specifications, which are presented in detail further in this report, include further tightening of $CO_2$ standards until 2050 for cars and light commercial vehicles (LCVs) accompanied by the development of recharging infrastructure, improvement of the techno-economic characteristics of batteries and the evolution of the biofuels industry..

Overall, the energy efficiency scenarios achieve higher levels of efficiency and energy savings relative to the reference scenarios because of the additional energy efficiency measures in stationary energy uses and the additional measures in the transport sector. Moreover the good

anticipation of strong emissions reduction commitment (enabling settings) leads people to act earlier and better, and removes market barriers facilitating the achievement of increased energy savings. Finally, it should be noted that the ETS back-loading, the Market Stability Reserve proposal and the revised Energy Taxation Directive have not been taken into account in the energy efficiency policies scenarios.

### 3.4.1. Efficiency values in the energy efficiency scenarios

Efficiency values are a key modelling instrument used to simulate energy saving obligations in the sectors of houses and office buildings. The efficiency value is measured in EUR/toe-saved and can be seen as a threshold which indicate as profitable all portions of energy saving investment which have an annual marginal energy saving cost equal or below the threshold value. The efficiency value is the additional amount that has to be borne annually for a limited period of time incurring as a unit cost above average fuel price in order to economize over fuel payments for an unlimited period of time due to the energy saving investment. In the model, the efficiency value is perceived by the demand actors as a virtual marginal value stemming from energy savings: it makes profitable all portions of the cost-potential curve (with increasing slope) of energy saving investment possibilities which are positioned below that value and thus the corresponding energy saving investments are selected and deliver energy savings over subsequent periods of time. The logic of setting the levels of efficiency values in a scenario context is to iterate until a certain pre-determined energy saving amount is obtained from scenario results. In this sense, the efficiency values are not policy instruments, but the ensuing energy saving amounts can be considered as targets or obligations and so they are policy instruments. Of course, a model like PRIMES does not cover the details of policies which enforce such a target or obligation. Nonetheless, considerations of accompanying policies which aim at enabling more effective implementation of the target/obligation can be mirrored in the model assumptions, as for example the change in interest rates related to the assumption of implementing the targets as obligations on utilities (see below for more details).

The efficiency values have a national component to represent national policies and an EU-wide component which also applies nationally but is defined at the EU-wide level to ensure harmonization across the Member-States. In the context of modelling the Energy Efficiency Directive, the efficiency values are considered as the shadow prices of energy savings obligations (by country and by sector) according to Article 7 of the EED.

**Table 3: Efficiency values assumed by scenario (EUR'10/toe-saved, EU28 wide) – PRIMES modelling assumptions**

| | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Reference 2013 | 261 | 213 | 181 | 141 | 139 | 96 | 95 |
| Reference plus | 270 | 217 | 183 | 142 | 140 | 97 | 96 |
| Reference plus LFR2.2 | 270 | 217 | 183 | 142 | 140 | 97 | 96 |
| EE - 25 | 270 | 298 | 332 | 343 | 360 | 385 | 417 |
| EE - 28 | 270 | 357 | 619 | 641 | 688 | 757 | 847 |
| EE - 30 | 270 | 537 | 991 | 1,185 | 1,289 | 1,442 | 1,642 |
| EE - 32 | 270 | 559 | 1,173 | 1,245 | 1,355 | 1,517 | 1,728 |
| EE - 35 | 270 | 764 | 1,768 | 1,849 | 2,019 | 2,271 | 2,595 |
| EE - 40 | 270 | 778 | 2,937 | 2,957 | 3,097 | 3,402 | 3,798 |

The energy efficiency values mainly induce investments which improve thermal integrity of existing and new houses and buildings and secondarily they induce rational use of electric appliances and lighting. In the EE scenarios the efficiency values are increased across scenarios so as to mirror the increasing energy efficiency ambition of the scenarios. Consequently the scenarios show increasing levels of thermal integrity of houses and buildings enabled mainly by acceleration of renovation and also by higher deepness of renovation in energy terms. The efficiency values are maintained the same across all scenarios until 2020, and they are increased in years 2025 and 2030 (see Table 3). Post 2030, an increase of the efficiency values by a very small rate is applied for the remaining modelling years.

Driven by the above mentioned energy efficiency values, and other controlling instruments at a lesser degree, the residential and tertiary sectors reduce energy consumption at rates which increase with the degree of energy efficiency ambition built-in each scenario. To illustrate this, the table below shows an energy saving indicator which is calculated as the difference of energy consumption by residential, tertiary and industry between an energy efficiency scenario and a hypothetical no-policy scenario. The indicator expresses this difference as percentage of energy consumption in 2010. The energy saving indicator has been used also in the context of the Reference 2013 scenario to measure performance in terms of Article 7 of the EED. It can be shown below that the indicator values show impressive energy saving achievements in the final energy demand sectors, excluding transport, which go far beyond expectations for 2020 under Article 7.

**Table 4: Reduction of final energy demand in industry, residential and tertiary sectors compared to a scenario without the Energy Efficiency Directive (EED) – PRIMES modelling results**

| | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Reference 2013 | -5.0% | -5.7% | -6.1% | -6.4% | -6.7% | -6.5% | -6.7% |
| Reference plus | -5.1% | -5.8% | -6.2% | -6.4% | -6.7% | -6.5% | -6.7% |
| Reference plus LFR2.2 | -5.1% | -5.8% | -6.6% | -6.7% | -6.7% | -6.8% | -7.0% |
| EE - 25 | -5.7% | -9.4% | -11.9% | -15.4% | -18.0% | -19.7% | -20.6% |
| EE - 28 | -6.1% | -11.5% | -17.4% | -22.4% | -26.0% | -29.3% | -31.7% |
| EE - 30 | -6.6% | -14.4% | -22.0% | -28.4% | -32.4% | -36.2% | -38.9% |
| EE - 32 | -6.6% | -15.2% | -24.5% | -29.5% | -33.5% | -36.9% | -39.4% |
| EE - 35 | -6.8% | -18.2% | -29.8% | -34.5% | -38.6% | -42.4% | -45.2% |
| EE - 40 | -6.8% | -18.4% | -37.6% | -41.5% | -44.9% | -48.6% | -51.2% |

It is remarkable that the energy saving performance as measured by the indicator shown in Table 4 change in 2020 although the changes in energy efficiency values are assumed for the time period after 2020. This is due to the anticipation features of the model: the actors in the demand sectors are modelled to have a foresight of ten years ahead and after seeing the increase in intensity of energy saving investment in the future they find optimal to distribute the effort over a longer period of time, enhance the deepness of renovation also in the short term and so avoid locking-in in inefficient renovation intensity in view of the accelerating energy saving requirements in the future. As a consequence, the performance in 2020 in the scenarios applying a long-term energy efficiency policy is found increased at a level of 6-7% which is almost 2 pp above performance under Article 7 in the context of the reference scenario. This can be seen as a benefit of maintaining a long term energy efficiency policy with increasing ambition.

As mentioned the energy efficiency values enable acceleration of renovation of houses and buildings for energy saving purposes. The degree of renovation per year (as % of stock) is historically of the order of 1% but the energy-related part of the renovation works is not necessarily high in the absence of energy-oriented incentives. In other words it matters for energy savings how deep the renovation goes in insulations and other interventions which improve thermal integrity of houses and buildings. Apart renovation pace and its deepness, energy efficiency progress is also influenced by the energy-related strictness of the building codes which concern new constructions and by the rate of demolishment. The latter as well as the rate of new construction are small in the EU and are driven by demographics and economic growth which evolve slowly in Europe. The building codes are already today very strict in most EU countries regarding the thermal integrity of houses and buildings. It is assumed in the projections, already in the reference scenario, that the building code standards become very strict in all countries to a horizon of 2020 and a few years later, and remain at very strict levels until 2050. But because the rate of new constructions is small, achieving significant energy savings in the short/medium term cannot be obtained only through the new constructions; mainly renovation rhythm and its deepness matter for that purpose.

Table 5: Renovation projections (average) in the various scenarios – PRIMES modelling results

| (%) | Average renovation rate EU28 | | | Average energy saving % after renovation EU28 | | |
|---|---|---|---|---|---|---|
| | 2015-2020 | 2021-2030 | 2031-2050 | 2015-2020 | 2021-2030 | 2031-2050 |
| Reference 2013 | 1.28 | 1.37 | 1.11 | 20.91 | 31.47 | 35.68 |
| Reference plus | 1.32 | 1.38 | 1.07 | 21.43 | 36.01 | 37.75 |
| Reference plus LFR2.2 | 1.30 | 1.38 | 1.07 | 21.43 | 36.04 | 37.79 |
| EE - 25 | 1.39 | 1.59 | 1.10 | 21.68 | 39.44 | 41.36 |
| EE - 28 | 1.48 | 1.84 | 1.15 | 21.94 | 43.54 | 45.77 |
| EE - 30 | 1.62 | 2.20 | 1.23 | 22.08 | 45.83 | 48.49 |
| EE - 32 | 1.63 | 2.25 | 1.25 | 22.10 | 46.05 | 48.66 |
| EE - 35 | 1.64 | 2.40 | 1.32 | 22.12 | 46.34 | 49.01 |
| EE - 40 | 1.65 | 2.43 | 1.33 | 22.11 | 46.36 | 49.07 |

The projected renovation rates escalate across scenarios mainly in the time period until 2030 reflecting the assumption that the efficiency ambition varies in the scenarios mainly for 2030. The deepness of renovation in relation to energy is projected to double in the decade of 2020 compared to the previous decade.

### 3.4.2. Discount rates in the energy efficiency scenarios

The widespread penetration of ESCOs or similar institutions and mainly the legislation provision that savings obligations apply on utilities which have to make sure efficiency investment at their consumer premises are expected to change the environment for decision making of services and households on energy saving investment. Individuals perceive a series of risk factors, lack information and have limited access to funding when considering energy saving investment in their premises. The risk factors are technical, administrative and institutional. Lack of information is important concerning the future performance and robustness of interventions when renovating a house. Barriers also stem from the different interests and competences

between owners and tenants of houses. One of the most important barriers is the limited access that individuals have to capital markets. Access to funding and cash flows depends on individual's income and is particularly difficult for the majority of individuals which have income below a threshold. Using individual savings for energy saving renovations is hardly possible in most cases as individuals associate very high opportunity costs (shadow interest rate) to savings and in general to the drawing of funding. According to the empirical literature, all the above barriers but most of all the lack of access to funding, explain why individuals use very high values of subjective discount rates when assessing costs and benefits of energy saving investments. The involvement of utilities and ESCOs implies removal of risk factors regarding technical, administrative and institutional issues, and also implies lower interest rates as these large organizations collectively bargain with banks the funding of energy investment projects and also collectively manage the individual project risks.

As a result the subjective discount rates which prevail in capital-budgeting decisions when such decisions are taken solely by individuals are reduced, moving closer to business interest rates.

In PRIMES, discount rates are assumed by sector following extensive literature review; the aim is to use discount rates which reflect reality. In the reference scenario, it is assumed that implementation of the EED implies reduction of discount rates from the default model values in the period after 2015 and mainly from 2020 onwards. As the reference scenario mirrors only currently adopted policies, it is assumed that the values of discount rates remain constant in the long term at the reduced levels reached by 2020 (see Table 6). The discount rates presented in Table 6 do not apply to transport sector.

In the context of the energy efficiency policy scenarios, it is assumed that the energy efficiency policies continue and intensify after 2020 following the same approach as the EED regarding energy saving obligations applied on utilities and the wide participation of ESCOs in energy saving investment projects. These assumptions are reflected in the design of energy efficiency scenarios where the discount rates, notably for households and the tertiary sector are progressively decreased after 2020, depending on the assumed intensity of efficiency policies by scenario.

The discount rates applied in the EE policies scenarios correspond to the discount rates that were used for the scenarios developed for the 2030 policy framework Impact Assessment. In particular, the EE – 25 scenarios assumes the same level of discount rates as the GHG40 scenario of the IA, which is the same as the reference scenario. The EE – 28 scenario applies the same discount rates as the GHG35/EE® scenario. This implies that discount rates decrease in 2025 from 2020 by 0.3 percentage points for both households and services; which are further reduced by 1.2 percentage points for households and 0.5 percentage points for services in 2030. In 2035, discount rates reduce by a further 0.3 points for households and by 0.2 points for services and remain stable thereafter. The EE – 30 and EE – 32 scenarios have the same discount rates as the GHG40/EE scenario of the 2030 IA. For households, discount rates decrease by 1 pp in 2025 and 2030, and 0.5 pp lower in 2035, extending also in 2040. For services, a 0.5 pp decrease is assumed for years 2025, 2030 and 2035 and stabilization thereafter.

The EE – 35 and EE – 40 scenarios the decrease in 2025 reaches 2 pp for households and 1 pp for the tertiary sector. The discount rates decrease further in 2035 by 1 pp for households and 0.5 pp for tertiary and remain at that level until the end of the projection period.

**Table 6: Discount rates in the energy efficiency policies scenarios – PRIMES modelling assumptions**

| Discount Rates of the Residential Sector (%) | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference 2013 | 17.5 | 17.5 | 14.75 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Reference plus | 17.5 | 17.5 | 14.75 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Reference plus LFR2.2 | 17.5 | 17.5 | 14.75 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| EE - 25 | 17.5 | 17.5 | 14.75 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| EE - 28 | 17.5 | 17.5 | 14.75 | 12 | 11.7 | 10.5 | 10.2 | 10.2 | 10.2 | 10.2 |
| EE - 30 | 17.5 | 17.5 | 14.75 | 12 | 11 | 10 | 9.5 | 9 | 9 | 9 |
| EE - 32 | 17.5 | 17.5 | 14.75 | 12 | 11 | 10 | 9.5 | 9 | 9 | 9 |
| EE - 35 | 17.5 | 17.5 | 14.75 | 12 | 10 | 10 | 9 | 9 | 9 | 9 |
| EE - 40 | 17.5 | 17.5 | 14.75 | 12 | 10 | 10 | 9 | 9 | 9 | 9 |
| | | | | | | | | | | |
| Discount Rates of the Tertiary sector (%) | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
| Reference 2013 | 12 | 12 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Reference plus | 12 | 12 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Reference plus LFR2.2 | 12 | 12 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| EE - 25 | 12 | 12 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| EE - 28 | 12 | 12 | 11 | 10 | 9.7 | 9.2 | 9 | 9 | 9 | 9 |
| EE - 30 | 12 | 12 | 11 | 10 | 9.5 | 9 | 8.5 | 8.5 | 8.5 | 8.5 |
| EE - 32 | 12 | 12 | 11 | 10 | 9.5 | 9 | 8.5 | 8.5 | 8.5 | 8.5 |
| EE - 35 | 12 | 12 | 11 | 10 | 9 | 9 | 8.5 | 8.5 | 8.5 | 8.5 |
| EE - 40 | 12 | 12 | 11 | 10 | 9 | 9 | 8.5 | 8.5 | 8.5 | 8.5 |

As regards transport sector, different discount rates apply between decision making for private and for public transport modes. For the latter, the model uses lower discount rates (8-12%) reflecting either business practices (e.g. heavy duty trucks and aviation) or policies in sectors regulated by the state (e.g. rail, busses). For private cars the model assumes higher discount rates (17.5%) which reflect perception of risks by individuals and eventual limited access to cash flow. The high discount rates in car choices has consequences for market penetration of electric vehicles which have significantly higher upfront costs but much lower operating costs than conventional cars. The discount rates for the transport sector are assumed to remain constant over the whole projection period and across scenarios.

For the industrial and energy supply sectors the discount rates assumed in the reference scenario are in line with business practices and range between 7 and 9% (the lower end applies to infrastructure subject to state regulation). A WACC at that level is reasonable and can be seen as a weighted sum of an interest rate applied on equity and a bank lending rate, the latter being lower than the former. As there is no reason to justify lowering of these WACC values, they are kept unchanged in the energy efficiency scenarios for industry and energy supply sectors.

### 3.4.3. Eco-design regulations and modelling of technology choice in the residential and tertiary sectors in the energy efficiency scenarios

The eco-design policy aims at reducing energy consumption of energy-using equipment and appliances by promoting product varieties which embed higher energy efficiency. Depending on implementing measures and voluntary agreements, the eco-design regulations certify specific energy consumption by product variety and eventually provides for mandatory requirements for certain products. The requirements impose a minimum bound on energy performance of products. The bounds are set for the next two to five years. This implies that the menu of technologies for consumer choices in the future is restricted to product varieties which have performances exceeding the minimum threshold value. Obviously the menu of choice will allow selecting technologies which perform above minimum threshold value; the choice will depend on relative costs, perception of technical risks and the policy context. The eco-design regulations, combined with the labelling directive, are playing an important role to remove uncertainties regarding technical risks and those stemming from lack of information.

The model represents a generic set of technologies (ordinary, improved, advanced, future, etc.) by product type. The technologies have increasingly higher energy efficiency performance at higher upfront cost. Choice of technology by product type is simulated within the economic optimization problem which drives actors' decision making. Technology costs are perceived to be higher than under conditions of market maturity, so as to reflect learning, scale return and subjective risk factors. All these elements improve under active efficiency policies implying that advanced technologies are adopted earlier than under reference conditions and that learning is accelerated. The technical characteristics of projected technologies are modified in a scenario if they are inferior to eco-design regulations as assumed in this scenario.

The reference scenario is assumed to include the currently adopted eco-design regulations to a horizon of 2020. This implies that technologies until 2020 comply with the regulations and that beyond 2020 all projected technologies perform equally or better than the regulations. The menu of choice obviously includes technologies that perform above the regulations' thresholds. As mentioned their uptake by consumers depend on economic conditions.

For the energy efficiency scenarios, it is assumed that beyond 2020 the eco-design regulations increase the performance requirements and also that the policy context, including the beneficial effects from labelling, is such that the consumers increasingly trust in advanced technology and perceive lower costs by neglecting risk factors. In the modelling, this mechanism has been simulated by reducing the perceived cost of high efficiency technologies (only). The reduction escalates in a range from reference to the most ambitious energy efficiency scenario to reflect escalating intensity of the performance requirements.

The resulting early uptake of advanced technology is modelled to induce acceleration of learning making them cheaper and more efficient as they are getting towards commercial maturity. So, the dynamic uptake of advanced technologies by consumers has subsequently effects on the progress of these technologies. As higher volumes of advanced technologies are chosen by consumers, production of such technologies moves further on the learning curve; thus efficiency improvements occur faster. At the same time, with increasing efficiency performance the cost of investment in these technologies is increasing. We can distinguish therefore two aspects of

technology performance that are affected, efficiency and investment costs, which both increase due to eco-design. PRIMES includes parameters that represent these two aspects, which are modified increasingly across scenarios.

In the following table (Table 7) we provide with examples of how the efficiency and investment cost parameters have been modified across scenarios. In particular, the table shows the characteristics of the most efficient technology that is available in 2030 for five different energy uses and compares to the characteristics of the technology that is used in 2010 for the respective energy uses. We remind that the uptake of technologies is endogenous in PRIMES, hence the average efficiency of the equipment that is utilised is a result of the model and is presented in a different table (Table 8). The figures that are presented on investment costs are the costs as perceived by consumers, hence, they include the effect of both drivers that have been discussed: a) the increase in costs that occurs because of increasing efficiency and b) the decrease that results from the reduction/elimination of perceived risks.

**Table 7: Efficiency and cost of investment (as perceived by consumers) for five indicative energy purposes[7]- PRIMES modelling assumptions**

| Energy purposes | Space heating in central boiler households using natural gas | Cooking in households using electricity | Air conditioning in households using electricity[8] | Space heating in offices using gas | Air cooling in offices using electricity[8] |
|---|---|---|---|---|---|
| Average efficiency of all equipment in 2010 | | | | | |
| All scenarios | 0.66 | 0.79 | 2.5 | 0.68 | 2.5 |
| Efficiency of the most efficient technology available for choice in 2030 | | | | | |
| Reference | 0.90 | 0.85 | 4.74 | 0.88 | 4.41 |
| EE-25 | 0.90 | 0.89 | 4.97 | 0.88 | 4.41 |
| EE-28 | 0.90 | 0.90 | 5.07 | 0.88 | 4.41 |
| EE-30 | 0.90 | 0.92 | 5.17 | 0.88 | 4.41 |
| EE-32 | 0.90 | 0.92 | 5.17 | 0.88 | 4.41 |
| EE-35 | 0.90 | 0.93 | 5.22 | 0.88 | 4.41 |
| EE-40 | 0.90 | 0.93 | 5.22 | 0.88 | 4.41 |
| Average cost of investment in ECU per toe in 2010, as perceived by consumers | | | | | |
| All scenarios | 246 | 424 | 552 | 53 | 332 |
| Cost of investment in ECU per toe of the most efficient technology available for choice in 2030, as perceived by consumers | | | | | |
| Reference | 699 | 933 | 1772 | 135 | 1066 |
| EE-25 | 441 | 624 | 1167 | 101 | 743 |
| EE-28 | 381 | 554 | 1004 | 90 | 644 |
| EE-30 | 335 | 504 | 901 | 81 | 572 |
| EE-32 | 335 | 504 | 901 | 81 | 572 |
| EE-35 | 316 | 483 | 857 | 77 | 540 |

[7] The figures that are presented are for Germany, and differ across Member-States.
[8] For air-conditioning the figures presented for efficiency are the coefficients of performance.

| | | | | | |
|---|---|---|---|---|---|
| EE-40 | 316 | 483 | 857 | 77 | 540 |

Overall, the effect of the eco-design regulation and other measures can be summarized in increased uptake of efficient technologies due to removal of barriers in respect to consumer information (reduction of perception cost) and in increased rate of improvements of the technical characteristics of technologies due to learning effects. Therefore, the average efficiency of equipment used by the residential and household sectors is improving both because more efficient technologies penetrate the market and because the technologies themselves are becoming more efficient faster. These benefits are partly offset by rebound effects which are inherent in the modelling and are of course limited by technical potential of performance improvement by type of product. So in very ambitious energy efficiency scenarios, the projections show some degree of saturation in the rate of improvement of performance of energy using equipment and appliances.

It should be reminded that the eco-design policy was already included in the reference scenario EE-policies package, with considerable effects on the uptake of more efficient technologies and the technology progress. In the EE scenarios the intensity of eco-design policy is assumed to increase after 2020 which adds effects on the modelling of a context with intense energy efficiency measures, which induce further uptake of advanced technologies. Therefore, as mentioned, across the EE scenarios the perception of the cost is reduced and techno-economic characteristics are improved.

To the 2030 horizon, the effects of eco-design are simulated to intensify relative to the reference scenario and across the EE scenarios. Moving from 2030 to 2050, the effects are simulated to intensify further and approach technical potential in the very ambitious cases. The learning effects are modelled to be relatively lower until 2030 than after 2030.

In the tables below we show indicators of energy efficiency improvement (relative to 2010) by category of equipment or appliance grouped by purpose of use. For example, according to Table 8 for the EE – 25 scenario, the efficiency of lighting equipment used in the residential sector in 2050 has improved on average by approximately 400%; in practice, this efficiency improvement can be delivered by replacing an average light bulb (of approximately 50W) with a CFL bulb (of approximately 10W). The resolution of the model is lower than the list of products considered in the eco-design regulations. In addition, the model has limited representation of engineering bottom-up information regarding the use of each equipment. Therefore, direct comparisons of model projections with eco-design regulations is hardly possible. Comparisons can be drawn from the projection of energy efficiency improvements by category of energy use.

**Table 8: Indicative ratios of efficiency improvement of energy using equipment in residential sector[9] – PRIMES modelling results**

Avg. Energy Efficiency improvement in equipment as effectively used by scenario, relative to 2010 (in % change)

| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
|---|---|---|---|---|---|---|
| | Heating | | | Cooling | | |

[9] The figures presented are EU averages; results differ by MS.

| | | | | | | |
|---|---|---|---|---|---|---|
| Reference 2013 | 7.7 | 18.8 | 28.8 | 17.6 | 28.3 | 62.1 |
| Reference plus | 7.8 | 19.1 | 29.1 | 17.6 | 28.3 | 62.1 |
| Reference plus and EUA | 7.8 | 19.0 | 29.0 | 17.6 | 28.8 | 66.2 |
| EE - 25 | 10.0 | 25.7 | 40.0 | 20.9 | 53.9 | 104.9 |
| EE - 28 | 11.4 | 28.8 | 46.5 | 22.5 | 65.5 | 115.1 |
| EE - 30 | 13.2 | 30.7 | 49.4 | 24.5 | 73.0 | 124.3 |
| EE - 32 | 13.2 | 30.7 | 49.4 | 24.5 | 72.9 | 124.3 |
| EE - 35 | 14.2 | 31.3 | 50.5 | 25.9 | 76.4 | 129.0 |
| EE - 40 | 14.1 | 31.3 | 50.9 | 25.9 | 76.7 | 129.0 |
| | | | | | | |
| | Water heating | | | Cooking | | |
| Reference 2013 | 10.7 | 17.9 | 26.5 | 3.9 | 6.4 | 9.3 |
| Reference plus | 10.7 | 18.0 | 26.6 | 3.9 | 6.4 | 9.3 |
| Reference plus LFR2.2 | 10.7 | 17.9 | 26.5 | 3.8 | 6.1 | 8.8 |
| EE - 25 | 11.3 | 19.1 | 21.2 | 4.8 | 10.5 | 21.3 |
| EE - 28 | 11.6 | 19.9 | 23.1 | 5.6 | 15.3 | 34.2 |
| EE - 30 | 12.0 | 20.9 | 24.7 | 7.0 | 18.9 | 40.5 |
| EE - 32 | 12.0 | 20.9 | 24.7 | 7.0 | 19.0 | 40.6 |
| EE - 35 | 12.2 | 21.7 | 25.9 | 8.0 | 21.4 | 43.5 |
| EE - 40 | 12.2 | 21.6 | 26.1 | 8.1 | 21.2 | 43.6 |
| | | | | | | |
| | Lighting | | | White appliances | | |
| Reference 2013 | 163.7 | 372.9 | 400.2 | 45.9 | 60.5 | 66.3 |
| Reference plus | 181.6 | 375.9 | 400.1 | 44.8 | 59.0 | 66.1 |
| Reference plus LFR2.2 | 182.5 | 376.5 | 400.5 | 44.0 | 58.9 | 64.8 |
| EE - 25 | 181.4 | 373.2 | 400.4 | 45.4 | 61.3 | 67.8 |
| EE - 28 | 184.7 | 380.2 | 414.9 | 47.4 | 69.3 | 83.2 |
| EE - 30 | 185.7 | 380.7 | 414.8 | 48.8 | 70.9 | 89.9 |
| EE - 32 | 185.5 | 380.6 | 414.8 | 48.0 | 70.5 | 89.9 |
| EE - 35 | 186.8 | 381.2 | 414.7 | 48.3 | 71.0 | 96.4 |
| EE - 40 | 186.0 | 380.7 | 414.6 | 48.6 | 70.9 | 96.4 |
| | | | | | | |
| | Black appliances | | | Central boilers | | |
| Reference 2013 | 18.2 | 27.9 | 30.3 | 11.2 | 23.6 | 45.9 |
| Reference plus | 18.2 | 28.0 | 30.3 | 11.3 | 24.2 | 46.3 |
| Reference plus LFR2.2 | 18.2 | 28.0 | 30.5 | 11.3 | 24.1 | 46.4 |
| EE - 25 | 18.6 | 28.8 | 31.8 | 13.0 | 30.1 | 55.5 |
| EE - 28 | 19.0 | 34.6 | 49.0 | 14.1 | 31.6 | 57.0 |
| EE - 30 | 19.1 | 34.7 | 53.7 | 15.5 | 32.7 | 58.5 |
| EE - 32 | 19.1 | 34.7 | 53.7 | 15.5 | 32.7 | 58.5 |
| EE - 35 | 19.1 | 34.9 | 60.2 | 16.2 | 33.6 | 59.7 |
| EE - 40 | 19.1 | 34.8 | 60.5 | 16.2 | 33.6 | 60.3 |
| | | | | | | |
| | Gas heaters | | | Heat pumps | | |
| Reference 2013 | 14.2 | 28.1 | 49.1 | 18.1 | 35.5 | 61.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Reference plus | 14.2 | 28.1 | 49.1 | 18.1 | 35.6 | 61.5 |
| Reference plus LFR2.2 | 14.2 | 28.1 | 49.3 | 18.1 | 35.6 | 62.0 |
| EE - 25 | 15.7 | 32.3 | 56.4 | 19.8 | 42.2 | 71.4 |
| EE - 28 | 16.3 | 33.4 | 57.5 | 20.8 | 44.5 | 73.1 |
| EE - 30 | 17.0 | 34.3 | 59.0 | 22.8 | 46.3 | 75.3 |
| EE - 32 | 17.0 | 34.3 | 59.0 | 22.8 | 46.3 | 75.4 |
| EE - 35 | 17.5 | 34.8 | 60.1 | 23.5 | 47.3 | 77.0 |
| EE - 40 | 17.5 | 34.8 | 60.7 | 23.4 | 47.2 | 77.9 |

**Table 9: Indicative ratios of efficiency improvement of energy using equipment in tertiary sector – PRIMES modelling results[9]**

Avg. Energy Efficiency improvement in equipment as effectively used by scenario, relative to 2010 (in % change)

| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
|---|---|---|---|---|---|---|
| | Heating | | | Cooling | | |
| Reference 2013 | 15.6 | 36.7 | 49.8 | 16.3 | 27.2 | 44.7 |
| Reference plus | 15.5 | 36.7 | 49.9 | 16.3 | 27.2 | 44.7 |
| Reference plus LFR2.2 | 15.5 | 36.0 | 48.3 | 16.3 | 27.2 | 45.2 |
| EE - 25 | 17.9 | 41.6 | 56.6 | 17.2 | 29.0 | 52.0 |
| EE - 28 | 19.3 | 55.0 | 63.6 | 17.4 | 30.1 | 54.9 |
| EE - 30 | 21.0 | 59.3 | 67.9 | 17.7 | 31.1 | 56.5 |
| EE - 32 | 21.0 | 59.5 | 68.2 | 17.7 | 31.1 | 56.5 |
| EE - 35 | 22.0 | 60.3 | 68.1 | 17.8 | 31.5 | 57.1 |
| EE - 40 | 22.1 | 59.5 | 67.8 | 17.8 | 31.7 | 57.2 |
| | | | | | | |
| | Lighting | | | Electric appliances | | |
| Reference 2013 | 156.8 | 374.3 | 394.4 | 5.5 | 21.3 | 54.1 |
| Reference plus | 158.3 | 374.0 | 394.5 | 5.5 | 21.3 | 54.1 |
| Reference plus LFR2.2 | 156.1 | 377.1 | 394.3 | 5.6 | 22.2 | 56.0 |
| EE - 25 | 208.4 | 371.8 | 394.3 | 6.5 | 25.5 | 60.1 |
| EE - 28 | 225.0 | 371.6 | 392.9 | 6.9 | 27.3 | 63.4 |
| EE - 30 | 236.1 | 372.6 | 394.5 | 7.4 | 28.9 | 65.7 |
| EE - 32 | 235.8 | 372.4 | 394.6 | 7.4 | 28.9 | 65.5 |
| EE - 35 | 242.4 | 375.5 | 395.0 | 7.7 | 29.8 | 66.6 |
| EE - 40 | 240.2 | 375.1 | 395.9 | 7.6 | 30.4 | 66.9 |
| | | | | | | |
| | Greenhouses-agriculture | | | Pumping in agriculture | | |
| Reference 2013 | 3.9 | 7.4 | 9.8 | 9.8 | 16.4 | 28.1 |
| Reference plus | 3.9 | 7.4 | 9.9 | 9.7 | 16.4 | 28.2 |
| Reference plus LFR2.2 | 3.9 | 7.4 | 9.6 | 9.6 | 15.8 | 27.4 |
| EE - 25 | 4.8 | 10.1 | 18.2 | 10.1 | 18.6 | 67.5 |
| EE - 28 | 5.3 | 11.9 | 22.4 | 10.3 | 19.4 | 68.3 |
| EE - 30 | 5.8 | 14.0 | 26.6 | 10.5 | 20.0 | 68.8 |
| EE - 32 | 5.8 | 14.0 | 26.7 | 10.5 | 20.1 | 68.9 |
| EE - 35 | 6.2 | 15.0 | 28.7 | 10.6 | 20.5 | 68.8 |

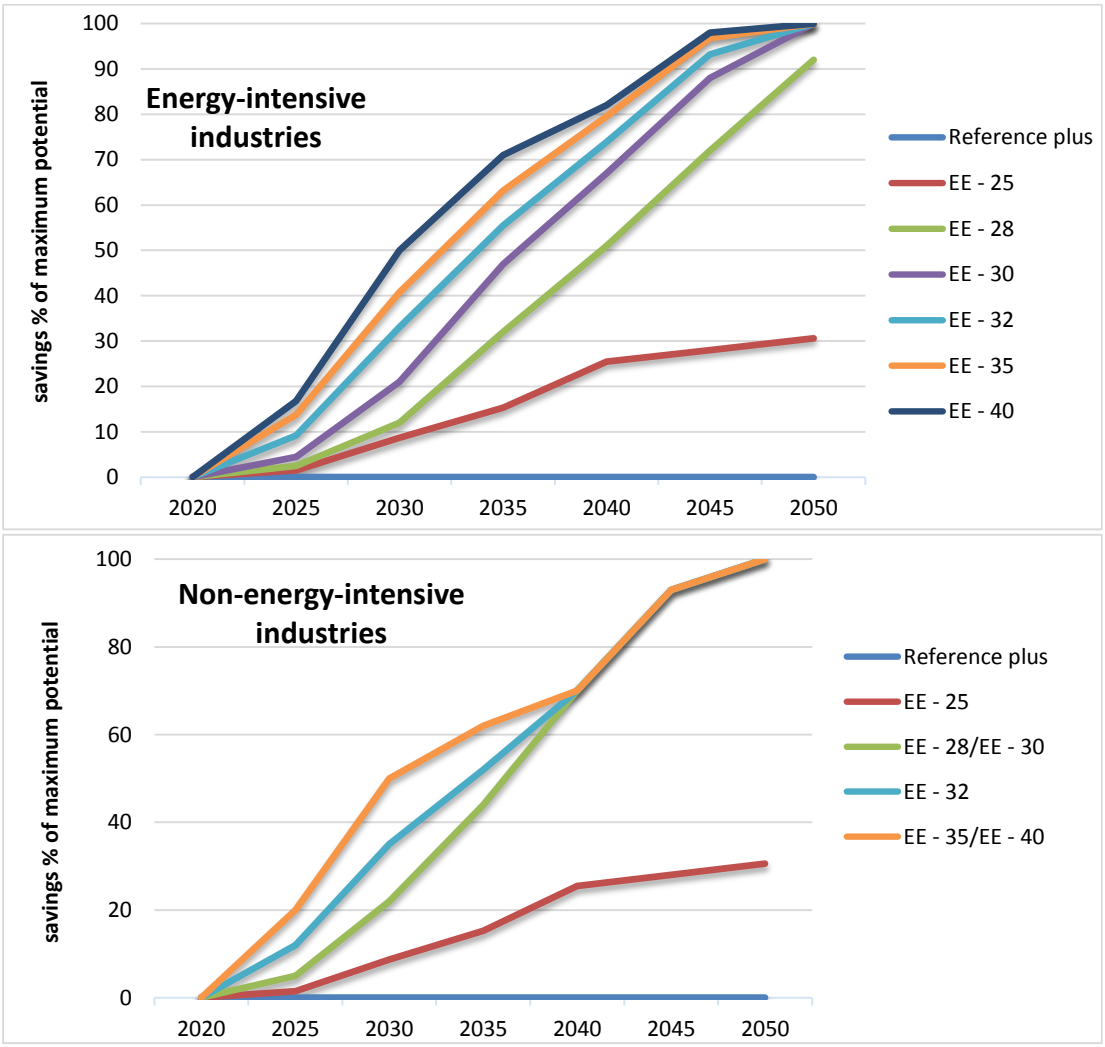
| | | | | | | |
|---|---|---|---|---|---|---|
| EE - 40 | 6.2 | 15.0 | 28.7 | 10.8 | 20.3 | 68.5 |

### 3.4.4. BAT in industry

Energy efficiency progress in the industrial sector in the EE policies scenarios occurs through the deployment of BAT (best available techniques), both vertically and horizontally; vertically refers to technologies associated with the equipment used for specific industrial process; horizontally, refers to systems that affect all industrial processes, such as energy control systems and heat recovery systems.

Regarding the technologies at the level of equipment, the menu of candidate for investment BATs is the same in all EE scenarios. What varies among scenarios is their uptake, depending on the intensity of energy efficiency policies assumed. Similar to what has been described in the previous section for the technologies in the residential and tertiary sectors, anticipation of increased energy efficiency savings results in moderation of the perception of risk associated with advanced technologies, and in acceleration of their maturity and uptake. This effect is represented in the EE – policies scenarios through modifying the parameters that reflect the perception of cost. The risk associated to anticipation does not refer to technical risk or lack of information but rather refers to regulatory risk: in the context of strong efficiency policy, as also in the context of strong emission reduction policies, industry anticipates that enforcement is

Figure 3: Uptake of horizontal energy saving BATs in the industrial sector as % of maximum potential – PRIMES modelling assumption



likely to become more stringent in the future and so in order to avoid locking-in inferior technologies increases the uptake of advance, hence more efficient technologies.

Regarding the horizontal BAT, their deployment leads to energy savings at all process levels. The model considers a maximum potential for energy savings from horizontal BAT adoption, which is different by sector and by country. The energy efficiency scenarios are designed to exploit partly the maximum potential, at a degree reflecting the intensity of energy efficiency ambition by scenario. Therefore the uptake of horizontal BAT increases by scenario but is limited by potential. Moreover, each scenario is assumed to follow a different path towards achieving this potential.

As shown in Figure 3 in the EE – 25 scenario the energy savings potential that industry is able to exploit in 2030 is assumed to be approx. 9% of its maximum level, while by the end of the projection period it reaches 30%. Already in the EE – 28 scenario these figures increase considerably, reaching -12% by 2030 for the energy intensive industries and 22% for the non-energy-intensive, and 92-100% to 2050. In the scenarios with more ambitious energy efficiency policies (EE – 30 to EE – 40) industry can exploit its maximum potential for energy savings by the end of the projection period, with intermediate levels for 2030 of 21-50% depending on the intensity of the efficiency policies. Overall, the uptake of BAT (vertical and horizontal) in industry contributes to decreasing energy intensity of the sector. The incurred benefits in terms of reduced energy intensity are summarized in Table 10. The reduction of energy consumption per unit of industrial output in 2030 relative to 2010 ranges between 24% for the EE – 25 scenario and app. 31% for the EE – 40 scenario. The corresponding figure for the reference scenarios (which do not assume the facilitation of the uptake of BAT technologies) is 19%. In 2050 the reduction reaches 43.6% in the EE - 25 scenario and app. 50% in the other scenarios.

**Table 10: Energy intensity indicator of the industrial sector (energy consumed in toe on value added in MEuros'10)- PRIMES modelling results**

| Energy intensity indicator of industry (2010=100) | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|
| Reference 2013 | 100 | 91.2 | 81.1 | 73.2 | 68.3 |
| Reference plus | 100 | 91.3 | 81.1 | 73.3 | 68.3 |
| Reference plus LFR2.2 | 100 | 91.3 | 80.5 | 73.7 | 68.3 |
| EE - 25 | 100 | 91.0 | 76.0 | 63.3 | 56.4 |
| EE - 28 | 100 | 90.6 | 73.6 | 57.4 | 48.1 |
| EE - 30 | 100 | 90.3 | 72.0 | 55.8 | 47.7 |
| EE - 32 | 100 | 90.3 | 69.9 | 54.7 | 47.7 |
| EE - 35 | 100 | 90.2 | 68.4 | 54.1 | 47.6 |
| EE - 40 | 100 | 90.2 | 67.7 | 54.0 | 47.6 |

### 3.4.5. Penetration of district heating and CHP

Energy efficiency policies induce efficiency improvements on the supply side through the promotion of investments in CHP and in distributed steam and heat networks. These investments are combined with incentives on the consumer side to shift towards heating through district heating, both in the residential and the tertiary sectors. This results in a larger number of dwellings in the residential sector having access to distributed heat networks, which in turn allows for further participation of CHP in heat/steam supply.

To simulate this effect, a parameter is utilized that controls the substitution of heating through individual (non-central) heating equipment with district heating; in particular, the parameter is controlling the availability of district heating in the menu of candidate technologies for space heating, which is increasing across the EE-scenarios[10]. The choice of shifting to district heating is however endogenous and depends on its economic viability, i.e. on comparing the total costs and benefits of using district heating instead of other non-central means. PRIMES represents various buildings categories, among which a specific buildings category in which space heating is supplied by district heating networks. This category is more cost efficient than other categories; it benefits from CHP steam injections, thereby offering stable prices to district heating consumers. This has rebound effects on energy efficiency, as houses connected to district heating generally consume more heat than houses which use individual (non-central) heating equipment. All these factors are taken into consideration in the model, which shows that the number of households that are connected to district heating is increasing across the EE scenarios, as demonstrated in Table 11. In parallel the share of CHP in heat/steam supply is increasing, as shown in Table 12. Both are necessary to increase overall efficiency in primary energy trends, because district heating alone, without CHP, can have lower efficiency performance, overall, than other configurations based on individually operating equipment for heating.

It should not be construed that the only factor resulting in increasing CHP in steam generation is the penetration of district heating. In a context with intense energy efficiency policies CHP penetrates both steam and electricity generation as a result of a combination of factors, including the CHP promotion policies and the increased requirements for energy efficiency in general. In the modelling exercise for the EE policies scenarios, CHP penetration was not facilitated through the modification of relevant parameters, as is the case for district heating penetration. The level of facilitation is similar to the reference scenarios, which already assume considerable penetration of CHP. Further penetration in the EE policies scenarios is thus the result of the increasing use of district heating and of increased requirements of the supply side for energy savings.

But CHP penetration depends also on economics which are influenced by scale parameters: the larger the volume of heat/steam and electricity, the more economic CHP projects can be. Increasing energy efficiency reduces volumes of steam/heat and electricity which goes against the economics of CHP projects for reasons of lower return to scale. Variability of load also acts to the detriment of CHP. In the context of high emission reduction targets, clean power solutions such as nuclear and RES are economically and technically superior options than CHP which is obliged to use fossil fuels, at least to a certain degree, given that biomass resources are limited

[10] It should be noted that PRIMES does not include a spatial resolution of the steam/heat networks. Representation of network developments is done through cost-supply curves that are specified by Member-State. These cost-supply curves are constructed so as to reflect in an aggregated way the different possibilities of network expansion and the geographical limitations by MS. The different assumptions between countries have been based in various sources (district heating surveys, buildings and houses statistics and surveys).

and clean hydrogen is not yet a mature option. In this context steam use remains primarily in industry which cannot be substituted with other energy forms in some processes.

Table 11: % of households connected to district heating networks – PRIMES modelling results

| % of households connected to district heating networks | 2010 | 2020 | 2030 | 2050 |
|---|---|---|---|---|
| Reference 2013 | 9 | 10 | 11 | 11 |
| Reference plus | 9 | 10 | 11 | 11 |
| Reference plus LFR2.2 | 9 | 10 | 11 | 11 |
| EE - 25 | 9 | 10 | 11 | 10 |
| EE - 28 | 9 | 10 | 11 | 16 |
| EE - 30 | 9 | 10 | 12 | 15 |
| EE - 32 | 9 | 10 | 12 | 15 |
| EE - 35 | 9 | 10 | 14 | 15 |
| EE - 40 | 9 | 10 | 14 | 16 |

Table 12: Share of CHP in total steam supply (including steam for self-consumption of industrial and refinery boilers) – PRIMES modelling results

| Share of CHP in total steam supply including distributed heat/steam (%) | 2010 | 2020 | 2030 | 2050 |
|---|---|---|---|---|
| Reference 2013 | 57 | 63 | 61 | 63 |
| Reference Plus | 57 | 63 | 61 | 64 |
| Reference Plus and EUA | 57 | 63 | 64 | 61 |
| EE - 25 | 57 | 63 | 65 | 74 |
| EE - 28 | 57 | 63 | 65 | 72 |
| EE - 30 | 57 | 63 | 66 | 73 |
| EE - 32 | 57 | 63 | 66 | 73 |
| EE - 35 | 57 | 63 | 65 | 75 |
| EE - 40 | 57 | 63 | 65 | 77 |

### 3.4.6. Grid losses

Modification of specific parameters has been used as an approach to represent the improvement of the rate of grid losses due to smoother load factor in electricity demand enabled by smart metering and generally demand response measures. Energy efficiency implies lower demand for electricity and generally lower electrical charge in power grids thus lower losses. The rate of reduction of grid losses across scenarios is assumed to be small as the potential for reducing grid losses through smoothing the load curve is limited. Table 14 summarizes the modelling results in regard to grid losses across EE scenarios.

The greater potential for improvements exists for the medium voltage electricity distribution grid, which is simulated to improve relative to the reference scenario by approximately 1-2% in 2030 and 2-5% in 2050 (see Table 13). Losses at the low voltage distribution grid are reduced by 0.5-1.5% in 2030 and 0.3-3.6% in 2050. Finally, in the transmission grid (which has the lower rate of losses) the improvements are of the order of 0.6-1.2% in 2030 and 1-3% in 2050.

Table 13: Percentage reduction of the rate of grid losses relative to reference plus scenario – PRIMES modelling assumptions

| Reduction of the rate of grid losses (% change from the reference scenario grid losses rate) | *electricity transmission grid HV* | | *electricity distribution grid MV* | | *electricity distribution grid LV* | |
|---|---|---|---|---|---|---|
| | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 |
| EE – 25 | 0.6 | 1.0 | 1.4 | 2.2 | 0.5 | 0.3 |
| EE – 28 | 0.9 | 2.0 | 1.8 | 3.5 | 0.9 | 1.6 |
| EE – 30/ EE – 32 | 1.1 | 2.4 | 2.0 | 4.1 | 1.3 | 2.9 |
| EE – 35/ EE – 40 | 1.2 | 3.0 | 2.2 | 5.0 | 1.5 | 3.6 |

Table 14: Ratio of electricity transmission and distribution losses to electricity supply (in %), excluding self-consumption – PRIMES modelling results

| Grid losses (%) | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|
| Reference 2013 | 6.2 | 6.1 | 6.4 | 6.6 | 6.7 |
| Reference plus | 6.2 | 6.1 | 6.3 | 6.5 | 6.7 |
| Reference plus LFR2.2 | 6.2 | 6.1 | 6.4 | 6.6 | 6.7 |
| EE - 25 | 6.2 | 6.1 | 6.5 | 6.4 | 6.6 |
| EE - 28 | 6.2 | 6.1 | 6.4 | 6.3 | 6.6 |
| EE - 30 | 6.2 | 6.1 | 6.1 | 5.8 | 5.8 |
| EE - 32 | 6.2 | 6.1 | 6.1 | 5.9 | 5.8 |
| EE - 35 | 6.2 | 6.1 | 5.6 | 5.3 | 4.9 |
| EE - 40 | 6.2 | 6.1 | 5.5 | 5.2 | 4.9 |

### 3.4.7. Additional measures for the transport sector

Following the specifications for the transport sector provided by the Commission, the transport sector in the energy efficiency scenarios has been modelled to include the following:

- $CO_2$ standards for cars and LCVs are assumed to vary across scenarios as shown in Table 15:

Table 15: Assumptions on $CO_2$ standards for cars and LCVs across scenarios

| Vehicle category (new vehicles) g $CO_2$/km | | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|
| Passenger cars (overall efficiency of all new passenger cars including electric vehicles assumed as 0 g$CO_2$/km) | EE - 25 | 95 | 85 | 78 | 65 | 38 | 33 | 27 |
| | EE - 28 | 95 | 85 | 75 | 63 | 37 | 32 | 26 |
| | EE - 30 | 95 | 85 | 72 | 60 | 35 | 30 | 25 |
| | EE - 32 | 95 | 85 | 70 | 50 | 25 | 18 | 17 |
| | EE - 35 | 95 | 85 | 70 | 50 | 25 | 18 | 17 |
| | EE - 40 | 95 | 85 | 70 | 50 | 25 | 18 | 17 |
| LCVs (vans) (overall efficiency of all new vans including electric vehicles assumed as 0 g$CO_2$/km) | EE - 25, EE - 28, EE - 30, EE - 32, EE - 35, EE - 40 | 147 | 130 | 110 | 90 | 70 | 65 | 60 |

- All EE scenarios assume improvement in specific fuel consumption of heavy duty vehicles of about 1.1% per year between years 2010 and 2030, as well as for the period 2030 to 2050.
- Charges for external costs in the transport sector are at the same level as in the IA on the White Paper on Transport (the central values from the "Handbook on estimation of external costs in the transport sector"). The revised tables with the coverage by Member state are shown in the following table:

**Table 16: Modelling assumptions related to the internalization of local externalities in the EE scenarios**

| Internalisation of local externalities - modelling assumptions | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HGV (buses and coaches not covered) | | | | CARS | | |
| | Air pollution | Noise | Congestion | Infrastracture charge | Air pollution | Noise | Congestion |
| 2020-2025 | | | | | | | |
| Notes | On the whole inter-urban network. | On the whole inter-urban network. | On the motrways network. | On the whole inter-urban network. | | | On the motrways network. |
| Countries | All 28 EU MS except LV, FI, CY, MT and Estonia | All 28 EU MS except LV, FI, CY, MT and Estonia | BE, NL, LU, DE, PL, FR, IT, UK | All 28 EU MS except LV, FI, CY, MT and Estonia | | | BE, NL, LU, DE, PL, FR, IT, UK |
| 2025-2050 | | | | | | | |
| Notes | On the whole inter-urban network. | On the whole inter-urban network. | On the whole inter-urban network. | On the whole inter-urban network. | On the whole inter-urban network | On the whole inter-urban network | On the whole inter-urban network |
| Countries | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS |

| Internalisation of local externalities - modelling assumptions | | | | | | | |
|---|---|---|---|---|---|---|---|
| | PASSENGER TRAINS | | | FREIGHT TRAINS | | | IWW |
| | Air pollution | Noise | Congestion | Air pollution | Noise | Congestion | Air pollution |
| 2020-2025 | | | | | | | |
| Notes | | | | | | | |
| Countries | | | | | | | |
| 2025-2050 | | | | | | | |
| Notes | On the whole network | On the whole network | On the whole network | The charge to be applied to diesel trains only | On the whole network | On the whole network | On the whole network |
| Countries | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS | All 28 EU MS |

- Regarding vehicle taxation[11], in line with the 2005 Commission proposal, it is assumed that in each Member State that did not introduce a CO2-related element, at least 25% of the total tax revenue from registration and annual circulation taxes respectively should originate in the CO2 based element of each of these taxes starting with 2020. From 2025 at least 50% of the total tax revenue from both the annual circulation tax and the registration tax (pending its abolition) should originate in the CO2 based

[11] Discussions on the COM(2012) 756 final are aimed to give new momentum to the 2005 proposal on car taxation.

element of each of these taxes[12]. The assumptions from the IA on the White Paper have been used. The only difference relates to Greece where the annual circulation tax for cars registered since 1 January 2011 is based on $CO_2$ emissions[13]. Regarding company car taxation, the EE scenarios include the same assumptions as in the IA on the White Paper on Transport.

- The assumptions on the wide deployment of intelligent transport systems are similar to the White Paper on Transport IA for road and waterborne. For aviation SES2+ is already included in the Reference plus scenario.
- No additional modelling assumptions have been made on fuel labelling[14].
- The assumptions on eco-driving are similar to the IA on White Paper on Transport, i.e. virtually 100% of drivers would be trained by 2050 (for road and rail).

These additional measures in the transport sector, in particular stricter $CO_2$ standards for cars and LCVs, are accompanied with developments of recharging infrastructure for electric vehicles. These developments are assumed to occur in a timely manner in all the energy efficiency policies scenarios. Learning in regard to batteries and other alternative technologies are also progressing at a faster pace than in the reference scenarios as part of the overall policy that transforms the sector. Biofuels industry also undergoes significant development especially beyond 2030 which results in an important uptake of biofuels in the transport fuel mix.

Compared to the GHG40 scenario of the IA on the 2030 policy framework, there are some differences in the policies considered for transport. Regarding the $CO_2$ standards, the scenarios follow the approach of the GHG40/EE, therefore standards start decreasing from 2025 onwards instead of 2030 as is the case in the GHG40. Further, compared to GHG40 the scenarios include additional transport measures such as internalisation of externalities, wide deployment of ITS, eco-driving and higher energy efficiency improvements for trucks; these additional measures are also included in the GHG40/EE scenario.

## 3.5. Main scenario results

Table 17 and Table 18 present a summary of the key results per scenario for the EU28. Detailed results by MS are provided in the Annex B. Cost related results are provided for all different cost accounting methodologies, which are described in the following section.

### 3.5.1. Cost reporting and discount rates

Generally, the PRIMES model tries to simulate and approximate the real-life behaviour of economic agents when purchasing and consuming energy products[15]. While actors are assumed by the model to behave rationally, perceived costs and risk factors can adjust the model outcomes to mimic more closely true behaviours and limitations of economic agents. The aim is

[12] http://www.acea.be/images/uploads/files/CO2_tax__overview_2013.pdf
[13] See the SWD(2012) 429 final , available at: http://ec.europa.eu/taxation_customs/resources/documents/taxation/other_taxes/passenger_car/swd_2012_429_en.pdf and ACEA overview of CO2-based motor vehicle taxes in the EU, available at: http://www.acea.be/images/uploads/files/CO2_tax__overview_2013.pdf
[14] According to the "EU Transport GHG: Routes to 2050?" project, financed by DG CLIMA, fuel efficiency labelling is unlikely to have a direct impact on reducing GHG emissions, especially when mandatory CO2 emission targets are enforced.
[15] For further details see the PRIMES manual.

to mimic true decision-making by private actors. To simulate this, the discount rates used reflect opportunity costs of drawing funds for the private sector. For individuals PRIMES relies on surveys about values of the so called subjective discount rates[16], for businesses PRIMES assumes weighted average cost of capital (WACC) values as used in common business practices and as set by regulatory authorities for utilities. When projecting the impact of policies (e.g. certain energy efficiency promoting policies) these subjective discount rates are reduced to simulate for instance the reductions in perceived risks influencing investment (through the operation of ESCOs – for instance) or by easing access to capital borrowing (through certification or additional public funding/incentives).

When calculating total costs by year, investment expenditures are annualised to show equivalent annual costs from an end-user perspective (from an opportunity cost perspective). Annual capital costs are estimated as annual fixed payments for principal and interests e.g. with the principal for power plants (but the same applies to all equipment) equal to overnight capital investment cost of the plant (for new plants) and not yet amortized capital cost for old plants (commissioned before 2011). For annuity calculations the standard discount rates of PRIMES are used with no modifications based on policy assumption. Cash payment for investment is also reported by sector and by type of investment, separately including investment in infrastructure.

There are therefore two moments in which discount rates are used within the modelling: at the level of decision making (first paragraph) and at the level of cost accounting for reporting purposes (second paragraph). The methodologies described in the following all refer to the cost accounting for reporting purposes.

**Cost methodology A:** the cost methodology is the default cost calculation in PRIMES and therefore uses the standard discount rates of PRIMES in all sectors; this methodology allows to maintain comparability across scenarios.

**Cost methodology B:** This cost methodology modifies the discount rates in the demand side for the accounting of costs. In the case of the scenarios and reporting described within this final report a 4% discount rate was applied to all demand side sectors.

**Cost methodology C:** This cost methodology additionally to the change in reporting discount rates of the demand side of methodology B, also modifies the discount rates of the supply side.

**Cost methodology D:** this cost accounting methodology uses the same discount rates in the reporting as used in the decision making process.

[16] Examples of different literature on discount rates: Kesicki Fabian, (2011) "Marginal abatement cost curves for policy making – expert-based vs. model-derived curves", 33rd IAEE International Conference, 6-9 June 2010, Rio de Janeiro, Brazil.
Dale, Larry and K. Sydny Fujita (2008) "An Analysis of the Price Elasticity of Demand for Household Appliances", Energy Analysis Department, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, University of California ,Berkeley, CA 94720, February 2008

Table 17: Projections on key elements by scenario for the EU28

| | Total final energy consumption (Mtoe) | | | Energy consumption in heavy industry (Mtoe) | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 1136 | 1126 | 1152 | 198 | 195 | 189 |
| Reference plus LFR2.2 | 1136 | 1123 | 1146 | 198 | 194 | 188 |
| EE - 25 | 1130 | 1064 | 964 | 197 | 183 | 159 |
| EE - 28 | 1126 | 1020 | 876 | 197 | 178 | 134 |
| EE - 30 | 1122 | 983 | 818 | 196 | 173 | 132 |
| EE - 32 | 1122 | 962 | 804 | 196 | 168 | 132 |
| EE - 35 | 1121 | 920 | 759 | 196 | 165 | 132 |
| EE - 40 | 1121 | 859 | 712 | 196 | 162 | 132 |
| | **Energy consumption in other industries (in Mtoe)** | | | **Energy consumption in residential sector (Mtoe)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 109 | 112 | 120 | 299 | 297 | 303 |
| Reference plus LFR2.2 | 109 | 111 | 121 | 299 | 297 | 302 |
| EE - 25 | 108 | 105 | 96 | 297 | 281 | 266 |
| EE - 28 | 108 | 100 | 84 | 296 | 262 | 231 |
| EE - 30 | 107 | 99 | 84 | 294 | 244 | 195 |
| EE - 32 | 107 | 97 | 84 | 294 | 237 | 192 |
| EE - 35 | 107 | 94 | 84 | 293 | 215 | 162 |
| EE - 40 | 107 | 94 | 83 | 293 | 180 | 134 |
| | **Energy consumption in tertiary sector (Mtoe)** | | | **Energy consumption in transport sector (Mtoe)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 172 | 167 | 173 | 358 | 355 | 367 |
| Reference plus LFR2.2 | 172 | 167 | 171 | 358 | 354 | 364 |
| EE - 25 | 170 | 157 | 153 | 357 | 338 | 289 |
| EE - 28 | 169 | 142 | 139 | 357 | 338 | 289 |
| EE - 30 | 168 | 130 | 120 | 357 | 336 | 288 |

| | | | | | | |
|---|---|---|---|---|---|---|
| EE - 32 | 168 | 125 | 118 | 357 | 336 | 278 |
| EE - 35 | 168 | 110 | 102 | 357 | 336 | 279 |
| EE - 40 | 168 | 86 | 85 | 357 | 336 | 279 |
| | **Primary energy savings wrt the 2020 value of PRIMES 2007 baseline projection** | | | **GHG emissions reduction (% relative to 1990)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | -17 | -20 | -18 | -25 | -33 | -45 |
| Reference plus LFR2.2 | -17 | -21 | -19 | -25 | -36 | -49 |
| EE - 25 | -17 | -25 | -24 | -25 | -39 | -76 |
| EE - 28 | -18 | -27 | -31 | -25 | -40 | -78 |
| EE - 30 | -18 | -29 | -36 | -25 | -40 | -79 |
| EE - 32 | -18 | -31 | -37 | -25 | -41 | -79 |
| EE - 35 | -18 | -34 | -41 | -25 | -41 | -79 |
| EE - 40 | -18 | -39 | -44 | -25 | -44 | -80 |
| | **Total net imports (Mtoe)** | | | **Natural gas net imports (Mtoe)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 909 | 921 | 962 | 266 | 296 | 345 |
| Reference plus LFR2.2 | 909 | 891 | 937 | 266 | 273 | 326 |
| EE - 25 | 904 | 835 | 610 | 264 | 252 | 254 |
| EE - 28 | 900 | 807 | 549 | 262 | 232 | 215 |
| EE - 30 | 897 | 782 | 516 | 260 | 215 | 192 |
| EE - 32 | 897 | 767 | 510 | 260 | 204 | 195 |
| EE - 35 | 897 | 747 | 486 | 260 | 185 | 179 |
| EE - 40 | 897 | 708 | 465 | 260 | 166 | 162 |
| | **Overall RES share (%)** | | | **Average electricity price (€'10/MWh)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 21 | 24 | 29 | 172 | 172 | 168 |
| Reference plus LFR2.2 | 21 | 27 | 31 | 172 | 175 | 176 |
| EE - 25 | 21 | 28 | 49 | 172 | 177 | 166 |
| EE - 28 | 21 | 28 | 50 | 173 | 174 | 167 |

| | | | | | | |
|---|---|---|---|---|---|---|
| EE - 30 | 21 | 28 | 51 | 173 | 173 | 164 |
| EE - 32 | 21 | 28 | 51 | 173 | 174 | 164 |
| EE - 35 | 21 | 27 | 52 | 172 | 172 | 164 |
| EE - 40 | 21 | 27 | 52 | 172 | 176 | 164 |
| | **Carbon price ETS sectors (€'10/ t of $CO_2$)** | | | **Carbon value non-ETS sectors (€'10/ t of $CO_2$)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 10 | 35 | 100 | 0 | 0 | 0 |
| Reference plus LFR2.2 | 10 | 38 | 210 | 0 | 0 | 0 |
| EE - 25 | 10 | 42 | 250 | 0 | 0 | 0 |
| EE - 28 | 10 | 33 | 220 | 0 | 0 | 0 |
| EE - 30 | 10 | 25 | 180 | 0 | 0 | 0 |
| EE - 32 | 10 | 23 | 175 | 0 | 0 | 0 |
| EE - 35 | 9 | 13 | 160 | 0 | 0 | 0 |
| EE - 40 | 8 | 6 | 165 | 0 | 0 | 0 |
| | **Average energy efficiency value (€'10/ toe)** | | | **Average renewables value (€'10/ MWh)** | | |
| | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 270 | 183 | 96 | 49 | 34 | 16 |
| Reference plus LFR2.2 | 270 | 183 | 96 | 49 | 48 | 16 |
| EE - 25 | 270 | 332 | 417 | 49 | 41 | 16 |
| EE - 28 | 270 | 619 | 847 | 49 | 40 | 15 |
| EE - 30 | 270 | 991 | 1642 | 49 | 42 | 15 |
| EE - 32 | 270 | 1173 | 1728 | 49 | 42 | 15 |
| EE - 35 | 270 | 1768 | 2595 | 49 | 43 | 15 |
| EE - 40 | 270 | 2937 | 3798 | 50 | 43 | 14 |

Table 18: System costs results by scenario for the EU28

| M€'10 | Cost reporting approach a | | | Cost reporting approach c | | | Cost reporting approach d | | |
|---|---|---|---|---|---|---|---|---|---|
| **Total system costs (excl. deductible auction payments)** [17] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 2111392 | 2336967 | 2701071 | 1716094 | 1847079 | 2100221 | 2042014 | 2251849 | 2596468 |
| Reference plus LFR2.2 | 2110779 | 2340931 | 2701704 | 1715730 | 1850041 | 2097684 | 2041508 | 2255824 | 2597289 |
| EE - 25 | 2107585 | 2383812 | 3104261 | 1710670 | 1863365 | 2353096 | 2037569 | 2291145 | 2981982 |
| EE - 28 | 2108429 | 2416299 | 3154854 | 1709671 | 1864042 | 2340102 | 2037638 | 2282946 | 2966761 |
| EE - 30 | 2106641 | 2481485 | 3327814 | 1706904 | 1888541 | 2413098 | 2035355 | 2318230 | 3048367 |
| EE - 32 | 2106644 | 2526015 | 3355417 | 1706992 | 1908175 | 2428303 | 2035422 | 2352033 | 3068597 |
| EE - 35 | 2105705 | 2662194 | 3593353 | 1705837 | 1971441 | 2543636 | 2034307 | 2449373 | 3227246 |
| EE - 40 | 2106529 | 3032745 | 4006278 | 1706460 | 2167004 | 2760924 | 2034988 | 2728456 | 3517587 |
| **Capital costs**[18,19] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 569982 | 803499 | 1056801 | 332102 | 468864 | 621386 | 510025 | 725572 | 956796 |
| Reference plus LFR2.2 | 569570 | 802060 | 1048688 | 331867 | 467952 | 616529 | 509691 | 724324 | 949776 |
| EE - 25 | 574762 | 835070 | 1274365 | 334660 | 485475 | 743577.8 | 514176 | 755323 | 1173797 |
| EE - 28 | 579818 | 851660 | 1260504 | 337387 | 494173 | 735064 | 518416 | 747891 | 1127360 |
| EE - 30 | 583046 | 856176 | 1254176 | 339071 | 496267 | 730325 | 521102 | 745246 | 1104795 |
| EE - 32 | 582725 | 854842 | 1251769 | 338890 | 495362 | 728875.7 | 520841 | 744597 | 1103015 |
| EE - 35 | 584219 | 844087 | 1229542 | 339680 | 488860 | 715328.1 | 522114 | 735798 | 1086028 |
| EE - 40 | 585120 | 825308 | 1198547 | 340194 | 477246 | 696642 | 522850 | 720370 | 1062418 |

[17] Total system costs are equal to the sum of capital costs, energy purchases and direct efficiency investments costs, minus auction payments for energy-related $CO_2$ emissions, plus additional costs for process $CO_2$ emissions and non-$CO_2$ emissions abatement, and disutility costs.

[18] Capital costs, energy purchases and demand-side investment expenditure are the sum of the respective costs for industry, the residential, tertiary and transport sectors.

[19] Direct energy efficiency costs include the costs relating to thermal integrity of buildings, i.e. for building insulation, triple glazing and other devices for energy savings including building management systems. For the industry sector they also include the investments that relate to the horizontal BAT deployment, such as for energy control systems and heat recovery systems. Capital costs include all other investments for appliances, equipment, vehicles, etc. that are caused by increased energy efficiency requirements.

| **Energy purchases**[18] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
|---|---|---|---|---|---|---|---|---|---|
| Reference plus | 1495254 | 1519374 | 1647398 | 1361472 | 1382411 | 1495393 | 1494870 | 1518994 | 1647048 |
| Reference plus LFR2.2 | 1495235 | 1522495 | 1668033 | 1361447 | 1384525 | 1512709 | 1494851 | 1522115 | 1667682 |
| EE - 25 | 1487962 | 1459806 | 1496958 | 1354768 | 1326572 | 1348683 | 1487576 | 1459443 | 1496524 |
| EE - 28 | 1483893 | 1399719 | 1360183 | 1351093 | 1271771 | 1225045 | 1483510 | 1399299 | 1359722 |
| EE - 30 | 1479061 | 1348245 | 1265222 | 1346714 | 1225207 | 1140195 | 1478677 | 1347843 | 1264793 |
| EE - 32 | 1479403 | 1322085 | 1250858 | 1346996 | 1201468 | 1124801 | 1479019 | 1321697 | 1250438 |
| EE - 35 | 1476440 | 1259525 | 1178151 | 1344379 | 1145653 | 1060013 | 1476057 | 1259194 | 1177815 |
| EE - 40 | 1475684 | 1186524 | 1107275 | 1343738 | 1079860 | 996860 | 1475301 | 1186260 | 1107025 |
| **Demand-side investment expenditure (energy related)**[18] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 3668340 | 3951608 | 4502269 | 3668340 | 3951608 | 4502269 | 3668340 | 3951608 | 4502269 |
| Reference plus LFR2.2 | 3668671 | 3955984 | 4497414 | 3668671 | 3955984 | 4497414 | 3668671 | 3955984 | 4497414 |
| EE - 25 | 3684532 | 4135222 | 5034516 | 3684532 | 4135222 | 5034516 | 3684532 | 4135222 | 5034516 |
| EE - 28 | 3693666 | 4568886 | 5354975 | 3693666 | 4568886 | 5354975 | 3693666 | 4568886 | 5354975 |
| EE - 30 | 3699635 | 5032700 | 5623277 | 3699635 | 5032700 | 5623277 | 3699635 | 5032700 | 5623277 |
| EE - 32 | 3699050 | 5452397 | 5671693 | 3699050 | 5452397 | 5671693 | 3699050 | 5452397 | 5671693 |
| EE - 35 | 3700868 | 6487715 | 6021296 | 3700868 | 6487715 | 6021296 | 3700868 | 6487715 | 6021296 |
| EE - 40 | 3701080 | 9677276 | 6272405 | 3701080 | 9677276 | 6272405 | 3701080 | 9677276 | 6272405 |
| **of which direct efficiency investment cost**[19] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
| Reference plus | 56209 | 43478 | 32280 | 32573 | 25188 | 18849 | 47171 | 36667 | 28032 |
| Reference plus LFR2.2 | 56172 | 43432 | 33882 | 32550 | 25159 | 19831 | 47134 | 36617 | 29636 |
| EE - 25 | 55697 | 87545 | 159554 | 32268 | 51185 | 93749 | 46718 | 75438 | 140852 |
| EE - 28 | 55393 | 160119 | 364299 | 32091 | 93617 | 214902 | 46464 | 131093 | 312433 |
| EE - 30 | 54964 | 264571 | 631779 | 31845 | 154784 | 369570 | 46108 | 212740 | 504463 |
| EE - 32 | 54987 | 332206 | 661303 | 31859 | 194688 | 386560 | 46130 | 268956 | 525857 |
| EE - 35 | 54762 | 535442 | 991972 | 31728 | 313789 | 577850 | 45935 | 431225 | 771773 |
| EE - 40 | 54725 | 989285 | 1504469 | 31705 | 579751 | 874789 | 45898 | 790975 | 1154265 |

| **Supply side investment expenditure (energy related)**[20] | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 | 2020 | 2030 | 2050 |
|---|---|---|---|---|---|---|---|---|---|
| Reference plus | 481897 | 418513 | 557059 | 481897 | 418513 | 557059 | 481897 | 418513 | 557059 |
| Reference plus LFR2.2 | 481775 | 488651 | 549997 | 481775 | 488651 | 549997 | 481775 | 488651 | 549997 |
| EE - 25 | 473867 | 550603 | 813727 | 473867 | 550603 | 813727 | 473867 | 550603 | 813727 |
| EE - 28 | 470631 | 495702 | 749377 | 470631 | 495702 | 749377 | 470631 | 495702 | 749377 |
| EE - 30 | 467329 | 440045 | 679570 | 467329 | 440045 | 679570 | 467329 | 440045 | 679570 |
| EE - 32 | 467739 | 409298 | 677388 | 467739 | 409298 | 677388 | 467739 | 409298 | 677388 |
| EE - 35 | 465887 | 327134 | 608923 | 465887 | 327134 | 608923 | 465887 | 327134 | 608923 |
| EE - 40 | 465126 | 206808 | 585250 | 465126 | 206808 | 585250 | 465126 | 206808 | 585250 |

[20] Supply-side investment expenditure is the sum of power grid investment, investment in power plants (including electricity and CHP) and in steam boilers.

# 4. Comparison to National projections

All scenarios are built taking into account available national estimations, as reported in the national energy efficiency progress reports[21], as well as the national notifications in accordance with Article 7 of the Energy Efficiency Directive[22]. Moreover, as the aim is to explore scenarios where energy efficiency measures are more intense than currently implemented and where energy savings are reaching their limits, special care has been taken to consider the maximum potential on energy savings for every country, to the extent that availability of data renders this possible. As a result, the scenarios with very intense energy efficiency measures entail ambitious energy savings, which however do not fall out of a reasonable sphere for every country, provided of course that the set of assumptions that enable these savings is satisfied.

In the following we briefly discuss the key trends in energy savings of Member-States (except for Croatia, as no NEEAP is available). These serve mainly to assess PRIMES projections in the context of the Reference 2013 scenario and the projections up to 2020. In some Member-States, it appears that current trends are expected to lead to the level of energy savings projected under the more ambitious energy efficiency scenarios of this analysis.

- **Austria:** Austria has already initiated a plan of renovating dwellings built in the period 1945-1980, with a horizon to 2020. This entails ambitious energy savings which are however feasible. The energy savings achieved in 2009 in both the residential sector and tertiary sectors were significant, and the respective target for 2016 is almost three times up. Overall, the potential for energy savings from current planning and the trends so far are consistent with PRIMES projections until 2020. Moreover, potential for further energy savings especially in the public sector is considerable enough to cover for the post 2020 PRIMES projections of the Reference scenario.
- **Belgium:** Belgium has achieved ESD targets for 2010 and is expected to surpass 2016 targets compared to 2001-2005. Belgium is committed to decrease energy consumption significantly by 2020, especially in the residential sector. PRIMES Reference scenario presents similar estimations. Comparing with the projections of PRIMES different efficiency policies scenarios for the residential sector it appears that Belgium has the potential to achieve the energy savings of the moderate (EE-28, EE-30) efficiency policies scenarios.
- **Bulgaria:** Building stock in Bulgaria currently has a very low efficiency rate, due to heating with electric stoves, the use of charcoal and wood, the low promotion of natural gas for heating in the residential sector and finally due to the use of construction products such as prefabricated concrete. The estimated potential for energy savings in the residential sector is very considerable (of the order of 25-35kWh/$m^2$), and is consistent with PRIMES projections until 2020 and also until 2030 for the Reference scenario.
- **Cyprus:** NEEAP of Cyprus indicates that ESD targets for 2010 have been achieved and it is also expected to achieve its targets for 2016. Although the data provided are not consistent (an amendment of 1st NEEAP is mentioned) with respect to targeted,

[21] http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm
[22] http://ec.europa.eu/energy/efficiency/eed/article7_en.htm

achieved and projected goals, it is expected that developments in Cyprus will be consistent to PRIMES Reference scenario until 2020. It is expected that Cyprus has the potential to achieve the savings of the PRIMES ambitious scenario (EE-32) by 2030 in the domestic sector.

- **Czech Republic:** For Czech Republic, no concrete estimations beyond 2020 exist for either the residential or the tertiary sector. Planning for the period up to 2020 however (0.5% reductions in the residential sector and 0.25% for the tertiary sector for the period 2011-2016) are close to PRIMES Reference projections.
- **Denmark:** Expectations of energy savings until 2020 (app. 10% to 2006) are consistent with PRIMES Reference projections (11% relative to 2005). The achieved energy savings so far and planning until 2050 towards the complete independence from fossil fuels renders the reductions of final energy demand that are projected with PRIMES throughout the projection period reasonable.
- **Estonia:** Estonia has set a 2020 target of maintaining final energy demand at the same level as in 2010. Currently, the minimum efficiency requirements for households are 150-300 kWh/m$^2$/year and there exists a target of reducing to 120-200 kWh/m$^2$/year. PRIMES respective energy savings projections fall within this range even for the more ambitious energy efficiency scenarios (EE-30, EE-32).
- **Finland:** The increase in the rate of efficiency that is observed in Finland since 2010 (12.1TWh saved in 2010, expected 24.7 TWh in 2016 and 33.7 TWh in 2020) justify the increased rates that are projected in PRIMES. There already exist a set of measures which set increasingly strict standards for new buildings, equipment as well as energy management for the public sector. Thus it is realistic to expect that the savings objectives will be met with existing measures.
- **France:** France appears to be ahead of its short term targets; the 2010 target of 5Mtoe savings was already achieved in the period 2007-2009, while it is estimated to overcome its energy savings target for 2016 (18Mtoe instead of 12Mtoe). 88% of this target will be achieved from the residential and the tertiary sector. Their goal on specific consumption reductions in buildings is to reach 150KwH/m$^2$ in 2020, through renovating fully 400000 buildings and partially 9 million buildings. The facilitation schemes for such improvements exist, however due to the economic crisis it can be expected that the situation will be hindered. PRIMES Reference scenario results are consistent with these estimations.
- **Germany:** Germany has set a target of 20% reduction in primary energy consumption in 2020 (relative to 2008) and 50% until 2050. Moreover, it has set ambitious final energy demand reductions towards achieving "climate neutral" (zero carbon emitting) building stock until 2050. These reductions imply a renovation rate of the building stock of 2% per year. These objectives justify PRIMES Reference projections in the period up to 2050.
- **Greece:** Greece's energy savings target has been achieved mainly due to the economic recession. In 2010, Greece had almost doubled the achieved savings compared to 2010 target, but according to the NEEAP it is expected to match 2016 ESD targets. Moreover, according to the NEEAP developments until 2020 are expected to follow the PRIMES reference scenario trends. All PRIMES efficiency scenarios are similar to the reference scenario until 2020 for the domestic sector. It appears that Greece has the potential to achieve the EE-25 scenario developments by 2030 in the residential sector, while in the tertiary sector the potential appears to match the moderate scenarios (EE-28, EE-30).

- **Hungary:** No reliable sources on energy efficiency trends exist for Hungary. It is estimated that app. 70% of its building stock is in very poor condition, efficiency wise. The country's goal in 2011 was to decrease energy consumption by 30% until 2030. From a technical perspective the potential for such ambitious energy savings exists, however the lack of infrastructure, technical expertise and of financial sources pose considerable difficulties. PRIMES Reference projections are less optimistic, reflecting these difficulties.
- **Ireland:** According to the revised 2011 NEEAP, Ireland achieved the 2010 targets for energy saving in residential and services sectors and they are estimating that they will meet the targets set for 2016. They are implementing a series of measures and incentives, which will be in force also after 2016 in order to keep the satisfactory pace of increasing energy savings. Most of the measures have institutional character and are targeting to financing energy saving projects through EPC schemes. Comparing the up-to-date achieved energy savings with the values projected with PRIMES it is concluded that the Reference reduction trend is compatible. Moreover, taking into account the economic crisis and the achieved energy savings so far, it is rational to expect that future developments will follow the trends of the scenarios EE-25 through EE-30.
- **Italy:** Italy achieved its energy saving targets in the residential sector for 2010 but did not manage to do the same in the tertiary sector. That was mainly due to the evolving economic crisis. Italy is planning to continue the implementation of energy saving measures and correct the measures that proved to have small impact. The overall energy saving target for 2016 is expected to be achieved. Taking into consideration the above facts and the continuation of the economic instability, it is concluded that the developments in Italy post 2020 can be similar to the modest scenario of PRIMES (EE-25).
- **Latvia:** According to Latvian NEEAP, the whole energy infrastructure of the country undergoes significant renovations in order to improve its overall efficiency. In particular, there is great potential for improvement in the residential sector. Latvian administration has implemented a series of measures that promote energy efficiency in the residential sector. It has also implemented similar measures to the tertiary sector. The results in the tertiary sector have been positive and the energy efficiency target for 2010 has been overcome. Based on these facts, it is estimated that even the projections from the ambitious scenario (EE-32) of PRIMES may be achieved, if energy efficiency measures continue to be implemented.
- **Lithuania:** Lithuania presents a significant increase in energy consumption in the services sector from 1996 to 2010. The average increase was 5.2% per year from 2000 to 2007. After 2007 the consumption presents a decrease of 4.7%. According to their national plans, they are expecting energy savings of 387 GWh in the services sector. In 2010 they achieved 110 GWh total final energy savings. This implies they are planning to triple the achieved target. This is possible since they are having in force a series of programs that offer initiatives and support to projects related to energy savings in the services sector, mainly in public services. The trends of the moderate energy efficiency scenarios (EE-28, EE-30) appear to be consistent with the Lithuanian NEEAP.
- **Luxembourg:** Luxembourg has managed to overcome the energy saving target for 2010 and has therefore adopted a more ambitious target for 2016 in the revised NEEAP. The achievement of 2010 target was based on a series of measures that were already

implemented since 1995, are still in force, and their results continue to be realized currently. There is also an additional series of measures that were implemented in 2005 and their results will be felt in the coming years. Finally, Luxembourg is planning new national measures that will keep enchasing energy savings in all sectors. Based on the above facts and taking into account the dramatic improvement already achieved up to 2010, it is estimated that the ambitious scenario of PRIMES (EE-32) can be validated.

- **Malta:** Malta has achieved its 2010 ESD target and according to the NEEAP it will achieve the 2016 target as well. The target for energy savings in 2020 will reach 22% with intermediate target in 2014 of 15% (percentage reductions relative to 2008 consumption). Relevant policies and measures are primarily focusing on the residential sector. For the tertiary sector, special emphasis is given on tourism and for the industry the emphasis is on energy efficiency improvements in water distribution networks. Taking the above into consideration, the potential for energy savings in Malta is quite significant, potentially comparable to the ambitious energy efficiency policies scenario developed with PRIMES (EE-32).
- **Netherlands:** The Netherlands is expected to achieve 13% energy savings in 2016 (relative to 2008), while it is estimated (IAGO) that post 2020 considerable energy savings will be achieved from interventions in the building stock. PRIMES projections for 2020 are consistent to national estimations, while national scenarios post 2020 are ambitious enough to cover the energy savings of the EE-25 through EE-35 scenarios.
- **Poland:** Poland has set ambitious targets until 2030 for improving energy efficiency in final energy demand sectors, as well as in production and distribution of energy. The main goal in Poland is that the economy develops without increasing primary energy demand and to reach the same levels of energy intensity as EU-15 countries. These ambitious targets correspond to the projections of even the very ambitious energy efficiency scenario of PRIMES (EE-35).
- **Portugal:** Portugal estimates considerable energy savings already in 2015 while it has updated its 2020 targets upwards, with considerable energy efficiency improvements expected especially in the public sector (the 25% target has been updated to 30% savings in 2016 relative to 2008). These trends are consistent with PRIMES results until 2020, while they cover for the projections in the EE - 25 and EE - 28 scenarios until 2030.
- **Romania:** According to the energy efficiency reporting of Romania, energy savings until 2010 have already covered a considerable part of its 2016 target and it is expected that the 2020 target will be achieved. Their estimation is that primary energy consumption will be reduced by 40% in the period 2004-2015. PRIMES projections for 2020 are consistent with these targets while there is potential for further reductions as projected in the energy efficiency scenarios.
- **Slovakia:** According to the National Energy Efficiency Plan, the actual reduction of energy consumption in recent years cannot be measured with accuracy due to internal difficulties, therefore the quantification and assessment of the efficiency targets is not feasible. However, PRIMES short term projections are consistent to trends observed from national statistical data on energy consumption (2005 and 2010), in particular for the residential sector.
- **Slovenia:** Slovenia has met its targets for 2010, and it is estimated that 2016 target of 9% savings in end-use energy compared to 2008 will also be met. However, current policy setting is not sufficient to overcome these targets, while there are no specific

targets set for 2020 and beyond. The short-term projections of PRIMES are consistent with this context.

- **Spain:** According to country estimations in 2020 final energy demand will be app. 1360 ktoe less than in 2010. These energy savings are mainly expected to come from improvements in heating equipment and electric appliances, rather than interventions which improve thermal integrity of dwellings. Technically, the potential for such energy savings is feasible even for the most ambitious targets; this technical potential however is currently not economically and institutionally supported. Overall, we estimate that with current planning energy savings may reach as far as the EE - 25 and EE - 28 scenarios.
- **Sweden:** Sweden has already covered successfully its 2016 targets (ESD) since 2010, and achievement of the 2020 efficiency target appears to be feasible (including -20% of kWh/$m^2$ heated in buildings relative to 1995 level and -20% of energy intensity (kWh/SEK) from 2008). PRIMES projections for 2020 are consistent to this trend, which is sufficient to cover also the energy savings projected for the EE – 25 scenario.
- **United Kingdom:** The Reference projection is in accordance with the likely reduction of energy consumption before 2020 as projected in the national reporting. Recently updated national scenarios show increase of energy consumption after 2020, which contrasts PRIMES projections under the assumption of continuation of energy efficiency policies after 2020.

# Annex A: F-gas emissions reduction in the reference plus scenario

| Proposed (exogenous) reduction of F-gases (in $ktCO_2$) in Reference plus compared to Reference 2013 scenario, resulting from the implementation of the F-gas regulation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
| AU | 0 | 0 | 427.8689 | 855.7378 | 855.7378 | 855.7378 | 855.7378 | 855.7378 |
| BE | 0 | 0 | 532.3701 | 1064.74 | 1064.74 | 1064.74 | 1064.74 | 1064.74 |
| BG | 0 | 0 | 111.0668 | 222.1336 | 222.1336 | 222.1336 | 222.1336 | 222.1336 |
| HR | 0 | 0 | 86.74938 | 173.4988 | 173.4988 | 173.4988 | 173.4988 | 173.4988 |
| CP | 0 | 0 | 48.00565 | 96.01131 | 96.01131 | 96.01131 | 96.01131 | 96.01131 |
| CZ | 0 | 0 | 239.4545 | 478.909 | 478.909 | 478.909 | 478.909 | 478.909 |
| DK | 0 | 0 | 472.9555 | 945.911 | 945.911 | 945.911 | 945.911 | 945.911 |
| ES | 0 | 0 | 48.63563 | 97.27125 | 97.27125 | 97.27125 | 97.27125 | 97.27125 |
| FI | 0 | 0 | 279.5443 | 559.0886 | 559.0886 | 559.0886 | 559.0886 | 559.0886 |
| FR | 0 | 0 | 4762.649 | 9525.298 | 9525.298 | 9525.298 | 9525.298 | 9525.298 |
| GE | 0 | 0 | 3479.385 | 6958.771 | 6958.771 | 6958.771 | 6958.771 | 6958.771 |
| GR | 0 | 0 | 511.3243 | 1022.649 | 1022.649 | 1022.649 | 1022.649 | 1022.649 |
| HU | 0 | 0 | 175.8153 | 351.6307 | 351.6307 | 351.6307 | 351.6307 | 351.6307 |
| IR | 0 | 0 | 367.2122 | 734.4244 | 734.4244 | 734.4244 | 734.4244 | 734.4244 |
| IT | 0 | 0 | 3002.942 | 6005.883 | 6005.883 | 6005.883 | 6005.883 | 6005.883 |
| LA | 0 | 0 | 28.43387 | 56.86774 | 56.86774 | 56.86774 | 56.86774 | 56.86774 |
| LI | 0 | 0 | 87.83509 | 175.6702 | 175.6702 | 175.6702 | 175.6702 | 175.6702 |
| LX | 0 | 0 | 56.79619 | 113.5924 | 113.5924 | 113.5924 | 113.5924 | 113.5924 |
| MA | 0 | 0 | 18.79494 | 37.58989 | 37.58989 | 37.58989 | 37.58989 | 37.58989 |
| NL | 0 | 0 | 517.7958 | 1035.592 | 1035.592 | 1035.592 | 1035.592 | 1035.592 |
| PD | 0 | 0 | 2375.362 | 4750.723 | 4750.723 | 4750.723 | 4750.723 | 4750.723 |
| PL | 0 | 0 | 270.6896 | 541.3793 | 541.3793 | 541.3793 | 541.3793 | 541.3793 |
| RO | 0 | 0 | 130.9629 | 261.9258 | 261.9258 | 261.9258 | 261.9258 | 261.9258 |
| SK | 0 | 0 | 106.2013 | 212.4027 | 212.4027 | 212.4027 | 212.4027 | 212.4027 |
| SN | 0 | 0 | 30.95708 | 61.91415 | 61.91415 | 61.91415 | 61.91415 | 61.91415 |
| SP | 0 | 0 | 3339.289 | 6678.579 | 6678.579 | 6678.579 | 6678.579 | 6678.579 |
| SV | 0 | 0 | 966.6305 | 1933.261 | 1933.261 | 1933.261 | 1933.261 | 1933.261 |
| UK | 0 | 0 | 4455.16 | 8910.32 | 8910.32 | 8910.32 | 8910.32 | 8910.32 |

# Annex B: EU28 Summary results of the scenarios presented in section 3

# Cost reporting method: a

| EU28: REF2012tplusF | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831587** | **806999** | **774028** | **750386** | **756269** | **758942** | **756325** | **741591** | **-1.2** | **-0.4** | **-0.7** | **-0.1** |
| Solids | 214627 | 196059 | 163855 | 149946 | 139419 | 127372 | 88814 | 78810 | 74257 | 72656 | 68963 | -2.7 | -1.6 | -4.4 | -1.3 |
| Oil | 176084 | 136469 | 103565 | 90795 | 77412 | 65152 | 55157 | 43065 | 33789 | 22982 | 16197 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149165 | 140761 | 124871 | 110507 | 103426 | 97087 | 84365 | 71349 | -2.7 | -1.2 | -2.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212589 | 257212 | 277033 | 294950 | 315867 | 335310 | 355412 | 368835 | 5.6 | 3.7 | 1.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 32955 | 34082 | 35124 | 35706 | 36025 | 36580 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136218 | 150600 | 151413 | 152531 | 154423 | 160741 | 163611 | 162741 | 6.5 | 1.9 | 0.1 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42406 | 54639 | 66346 | 73718 | 78176 | 85525 | 93351 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22777 | 28573 | 32011 | 37261 | 41669 | 45099 | 45953 | 24.0 | 20.0 | 3.5 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9248 | 9453 | 9979 | 15341 | 19017 | 25152 | 30210 | 2.3 | 4.6 | 0.8 | 5.7 |
| **Net Imports** | **829314** | **988719** | **956735** | **967965** | **909430** | **914865** | **920857** | **911994** | **917314** | **940317** | **961688** | **1.4** | **-0.5** | **0.1** | **0.2** |
| Solids | 98273 | 125211 | 110927 | 116119 | 95051 | 87995 | 85092 | 61658 | 54216 | 54638 | 54894 | 1.2 | -1.5 | -1.1 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551754 | 527894 | 519346 | 516402 | 517466 | 518318 | 527807 | 532886 | 0.5 | -0.7 | -0.2 | 0.2 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527813 | 506534 | 496537 | 490142 | 488282 | 485469 | 489278 | 488275 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23941 | 21361 | 22809 | 26260 | 29184 | 32849 | 38529 | 44612 | 2.8 | -0.6 | 2.1 | 2.7 |
| Natural gas | 193432 | 257849 | 276001 | 286188 | 266292 | 285786 | 295737 | 308333 | 317942 | 330144 | 345370 | 3.6 | -0.4 | 1.1 | 0.8 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746078** | **1660906** | **1631144** | **1611172** | **1605665** | **1611671** | **1628926** | **1632192** | **0.2** | **-0.6** | **-0.3** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266064 | 234470 | 215366 | 173905 | 140468 | 128472 | 127295 | 123857 | -1.3 | -1.8 | -2.9 | -1.7 |
| Oil | 665142 | 683909 | 620735 | 589293 | 550703 | 528750 | 514194 | 502296 | 493414 | 490670 | 487100 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435135 | 406133 | 408655 | 403538 | 407397 | 409137 | 406913 | 407615 | 1.2 | -0.9 | -0.1 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226624 | 279007 | 300279 | 320066 | 342143 | 363967 | 385020 | 399468 | 5.9 | 4.2 | 1.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 10.8 | 8.7 | 8.0 | 7.8 | 7.6 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.4 | 31.9 | 31.3 | 30.6 | 30.1 | 29.8 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 25.0 | 25.4 | 25.4 | 25.0 | 25.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.0 | 12.5 | 13.4 | 13.6 | 13.6 | 13.2 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.4 | 19.9 | 21.3 | 22.6 | 23.6 | 24.5 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369020 | 352626 | 359642 | 367834 | 384934 | 414973 | 448155 | 474233 | -0.5 | -0.7 | 0.4 | 1.3 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383279** | **350653** | **338227** | **299628** | **283107** | **287705** | **299279** | **300677** | **0.8** | **-1.7** | **-1.6** | **0.0** |
| Solids | 223038 | 228941 | 197605 | 186789 | 158213 | 143833 | 105916 | 76434 | 68124 | 69913 | 68236 | -1.2 | -2.2 | -3.9 | -2.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5907 | 5284 | 4524 | 4024 | 4157 | 4106 | 3999 | -6.5 | -11.7 | -2.6 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131860 | 124637 | 126186 | 124553 | 127862 | 129233 | 128779 | 124793 | 3.8 | -1.8 | 0.0 | 0.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47765 | 55099 | 56071 | 57403 | 62394 | 70305 | 74626 | 76713 | 11.7 | 2.0 | 0.4 | 1.5 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7232 | 12393 | 15886 | 21855 | 26937 | 1.6 | 3.5 | 0.6 | 6.8 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971213** | **907635** | **869885** | **873784** | **869927** | **857971** | **852563** | **841625** | **-0.7** | **-1.0** | **-0.4** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646759 | 614530 | 592841 | 577534 | 564620 | 552898 | 546497 | 538635 | -1.0 | -0.9 | -0.6 | -0.3 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26359 | 26690 | 26750 | 26670 | 27551 | 28879 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22289 | 20164 | 19238 | 19339 | 18308 | 17120 | 16930 | 17867 | 1.1 | -0.3 | -0.4 | -0.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283934 | 246737 | 231448 | 250222 | 260249 | 261282 | 261585 | 256244 | -0.6 | -1.8 | 0.1 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82447** | **77111** | **73795** | **70810** | **68774** | **68154** | **68439** | **68633** | **0.2** | **-1.3** | **-0.8** | **-0.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119317** | **122300** | **121539** | **121545** | **121156** | **119756** | **119349** | **119926** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170679** | **1135707** | **1129540** | **1125739** | **1126378** | **1134045** | **1145322** | **1151911** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304790 | 306458 | 305818 | 306946 | 304679 | 304286 | 307156 | 309068 | -1.3 | 0.5 | 0.0 | 0.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197097 | 197798 | 195317 | 194779 | 192244 | 190028 | 190299 | 188589 | -1.5 | 0.5 | -0.2 | -0.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107693 | 108660 | 110501 | 112167 | 112436 | 114258 | 116857 | 120479 | -1.0 | 0.5 | 0.3 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311971 | 298542 | 299594 | 296933 | 298540 | 301009 | 303725 | 303245 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181930 | 172265 | 171368 | 167259 | 168215 | 169544 | 172346 | 172611 | 1.2 | -0.9 | -0.3 | 0.2 |
| Transport | 342901 | 368665 | 367191 | 371987 | 358443 | 352759 | 354602 | 354943 | 359206 | 362096 | 366986 | 0.7 | -0.2 | -0.1 | 0.2 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48396 | 46049 | 43058 | 41182 | 39790 | 37899 | 36225 | 34454 | -2.2 | -0.8 | -1.1 | -0.9 |
| Oil | 485890 | 502788 | 457366 | 440656 | 407882 | 391518 | 379332 | 370260 | 365014 | 363481 | 361555 | -0.6 | -1.1 | -0.7 | -0.2 |
| Gas | 266925 | 285438 | 269920 | 271580 | 251689 | 251363 | 248334 | 247896 | 247261 | 245785 | 249377 | 0.1 | -0.7 | -0.1 | 0.0 |
| Electricity | 217599 | 239418 | 245271 | 254509 | 254919 | 264128 | 275763 | 286183 | 299289 | 314052 | 323069 | 1.2 | 0.4 | 0.8 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 55781 | 56041 | 55856 | 56417 | 57242 | 58019 | 58386 | 1.5 | 0.4 | 0.0 | 0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100154 | 119123 | 123004 | 124620 | 124896 | 125946 | 125902 | 122809 | 5.2 | 3.8 | 0.5 | -0.1 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1858 | 2261 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194876** | **245063** | **264319** | **282449** | **299844** | **316529** | **330560** | **342242** | **5.4** | **5.1** | **1.4** | **1.0** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.2** | **4285.8** | **4111.8** | **3785.7** | **3540.4** | **3385.4** | **3208.5** | **3125.4** | **-0.7** | **-1.2** | **-1.2** | **-1.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.3 | 1903.9 | 1829.4 | 1603.2 | 1395.2 | 1265.6 | 1097.0 | 1017.9 | | -1.3 | -1.7 | -2.2 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2382.0 | 2282.4 | 2182.5 | 2145.2 | 2119.8 | 2111.5 | 2107.5 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.2** | **3254.6** | **3114.0** | **2872.9** | **2644.0** | **2503.9** | **2425.0** | **2357.1** | **-0.5** | **-1.5** | **-1.2** | **-1.0** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.0 | 1037.0 | 969.8 | 790.8 | 618.5 | 518.0 | 459.9 | 400.7 | -0.5 | -2.5 | -2.7 | -3.3 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.4 | 130.8 | 124.3 | 116.3 | 110.5 | 106.1 | 103.4 | -0.6 | -1.4 | -1.1 | -0.9 |
| Industry | 693.6 | 640.7 | 520.3 | 538.9 | 508.4 | 492.9 | 483.8 | 457.0 | 433.4 | 425.6 | 424.0 | -2.8 | -0.2 | -0.5 | -0.7 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.2 | 350.0 | 339.2 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.4 | 181.5 | 159.5 | 151.7 | 144.9 | 140.5 | 137.5 | -0.3 | -2.4 | -2.0 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.3 | 955.3 | 950.4 | 958.0 | 960.7 | 968.4 | 0.5 | -0.7 | -0.3 | 0.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.8** | **238.5** | **225.6** | **210.1** | **105.5** | **84.2** | **-1.0** | **1.5** | **-1.4** | **-5.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **72.3** | **66.6** | **62.3** | **59.6** | **56.4** | **55.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: REF2012tplusF | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.6 | 96.7 | 89.9 | 84.2 | 79.4 | 74.4 | -1.2 | -2.1 | -1.9 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.78 | 1.65 | 1.55 | 1.49 | 1.44 | -0.7 | -0.9 | -0.9 | -1.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.2 | 55.1 | 54.7 | 54.7 | 55.4 | 56.5 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2111.4 | 2230.0 | 2337.0 | 2407.6 | 2502.4 | 2609.3 | 2701.1 | 3.7 | 3.0 | 1.0 | 0.7 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.4 | 14.0 | 13.5 | 13.1 | 12.7 | 12.3 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 81.1 | 76.9 | 73.3 | 70.8 | 68.3 | | -0.9 | -1.2 | -0.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.8 | 62.5 | 58.5 | 54.1 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.8 | 64.6 | 60.2 | 56.2 | 53.0 | 49.3 | 0.0 | -2.4 | -2.0 | -1.3 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.8 | 24.3 | 24.0 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.18 | 0.13 | 0.11 | 0.09 | 0.08 | -1.6 | -2.8 | -3.2 | -4.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.74 | 1.69 | 1.65 | 1.62 | 1.61 | -0.8 | -0.7 | -0.5 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.58 | 1.50 | 1.42 | 1.39 | 1.37 | -1.5 | -0.7 | -0.5 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.09 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.95 | 0.90 | 0.85 | 0.81 | 0.80 | -1.5 | -1.6 | -1.7 | -0.9 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 22.7 | 24.4 | 25.8 | 27.0 | 27.9 | 28.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.0 | 12.5 | 12.9 | 13.4 | 14.1 | | | | |
| **Gross Electricity generation by source (in GWh$_e$** | **3007267** | **3287285** | **3328110** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887133 | 744275 | 700745 | 798536 | 868963 | 899072 | 923584 | 925368 | -0.3 | -2.1 | 0.7 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 802985 | 695187 | 634705 | 475408 | 338823 | 316001 | 348162 | 364411 | -1.2 | -1.8 | -3.7 | -1.3 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46047 | 26351 | 24719 | 20367 | 20887 | 21379 | 22072 | 21396 | -7.1 | -11.2 | -2.5 | 0.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752612 | 707159 | 724245 | 738503 | 771635 | 789791 | 800906 | 787806 | 4.5 | -1.2 | 0.4 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190537 | 221059 | 232213 | 244380 | 272146 | 315813 | 329348 | 341583 | 12.0 | 4.2 | 1.0 | 1.7 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383199 | 396304 | 408416 | 415190 | 418892 | 425350 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263519 | 493091 | 635340 | 771467 | 857183 | 909025 | 994478 | 1085475 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 176869 | 206134 | 250245 | 305813 | 332001 | 347866 | 68.9 | 20.4 | 3.7 | 2.7 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 14959 | 15945 | 22307 | 27156 | 40804 | 48243 | 2.5 | 5.9 | 2.8 | 5.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930091** | **1020608** | **1068184** | **1139437** | **1200565** | **1276176** | **1332501** | **1384829** | **2.6** | **2.0** | **1.1** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96620 | 107067 | 115262 | 119221 | 122229 | 122236 | -0.4 | -1.7 | -0.4 | 0.7 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439930 | 518253 | 583930 | 638972 | 695773 | 745304 | 788875 | 7.1 | 6.9 | 2.9 | 1.5 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122425 | 124880 | 128891 | 130589 | 132262 | 134472 | 1.0 | 0.7 | 0.3 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206837 | 259330 | 306665 | 336105 | 356156 | 386066 | 416514 | 20.7 | 9.4 | 4.0 | 1.5 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 133698 | 149351 | 170783 | 205486 | 220708 | 230983 | 66.7 | 14.0 | 3.0 | 2.2 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2800 | 3033 | 3193 | 3542 | 6268 | 6906 | 0.0 | 21.3 | 6.2 | 4.2 |
| Thermal power | 398853 | 429386 | 480034 | 488042 | 469516 | 453312 | 448440 | 446331 | 461183 | 464968 | 473718 | 1.9 | -0.2 | -0.5 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102082 | 112459 | 114394 | 114917 | 120643 | 127184 | 136115 | 138177 | 0.9 | 1.1 | 0.2 | 0.9 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1614 | 7554 | 18146 | 34422 | 38409 | 0.0 | 0.0 | 6.0 | 17.2 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 121308 | 103796 | 90400 | 87684 | 86635 | 81361 | -0.6 | -2.1 | -3.1 | -1.2 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259228 | 266067 | 280845 | 291675 | 296751 | 298216 | 302087 | 5.7 | 1.4 | 0.8 | 0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 33187 | 27457 | 23519 | 19708 | 20759 | 19695 | 21359 | -2.2 | -4.8 | -3.4 | -0.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34666 | 37570 | 39320 | 42903 | 53878 | 57521 | 65334 | 5.0 | 3.5 | 1.3 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 960 | 1645 | 2109 | 2901 | 3576 | 2.5 | 2.2 | 0.6 | 6.8 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 36.2 | 35.4 | 35.0 | 34.5 | 34.7 | 34.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.3 | 42.7 | 43.1 | 43.7 | 43.9 | 44.2 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.5 | 16.1 | 16.4 | 16.8 | 16.7 | 16.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.7 | 3.4 | 5.0 | 6.9 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 60.8 | 66.3 | 70.3 | 71.8 | 72.2 | 73.0 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.9 | 21.8 | 22.8 | 22.5 | 21.9 | 21.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 40.9 | 44.6 | 47.5 | 49.3 | 50.2 | 51.7 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7494.3** | **7964.8** | **8291.0** | **8630.6** | **8887.9** | **9151.0** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.3 | 600.9 | 620.7 | 642.2 | 656.8 | 671.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.8 | 5711.8 | 5881.1 | 6051.7 | 6176.6 | 6302.7 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.0 | 720.7 | 775.2 | 829.4 | 867.0 | 904.4 | 1.0 | 1.6 | 2.1 | 1.1 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 775.3 | 886.4 | 967.5 | 1059.2 | 1138.1 | 1221.5 | 1.4 | 2.6 | 2.7 | 1.6 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.6 | 48.1 | 49.4 | 50.6 | -0.9 | 0.7 | 0.9 | 0.6 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.8** | **3564.2** | **3709.0** | **3806.2** | **3904.6** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.2 | 2492.9 | 2593.3 | 2659.8 | 2731.0 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.9 | 631.8 | 663.1 | 684.1 | 702.1 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.6 | 439.5 | 452.6 | 462.3 | 471.5 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350138** | **351907** | **352189** | **356402** | **359261** | **364112** | **0.7** | **-0.3** | **-0.1** | **0.2** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7915 | 7986 | 8113 | 8157 | 8235 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145691 | 141615 | 140285 | 140674 | 141079 | 142285 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122576 | 127381 | 129214 | 131227 | 132138 | 133971 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9823 | 9955 | 10003 | 9856 | 9635 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58139 | 58115 | 57554 | 59065 | 60644 | 62563 | 0.9 | 1.2 | 0.4 | 0.4 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7059 | 7195 | 7320 | 7386 | 7423 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EEREF2012tp | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831603** | **807039** | **768617** | **759481** | **762551** | **773611** | **772270** | **756520** | **-1.2** | **-0.4** | **-0.6** | **0.0** |
| Solids | 214627 | 196059 | 163855 | 149978 | 139407 | 124742 | 85254 | 68644 | 68188 | 65787 | 70844 | -2.7 | -1.6 | -4.8 | -0.9 |
| Oil | 176084 | 136469 | 103565 | 90791 | 77413 | 65119 | 55076 | 43039 | 33760 | 22939 | 16155 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149149 | 140909 | 124742 | 107197 | 99034 | 94013 | 82152 | 69868 | -2.7 | -1.2 | -2.7 | -2.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212593 | 257179 | 281188 | 327166 | 362268 | 383030 | 404022 | 404702 | 5.6 | 3.7 | 2.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33035 | 34543 | 35845 | 36525 | 36945 | 37347 | 0.4 | 0.0 | 0.7 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136223 | 150582 | 151760 | 170091 | 174442 | 181727 | 186996 | 179818 | 6.5 | 1.9 | 1.2 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42384 | 58213 | 74562 | 84338 | 88134 | 95665 | 100008 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22785 | 28727 | 33075 | 38333 | 43412 | 46834 | 47258 | 24.0 | 20.0 | 3.8 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9247 | 9453 | 14895 | 29310 | 33231 | 37582 | 40271 | 2.3 | 4.6 | 4.9 | 5.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967983** | **909455** | **911750** | **890923** | **885671** | **892039** | **906624** | **937124** | **1.4** | **-0.5** | **-0.2** | **0.3** |
| Solids | 98273 | 125211 | 110927 | 116118 | 94901 | 86721 | 75633 | 56766 | 46073 | 42460 | 48371 | 1.2 | -1.5 | -2.2 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551740 | 527919 | 519052 | 515366 | 517145 | 518000 | 526469 | 531046 | 0.5 | -0.7 | -0.2 | 0.1 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527800 | 506550 | 496323 | 489514 | 488315 | 485583 | 488871 | 487639 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23940 | 21370 | 22729 | 25852 | 28830 | 32417 | 37597 | 43407 | 2.8 | -0.6 | 1.9 | 2.6 |
| Natural gas | 193432 | 257849 | 276001 | 286216 | 266445 | 284172 | 273437 | 283704 | 297630 | 305955 | 326010 | 3.6 | -0.4 | 0.3 | 0.9 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746112** | **1660971** | **1622617** | **1590334** | **1585625** | **1601066** | **1611178** | **1622558** | **0.2** | **-0.6** | **-0.4** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266096 | 234308 | 211463 | 160887 | 125410 | 114262 | 108248 | 119215 | -1.3 | -1.8 | -3.7 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589276 | 550730 | 528423 | 513078 | 501948 | 493067 | 489287 | 485218 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435148 | 406434 | 406912 | 377929 | 378376 | 385751 | 380511 | 386774 | 1.2 | -0.9 | -0.7 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226630 | 278971 | 304500 | 355144 | 392066 | 415184 | 437641 | 438502 | 5.9 | 4.2 | 2.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.0 | 10.1 | 7.9 | 7.1 | 6.7 | 7.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.6 | 32.3 | 31.7 | 30.8 | 30.4 | 29.9 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 23.8 | 23.9 | 24.1 | 23.6 | 23.8 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 10.7 | 11.6 | 12.0 | 12.2 | 12.3 | 12.0 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.8 | 22.3 | 24.7 | 25.9 | 27.2 | 27.0 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369057 | 352584 | 355557 | 360733 | 379366 | 423931 | 450668 | 490285 | -0.5 | -0.7 | 0.2 | 1.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383287** | **350708** | **332646** | **288803** | **277186** | **288098** | **292659** | **303342** | **0.8** | **-1.7** | **-1.9** | **0.2** |
| Solids | 223038 | 228941 | 197605 | 186820 | 158055 | 139972 | 94843 | 63404 | 54962 | 53043 | 66290 | -1.2 | -2.2 | -5.0 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10882 | 5905 | 5166 | 4432 | 4145 | 3946 | 3881 | 3933 | -6.5 | -11.7 | -2.8 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131875 | 124913 | 124644 | 107638 | 104907 | 112247 | 110239 | 109159 | 3.8 | -1.8 | -1.5 | 0.1 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47734 | 55038 | 56010 | 69740 | 78362 | 86837 | 91211 | 86960 | 11.7 | 2.0 | 2.4 | 1.1 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 12149 | 26368 | 30105 | 34285 | 37000 | 1.6 | 3.5 | 6.0 | 5.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971267** | **907652** | **863046** | **853513** | **842500** | **833304** | **827128** | **817913** | **-0.7** | **-1.0** | **-0.6** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646746 | 614553 | 592625 | 576768 | 564502 | 552799 | 545771 | 537607 | -1.0 | -0.9 | -0.6 | -0.4 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26358 | 26693 | 26752 | 26670 | 27518 | 28765 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22356 | 20225 | 19400 | 20165 | 19713 | 19207 | 18301 | 19022 | 1.1 | -0.3 | 0.0 | -0.3 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283933 | 246672 | 224664 | 229887 | 231533 | 234629 | 235539 | 232520 | -0.6 | -1.9 | -0.7 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82441** | **77114** | **73358** | **69035** | **67496** | **68305** | **68067** | **69841** | **0.2** | **-1.3** | **-1.1** | **0.1** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122303** | **121539** | **121555** | **121161** | **119760** | **119345** | **119914** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170647** | **1135779** | **1128931** | **1122601** | **1123096** | **1133454** | **1140807** | **1146350** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304797 | 306480 | 305658 | 304669 | 303472 | 306200 | 306833 | 309171 | -1.3 | 0.5 | -0.1 | 0.1 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197107 | 197778 | 195190 | 193640 | 191295 | 192262 | 189981 | 188173 | -1.5 | 0.5 | -0.2 | -0.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107689 | 108701 | 110468 | 111029 | 112177 | 113938 | 116852 | 120998 | -1.0 | 0.5 | 0.2 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311942 | 298600 | 299525 | 296866 | 298046 | 300500 | 302878 | 302160 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181920 | 172256 | 171034 | 166580 | 167238 | 168512 | 171020 | 171155 | 1.2 | -0.9 | -0.3 | 0.1 |
| Transport | 342901 | 368665 | 367191 | 371988 | 358443 | 352714 | 354487 | 354340 | 358241 | 360076 | 363863 | 0.7 | -0.2 | -0.1 | 0.1 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48387 | 46039 | 43054 | 40853 | 39199 | 37796 | 35424 | 33225 | -2.2 | -0.8 | -1.2 | -1.0 |
| Oil | 485890 | 502788 | 457366 | 440593 | 407865 | 391561 | 379259 | 370256 | 364917 | 362479 | 359464 | -0.6 | -1.1 | -0.7 | -0.3 |
| Gas | 266925 | 285438 | 269920 | 271625 | 251721 | 251100 | 239185 | 241483 | 241473 | 238544 | 244010 | 0.1 | -0.7 | -0.5 | 0.1 |
| Electricity | 217599 | 239418 | 245271 | 254518 | 254958 | 263298 | 273814 | 283397 | 299364 | 311037 | 319921 | 1.2 | 0.4 | 0.7 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 55800 | 56261 | 57373 | 57090 | 57454 | 57545 | 56575 | 1.5 | 0.4 | 0.3 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100144 | 119133 | 123229 | 131465 | 130736 | 131057 | 133922 | 130898 | 5.2 | 3.8 | 1.0 | 0.0 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1856 | 2257 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194777** | **245087** | **269100** | **315349** | **338256** | **357293** | **373697** | **372667** | **5.4** | **5.1** | **2.6** | **0.8** |
| **TOTAL GHG emissions (Mt of $CO_2$ eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.3** | **4285.9** | **4088.6** | **3657.4** | **3380.7** | **3093.8** | **2980.3** | **2920.6** | **-0.7** | **-1.2** | **-1.6** | **-1.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.6 | 1903.8 | 1806.5 | 1491.9 | 1244.5 | 981.4 | 885.9 | 826.5 | | -1.3 | -2.4 | -2.9 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2382.1 | 2282.0 | 2165.6 | 2136.2 | 2112.4 | 2094.4 | 2094.2 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.3** | **3254.7** | **3091.1** | **2748.3** | **2487.2** | **2316.4** | **2227.3** | **2173.0** | **-0.5** | **-1.5** | **-1.7** | **-1.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.3 | 1037.1 | 948.5 | 700.2 | 488.8 | 348.8 | 291.3 | 246.1 | -0.5 | -2.5 | -3.9 | -5.1 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.5 | 130.2 | 118.8 | 113.4 | 108.9 | 104.9 | 102.7 | -0.6 | -1.4 | -1.6 | -0.7 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 508.3 | 491.3 | 454.5 | 432.6 | 417.1 | 400.8 | 401.0 | -2.8 | -0.2 | -1.1 | -0.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.1 | 349.9 | 339.1 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.5 | 182.1 | 160.7 | 153.8 | 147.1 | 143.1 | 140.3 | -0.3 | -2.4 | -1.9 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.2 | 955.0 | 948.7 | 955.3 | 955.1 | 959.7 | 0.5 | -0.7 | -0.3 | 0.0 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.5** | **234.8** | **222.7** | **106.0** | **75.0** | **63.6** | **-1.0** | **1.5** | **-1.5** | **-6.3** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **71.9** | **64.3** | **59.5** | **54.4** | **52.4** | **51.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EEREF2012tp | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.0 | 95.4 | 88.7 | 83.6 | 78.5 | 73.9 | -1.2 | -2.1 | -2.0 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.90 | 1.73 | 1.57 | 1.45 | 1.38 | 1.34 | -0.7 | -0.9 | -1.2 | -1.3 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.3 | 54.0 | 53.7 | 53.6 | 54.0 | 55.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2110.8 | 2233.7 | 2340.9 | 2415.7 | 2521.6 | 2615.4 | 2701.7 | 3.7 | 3.0 | 1.0 | 0.7 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.5 | 14.0 | 13.5 | 13.2 | 12.7 | 12.3 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 80.5 | 76.6 | 73.7 | 70.7 | 68.3 | | -0.9 | -1.2 | -0.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.7 | 62.4 | 58.3 | 53.9 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.7 | 64.3 | 59.8 | 55.9 | 52.6 | 48.9 | 0.0 | -2.4 | -2.0 | -1.4 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.7 | 24.2 | 23.7 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.11 | 0.07 | 0.06 | 0.05 | -1.6 | -2.8 | -4.4 | -5.8 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.68 | 1.64 | 1.61 | 1.59 | -0.8 | -0.7 | -0.6 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.49 | 1.43 | 1.36 | 1.31 | 1.30 | -1.5 | -0.8 | -1.1 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.10 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.96 | 0.92 | 0.87 | 0.84 | 0.82 | -1.5 | -1.5 | -1.6 | -0.8 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 23.2 | 27.3 | 29.2 | 30.5 | 31.6 | 31.3 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.2 | 12.9 | 13.2 | 13.8 | 14.3 | | | | |
| **Gross Electricity generation by source (in GWh$_e$** | **3007267** | **3287285** | **3328110** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887134 | 744027 | 674641 | 728730 | 757233 | 793580 | 819198 | 830918 | -0.3 | -2.1 | -0.2 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 803284 | 694245 | 616329 | 423482 | 286975 | 279546 | 289864 | 383486 | -1.2 | -1.8 | -4.8 | -0.5 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46006 | 26248 | 24143 | 21609 | 21936 | 20680 | 21092 | 21014 | -7.1 | -11.3 | -1.9 | -0.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752631 | 709359 | 712182 | 650916 | 656965 | 698438 | 685021 | 684939 | 4.5 | -1.1 | -0.9 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190393 | 220804 | 230831 | 301859 | 347900 | 395384 | 411046 | 386208 | 12.0 | 4.2 | 3.2 | 1.2 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384124 | 401665 | 416802 | 424714 | 429587 | 434269 | 0.4 | 0.0 | 0.7 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 492833 | 676897 | 867003 | 980678 | 1024811 | 1112385 | 1162884 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 177766 | 215788 | 257904 | 316342 | 342089 | 352437 | 68.9 | 20.4 | 4.2 | 2.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 24101 | 42581 | 52683 | 64351 | 69255 | 2.5 | 5.9 | 7.1 | 5.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930079** | **1020452** | **1083464** | **1176138** | **1248640** | **1330980** | **1376611** | **1411747** | **2.6** | **2.0** | **1.4** | **0.9** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96796 | 98875 | 100424 | 104980 | 108188 | 109688 | -0.4 | -1.7 | -1.2 | 0.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439843 | 535831 | 627363 | 695178 | 751925 | 801282 | 828136 | 7.1 | 6.8 | 3.6 | 1.4 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122643 | 127080 | 132075 | 134547 | 136767 | 138749 | 1.0 | 0.7 | 0.5 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206749 | 276105 | 342752 | 383896 | 402069 | 432537 | 449562 | 20.7 | 9.4 | 5.2 | 1.4 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 134048 | 153503 | 174390 | 208118 | 221989 | 229103 | 66.7 | 14.0 | 3.3 | 2.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 4029 | 4817 | 7192 | 9989 | 10722 | 0.0 | 21.3 | 9.3 | 5.0 |
| Thermal power | 398853 | 429386 | 480034 | 488029 | 469448 | 450838 | 449899 | 453037 | 474075 | 467141 | 473922 | 1.9 | -0.2 | -0.4 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102095 | 112523 | 115228 | 121759 | 127854 | 135206 | 144381 | 147777 | 0.9 | 1.1 | 0.8 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1217 | 11168 | 46040 | 53428 | 76417 | 0.0 | 0.0 | 3.0 | 23.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 120625 | 99240 | 84100 | 80329 | 76657 | 76662 | -0.6 | -2.1 | -3.5 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259247 | 263993 | 272388 | 285689 | 296238 | 284709 | 282117 | 5.7 | 1.4 | 0.5 | 0.2 |
| Oil fired | 67499 | 59434 | 54039 | 42242 | 33119 | 27379 | 23315 | 19619 | 19190 | 19793 | 22407 | -2.2 | -4.8 | -3.4 | -0.2 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34646 | 37931 | 53343 | 60129 | 74321 | 81430 | 87824 | 5.0 | 3.5 | 4.4 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1613 | 3500 | 3996 | 4551 | 4912 | 2.5 | 2.2 | 6.0 | 5.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 35.6 | 34.1 | 33.3 | 33.0 | 33.2 | 33.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.2 | 42.1 | 41.7 | 42.7 | 42.5 | 43.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.7 | 17.8 | 17.8 | 17.0 | 15.8 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 2.5 | 6.2 | 7.3 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 61.5 | 69.8 | 74.4 | 75.1 | 76.1 | 74.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.2 | 20.0 | 20.1 | 19.8 | 19.6 | 19.2 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 42.3 | 49.8 | 54.3 | 55.3 | 56.5 | 55.6 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7493.9** | **7963.7** | **8283.6** | **8618.3** | **8861.3** | **9109.6** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.4 | 601.0 | 621.5 | 643.4 | 659.5 | 675.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.7 | 5711.6 | 5879.5 | 6048.7 | 6170.1 | 6292.1 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.1 | 720.9 | 776.4 | 831.5 | 871.5 | 911.6 | 1.0 | 1.6 | 2.1 | 1.2 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 774.9 | 885.2 | 959.4 | 1046.3 | 1110.3 | 1178.7 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.8 | 48.4 | 49.9 | 51.4 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.4** | **3563.5** | **3708.0** | **3804.2** | **3902.3** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.3 | 2493.0 | 2593.4 | 2659.9 | 2730.9 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.5 | 631.1 | 662.2 | 682.4 | 700.3 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.5 | 439.4 | 452.4 | 461.9 | 471.1 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350095** | **351819** | **351611** | **355469** | **357288** | **361034** | **0.7** | **-0.3** | **-0.1** | **0.1** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7917 | 7993 | 8124 | 8179 | 8267 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145688 | 141628 | 140278 | 140656 | 140994 | 142096 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122573 | 127385 | 129218 | 131228 | 132137 | 133974 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9818 | 9947 | 9991 | 9841 | 9620 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58101 | 58010 | 56970 | 58131 | 58713 | 59598 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7060 | 7206 | 7338 | 7423 | 7478 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE25DEC_a | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831444** | **803947** | **765326** | **741079** | **792186** | **865854** | **914808** | **969301** | **-1.2** | **-0.5** | **-0.8** | **1.4** |
| Solids | 214627 | 196059 | 163855 | 149857 | 138706 | 123526 | 79364 | 75176 | 86364 | 85004 | 95055 | -2.7 | -1.7 | -5.4 | 0.9 |
| Oil | 176084 | 136469 | 103565 | 90650 | 77089 | 63740 | 52994 | 38066 | 26283 | 15501 | 9717 | -5.2 | -2.9 | -3.7 | -8.1 |
| Natural gas | 209437 | 190678 | 158525 | 149175 | 139739 | 117107 | 98366 | 86336 | 77911 | 72198 | 62656 | -2.7 | -1.3 | -3.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212656 | 256956 | 280618 | 320040 | 376215 | 437494 | 495696 | 542420 | 5.6 | 3.7 | 2.2 | 2.7 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33025 | 34206 | 35763 | 36482 | 36980 | 37600 | 0.4 | 0.0 | 0.6 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136284 | 150330 | 150673 | 162906 | 184375 | 212922 | 244428 | 268747 | 6.5 | 1.9 | 0.8 | 2.5 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42397 | 59186 | 76354 | 87526 | 103384 | 113076 | 122446 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22796 | 28247 | 34224 | 42054 | 51533 | 60737 | 65708 | 24.0 | 20.0 | 4.1 | 3.3 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9252 | 9486 | 12350 | 26497 | 33173 | 40474 | 47919 | 2.3 | 4.6 | 2.9 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967825** | **903668** | **875647** | **835281** | **771247** | **697164** | **652326** | **609655** | **1.4** | **-0.6** | **-0.8** | **-1.6** |
| Solids | 98273 | 125211 | 110927 | 115959 | 93849 | 84961 | 66850 | 50931 | 42165 | 47070 | 54267 | 1.2 | -1.7 | -3.3 | -1.0 |
| Oil | 535238 | 604030 | 563977 | 551776 | 526129 | 506067 | 490765 | 445719 | 380361 | 311606 | 250227 | 0.5 | -0.7 | -0.7 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527783 | 505240 | 486722 | 471795 | 436711 | 386824 | 335671 | 286898 | 0.4 | -0.7 | -0.7 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23992 | 20889 | 19345 | 18970 | 9008 | -6462 | -24065 | -36671 | 2.8 | -0.8 | -1.0 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286170 | 263551 | 262916 | 252177 | 243394 | 236661 | 248595 | 253511 | 3.6 | -0.5 | -0.4 | 0.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745803** | **1652199** | **1583545** | **1517682** | **1502789** | **1502564** | **1505976** | **1516655** | **0.2** | **-0.7** | **-0.8** | **0.0** |
| Solids | 321277 | 317986 | 280653 | 265816 | 232554 | 208487 | 146214 | 126107 | 128529 | 132074 | 149323 | -1.3 | -1.9 | -4.5 | 0.1 |
| Oil | 665142 | 683909 | 620735 | 589177 | 548720 | 514369 | 487727 | 427419 | 351879 | 273200 | 206253 | -0.7 | -1.2 | -1.2 | -4.2 |
| Natural gas | 396145 | 448380 | 444428 | 435128 | 402372 | 378032 | 347896 | 325453 | 308882 | 313541 | 307557 | 1.2 | -1.0 | -1.4 | -0.6 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226705 | 278698 | 303830 | 347021 | 409159 | 477290 | 542631 | 596166 | 5.9 | 4.2 | 2.2 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 9.6 | 8.4 | 8.6 | 8.8 | 9.8 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.5 | 32.1 | 28.4 | 23.4 | 18.1 | 13.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.4 | 23.9 | 22.9 | 21.7 | 20.6 | 20.8 | 20.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.4 | 12.5 | 14.4 | 15.8 | 16.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.2 | 22.9 | 27.2 | 31.8 | 36.0 | 39.3 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 349448 | 346313 | 354118 | 384977 | 469412 | 537575 | 628480 | -0.5 | -0.8 | 0.1 | 2.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383167** | **347005** | **319581** | **263260** | **276844** | **318740** | **355937** | **387617** | **0.8** | **-1.8** | **-2.7** | **2.0** |
| Solids | 223038 | 228941 | 197605 | 186548 | 156397 | 139728 | 83915 | 71852 | 83291 | 92584 | 113913 | -1.2 | -2.3 | -6.0 | 1.5 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10903 | 5853 | 4753 | 3682 | 3106 | 2605 | 2131 | 1453 | -6.5 | -11.8 | -4.5 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131882 | 122847 | 107176 | 93753 | 98940 | 105870 | 115096 | 114231 | 3.8 | -1.9 | -2.7 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47857 | 55113 | 61019 | 72167 | 79529 | 91656 | 101837 | 106318 | 11.7 | 2.0 | 2.7 | 2.0 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6905 | 9744 | 23417 | 29558 | 36119 | 41961 | 1.6 | 3.5 | 3.7 | 7.6 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5760 | 8170 | 9741 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971028** | **905006** | **855510** | **834844** | **839867** | **831019** | **800692** | **783325** | **-0.7** | **-1.0** | **-0.8** | **-0.3** |
| Refineries | 740500 | 763156 | 670015 | 646609 | 612971 | 581569 | 556452 | 505593 | 441463 | 375620 | 318228 | -1.0 | -0.9 | -1.0 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24912 | 60738 | 102228 | 133347 | 162195 | 34.1 | 6.9 | -0.4 | 9.8 |
| District heating | 18667 | 19517 | 20813 | 22253 | 20061 | 17368 | 17959 | 16226 | 13430 | 11832 | 12670 | 1.1 | -0.4 | -1.1 | -1.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283945 | 245945 | 231217 | 235520 | 257309 | 273897 | 279893 | 290233 | -0.6 | -1.9 | -0.4 | 1.0 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76779** | **70555** | **65335** | **61094** | **59588** | **57117** | **57871** | **0.2** | **-1.4** | **-1.6** | **-0.6** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122348** | **121118** | **118980** | **116711** | **112934** | **111914** | **111803** | **-0.2** | **0.6** | **-0.3** | **-0.3** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170526** | **1129628** | **1091988** | **1064222** | **1027644** | **996806** | **976814** | **963921** | **0.3** | **-0.2** | **-0.6** | **-0.5** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304773 | 305551 | 296688 | 287661 | 275233 | 262820 | 258400 | 255269 | -1.3 | 0.5 | -0.6 | -0.6 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197085 | 197311 | 189748 | 182711 | 174499 | 167879 | 163910 | 159223 | -1.5 | 0.5 | -0.8 | -0.7 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107688 | 108240 | 106940 | 104950 | 100734 | 94941 | 94490 | 96046 | -1.0 | 0.5 | -0.3 | -0.4 |
| Residential | 286291 | 311793 | 311545 | 311966 | 297301 | 287029 | 280591 | 270390 | 269207 | 267629 | 266350 | 0.8 | -0.5 | -0.6 | -0.3 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 169791 | 164596 | 157477 | 154657 | 154035 | 152932 | 153116 | 1.2 | -1.0 | -0.8 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356986 | 343675 | 338492 | 327364 | 310744 | 297853 | 289186 | 0.7 | -0.3 | -0.5 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48406 | 45963 | 41407 | 37989 | 32461 | 26404 | 21976 | 19050 | -2.2 | -0.8 | -1.9 | -3.4 |
| Oil | 485890 | 502788 | 457366 | 440511 | 406073 | 379371 | 357925 | 306473 | 247536 | 194098 | 145528 | -0.6 | -1.2 | -1.3 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271611 | 249818 | 241390 | 226204 | 197505 | 167812 | 146177 | 128524 | 0.1 | -0.8 | -1.0 | -2.8 |
| Electricity | 217599 | 239418 | 245271 | 254494 | 253109 | 257380 | 264688 | 276023 | 299154 | 318899 | 336301 | 1.2 | 0.3 | 0.4 | 1.2 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55505 | 53991 | 55135 | 53738 | 54700 | 54578 | 55243 | 1.5 | 0.4 | -0.1 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100141 | 118900 | 117853 | 121427 | 146472 | 172345 | 204206 | 232560 | 5.2 | 3.8 | 0.2 | 3.3 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 855 | 14970 | 28854 | 36880 | 46715 | 0.0 | 0.0 | 12.6 | 22.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194892** | **244883** | **266631** | **307278** | **353668** | **410539** | **463124** | **506893** | **5.4** | **5.1** | **2.3** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4622.9** | **4263.0** | **3966.6** | **3444.7** | **2814.6** | **2108.3** | **1679.8** | **1346.0** | **-0.7** | **-1.3** | **-2.1** | **-4.6** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.3 | 1890.3 | 1744.7 | 1371.1 | 1130.5 | 751.5 | 553.9 | 394.4 | | -1.4 | -3.2 | -6.0 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2372.6 | 2221.9 | 2073.5 | 1684.1 | 1356.7 | 1125.9 | 951.7 | | -1.2 | -1.3 | -3.8 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.0** | **3231.8** | **2970.1** | **2538.8** | **2100.8** | **1608.9** | **1255.4** | **960.5** | **-0.5** | **-1.6** | **-2.4** | **-4.7** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.1 | 1025.1 | 904.7 | 609.5 | 443.4 | 248.2 | 141.8 | 61.6 | -0.5 | -2.7 | -5.1 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.9 | 123.3 | 111.9 | 98.8 | 83.5 | 70.9 | 60.1 | -0.6 | -1.4 | -2.1 | -3.1 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 506.5 | 472.0 | 423.0 | 356.9 | 281.9 | 239.3 | 206.4 | -2.8 | -0.3 | -1.8 | -3.5 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 390.8 | 363.8 | 339.1 | 285.8 | 238.1 | 191.5 | 143.5 | -0.1 | -1.6 | -1.4 | -4.2 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 192.5 | 175.3 | 151.5 | 125.7 | 107.6 | 88.0 | 68.6 | -0.3 | -2.5 | -2.4 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.1 | 903.8 | 790.3 | 649.5 | 524.0 | 420.1 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.6** | **276.5** | **231.6** | **222.7** | **100.1** | **61.9** | **34.4** | **-1.0** | **1.5** | **-1.7** | **-9.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **75.0** | **69.8** | **60.6** | **49.5** | **37.1** | **29.6** | **23.7** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE25DEC_a | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.0 | 102.5 | 91.1 | 84.1 | 78.5 | 73.4 | 69.1 | -1.2 | -2.1 | -2.4 | -1.4 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.88 | 1.67 | 1.40 | 1.07 | 0.83 | 0.63 | -0.7 | -0.9 | -1.6 | -4.7 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 53.0 | 49.3 | 44.6 | 41.6 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2107.6 | 2239.3 | 2383.8 | 2509.9 | 2727.9 | 2924.0 | 3104.3 | 3.7 | 3.0 | 1.2 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.5 | 14.3 | 14.0 | 14.2 | 14.3 | 14.1 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.0 | 82.9 | 76.0 | 69.4 | 63.3 | 59.6 | 56.4 | | -0.9 | -1.8 | -1.5 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.6 | 74.6 | 67.5 | 60.5 | 55.9 | 51.5 | 47.5 | -0.5 | -1.8 | -2.1 | -1.7 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.6 | 69.0 | 60.8 | 55.3 | 51.1 | 47.0 | 43.8 | 0.0 | -2.5 | -2.4 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.9 | 23.9 | 21.5 | 19.8 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.14 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -5.3 | -12.4 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.52 | 1.28 | 1.07 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.47 | 1.30 | 1.07 | 0.93 | 0.81 | -1.5 | -0.8 | -1.2 | -2.9 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.06 | 0.88 | 0.72 | 0.54 | -0.9 | -1.1 | -0.8 | -4.0 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.07 | 0.96 | 0.81 | 0.70 | 0.58 | 0.45 | -1.5 | -1.6 | -1.6 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.09 | 1.76 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.7 | 28.0 | 33.3 | 39.3 | 44.8 | 49.2 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.6 | 24.6 | 39.0 | 52.8 | 64.6 | | | | |
| **Gross Electricity generation by source (in GWh$_e$** | **3007267** | **3287285** | **3328110** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 741418 | 704452 | 752816 | 874405 | 983767 | 1035489 | 1115566 | -0.3 | -2.1 | 0.2 | 2.0 |
| Solids | 933660 | 974939 | 830048 | 802058 | 685246 | 606329 | 359147 | 279629 | 355482 | 439716 | 580505 | -1.2 | -1.9 | -6.3 | 2.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46072 | 26110 | 21836 | 17087 | 16396 | 13294 | 10941 | 7080 | -7.1 | -11.3 | -4.2 | -4.3 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752907 | 695759 | 592916 | 548708 | 606114 | 654270 | 701570 | 741852 | 4.5 | -1.3 | -2.3 | 1.5 |
| Biomass-waste | 46848 | 83787 | 145901 | 190811 | 221073 | 245047 | 302579 | 343878 | 398663 | 436508 | 452663 | 12.0 | 4.2 | 3.2 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384015 | 397739 | 415852 | 424213 | 429997 | 437204 | 0.4 | 0.0 | 0.6 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 492988 | 688212 | 887839 | 1017740 | 1202144 | 1314840 | 1423788 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 174692 | 232960 | 281339 | 384382 | 459385 | 497917 | 68.9 | 20.4 | 5.0 | 3.9 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 16485 | 22193 | 42213 | 51146 | 65067 | 78412 | 2.5 | 5.9 | 6.2 | 6.5 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29989 | 39947 | 43095 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930134** | **1019630** | **1078153** | **1177866** | **1253288** | **1434303** | **1517723** | **1605698** | **2.6** | **2.0** | **1.5** | **1.6** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96480 | 101529 | 115363 | 129789 | 136412 | 146220 | -0.4 | -1.7 | -0.9 | 1.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439905 | 536700 | 641546 | 721130 | 857145 | 952070 | 1018172 | 7.1 | 6.9 | 3.8 | 2.3 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122569 | 125387 | 131897 | 134294 | 136796 | 139263 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206812 | 279169 | 348044 | 394609 | 463825 | 504441 | 542322 | 20.7 | 9.4 | 5.3 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 131564 | 163724 | 188558 | 252207 | 301387 | 324358 | 66.7 | 14.0 | 4.0 | 3.5 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3397 | 4391 | 6066 | 6818 | 9446 | 12229 | 0.0 | 21.3 | 10.2 | 5.3 |
| Thermal power | 398853 | 429386 | 480034 | 488085 | 468562 | 444973 | 434790 | 416796 | 447369 | 429241 | 441306 | 1.9 | -0.2 | -0.7 | 0.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102144 | 112030 | 112469 | 119635 | 124845 | 134219 | 141086 | 145414 | 0.9 | 1.0 | 0.7 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 2914 | 17342 | 86936 | 140736 | 205417 | 0.0 | 0.0 | 12.4 | 23.7 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141212 | 120935 | 103545 | 87105 | 95824 | 99277 | 105655 | -0.6 | -2.2 | -3.1 | 0.1 |
| Gas fired | 129190 | 169054 | 224922 | 253079 | 258989 | 258688 | 258402 | 252743 | 266496 | 238259 | 236467 | 5.7 | 1.4 | 0.0 | -0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42257 | 32824 | 26311 | 22176 | 17903 | 15113 | 11806 | 10104 | -2.2 | -4.9 | -3.8 | -3.9 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34635 | 38121 | 49373 | 55936 | 66012 | 75104 | 83510 | 5.0 | 3.5 | 3.6 | 2.7 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 917 | 1294 | 3109 | 3924 | 4795 | 5570 | 2.5 | 2.2 | 3.7 | 7.6 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.4 | 34.9 | 33.0 | 34.1 | 34.3 | 35.4 | 36.2 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.6 | 39.7 | 40.5 | 39.6 | 40.1 | 40.4 | 41.6 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.4 | 17.1 | 16.6 | 15.7 | 14.9 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.7 | 1.7 | 7.3 | 9.9 | 15.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.5 | 64.4 | 73.7 | 76.7 | 77.1 | 76.5 | 75.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.5 | 21.4 | 22.6 | 22.0 | 21.2 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.7 | 43.9 | 52.4 | 54.2 | 55.1 | 55.3 | 54.2 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.1** | **7866.6** | **8129.5** | **8371.8** | **8563.6** | **8768.3** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.5 | 624.3 | 649.7 | 666.0 | 688.2 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.0 | 5613.5 | 5719.4 | 5791.3 | 5857.5 | 5930.9 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.3 | 724.4 | 783.1 | 844.4 | 889.4 | 936.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.3 | 880.2 | 955.9 | 1037.7 | 1100.4 | 1161.1 | 1.4 | 2.6 | 2.6 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.1 | 46.9 | 48.7 | 50.3 | 51.8 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.1** | **3510.2** | **3635.2** | **3713.0** | **3799.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.9 | 2426.9 | 2502.0 | 2545.1 | 2598.4 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.2 | 639.9 | 674.4 | 698.6 | 719.9 | -0.3 | 2.2 | 2.2 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.0 | 443.4 | 458.8 | 469.3 | 481.3 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341091** | **335882** | **324776** | **308209** | **295372** | **286747** | **0.7** | **-0.3** | **-0.5** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7830 | 7417 | 7126 | 6765 | 6517 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141051 | 132491 | 123761 | 108956 | 98351 | 91716 | 0.2 | -1.5 | -1.7 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120893 | 119505 | 116870 | 114453 | 112314 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9891 | 10058 | 10158 | 10059 | 9897 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 57978 | 57687 | 56798 | 57704 | 58264 | 58739 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7090 | 7237 | 7394 | 7479 | 7564 | -0.1 | 0.8 | 1.1 | 0.3 |

*Source: PRIMES*

| EU28: EE28DEC_a | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831437** | **801762** | **755841** | **725478** | **752677** | **809776** | **844531** | **893883** | **-1.2** | **-0.5** | **-1.0** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149869 | 138232 | 123154 | 90202 | 72964 | 82829 | 79852 | 87778 | -2.7 | -1.7 | -4.2 | -0.1 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77048 | 63601 | 52502 | 37441 | 25814 | 15218 | 9563 | -5.2 | -2.9 | -3.8 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149171 | 139082 | 113313 | 91950 | 80998 | 72555 | 64788 | 56354 | -2.7 | -1.3 | -4.1 | -2.4 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212646 | 256569 | 275950 | 303517 | 358323 | 410842 | 462472 | 499849 | 5.6 | 3.7 | 1.7 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33018 | 34250 | 35506 | 36325 | 36829 | 37369 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136273 | 149839 | 148537 | 152949 | 174836 | 200774 | 226912 | 246363 | 6.5 | 1.9 | 0.2 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42476 | 57343 | 72675 | 82478 | 95714 | 106730 | 114608 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27677 | 32338 | 39917 | 48264 | 54969 | 58808 | 24.0 | 20.0 | 3.6 | 3.0 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9375 | 11305 | 25586 | 29765 | 37033 | 42702 | 2.3 | 4.6 | 2.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967839** | **900458** | **866965** | **807173** | **734965** | **658732** | **602199** | **548661** | **1.4** | **-0.6** | **-1.1** | **-1.9** |
| Solids | 98273 | 125211 | 110927 | 115992 | 93136 | 88046 | 69163 | 49599 | 39910 | 41369 | 42222 | 1.2 | -1.7 | -2.9 | -2.4 |
| Oil | 535238 | 604030 | 563977 | 551766 | 525490 | 503628 | 482210 | 434054 | 369310 | 302311 | 243972 | 0.5 | -0.7 | -0.9 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504790 | 485072 | 465782 | 428610 | 379144 | 329168 | 282412 | 0.4 | -0.7 | -0.8 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23990 | 20700 | 18556 | 16428 | 5444 | -9835 | -26856 | -38440 | 2.8 | -0.9 | -2.3 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286167 | 261728 | 253924 | 231722 | 221579 | 213435 | 216501 | 214771 | 3.6 | -0.5 | -1.2 | -0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745811** | **1646805** | **1565378** | **1473972** | **1426998** | **1408053** | **1385572** | **1380243** | **0.2** | **-0.7** | **-1.1** | **-0.3** |
| Solids | 321277 | 317986 | 280653 | 265860 | 231368 | 211199 | 159365 | 122563 | 122739 | 121221 | 130000 | -1.3 | -1.9 | -3.7 | -1.0 |
| Oil | 665142 | 683909 | 620735 | 589163 | 548041 | 511791 | 478681 | 415129 | 340359 | 263623 | 199845 | -0.7 | -1.2 | -1.3 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 399892 | 365248 | 321025 | 298299 | 280301 | 274037 | 262515 | 1.2 | -1.1 | -2.2 | -1.0 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226691 | 278276 | 298824 | 329085 | 389798 | 448738 | 506371 | 549642 | 5.9 | 4.2 | 1.7 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.5 | 10.8 | 8.6 | 8.7 | 8.7 | 9.4 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 32.7 | 32.5 | 29.1 | 24.2 | 19.0 | 14.5 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.3 | 23.3 | 21.8 | 20.9 | 19.9 | 19.8 | 19.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 12.7 | 14.2 | 15.5 | 16.0 | 17.4 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.3 | 27.3 | 31.9 | 36.5 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368945 | 347832 | 345068 | 347652 | 361511 | 432009 | 490276 | 567575 | -0.5 | -0.8 | 0.0 | 2.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383216** | **344914** | **318554** | **268464** | **269109** | **303605** | **329854** | **352983** | **0.8** | **-1.9** | **-2.5** | **1.4** |
| Solids | 223038 | 228941 | 197605 | 186589 | 155340 | 143922 | 99837 | 74431 | 84828 | 90376 | 104545 | -1.2 | -2.4 | -4.3 | 0.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5803 | 4686 | 3564 | 2920 | 2502 | 1907 | 1431 | -6.5 | -11.9 | -4.8 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131898 | 121704 | 101946 | 87327 | 91534 | 97445 | 99960 | 99748 | 3.8 | -2.0 | -3.3 | 0.7 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47866 | 55270 | 61147 | 68894 | 77562 | 87490 | 95746 | 99228 | 11.7 | 2.1 | 2.2 | 1.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8842 | 22662 | 26372 | 32968 | 37446 | 1.6 | 3.5 | 2.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4967 | 8898 | 10585 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970995** | **903441** | **851671** | **823574** | **813426** | **796188** | **762278** | **747900** | **-0.7** | **-1.0** | **-0.9** | **-0.5** |
| Refineries | 740500 | 763156 | 670015 | 646597 | 612472 | 579693 | 549709 | 496255 | 432678 | 368330 | 313275 | -1.0 | -0.9 | -1.1 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24801 | 58617 | 96526 | 127165 | 152884 | 34.1 | 6.9 | -0.5 | 9.5 |
| District heating | 18667 | 19517 | 20813 | 22232 | 19700 | 16928 | 17643 | 19353 | 19464 | 18876 | 20172 | 1.1 | -0.5 | -1.1 | 0.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283944 | 245240 | 229693 | 231421 | 239201 | 247520 | 247907 | 261570 | -0.6 | -1.9 | -0.6 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82418** | **76623** | **70107** | **64646** | **59052** | **56495** | **53300** | **52898** | **0.2** | **-1.4** | **-1.7** | **-1.0** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122382** | **120824** | **118046** | **112393** | **107013** | **102441** | **99350** | **-0.2** | **0.6** | **-0.4** | **-0.9** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170503** | **1125938** | **1074992** | **1019819** | **971214** | **932494** | **900118** | **875831** | **0.3** | **-0.3** | **-1.0** | **-0.8** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304755 | 304156 | 290815 | 278346 | 256170 | 238416 | 225347 | 217675 | -1.3 | 0.4 | -0.9 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197065 | 196528 | 186844 | 178020 | 162912 | 152944 | 142970 | 133937 | -1.5 | 0.5 | -1.0 | -1.4 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107628 | 103972 | 100326 | 93258 | 85471 | 82377 | 83738 | -1.0 | 0.4 | -0.7 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311961 | 295956 | 279524 | 261677 | 248674 | 244598 | 238965 | 230897 | 0.8 | -0.5 | -1.2 | -0.6 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 168844 | 160950 | 142207 | 140414 | 139763 | 138463 | 138593 | 1.2 | -1.1 | -1.7 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356983 | 343702 | 337590 | 325955 | 309718 | 297343 | 288666 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48409 | 45883 | 40364 | 35492 | 27909 | 21324 | 16194 | 12956 | -2.2 | -0.8 | -2.5 | -4.9 |
| Oil | 485890 | 502788 | 457366 | 440538 | 405482 | 377234 | 349893 | 298038 | 240280 | 188670 | 142341 | -0.6 | -1.2 | -1.5 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271576 | 248550 | 234260 | 206680 | 177468 | 147177 | 124456 | 103580 | 0.1 | -0.8 | -1.8 | -3.4 |
| Electricity | 217599 | 239418 | 245271 | 254489 | 252048 | 254540 | 260468 | 262824 | 281431 | 296228 | 312482 | 1.2 | 0.3 | 0.3 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55197 | 52788 | 53266 | 56559 | 59270 | 59540 | 60160 | 1.5 | 0.3 | -0.4 | 0.6 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100128 | 118517 | 115209 | 113098 | 134845 | 157626 | 183641 | 205790 | 5.2 | 3.8 | -0.5 | 3.0 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 922 | 13571 | 25387 | 31390 | 38522 | 0.0 | 0.0 | 13.4 | 20.5 |
| **RES in Gross Final Energy Consumption (A)** | **88147** | **104692** | **149354** | **194992** | **244149** | **261570** | **290397** | **334459** | **385558** | **431496** | **468980** | **5.4** | **5.0** | **1.7** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.0** | **4250.0** | **3940.0** | **3431.6** | **2718.0** | **2031.0** | **1605.5** | **1250.7** | **-0.7** | **-1.3** | **-2.1** | **-4.9** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.7 | 1881.1 | 1740.8 | 1427.5 | 1106.0 | 738.9 | 542.1 | 360.3 | | -1.5 | -2.7 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2368.8 | 2199.2 | 2004.1 | 1612.0 | 1292.2 | 1063.4 | 890.4 | | -1.2 | -1.7 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.1** | **3218.9** | **2944.3** | **2519.7** | **2006.2** | **1518.8** | **1169.6** | **864.8** | **-0.5** | **-1.6** | **-2.4** | **-5.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.3 | 1017.4 | 908.1 | 668.7 | 445.7 | 256.1 | 156.1 | 69.3 | -0.5 | -2.7 | -4.1 | -10.7 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.8 | 122.2 | 111.3 | 95.4 | 79.6 | 66.4 | 54.8 | -0.6 | -1.4 | -2.2 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 504.2 | 461.7 | 414.3 | 328.4 | 248.9 | 199.2 | 160.9 | -2.8 | -0.3 | -1.9 | -4.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 389.0 | 351.9 | 307.1 | 247.6 | 200.2 | 155.0 | 107.1 | -0.1 | -1.6 | -2.3 | -5.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 191.4 | 169.2 | 118.0 | 103.9 | 88.4 | 71.2 | 54.8 | -0.3 | -2.6 | -4.7 | -3.8 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.2 | 900.3 | 785.1 | 645.7 | 521.7 | 417.9 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.7** | **237.6** | **220.8** | **113.0** | **73.4** | **34.8** | **-1.0** | **1.5** | **-1.4** | **-9.2** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.8** | **69.3** | **60.4** | **47.8** | **35.7** | **28.2** | **22.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE28DEC_a | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.6 | 101.3 | 88.4 | 79.9 | 73.5 | 67.5 | 62.9 | -1.2 | -2.2 | -2.6 | -1.7 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.71 | 1.41 | 1.08 | 0.84 | 0.63 | -0.7 | -0.9 | -1.3 | -4.9 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.4 | 44.9 | 41.6 | 38.0 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2108.4 | 2246.9 | 2416.3 | 2548.0 | 2766.4 | 2974.3 | 3154.9 | 3.7 | 3.0 | 1.4 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.5 | 14.5 | 14.3 | 14.4 | 14.5 | 14.4 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.6 | 81.2 | 73.6 | 64.6 | 57.4 | 52.0 | 48.1 | | -1.0 | -2.1 | -2.1 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.2 | 72.6 | 62.9 | 55.6 | 50.8 | 46.0 | 41.2 | -0.5 | -1.8 | -2.8 | -2.1 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.2 | 67.4 | 54.9 | 50.2 | 46.4 | 42.6 | 39.6 | 0.0 | -2.6 | -3.3 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.8 | 23.7 | 21.4 | 19.7 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -4.2 | -12.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.51 | 1.27 | 1.05 | 0.85 | -0.8 | -0.7 | -0.7 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.49 | 1.28 | 1.04 | 0.88 | 0.74 | -1.5 | -0.8 | -1.1 | -3.4 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.26 | 1.17 | 1.00 | 0.82 | 0.65 | 0.46 | -0.9 | -1.1 | -1.1 | -4.5 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.05 | 0.83 | 0.74 | 0.63 | 0.51 | 0.40 | -1.5 | -1.6 | -3.1 | -3.6 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.08 | 1.75 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.7 | 27.7 | 33.4 | 39.5 | 45.3 | 50.1 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.7 | 24.9 | 39.4 | 53.4 | 65.2 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887191 | 738989 | 702340 | 740054 | 816776 | 896746 | 928842 | 1031485 | -0.3 | -2.1 | 0.0 | 1.7 |
| Solids | 933660 | 974939 | 830048 | 802211 | 680083 | 629832 | 432779 | 288140 | 349610 | 413849 | 527273 | -1.2 | -2.0 | -4.4 | 1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45943 | 25921 | 21502 | 16650 | 15385 | 12995 | 9758 | 5890 | -7.1 | -11.4 | -4.3 | -5.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752725 | 688399 | 562102 | 508135 | 550300 | 591950 | 622355 | 631414 | 4.5 | -1.4 | -3.0 | 1.1 |
| Biomass-waste | 46848 | 83787 | 145901 | 190910 | 221182 | 246702 | 288607 | 330875 | 376774 | 399427 | 416538 | 12.0 | 4.2 | 2.7 | 1.9 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383935 | 398253 | 412865 | 422378 | 428244 | 434522 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 493905 | 666774 | 845061 | 959050 | 1112954 | 1241041 | 1332651 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 170576 | 218794 | 264894 | 358113 | 413029 | 443996 | 68.9 | 20.4 | 4.3 | 3.6 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 18395 | 39374 | 44906 | 55857 | 67319 | 2.5 | 5.9 | 4.3 | 6.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23588 | 39255 | 43996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930139** | **1019358** | **1060619** | **1144729** | **1201223** | **1350698** | **1414248** | **1479188** | **2.6** | **2.0** | **1.2** | **1.3** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 95269 | 99226 | 107997 | 118651 | 122740 | 135749 | -0.4 | -1.7 | -1.1 | 1.6 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440313 | 522735 | 614650 | 686494 | 805206 | 887091 | 941755 | 7.1 | 6.9 | 3.4 | 2.2 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122535 | 125565 | 131188 | 133642 | 136131 | 138195 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207219 | 268269 | 330274 | 371379 | 429150 | 474066 | 506362 | 20.7 | 9.4 | 4.8 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128896 | 155543 | 178669 | 236628 | 269739 | 287359 | 66.7 | 14.0 | 3.4 | 3.1 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5258 | 5785 | 7154 | 9839 | 0.0 | 21.3 | 7.0 | 5.7 |
| Thermal power | 398853 | 429386 | 480034 | 488089 | 467884 | 442615 | 430853 | 406733 | 426841 | 404417 | 401685 | 1.9 | -0.3 | -0.8 | -0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102206 | 111262 | 111094 | 114309 | 120483 | 126026 | 128250 | 131587 | 0.9 | 1.0 | 0.3 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1783 | 16078 | 78375 | 121021 | 176213 | 0.0 | 0.0 | 7.0 | 25.8 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141039 | 120703 | 102985 | 87183 | 93454 | 94747 | 99301 | -0.6 | -2.2 | -3.1 | -0.2 |
| Gas fired | 129190 | 169054 | 224922 | 253085 | 258726 | 256881 | 258153 | 246702 | 252869 | 226531 | 212698 | 5.7 | 1.4 | 0.0 | -1.0 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 32648 | 26149 | 22149 | 17516 | 14575 | 11145 | 9053 | -2.2 | -4.9 | -3.8 | -4.4 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34568 | 37972 | 46393 | 52324 | 62443 | 67618 | 75663 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1174 | 3009 | 3501 | 4376 | 4971 | 2.5 | 2.2 | 2.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.3 | 35.1 | 33.3 | 33.8 | 34.0 | 35.1 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.6 | 40.3 | 38.7 | 39.3 | 39.7 | 40.7 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 16.9 | 16.8 | 16.7 | 15.5 | 14.6 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.4 | 6.4 | 9.5 | 13.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 64.3 | 72.4 | 76.8 | 77.1 | 76.8 | 76.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 21.3 | 22.2 | 21.5 | 20.6 | 21.1 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 43.6 | 51.0 | 54.6 | 55.6 | 56.2 | 55.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.5** | **7862.8** | **8125.9** | **8368.6** | **8567.1** | **8778.8** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.3 | 624.3 | 650.1 | 666.0 | 687.8 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.1 | 5606.3 | 5714.1 | 5784.8 | 5856.4 | 5936.6 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.2 | 724.1 | 783.0 | 844.4 | 888.8 | 934.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.7 | 884.0 | 957.6 | 1040.6 | 1105.8 | 1168.1 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.9 | 48.6 | 50.2 | 51.7 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.8** | **3510.3** | **3635.2** | **3713.3** | **3801.1** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.7 | 2426.9 | 2502.0 | 2545.1 | 2599.1 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.0 | 640.0 | 674.4 | 698.8 | 720.4 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341130** | **335023** | **323408** | **307230** | **294916** | **286281** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7826 | 7413 | 7123 | 6756 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141053 | 131328 | 122232 | 107730 | 97534 | 90905 | 0.2 | -1.5 | -1.8 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120885 | 119497 | 116860 | 114419 | 112190 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9900 | 10061 | 10161 | 10062 | 9908 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58016 | 57997 | 56968 | 57966 | 58674 | 59224 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7087 | 7237 | 7390 | 7472 | 7558 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE30EC_a | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831440** | **799875** | **743685** | **701180** | **705973** | **762343** | **788381** | **831896** | **-1.2** | **-0.5** | **-1.3** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149881 | 137862 | 122299 | 91633 | 70653 | 78043 | 73804 | 81348 | -2.7 | -1.7 | -4.0 | -0.6 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77001 | 63361 | 51913 | 36860 | 25431 | 15030 | 9475 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149167 | 138308 | 109242 | 86359 | 72823 | 66612 | 60095 | 52276 | -2.7 | -1.4 | -4.6 | -2.5 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212643 | 256335 | 270153 | 292441 | 339288 | 395213 | 439951 | 468564 | 5.6 | 3.7 | 1.3 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33015 | 34057 | 35347 | 36238 | 36724 | 37241 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136270 | 149552 | 144438 | 147330 | 164985 | 192847 | 216951 | 232725 | 6.5 | 1.9 | -0.1 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42529 | 56256 | 70034 | 79190 | 91665 | 101234 | 107079 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22800 | 27188 | 30766 | 37543 | 45490 | 50444 | 52829 | 24.0 | 20.0 | 3.0 | 2.7 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9272 | 9255 | 10254 | 22224 | 28973 | 34597 | 38691 | 2.3 | 4.6 | 1.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967865** | **896858** | **851897** | **781960** | **703647** | **622500** | **568983** | **516147** | **1.4** | **-0.6** | **-1.4** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115986 | 92085 | 88383 | 69208 | 48698 | 34135 | 34684 | 37988 | 1.2 | -1.8 | -2.8 | -3.0 |
| Oil | 535238 | 604030 | 563977 | 551783 | 524921 | 499562 | 474115 | 424096 | 360728 | 296187 | 241093 | 0.5 | -0.7 | -1.0 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527785 | 504377 | 482326 | 460142 | 421475 | 373059 | 324755 | 280194 | 0.4 | -0.7 | -0.9 | -2.4 |
| - Oil products | 17192 | 18909 | 22737 | 23998 | 20544 | 17236 | 13972 | 2621 | -12331 | -28568 | -39101 | 2.8 | -1.0 | -3.8 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286182 | 259779 | 243145 | 215430 | 202788 | 192843 | 197665 | 191804 | 3.6 | -0.6 | -1.9 | -0.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745840** | **1641318** | **1538154** | **1424462** | **1348976** | **1324389** | **1296206** | **1285743** | **0.2** | **-0.7** | **-1.4** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265867 | 229947 | 210682 | 160840 | 119352 | 112178 | 108488 | 119336 | -1.3 | -2.0 | -3.5 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589181 | 547424 | 507485 | 469996 | 404589 | 331395 | 257310 | 196877 | -0.7 | -1.2 | -1.5 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435131 | 397168 | 350396 | 299142 | 271333 | 253765 | 250508 | 235469 | 1.2 | -1.1 | -2.8 | -1.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226686 | 278011 | 292467 | 317138 | 369094 | 431823 | 482274 | 515911 | 5.9 | 4.2 | 1.3 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.7 | 11.3 | 8.8 | 8.5 | 8.4 | 9.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.0 | 33.0 | 30.0 | 25.0 | 19.9 | 15.3 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.8 | 21.0 | 20.1 | 19.2 | 19.3 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.6 | 12.6 | 13.8 | 14.9 | 15.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.0 | 22.3 | 27.4 | 32.6 | 37.2 | 40.1 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368960 | 346100 | 341018 | 327452 | 325368 | 369662 | 414848 | 477805 | -0.5 | -0.9 | -0.6 | 1.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383240** | **342669** | **314342** | **262790** | **250347** | **285890** | **309431** | **324588** | **0.8** | **-2.0** | **-2.6** | **1.1** |
| Solids | 223038 | 228941 | 197605 | 186586 | 154012 | 144346 | 103084 | 72208 | 76026 | 79294 | 94598 | -1.2 | -2.5 | -3.9 | -0.4 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5748 | 4534 | 3408 | 2846 | 2364 | 1856 | 1411 | -6.5 | -12.0 | -5.1 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131885 | 120828 | 98403 | 80926 | 81726 | 88245 | 92479 | 85378 | 3.8 | -2.1 | -3.9 | 0.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47906 | 55284 | 60204 | 67359 | 73896 | 88093 | 96433 | 99088 | 11.7 | 2.1 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8014 | 19671 | 26030 | 31164 | 34353 | 1.6 | 3.5 | 1.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5133 | 8204 | 9760 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971007** | **902315** | **846802** | **808194** | **784669** | **760011** | **723080** | **711920** | **-0.7** | **-1.0** | **-1.1** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646610 | 612017 | 576578 | 543143 | 488133 | 425887 | 363546 | 310943 | -1.0 | -0.9 | -1.2 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24665 | 56942 | 93286 | 121756 | 146384 | 34.1 | 6.9 | -0.5 | 9.3 |
| District heating | 18667 | 19517 | 20813 | 22233 | 19528 | 16633 | 17491 | 16697 | 15087 | 13577 | 13157 | 1.1 | -0.6 | -1.1 | -1.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244740 | 228234 | 222894 | 222898 | 225752 | 224200 | 241436 | -0.6 | -1.9 | -0.9 | 0.4 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76470** | **69593** | **63435** | **57201** | **52873** | **49874** | **49702** | **0.2** | **-1.4** | **-1.9** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122388** | **120219** | **115589** | **108895** | **103746** | **99548** | **98032** | **-0.2** | **0.6** | **-0.6** | **-0.8** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170516** | **1122037** | **1051763** | **982544** | **921756** | **879825** | **844651** | **818430** | **0.3** | **-0.3** | **-1.3** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304758 | 303324 | 288362 | 272460 | 249504 | 231894 | 219876 | 215796 | -1.3 | 0.4 | -1.1 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197068 | 196069 | 185031 | 172991 | 156761 | 146989 | 137759 | 132040 | -1.5 | 0.4 | -1.2 | -1.3 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107691 | 107255 | 103331 | 99469 | 92743 | 84905 | 82117 | 83757 | -1.0 | 0.4 | -0.8 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311965 | 293837 | 265513 | 244073 | 224369 | 217458 | 208100 | 194938 | 0.8 | -0.6 | -1.8 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181919 | 167895 | 154151 | 129807 | 123577 | 122353 | 120513 | 119851 | 1.2 | -1.1 | -2.5 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343737 | 336203 | 324307 | 308120 | 296163 | 287844 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48418 | 45836 | 39463 | 33608 | 26598 | 20367 | 15504 | 12819 | -2.2 | -0.8 | -3.1 | -4.7 |
| Oil | 485890 | 502788 | 457366 | 440563 | 404972 | 373700 | 343639 | 290716 | 234082 | 184001 | 140138 | -0.6 | -1.2 | -1.6 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271582 | 246780 | 223631 | 192715 | 162950 | 132572 | 111236 | 92936 | 0.1 | -0.9 | -2.4 | -3.6 |
| Electricity | 217599 | 239418 | 245271 | 254495 | 250988 | 251095 | 251802 | 250167 | 267207 | 280010 | 293861 | 1.2 | 0.2 | 0.0 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55298 | 54920 | 52113 | 52793 | 52191 | 54294 | 53734 | 52884 | 1.5 | 0.3 | -0.4 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100093 | 118281 | 111163 | 107002 | 126549 | 148234 | 171980 | 191234 | 5.2 | 3.8 | -1.0 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 984 | 12586 | 23069 | 28187 | 34558 | 0.0 | 0.0 | 14.2 | 19.5 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194862** | **244210** | **255521** | **279728** | **318093** | **370608** | **410496** | **439323** | **5.4** | **5.0** | **1.4** | **2.3** |
| **TOTAL GHG emissions (Mt of $CO_2$ eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4235.7** | **3892.8** | **3407.3** | **2708.3** | **1990.8** | **1554.3** | **1219.1** | **-0.7** | **-1.3** | **-2.2** | **-5.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.4 | 1872.2 | 1731.4 | 1454.7 | 1147.7 | 750.6 | 532.2 | 360.2 | | -1.5 | -2.5 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2363.5 | 2161.4 | 1952.6 | 1560.6 | 1240.2 | 1022.1 | 858.9 | | -1.2 | -1.9 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3204.7** | **2897.3** | **2464.6** | **1990.7** | **1472.4** | **1107.6** | **826.3** | **-0.5** | **-1.6** | **-2.6** | **-5.3** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.2 | 1009.5 | 901.1 | 674.8 | 481.7 | 269.4 | 143.8 | 63.3 | -0.5 | -2.8 | -3.9 | -11.2 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 121.4 | 109.5 | 95.3 | 77.3 | 64.8 | 54.2 | -0.6 | -1.4 | -2.3 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 502.9 | 457.8 | 404.1 | 330.8 | 240.3 | 193.9 | 164.4 | -2.8 | -0.3 | -2.2 | -4.4 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 326.6 | 276.3 | 216.0 | 170.7 | 127.9 | 84.2 | -0.1 | -1.7 | -3.3 | -5.8 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.4 | 159.0 | 104.6 | 88.2 | 75.2 | 59.9 | 45.5 | -0.3 | -2.7 | -5.8 | -4.1 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 895.3 | 778.7 | 639.6 | 517.4 | 414.7 | 0.5 | -0.7 | -0.9 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.6** | **268.3** | **226.5** | **119.1** | **84.2** | **41.6** | **-1.0** | **1.5** | **-0.2** | **-8.9** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.5** | **59.9** | **47.6** | **35.0** | **27.3** | **21.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | | | | | EU28: EE30EC_a |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 99.6 | 85.5 | 75.5 | 69.2 | 63.2 | 58.6 | -1.2 | -2.2 | -2.9 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.73 | 1.48 | 1.11 | 0.85 | 0.64 | -0.7 | -0.9 | -1.2 | -4.8 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.9 | 45.0 | 41.9 | 38.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.8 | 2106.6 | 2268.9 | 2481.5 | 2640.5 | 2871.3 | 3135.8 | 3327.8 | 3.7 | 3.0 | 1.7 | 1.5 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.7 | 14.9 | 14.8 | 15.0 | 15.3 | 15.2 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 80.5 | 72.0 | 63.0 | 55.8 | 50.7 | 47.7 | | -1.0 | -2.2 | -2.0 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.6 | 69.0 | 58.7 | 50.2 | 45.2 | 40.1 | 34.7 | -0.5 | -1.9 | -3.4 | -2.6 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.6 | 50.1 | 44.2 | 40.6 | 37.1 | 34.2 | 0.0 | -2.6 | -4.2 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.5 | 21.2 | 19.7 | 18.5 | -0.6 | -1.6 | -2.2 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.24 | 0.22 | 0.17 | 0.12 | 0.06 | 0.03 | 0.01 | -1.6 | -3.0 | -3.8 | -12.3 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.53 | 1.28 | 1.06 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.04 | 0.88 | 0.76 | -1.5 | -0.8 | -1.1 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.13 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.40 | 2.08 | 1.75 | 1.44 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.2 | 23.6 | 27.7 | 33.6 | 40.5 | 46.3 | 50.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.0 | 25.5 | 40.3 | 54.3 | 66.0 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 737206 | 697551 | 703936 | 745532 | 805231 | 828021 | 942094 | -0.3 | -2.2 | -0.5 | 1.5 |
| Solids | 933660 | 974939 | 830048 | 802248 | 672875 | 633340 | 445974 | 290407 | 296392 | 343369 | 460318 | -1.2 | -2.1 | -4.0 | 0.2 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46138 | 25643 | 21236 | 15863 | 15003 | 12161 | 9521 | 6818 | -7.1 | -11.5 | -4.7 | -4.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752506 | 682930 | 535702 | 461222 | 485358 | 527364 | 561565 | 537679 | 4.5 | -1.5 | -3.8 | 0.8 |
| Biomass-waste | 46848 | 83787 | 145901 | 190998 | 221100 | 243967 | 279555 | 316897 | 383126 | 404743 | 419314 | 12.0 | 4.2 | 2.4 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383900 | 396014 | 411008 | 421373 | 427027 | 433031 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 494523 | 654141 | 814344 | 920816 | 1065871 | 1177141 | 1245105 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 169222 | 210907 | 256819 | 347455 | 389884 | 415082 | 68.9 | 20.4 | 3.9 | 3.4 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17408 | 35745 | 44467 | 52941 | 58842 | 2.5 | 5.9 | 3.7 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25514 | 35468 | 41738 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930117** | **1019066** | **1051883** | **1118578** | **1159634** | **1289256** | **1335777** | **1381991** | **2.6** | **2.0** | **0.9** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94547 | 95440 | 99378 | 106810 | 109859 | 124496 | -0.4 | -1.7 | -1.5 | 1.3 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440528 | 516836 | 598131 | 666532 | 779590 | 847363 | 887761 | 7.1 | 6.9 | 3.1 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122519 | 124892 | 129931 | 133343 | 135775 | 137741 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207434 | 263223 | 319570 | 357961 | 412770 | 451631 | 475383 | 20.7 | 9.4 | 4.4 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128059 | 150414 | 173458 | 227705 | 253137 | 266843 | 66.7 | 14.0 | 3.1 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5772 | 6819 | 7794 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488067 | 467376 | 440499 | 425007 | 393724 | 402856 | 378555 | 369733 | 1.9 | -0.3 | -0.9 | -0.7 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102193 | 110999 | 110785 | 112357 | 116951 | 122443 | 123037 | 127535 | 0.9 | 0.9 | 0.1 | 0.6 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 929 | 7041 | 54353 | 109237 | 152359 | 0.0 | 0.0 | 0.3 | 29.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140915 | 120678 | 101809 | 84889 | 86940 | 86592 | 90109 | -0.6 | -2.2 | -3.2 | -0.6 |
| Gas fired | 129190 | 169054 | 224922 | 253060 | 258508 | 255100 | 253809 | 236957 | 233930 | 208106 | 189793 | 5.7 | 1.4 | -0.2 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42258 | 32481 | 25979 | 21937 | 17295 | 14324 | 10933 | 8658 | -2.2 | -5.0 | -3.8 | -4.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34570 | 37832 | 46389 | 51971 | 64207 | 68787 | 76613 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1064 | 2612 | 3455 | 4137 | 4560 | 2.5 | 2.2 | 1.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 35.0 | 32.9 | 33.1 | 33.5 | 34.7 | 35.8 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.5 | 39.7 | 38.8 | 38.4 | 38.7 | 39.9 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 17.0 | 16.8 | 17.1 | 15.9 | 15.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.5 | 3.5 | 7.4 | 11.8 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.5 | 72.4 | 77.3 | 78.6 | 78.2 | 77.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.8 | 21.0 | 21.4 | 20.6 | 19.7 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.7 | 51.4 | 55.8 | 58.0 | 58.5 | 56.9 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7855.0** | **8124.7** | **8368.9** | **8550.3** | **8780.6** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.4 | 623.9 | 650.1 | 668.2 | 688.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5595.7 | 5706.9 | 5781.9 | 5833.5 | 5930.2 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.0 | 782.0 | 843.7 | 890.5 | 934.3 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.0 | 965.1 | 1044.6 | 1108.1 | 1176.5 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.7 | 48.5 | 50.1 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.6** | **3635.4** | **3713.0** | **3801.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.6 | 2426.9 | 2502.1 | 2544.8 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.2 | 640.2 | 674.5 | 698.7 | 720.5 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **333676** | **321809** | **305674** | **293781** | **285504** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7827 | 7408 | 7126 | 6777 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129744 | 120077 | 105833 | 96151 | 89639 | 0.2 | -1.5 | -1.9 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120880 | 119493 | 116856 | 114368 | 112069 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9902 | 10060 | 10154 | 10066 | 9912 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58237 | 57543 | 58324 | 58951 | 59842 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7086 | 7228 | 7382 | 7469 | 7546 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE32DEC_a | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831468** | **799964** | **740446** | **686479** | **697777** | **753848** | **786422** | **826944** | **-1.2** | **-0.5** | **-1.5** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149901 | 137886 | 121487 | 92642 | 71589 | 77783 | 74783 | 80855 | -2.7 | -1.7 | -3.9 | -0.7 |
| Oil | 176084 | 136469 | 103565 | 90643 | 77000 | 63188 | 51467 | 36453 | 24996 | 14671 | 9255 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149164 | 138410 | 108293 | 82862 | 72235 | 66426 | 60400 | 52290 | -2.7 | -1.3 | -5.0 | -2.3 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212653 | 256326 | 269236 | 288211 | 335647 | 388977 | 434247 | 462008 | 5.6 | 3.7 | 1.2 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33016 | 34060 | 35321 | 36238 | 36754 | 37250 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136279 | 149547 | 143841 | 145115 | 162264 | 189122 | 211665 | 226728 | 6.5 | 1.9 | -0.3 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42525 | 56066 | 69039 | 78836 | 91364 | 101175 | 106983 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27070 | 30051 | 37033 | 43931 | 50108 | 52354 | 24.0 | 20.0 | 2.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9242 | 9945 | 22193 | 28322 | 34545 | 38693 | 2.3 | 4.6 | 0.7 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967842** | **896951** | **845485** | **767260** | **697431** | **610672** | **560112** | **510299** | **1.4** | **-0.6** | **-1.5** | **-2.0** |
| Solids | 98273 | 125211 | 110927 | 115977 | 92086 | 86603 | 71563 | 50346 | 33547 | 35484 | 39779 | 1.2 | -1.8 | -2.5 | -2.9 |
| Oil | 535238 | 604030 | 563977 | 551775 | 524913 | 497891 | 468781 | 418135 | 352234 | 285209 | 231795 | 0.5 | -0.7 | -1.1 | -3.5 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527771 | 504350 | 481251 | 456554 | 417176 | 366720 | 316376 | 272960 | 0.4 | -0.7 | -1.0 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24004 | 20563 | 16640 | 12228 | 959 | -14487 | -31167 | -41165 | 2.8 | -1.0 | -5.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286173 | 259880 | 240341 | 203996 | 201265 | 190777 | 200167 | 194805 | 3.6 | -0.6 | -2.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745845** | **1641499** | **1528503** | **1395061** | **1334563** | **1304066** | **1285376** | **1274943** | **0.2** | **-0.7** | **-1.6** | **-0.4** |
| Solids | 321277 | 317986 | 280653 | 265879 | 229971 | 208090 | 164205 | 121935 | 111331 | 110267 | 120634 | -1.3 | -2.0 | -3.3 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589170 | 547415 | 505642 | 464217 | 398221 | 322465 | 245974 | 187359 | -0.7 | -1.2 | -1.6 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 397373 | 346644 | 284212 | 269222 | 251512 | 253315 | 238485 | 1.2 | -1.1 | -3.3 | -0.9 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226699 | 278001 | 291393 | 312616 | 365073 | 424907 | 475377 | 508027 | 5.9 | 4.2 | 1.2 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.6 | 11.8 | 9.1 | 8.5 | 8.6 | 9.5 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 33.1 | 33.3 | 29.8 | 24.7 | 19.1 | 14.7 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.7 | 20.4 | 20.2 | 19.3 | 19.7 | 18.7 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.7 | 12.3 | 13.6 | 15.0 | 15.7 | 17.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.4 | 27.4 | 32.6 | 37.0 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 346243 | 339638 | 322853 | 325994 | 372051 | 422057 | 486850 | -0.5 | -0.9 | -0.7 | 2.1 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383270** | **342902** | **311500** | **260315** | **253664** | **283396** | **315940** | **329255** | **0.8** | **-1.9** | **-2.7** | **1.2** |
| Solids | 223038 | 228941 | 197605 | 186612 | 154047 | 142724 | 108644 | 75790 | 75764 | 81507 | 95989 | -1.2 | -2.5 | -3.4 | -0.6 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10894 | 5780 | 4530 | 3342 | 2862 | 2326 | 1774 | 1382 | -6.5 | -11.9 | -5.3 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131897 | 121019 | 96899 | 72885 | 82284 | 87917 | 97108 | 89307 | 3.8 | -2.1 | -4.9 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47890 | 55259 | 60493 | 67659 | 73056 | 87612 | 96763 | 99208 | 11.7 | 2.0 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7785 | 19671 | 25422 | 31164 | 34436 | 1.6 | 3.5 | 1.4 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4354 | 7624 | 8933 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971003** | **902264** | **844055** | **794081** | **773655** | **747918** | **711552** | **700279** | **-0.7** | **-1.0** | **-1.3** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646602 | 612015 | 575176 | 538738 | 483283 | 419083 | 354850 | 303582 | -1.0 | -0.9 | -1.3 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24592 | 56290 | 90339 | 117093 | 140679 | 34.1 | 6.9 | -0.6 | 9.1 |
| District heating | 18667 | 19517 | 20813 | 22236 | 19511 | 16517 | 17100 | 16519 | 14649 | 13006 | 12337 | 1.1 | -0.6 | -1.3 | -1.6 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244709 | 227005 | 213651 | 217563 | 223847 | 226602 | 243681 | -0.6 | -1.9 | -1.3 | 0.7 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82417** | **76473** | **69205** | **62612** | **56616** | **52250** | **49421** | **49582** | **0.2** | **-1.4** | **-2.0** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122386** | **118832** | **112517** | **107050** | **102422** | **98660** | **98024** | **-0.2** | **0.6** | **-0.8** | **-0.7** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170498** | **1122131** | **1045780** | **961900** | **910592** | **865633** | **829576** | **804488** | **0.3** | **-0.3** | **-1.5** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304746 | 303294 | 284070 | 264250 | 244678 | 227059 | 218180 | 215824 | -1.3 | 0.4 | -1.4 | -1.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197056 | 196038 | 182527 | 167633 | 153488 | 142215 | 136075 | 131971 | -1.5 | 0.4 | -1.6 | -1.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107256 | 101543 | 96618 | 91190 | 84844 | 82105 | 83853 | -1.0 | 0.4 | -1.0 | -0.7 |
| Residential | 286291 | 311793 | 311545 | 311966 | 293951 | 264442 | 237183 | 222346 | 215230 | 205525 | 191961 | 0.8 | -0.6 | -2.1 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181912 | 167904 | 153537 | 124963 | 122181 | 121073 | 119121 | 118281 | 1.2 | -1.1 | -2.9 | -0.3 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343731 | 335504 | 321387 | 302271 | 286749 | 278421 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48401 | 45820 | 38896 | 32222 | 25970 | 20044 | 15289 | 12806 | -2.2 | -0.8 | -3.5 | -4.5 |
| Oil | 485890 | 502788 | 457366 | 440528 | 404993 | 373025 | 340679 | 286063 | 226544 | 173713 | 131120 | -0.6 | -1.2 | -1.7 | -4.7 |
| Gas | 266925 | 285438 | 269920 | 271568 | 246738 | 221648 | 186717 | 160769 | 131160 | 110035 | 92259 | 0.1 | -0.9 | -2.7 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254490 | 251071 | 249644 | 246274 | 249412 | 266659 | 283267 | 296658 | 1.2 | 0.2 | -0.2 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 54931 | 51874 | 51261 | 51518 | 53599 | 53119 | 52135 | 1.5 | 0.3 | -0.7 | 0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100133 | 118316 | 110095 | 103700 | 124219 | 144397 | 165330 | 184049 | 5.2 | 3.8 | -1.3 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1048 | 12642 | 23231 | 28823 | 35460 | 0.0 | 0.0 | 14.9 | 19.3 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194912** | **244213** | **254336** | **275168** | **313975** | **364278** | **403415** | **430964** | **5.4** | **5.0** | **1.2** | **2.3** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4236.3** | **3870.9** | **3380.1** | **2700.2** | **2081.7** | **1524.7** | **1198.9** | **-0.7** | **-1.3** | **-2.2** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1872.8 | 1714.7 | 1447.8 | 1156.1 | 865.4 | 535.4 | 368.1 | | -1.5 | -2.5 | -6.6 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2363.4 | 2156.1 | 1932.2 | 1544.1 | 1216.4 | 989.3 | 830.7 | | -1.2 | -2.0 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3205.3** | **2875.5** | **2434.4** | **1982.1** | **1478.9** | **1078.0** | **802.9** | **-0.5** | **-1.6** | **-2.7** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.4 | 1010.2 | 890.0 | 676.1 | 496.0 | 304.2 | 150.2 | 69.2 | -0.5 | -2.8 | -3.9 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.4 | 120.7 | 107.7 | 94.1 | 76.1 | 63.4 | 53.3 | -0.6 | -1.4 | -2.5 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 502.9 | 450.5 | 391.8 | 324.8 | 238.6 | 193.1 | 165.7 | -2.8 | -0.3 | -2.5 | -4.2 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 324.7 | 266.2 | 213.4 | 168.2 | 125.6 | 82.2 | -0.1 | -1.7 | -3.6 | -5.7 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.3 | 158.2 | 100.6 | 86.9 | 74.0 | 58.9 | 44.7 | -0.3 | -2.7 | -6.2 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 892.1 | 766.9 | 617.8 | 486.7 | 387.7 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.4** | **271.3** | **227.1** | **203.6** | **84.3** | **44.8** | **-1.0** | **1.5** | **-0.1** | **-8.6** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.1** | **59.5** | **47.5** | **36.6** | **26.8** | **21.1** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE32DEC_a | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 98.9 | 83.7 | 74.7 | 68.1 | 62.6 | 58.1 | -1.2 | -2.2 | -3.1 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.75 | 1.49 | 1.13 | 0.84 | 0.63 | -0.7 | -0.9 | -1.1 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.3 | 52.8 | 50.0 | 44.8 | 41.6 | 38.2 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.7 | 2106.6 | 2274.1 | 2526.0 | 2667.4 | 2919.6 | 3187.4 | 3355.4 | 3.7 | 3.0 | 1.8 | 1.4 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.7 | 15.2 | 14.9 | 15.2 | 15.5 | 15.3 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 79.3 | 69.9 | 61.7 | 54.7 | 50.3 | 47.7 | | -1.0 | -2.5 | -1.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.7 | 68.7 | 57.1 | 49.8 | 44.7 | 39.6 | 34.2 | -0.5 | -1.9 | -3.6 | -2.5 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.3 | 48.2 | 43.7 | 40.2 | 36.6 | 33.8 | 0.0 | -2.6 | -4.5 | -1.8 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.17 | 0.12 | 0.07 | 0.03 | 0.01 | -1.6 | -3.0 | -3.6 | -12.0 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.53 | 1.27 | 1.04 | 0.85 | -0.8 | -0.7 | -0.7 | -3.5 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.05 | 0.89 | 0.77 | -1.5 | -0.8 | -1.1 | -3.2 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.12 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.80 | 0.71 | 0.61 | 0.49 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.2 | 23.6 | 27.8 | 33.5 | 40.5 | 46.3 | 50.6 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 41.7 | 56.1 | 67.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 737094 | 695966 | 671581 | 726105 | 798952 | 840125 | 951928 | -0.3 | -2.2 | -0.9 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802441 | 673122 | 626542 | 472340 | 309132 | 296674 | 353066 | 471389 | -1.2 | -2.1 | -3.5 | 0.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46090 | 25933 | 20996 | 15476 | 14946 | 11957 | 9079 | 6804 | -7.1 | -11.4 | -5.0 | -4.0 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752382 | 683775 | 527858 | 412106 | 489498 | 545965 | 585388 | 564000 | 4.5 | -1.5 | -4.9 | 1.6 |
| Biomass-waste | 46848 | 83787 | 145901 | 190886 | 220979 | 244742 | 280971 | 313979 | 382009 | 408675 | 423080 | 12.0 | 4.2 | 2.4 | 2.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383908 | 396051 | 410707 | 421369 | 427378 | 433145 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263516 | 494482 | 651933 | 802781 | 916701 | 1062374 | 1176449 | 1243985 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 168544 | 207575 | 253072 | 332020 | 389257 | 413030 | 68.9 | 20.4 | 3.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17165 | 35769 | 43673 | 52941 | 59113 | 2.5 | 5.9 | 3.5 | 6.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21447 | 34196 | 37477 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930133** | **1019117** | **1050394** | **1107267** | **1151276** | **1276755** | **1336932** | **1383221** | **2.6** | **2.0** | **0.8** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94355 | 93074 | 97019 | 106069 | 111559 | 125868 | -0.4 | -1.7 | -1.8 | 1.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440507 | 515248 | 593178 | 662294 | 769161 | 846491 | 885789 | 7.1 | 6.9 | 3.0 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122525 | 124926 | 129886 | 133333 | 135857 | 137763 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207413 | 262092 | 316799 | 356039 | 411094 | 450743 | 474229 | 20.7 | 9.4 | 4.3 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 127596 | 148184 | 171173 | 219008 | 253072 | 265913 | 66.7 | 14.0 | 2.9 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5195 | 5726 | 6819 | 7884 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488084 | 467448 | 440791 | 421015 | 391964 | 401526 | 378882 | 371565 | 1.9 | -0.3 | -1.0 | -0.6 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102201 | 110979 | 109605 | 109469 | 114625 | 121685 | 123473 | 127484 | 0.9 | 0.9 | -0.1 | 0.8 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 7017 | 39838 | 112916 | 155344 | 0.0 | 0.0 | 0.0 | 29.3 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140919 | 120425 | 101448 | 85067 | 86716 | 86825 | 91099 | -0.6 | -2.2 | -3.2 | -0.5 |
| Gas fired | 129190 | 169054 | 224922 | 253082 | 258579 | 255752 | 250579 | 235342 | 233215 | 208211 | 190620 | 5.7 | 1.4 | -0.3 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32474 | 25963 | 21926 | 17249 | 14258 | 10845 | 8525 | -2.2 | -5.0 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34574 | 37740 | 46029 | 51694 | 63962 | 68864 | 76749 | 5.0 | 3.5 | 2.9 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1034 | 2612 | 3375 | 4137 | 4571 | 2.5 | 2.2 | 1.4 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.8 | 32.6 | 33.3 | 33.8 | 35.0 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.4 | 39.3 | 39.0 | 39.1 | 38.8 | 40.3 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.2 | 16.9 | 16.6 | 17.0 | 15.9 | 15.0 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.6 | 3.5 | 7.4 | 12.3 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.8 | 72.5 | 76.6 | 78.1 | 77.7 | 77.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.9 | 20.5 | 20.9 | 20.5 | 19.8 | 20.8 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.9 | 52.0 | 55.6 | 57.5 | 57.9 | 56.3 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7847.0** | **8107.3** | **8321.8** | **8497.6** | **8736.7** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.7 | 624.8 | 654.3 | 672.4 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5586.5 | 5687.5 | 5727.4 | 5774.6 | 5882.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.5 | 783.0 | 847.4 | 893.7 | 936.1 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.4 | 965.2 | 1044.0 | 1106.6 | 1175.4 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.8 | 48.7 | 50.3 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.8** | **3635.2** | **3713.2** | **3802.0** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.7 | 2501.4 | 2544.6 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.3 | 640.5 | 674.9 | 699.1 | 720.7 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 458.9 | 469.5 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **332999** | **318900** | **299836** | **284378** | **276091** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7830 | 7409 | 7150 | 6799 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129020 | 117139 | 99984 | 86786 | 80259 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120869 | 119477 | 116806 | 114305 | 112009 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9908 | 10070 | 10174 | 10083 | 9922 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58282 | 57569 | 58330 | 58926 | 59834 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7090 | 7236 | 7393 | 7480 | 7553 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE35DEC_a | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831443** | **798097** | **721554** | **649102** | **655124** | **708686** | **738516** | **772731** | **-1.2** | **-0.5** | **-2.0** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149894 | 138022 | 120411 | 95355 | 73147 | 68307 | 66481 | 74661 | -2.7 | -1.7 | -3.6 | -1.2 |
| Oil | 176084 | 136469 | 103565 | 90642 | 76989 | 62929 | 51072 | 36190 | 24841 | 14597 | 9226 | -5.2 | -2.9 | -4.0 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149166 | 137906 | 104415 | 74720 | 66446 | 60892 | 56113 | 48137 | -2.7 | -1.4 | -5.9 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212638 | 255227 | 261891 | 270431 | 312924 | 377010 | 420735 | 443046 | 5.6 | 3.6 | 0.6 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32948 | 33863 | 35274 | 36210 | 36682 | 37175 | 0.4 | 0.0 | 0.5 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136264 | 148525 | 138975 | 135192 | 152282 | 183737 | 206664 | 219019 | 6.5 | 1.8 | -0.9 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42457 | 54230 | 64111 | 73226 | 88366 | 97331 | 102001 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14051 | 22799 | 26599 | 27969 | 34472 | 41317 | 46941 | 48311 | 24.0 | 20.0 | 2.1 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9139 | 9295 | 17669 | 27380 | 33117 | 36540 | 2.3 | 4.6 | 0.0 | 7.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967878** | **896579** | **832192** | **746859** | **678342** | **588415** | **532890** | **485823** | **1.4** | **-0.6** | **-1.8** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115995 | 91872 | 88795 | 77135 | 54512 | 33614 | 28266 | 33117 | 1.2 | -1.9 | -1.7 | -4.1 |
| Oil | 535238 | 604030 | 563977 | 551794 | 524754 | 493926 | 462831 | 413413 | 348476 | 282617 | 230928 | 0.5 | -0.7 | -1.2 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527781 | 504232 | 478665 | 452504 | 413957 | 364112 | 314538 | 272306 | 0.4 | -0.7 | -1.1 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20523 | 15260 | 10326 | -544 | -15636 | -31921 | -41378 | 2.8 | -1.0 | -6.6 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286177 | 260000 | 229334 | 184913 | 183587 | 172925 | 183431 | 179054 | 3.6 | -0.6 | -3.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745856** | **1639260** | **1496318** | **1337283** | **1272821** | **1236646** | **1210247** | **1196253** | **0.2** | **-0.8** | **-2.0** | **-0.6** |
| Solids | 321277 | 317986 | 280653 | 265889 | 229894 | 209206 | 172490 | 127659 | 101921 | 94747 | 107778 | -1.3 | -2.0 | -2.8 | -2.3 |
| Oil | 665142 | 683909 | 620735 | 589188 | 547246 | 501416 | 457872 | 393237 | 318552 | 243308 | 186463 | -0.7 | -1.3 | -1.8 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435126 | 396988 | 331758 | 256986 | 245755 | 228128 | 232291 | 218580 | 1.2 | -1.1 | -4.3 | -0.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226679 | 276783 | 283537 | 293899 | 341494 | 412229 | 461192 | 487866 | 5.9 | 4.1 | 0.6 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 14.0 | 12.9 | 10.0 | 8.2 | 7.8 | 9.0 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.5 | 34.2 | 30.9 | 25.8 | 20.1 | 15.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 19.2 | 19.3 | 18.4 | 19.2 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.8 | 13.1 | 14.4 | 14.9 | 16.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.9 | 22.0 | 26.8 | 33.3 | 38.1 | 40.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368917 | 345669 | 330896 | 293605 | 293130 | 321803 | 358103 | 402709 | -0.5 | -0.9 | -1.6 | 1.6 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383290** | **342379** | **306462** | **251160** | **240293** | **263396** | **292881** | **305139** | **0.8** | **-2.0** | **-3.1** | **1.0** |
| Solids | 223038 | 228941 | 197605 | 186639 | 153980 | 145683 | 118800 | 82691 | 67484 | 67081 | 83372 | -1.2 | -2.5 | -2.6 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10891 | 5772 | 4526 | 3246 | 2877 | 2261 | 1759 | 1324 | -6.5 | -11.9 | -5.6 | -4.4 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131871 | 121328 | 90859 | 60242 | 71658 | 76118 | 87162 | 78514 | 3.8 | -2.0 | -6.8 | 1.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47914 | 54502 | 58541 | 61455 | 67591 | 87430 | 98490 | 99061 | 11.7 | 1.9 | 1.2 | 2.4 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7416 | 15477 | 24875 | 30256 | 32981 | 1.6 | 3.5 | 0.9 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5227 | 8133 | 9887 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970990** | **901576** | **834079** | **774053** | **751647** | **722264** | **680808** | **668964** | **-0.7** | **-1.0** | **-1.5** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646614 | 611888 | 572137 | 534023 | 479539 | 416152 | 352855 | 302891 | -1.0 | -0.9 | -1.4 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25358 | 24591 | 55183 | 89206 | 114770 | 138649 | 34.1 | 6.9 | -0.6 | 9.0 |
| District heating | 18667 | 19517 | 20813 | 22214 | 19374 | 16880 | 16836 | 15392 | 11457 | 9032 | 8466 | 1.1 | -0.7 | -1.4 | -3.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283940 | 244285 | 219705 | 198604 | 201533 | 205449 | 204150 | 218957 | -0.6 | -1.9 | -2.0 | 0.5 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82413** | **76461** | **68614** | **61707** | **55594** | **50071** | **46854** | **46409** | **0.2** | **-1.4** | **-2.1** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119320** | **122392** | **117523** | **110687** | **105453** | **101389** | **98061** | **98032** | **-0.2** | **0.6** | **-1.0** | **-0.6** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170499** | **1120502** | **1022200** | **920075** | **870767** | **825095** | **786402** | **758883** | **0.3** | **-0.3** | **-2.0** | **-1.0** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304745 | 302877 | 280054 | 258754 | 240404 | 224866 | 216668 | 215641 | -1.3 | 0.4 | -1.6 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197049 | 195802 | 180295 | 164999 | 151021 | 140128 | 134921 | 132017 | -1.5 | 0.4 | -1.7 | -1.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107696 | 107075 | 99759 | 93755 | 89383 | 84738 | 81747 | 83624 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293092 | 251791 | 215196 | 200746 | 191367 | 179003 | 162158 | 0.8 | -0.6 | -3.0 | -1.4 |
| Tertiary | 166083 | 179768 | 187856 | 181914 | 167514 | 146543 | 110285 | 107949 | 106466 | 103915 | 102487 | 1.2 | -1.1 | -4.1 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357021 | 343813 | 335840 | 321668 | 302395 | 286817 | 278598 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48392 | 45791 | 37307 | 30784 | 24756 | 19349 | 15032 | 12838 | -2.2 | -0.8 | -3.9 | -4.3 |
| Oil | 485890 | 502788 | 457366 | 440511 | 404794 | 370041 | 336053 | 282475 | 223560 | 171624 | 130236 | -0.6 | -1.2 | -1.8 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271648 | 246107 | 212814 | 172720 | 148895 | 120968 | 100246 | 84352 | 0.1 | -0.9 | -3.5 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254475 | 250763 | 243009 | 232195 | 235980 | 252502 | 267515 | 277267 | 1.2 | 0.2 | -0.8 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55309 | 54749 | 52233 | 49602 | 48996 | 49000 | 48086 | 47269 | 1.5 | 0.2 | -1.0 | -0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100099 | 118037 | 106198 | 97670 | 117922 | 138284 | 157500 | 174420 | 5.2 | 3.7 | -1.9 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1050 | 11743 | 21433 | 26399 | 32502 | 0.0 | 0.0 | 14.9 | 18.7 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194885** | **243413** | **247548** | **258410** | **295279** | **352999** | **390762** | **412300** | **5.4** | **5.0** | **0.6** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.2** | **4234.8** | **3831.5** | **3346.3** | **2731.5** | **2034.1** | **1473.0** | **1167.3** | **-0.7** | **-1.3** | **-2.3** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1873.1 | 1708.6 | 1462.8 | 1226.1 | 851.2 | 513.1 | 358.2 | | -1.5 | -2.4 | -6.8 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2361.7 | 2123.0 | 1883.6 | 1505.4 | 1182.8 | 959.9 | 809.1 | | -1.2 | -2.2 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.3** | **3203.6** | **2836.0** | **2391.9** | **1987.8** | **1421.7** | **1025.6** | **770.7** | **-0.5** | **-1.6** | **-2.9** | **-5.5** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.5 | 1010.1 | 887.4 | 682.7 | 544.4 | 283.7 | 129.8 | 58.1 | -0.5 | -2.8 | -3.8 | -11.6 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.6 | 138.6 | 119.8 | 106.6 | 92.7 | 75.0 | 62.0 | 53.0 | -0.6 | -1.4 | -2.6 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.0 | 445.3 | 390.3 | 322.6 | 235.8 | 191.3 | 167.5 | -2.8 | -0.3 | -2.5 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 301.2 | 230.4 | 184.0 | 143.8 | 103.9 | 65.0 | -0.1 | -1.7 | -5.0 | -6.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.8 | 150.8 | 88.9 | 76.4 | 65.3 | 51.8 | 39.0 | -0.3 | -2.7 | -7.3 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.1 | 931.6 | 893.1 | 767.6 | 618.1 | 486.8 | 388.0 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **275.5** | **280.0** | **252.6** | **213.1** | **85.0** | **45.4** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **67.4** | **58.9** | **48.1** | **35.8** | **25.9** | **20.5** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE35DEC_a | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 96.9 | 80.2 | 71.2 | 64.6 | 59.0 | 54.5 | -1.2 | -2.2 | -3.5 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.90 | 1.79 | 1.56 | 1.15 | 0.85 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 53.5 | 50.9 | 45.4 | 41.9 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2105.7 | 2303.6 | 2662.2 | 2800.0 | 3076.7 | 3383.6 | 3593.4 | 3.7 | 3.0 | 2.4 | 1.5 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.9 | 16.0 | 15.7 | 16.1 | 16.5 | 16.4 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 78.2 | 68.4 | 60.7 | 54.1 | 50.0 | 47.6 | | -1.0 | -2.7 | -1.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.4 | 51.8 | 44.9 | 39.8 | 34.5 | 28.9 | -0.5 | -1.9 | -4.5 | -2.9 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 42.6 | 38.6 | 35.3 | 32.0 | 29.3 | 0.0 | -2.6 | -5.7 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.18 | 0.14 | 0.07 | 0.03 | 0.01 | -1.6 | -2.9 | -3.0 | -12.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.74 | 1.55 | 1.29 | 1.06 | 0.87 | -0.8 | -0.7 | -0.5 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.51 | 1.34 | 1.05 | 0.88 | 0.78 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.20 | 1.07 | 0.92 | 0.75 | 0.58 | 0.40 | -0.9 | -1.1 | -2.0 | -4.8 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.3 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.6 | 27.4 | 33.1 | 41.4 | 47.7 | 51.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 42.3 | 57.0 | 68.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887184 | 735586 | 669229 | 614947 | 659774 | 720713 | 744717 | 842447 | -0.3 | -2.2 | -1.8 | 1.6 |
| Solids | 933660 | 974939 | 830048 | 802585 | 672393 | 640613 | 512510 | 347072 | 254027 | 279264 | 383058 | -1.2 | -2.1 | -2.7 | -1.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46106 | 25934 | 20837 | 15014 | 14592 | 11325 | 9041 | 6365 | -7.1 | -11.4 | -5.3 | -4.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 751990 | 686270 | 486846 | 332572 | 422612 | 470687 | 517385 | 495099 | 4.5 | -1.5 | -7.0 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190927 | 217341 | 235321 | 251362 | 287318 | 385914 | 420958 | 423826 | 12.0 | 4.1 | 1.5 | 2.6 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383119 | 393758 | 410167 | 421052 | 426538 | 432263 | 0.4 | 0.0 | 0.5 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 493685 | 630586 | 745477 | 851466 | 1027510 | 1131758 | 1186061 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166774 | 199365 | 242347 | 324463 | 380512 | 399815 | 68.9 | 20.4 | 3.3 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 16590 | 30867 | 42970 | 51601 | 56662 | 2.5 | 5.9 | 3.2 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26696 | 37510 | 41357 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930099** | **1018489** | **1034966** | **1069732** | **1102173** | **1232199** | **1284806** | **1313671** | **2.6** | **2.0** | **0.5** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 92030 | 88076 | 89123 | 95965 | 99041 | 111503 | -0.4 | -1.7 | -2.3 | 1.2 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440177 | 507020 | 569290 | 632812 | 751015 | 824198 | 856398 | 7.1 | 6.9 | 2.6 | 2.1 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122324 | 124437 | 129518 | 133244 | 135613 | 137475 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207087 | 255211 | 297577 | 333051 | 397636 | 434546 | 453476 | 20.7 | 9.4 | 3.7 | 2.1 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126450 | 144021 | 165061 | 214442 | 247367 | 257956 | 66.7 | 14.0 | 2.7 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5692 | 6672 | 7490 | 0.0 | 21.3 | 7.0 | 4.3 |
| Thermal power | 398853 | 429386 | 480034 | 488050 | 467150 | 435917 | 412366 | 380238 | 385220 | 361567 | 345770 | 1.9 | -0.3 | -1.2 | -0.9 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102482 | 110690 | 107069 | 106056 | 106727 | 116105 | 120128 | 122405 | 0.9 | 0.9 | -0.4 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 2079 | 31330 | 100998 | 136082 | 0.0 | 0.0 | 0.0 | 28.5 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140957 | 120336 | 101121 | 83728 | 81636 | 80081 | 80781 | -0.6 | -2.2 | -3.3 | -1.1 |
| Gas fired | 129190 | 169054 | 224922 | 253051 | 258083 | 251352 | 242831 | 225181 | 219910 | 195644 | 173275 | 5.7 | 1.4 | -0.6 | -1.7 |
| Oil fired | 67499 | 59434 | 54039 | 42249 | 32633 | 25945 | 21971 | 17654 | 14598 | 10928 | 8598 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34575 | 37374 | 45454 | 51620 | 65773 | 70898 | 78739 | 5.0 | 3.5 | 2.8 | 2.8 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 989 | 2055 | 3302 | 4016 | 4378 | 2.5 | 2.2 | 0.9 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.4 | 31.7 | 32.7 | 33.0 | 34.2 | 35.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.1 | 38.4 | 39.0 | 38.5 | 38.2 | 39.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 15.9 | 16.3 | 16.4 | 17.1 | 16.2 | 15.2 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 2.3 | 6.2 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.8 | 64.7 | 72.1 | 76.0 | 79.9 | 79.7 | 79.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.6 | 20.0 | 20.2 | 19.7 | 18.8 | 19.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 44.1 | 52.1 | 55.8 | 60.2 | 60.9 | 59.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.0** | **7452.1** | **7851.0** | **8111.2** | **8322.6** | **8497.1** | **8737.4** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.3 | 603.2 | 624.5 | 654.3 | 672.3 | 690.5 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.6 | 5410.5 | 5587.2 | 5688.6 | 5727.3 | 5773.8 | 5881.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.9 | 723.7 | 782.3 | 847.2 | 893.4 | 935.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.4 | 775.4 | 892.0 | 969.1 | 1045.2 | 1107.3 | 1178.7 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 44.9 | 46.7 | 48.6 | 50.3 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.4** | **3511.3** | **3635.6** | **3713.0** | **3801.5** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.6 | 2501.4 | 2545.0 | 2599.8 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.7 | 641.0 | 675.2 | 698.7 | 720.2 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 459.0 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354504** | **341294** | **333375** | **319214** | **299991** | **284477** | **276292** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7806 | 7825 | 7403 | 7147 | 6800 | 6514 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156774 | 141065 | 129021 | 117140 | 99985 | 86784 | 80261 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118271 | 120872 | 119462 | 116791 | 114294 | 111986 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9231 | 9910 | 10073 | 10178 | 10078 | 9918 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56124 | 58173 | 58663 | 57906 | 58498 | 59044 | 60067 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6749 | 7083 | 7229 | 7391 | 7476 | 7548 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE40DEC_a | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831467** | **798182** | **721654** | **594126** | **601760** | **645922** | **686502** | **725722** | **-1.2** | **-0.5** | **-2.9** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149909 | 138357 | 122588 | 88013 | 75580 | 67117 | 60562 | 71523 | -2.7 | -1.7 | -4.4 | -1.0 |
| Oil | 176084 | 136469 | 103565 | 90639 | 76992 | 62871 | 50594 | 35891 | 24685 | 14526 | 9193 | -5.2 | -2.9 | -4.1 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149168 | 137818 | 104402 | 65593 | 59388 | 56195 | 53182 | 45391 | -2.7 | -1.4 | -7.2 | -1.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212647 | 254989 | 258925 | 252117 | 285731 | 346347 | 397618 | 420849 | 5.6 | 3.6 | -0.1 | 2.6 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32956 | 33532 | 34287 | 35802 | 36254 | 36918 | 0.4 | 0.0 | 0.4 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136274 | 148474 | 138011 | 124759 | 141967 | 166669 | 198037 | 212409 | 6.5 | 1.8 | -1.7 | 2.7 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42272 | 52303 | 60668 | 65752 | 81456 | 90026 | 94075 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22796 | 26526 | 24785 | 30544 | 37164 | 41902 | 42969 | 24.0 | 20.0 | 0.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9129 | 8374 | 13182 | 25256 | 31400 | 34479 | 2.3 | 4.6 | -1.0 | 7.3 |
| **Net Imports** | **829314** | **988719** | **956735** | **967871** | **897192** | **834294** | **707942** | **653319** | **571662** | **512780** | **465308** | **1.4** | **-0.6** | **-2.3** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 116028 | 92380 | 91837 | 65754 | 54356 | 39287 | 28264 | 32001 | 1.2 | -1.8 | -3.3 | -3.5 |
| Oil | 535238 | 604030 | 563977 | 551788 | 524779 | 492943 | 455032 | 407527 | 344764 | 280202 | 229748 | 0.5 | -0.7 | -1.4 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504240 | 477965 | 447164 | 409846 | 361424 | 312739 | 271449 | 0.4 | -0.7 | -1.2 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20538 | 14978 | 7868 | -2320 | -16660 | -32538 | -41702 | 2.8 | -1.0 | -9.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286142 | 260089 | 229511 | 166466 | 166071 | 156056 | 166898 | 161971 | 3.6 | -0.6 | -4.4 | -0.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745873** | **1639958** | **1498520** | **1243389** | **1194435** | **1157129** | **1138123** | **1128729** | **0.2** | **-0.7** | **-2.7** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265938 | 230738 | 214425 | 153767 | 129936 | 106403 | 88826 | 103524 | -1.3 | -1.9 | -4.0 | -2.0 |
| Oil | 665142 | 683909 | 620735 | 589179 | 547273 | 500376 | 449594 | 387052 | 314684 | 240821 | 185250 | -0.7 | -1.3 | -1.9 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435092 | 396989 | 331922 | 229412 | 221181 | 206561 | 212827 | 198752 | 1.2 | -1.1 | -5.3 | -0.7 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226690 | 276534 | 280435 | 274298 | 312833 | 379722 | 436921 | 464526 | 5.9 | 4.1 | -0.1 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 14.3 | 12.4 | 10.9 | 9.2 | 7.8 | 9.2 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.4 | 36.2 | 32.4 | 27.2 | 21.2 | 16.4 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 18.5 | 18.5 | 17.9 | 18.7 | 17.6 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.1 | 12.2 | 13.1 | 14.1 | 15.8 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.7 | 22.1 | 26.2 | 32.8 | 38.4 | 41.2 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368936 | 346142 | 334042 | 261356 | 268879 | 295275 | 321605 | 369255 | -0.5 | -0.9 | -2.8 | 1.7 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383320** | **343115** | **312621** | **223213** | **227200** | **247274** | **275839** | **290789** | **0.8** | **-1.9** | **-4.2** | **1.3** |
| Solids | 223038 | 228941 | 197605 | 186660 | 154839 | 151933 | 103497 | 86710 | 71848 | 61126 | 79650 | -1.2 | -2.4 | -3.9 | -1.3 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5786 | 4352 | 3158 | 2918 | 2269 | 1707 | 1313 | -6.5 | -11.9 | -5.9 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131886 | 121199 | 91115 | 52958 | 62634 | 67127 | 79340 | 69361 | 3.8 | -2.1 | -7.9 | 1.4 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47910 | 54494 | 58369 | 56735 | 63527 | 77803 | 97239 | 99097 | 11.7 | 1.9 | 0.4 | 2.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6851 | 6864 | 11411 | 23228 | 29110 | 31632 | 1.6 | 3.5 | 0.1 | 7.9 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4999 | 7317 | 9736 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970986** | **901663** | **832719** | **742152** | **719594** | **686953** | **651670** | **641675** | **-0.7** | **-1.0** | **-1.9** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646606 | 611902 | 571290 | 527852 | 474892 | 413249 | 350939 | 301978 | -1.0 | -0.9 | -1.5 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25359 | 24595 | 53757 | 86249 | 110546 | 134920 | 34.1 | 6.9 | -0.6 | 8.9 |
| District heating | 18667 | 19517 | 20813 | 22216 | 19390 | 16564 | 12685 | 11810 | 7176 | 5305 | 4734 | 1.1 | -0.7 | -4.2 | -4.8 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283942 | 244341 | 219506 | 177020 | 179134 | 180279 | 184880 | 200043 | -0.6 | -1.9 | -3.2 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82408** | **76506** | **68665** | **59458** | **54181** | **48840** | **44715** | **44598** | **0.2** | **-1.4** | **-2.5** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122391** | **116695** | **108596** | **103913** | **100940** | **97869** | **98038** | **-0.2** | **0.6** | **-1.2** | **-0.5** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170494** | **1120654** | **1020866** | **858690** | **816464** | **776267** | **738226** | **711900** | **0.3** | **-0.3** | **-2.6** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304739 | 302929 | 278925 | 255989 | 238419 | 224364 | 216224 | 215251 | -1.3 | 0.4 | -1.7 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197042 | 195821 | 179152 | 161968 | 148782 | 139680 | 134616 | 131840 | -1.5 | 0.4 | -1.9 | -1.0 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107697 | 107107 | 99773 | 94021 | 89636 | 84684 | 81608 | 83411 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293086 | 251356 | 180244 | 169433 | 161469 | 149291 | 133559 | 0.8 | -0.6 | -4.7 | -1.5 |
| Tertiary | 166083 | 179768 | 187856 | 181915 | 167577 | 146523 | 86398 | 86442 | 87331 | 85438 | 84513 | 1.2 | -1.1 | -6.4 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357063 | 344062 | 336059 | 322170 | 303104 | 287273 | 278578 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48413 | 45741 | 36612 | 28972 | 23511 | 19266 | 14984 | 12769 | -2.2 | -0.8 | -4.5 | -4.0 |
| Oil | 485890 | 502788 | 457366 | 440495 | 404845 | 369931 | 330059 | 278025 | 220184 | 169503 | 129150 | -0.6 | -1.2 | -2.0 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271612 | 246200 | 212909 | 153899 | 134429 | 110162 | 90003 | 74938 | 0.1 | -0.9 | -4.6 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254471 | 250887 | 243332 | 211399 | 217179 | 235509 | 249796 | 258410 | 1.2 | 0.2 | -1.7 | 1.0 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 54725 | 52089 | 42745 | 42851 | 43173 | 42133 | 41944 | 1.5 | 0.2 | -2.4 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100121 | 117994 | 105396 | 90561 | 109905 | 128800 | 148145 | 165222 | 5.2 | 3.7 | -2.6 | 3.1 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1055 | 10564 | 19173 | 23662 | 29468 | 0.0 | 0.0 | 15.0 | 18.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194970** | **242986** | **244446** | **239514** | **270796** | **323447** | **366990** | **389609** | **5.4** | **5.0** | **-0.1** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.3** | **4238.7** | **3853.8** | **3185.7** | **2711.2** | **2133.0** | **1451.4** | **1123.8** | **-0.7** | **-1.3** | **-2.8** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.0 | 1876.7 | 1731.6 | 1367.8 | 1256.2 | 986.8 | 522.7 | 339.2 | | -1.5 | -3.1 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2362.0 | 2122.2 | 1817.9 | 1455.0 | 1146.2 | 928.7 | 784.6 | | -1.2 | -2.6 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.4** | **3207.3** | **2857.0** | **2230.9** | **1938.4** | **1516.5** | **1002.0** | **727.4** | **-0.5** | **-1.6** | **-3.6** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.6 | 1013.0 | 908.7 | 593.9 | 543.4 | 407.5 | 136.4 | 41.3 | -0.5 | -2.8 | -5.2 | -12.5 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 118.7 | 103.9 | 91.5 | 75.6 | 61.8 | 52.3 | -0.6 | -1.4 | -2.8 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.7 | 447.5 | 385.1 | 325.8 | 246.9 | 193.8 | 165.6 | -2.8 | -0.3 | -2.6 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 300.2 | 182.2 | 146.4 | 112.7 | 79.0 | 47.5 | -0.1 | -1.7 | -7.2 | -6.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.7 | 149.5 | 71.9 | 62.0 | 53.9 | 43.2 | 32.8 | -0.3 | -2.7 | -9.2 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.3 | 932.3 | 893.9 | 769.2 | 619.9 | 487.8 | 387.9 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.9** | **276.8** | **280.4** | **281.7** | **217.2** | **87.0** | **45.2** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.6** | **67.8** | **56.0** | **47.7** | **37.5** | **25.5** | **19.8** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE40DEC_a | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 97.0 | 74.6 | 66.9 | 60.4 | 55.5 | 51.4 | -1.2 | -2.2 | -4.2 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.79 | 1.62 | 1.31 | 0.88 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 54.4 | 52.1 | 47.0 | 42.8 | 39.1 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1890.9 | 2106.5 | 2306.4 | 3032.7 | 3129.4 | 3395.2 | 3745.7 | 4006.3 | 3.7 | 3.0 | 3.7 | 1.4 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.3 | 14.8 | 14.9 | 18.2 | 17.5 | 17.7 | 18.3 | 18.3 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 77.9 | 67.7 | 60.2 | 54.0 | 49.9 | 47.6 | | -1.0 | -2.8 | -1.7 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.3 | 43.4 | 37.9 | 33.5 | 28.7 | 23.8 | -0.5 | -1.9 | -6.2 | -3.0 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 33.4 | 30.9 | 29.0 | 26.3 | 24.2 | 0.0 | -2.6 | -8.0 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.3 | 20.7 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.17 | 0.15 | 0.10 | 0.03 | 0.01 | -1.6 | -2.9 | -3.4 | -13.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.79 | 1.60 | 1.33 | 1.09 | 0.89 | -0.8 | -0.7 | -0.3 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.60 | 1.50 | 1.37 | 1.10 | 0.90 | 0.77 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.19 | 1.01 | 0.86 | 0.70 | 0.53 | 0.36 | -0.9 | -1.1 | -2.6 | -5.1 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.02 | 0.83 | 0.72 | 0.62 | 0.51 | 0.39 | -1.5 | -1.6 | -3.0 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.05 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.3 | 27.4 | 32.6 | 40.5 | 48.0 | 52.4 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.4 | 26.3 | 42.3 | 57.5 | 68.9 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 735874 | 673556 | 536430 | 570593 | 608066 | 658356 | 759401 | -0.3 | -2.2 | -3.1 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802733 | 676404 | 666387 | 433376 | 368393 | 312489 | 244337 | 355684 | -1.2 | -2.0 | -4.4 | -1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45969 | 26009 | 19984 | 14419 | 14214 | 11321 | 8686 | 5273 | -7.1 | -11.4 | -5.7 | -4.9 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752003 | 685820 | 487963 | 290207 | 364085 | 405726 | 463517 | 434346 | 4.5 | -1.5 | -8.2 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190884 | 217533 | 234409 | 232058 | 271052 | 349523 | 422133 | 424394 | 12.0 | 4.1 | 0.6 | 3.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383210 | 389910 | 398682 | 416298 | 421554 | 429275 | 0.4 | 0.0 | 0.4 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 491540 | 608172 | 705437 | 764556 | 947168 | 1046811 | 1093895 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166878 | 186689 | 227932 | 307285 | 356600 | 373788 | 68.9 | 20.4 | 2.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15368 | 15783 | 24859 | 39611 | 48636 | 52932 | 2.5 | 5.9 | 2.7 | 6.2 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25755 | 33225 | 39996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930117** | **1017665** | **1025340** | **1040514** | **1041376** | **1159956** | **1208177** | **1231823** | **2.6** | **2.0** | **0.2** | **0.8** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 91595 | 85077 | 81388 | 81611 | 87645 | 100457 | -0.4 | -1.7 | -2.6 | 0.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439349 | 498334 | 548216 | 592728 | 708714 | 776055 | 806035 | 7.1 | 6.8 | 2.2 | 1.9 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122346 | 124018 | 126767 | 131195 | 133426 | 136486 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206259 | 246614 | 283136 | 303191 | 367918 | 402833 | 418949 | 20.7 | 9.3 | 3.2 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126407 | 137873 | 158087 | 204541 | 233861 | 244110 | 66.7 | 14.0 | 2.2 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2967 | 3188 | 4683 | 5061 | 5936 | 6491 | 0.0 | 21.3 | 6.8 | 3.6 |
| Thermal power | 398853 | 429386 | 480034 | 488068 | 467155 | 435411 | 407222 | 367261 | 369631 | 344477 | 325331 | 1.9 | -0.3 | -1.4 | -1.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102224 | 110690 | 106163 | 101682 | 99932 | 110710 | 115158 | 115917 | 0.9 | 0.9 | -0.8 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 904 | 11046 | 84221 | 127005 | 0.0 | 0.0 | 0.0 | 28.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141085 | 120710 | 101239 | 83482 | 80448 | 76328 | 77196 | -0.6 | -2.2 | -3.3 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253066 | 257793 | 250302 | 240038 | 216231 | 209465 | 183114 | 157776 | 5.7 | 1.4 | -0.7 | -2.1 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32647 | 25926 | 21875 | 17342 | 14391 | 10933 | 8611 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34727 | 37564 | 43154 | 48690 | 62243 | 70237 | 77547 | 5.0 | 3.5 | 2.2 | 3.0 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 915 | 1515 | 3084 | 3864 | 4199 | 2.5 | 2.2 | 0.1 | 7.9 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.2 | 34.8 | 29.7 | 31.8 | 32.6 | 33.7 | 35.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.0 | 37.7 | 39.0 | 39.4 | 37.6 | 38.4 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.6 | 15.5 | 16.2 | 16.2 | 17.4 | 16.6 | 15.3 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 1.3 | 4.6 | 10.2 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 63.9 | 73.7 | 75.1 | 78.5 | 80.5 | 79.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 19.1 | 19.0 | 17.9 | 17.9 | 19.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.8 | 43.2 | 54.6 | 56.2 | 60.6 | 62.5 | 60.4 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.3** | **7454.4** | **7853.0** | **8116.4** | **8331.3** | **8502.4** | **8734.5** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.8 | 575.0 | 603.0 | 623.9 | 653.4 | 671.9 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.7 | 5411.0 | 5587.4 | 5689.2 | 5730.0 | 5775.2 | 5879.3 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.4 | 722.9 | 781.4 | 845.4 | 892.1 | 935.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.8 | 778.0 | 894.9 | 975.3 | 1054.1 | 1113.0 | 1176.9 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 42.9 | 44.8 | 46.6 | 48.5 | 50.1 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.4** | **3385.7** | **3511.9** | **3635.6** | **3712.7** | **3801.2** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.2 | 2346.6 | 2426.5 | 2501.7 | 2545.0 | 2600.0 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.9 | 641.6 | 674.9 | 698.2 | 719.7 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.8 | 459.0 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354546** | **341541** | **333642** | **319752** | **300729** | **284965** | **276309** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7803 | 7826 | 7395 | 7136 | 6791 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156777 | 141081 | 129027 | 117154 | 100042 | 86814 | 80247 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118899 | 118275 | 120887 | 119476 | 116805 | 114271 | 111965 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9230 | 9895 | 10075 | 10170 | 10074 | 9915 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56163 | 58408 | 58933 | 58431 | 59201 | 59549 | 60118 | 0.9 | 1.2 | 0.5 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6745 | 7074 | 7220 | 7375 | 7467 | 7550 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

# Cost reporting method: c

| EU28: REF2012tplusF | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831587** | **806999** | **774028** | **750386** | **756269** | **758942** | **756325** | **741591** | **-1.2** | **-0.4** | **-0.7** | **-0.1** |
| Solids | 214627 | 196059 | 163855 | 149946 | 139419 | 127372 | 88814 | 78810 | 74257 | 72656 | 68963 | -2.7 | -1.6 | -4.4 | -1.3 |
| Oil | 176084 | 136469 | 103565 | 90795 | 77412 | 65152 | 55157 | 43065 | 33789 | 22982 | 16197 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149165 | 140761 | 124871 | 110507 | 103426 | 97087 | 84365 | 71349 | -2.7 | -1.2 | -2.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212589 | 257212 | 277033 | 294950 | 315867 | 335310 | 355412 | 368835 | 5.6 | 3.7 | 1.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 32955 | 34082 | 35124 | 35706 | 36025 | 36580 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136218 | 150600 | 151413 | 152531 | 154423 | 160741 | 163611 | 162741 | 6.5 | 1.9 | 0.1 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42406 | 54639 | 66346 | 73718 | 78176 | 85525 | 93351 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22777 | 28573 | 32011 | 37261 | 41669 | 45099 | 45953 | 24.0 | 20.0 | 3.5 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9248 | 9453 | 9979 | 15341 | 19017 | 25152 | 30210 | 2.3 | 4.6 | 0.8 | 5.7 |
| **Net Imports** | **829314** | **988719** | **956735** | **967965** | **909430** | **914865** | **920857** | **911994** | **917314** | **940317** | **961688** | **1.4** | **-0.5** | **0.1** | **0.2** |
| Solids | 98273 | 125211 | 110927 | 116119 | 95051 | 87995 | 85092 | 61658 | 54216 | 54638 | 54894 | 1.2 | -1.5 | -1.1 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551754 | 527894 | 519346 | 516402 | 517466 | 518318 | 527807 | 532886 | 0.5 | -0.7 | -0.2 | 0.2 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527813 | 506534 | 496537 | 490142 | 488282 | 485469 | 489278 | 488275 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23941 | 21361 | 22809 | 26260 | 29184 | 32849 | 38529 | 44612 | 2.8 | -0.6 | 2.1 | 2.7 |
| Natural gas | 193432 | 257849 | 276001 | 286188 | 266292 | 285786 | 295737 | 308333 | 317942 | 330144 | 345370 | 3.6 | -0.4 | 1.1 | 0.8 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746078** | **1660906** | **1631144** | **1611172** | **1605665** | **1611671** | **1628926** | **1632192** | **0.2** | **-0.6** | **-0.3** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266064 | 234470 | 215366 | 173905 | 140468 | 128472 | 127295 | 123857 | -1.3 | -1.8 | -2.9 | -1.7 |
| Oil | 665142 | 683909 | 620735 | 589293 | 550703 | 528750 | 514194 | 502296 | 493414 | 490670 | 487100 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435135 | 406133 | 408655 | 403538 | 407397 | 409137 | 406913 | 407615 | 1.2 | -0.9 | -0.1 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226624 | 279007 | 300279 | 320066 | 342143 | 363967 | 385020 | 399468 | 5.9 | 4.2 | 1.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 10.8 | 8.7 | 8.0 | 7.8 | 7.6 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.4 | 31.9 | 31.3 | 30.6 | 30.1 | 29.8 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 25.0 | 25.4 | 25.4 | 25.0 | 25.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.0 | 12.5 | 13.4 | 13.6 | 13.6 | 13.2 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.4 | 19.9 | 21.3 | 22.6 | 23.6 | 24.5 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369020 | 352626 | 359642 | 367834 | 384934 | 414973 | 448155 | 474233 | -0.5 | -0.7 | 0.4 | 1.3 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383279** | **350653** | **338227** | **299628** | **283107** | **287705** | **299279** | **300677** | **0.8** | **-1.7** | **-1.6** | **0.0** |
| Solids | 223038 | 228941 | 197605 | 186789 | 158213 | 143833 | 105916 | 76434 | 68124 | 69913 | 68236 | -1.2 | -2.2 | -3.9 | -2.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5907 | 5284 | 4524 | 4024 | 4157 | 4106 | 3999 | -6.5 | -11.7 | -2.6 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131860 | 124637 | 126186 | 124553 | 127862 | 129233 | 128779 | 124793 | 3.8 | -1.8 | 0.0 | 0.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47765 | 55099 | 56071 | 57403 | 62394 | 70305 | 74626 | 76713 | 11.7 | 2.0 | 0.4 | 1.5 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7232 | 12393 | 15886 | 21855 | 26937 | 1.6 | 3.5 | 0.6 | 6.8 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971213** | **907635** | **869885** | **873784** | **869927** | **857971** | **852563** | **841625** | **-0.7** | **-1.0** | **-0.4** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646759 | 614530 | 592841 | 577534 | 564620 | 552898 | 546497 | 538635 | -1.0 | -0.9 | -0.6 | -0.3 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26359 | 26690 | 26750 | 26670 | 27551 | 28879 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22289 | 20164 | 19238 | 19339 | 18308 | 17120 | 16930 | 17867 | 1.1 | -0.3 | -0.4 | -0.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283934 | 246737 | 231448 | 250222 | 260249 | 261282 | 261585 | 256244 | -0.6 | -1.8 | 0.1 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82447** | **77111** | **73795** | **70810** | **68774** | **68154** | **68439** | **68633** | **0.2** | **-1.3** | **-0.8** | **-0.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119317** | **122300** | **121539** | **121545** | **121156** | **119756** | **119349** | **119926** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170679** | **1135707** | **1129540** | **1125739** | **1126378** | **1134045** | **1145322** | **1151911** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304790 | 306458 | 305818 | 306946 | 304679 | 304286 | 307156 | 309068 | -1.3 | 0.5 | 0.0 | 0.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197097 | 197798 | 195317 | 194779 | 192244 | 190028 | 190299 | 188589 | -1.5 | 0.5 | -0.2 | -0.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107693 | 108660 | 110501 | 112167 | 112436 | 114258 | 116857 | 120479 | -1.0 | 0.5 | 0.3 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311971 | 298542 | 299594 | 296933 | 298540 | 301009 | 303725 | 303245 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181930 | 172265 | 171368 | 167259 | 168215 | 169544 | 172346 | 172611 | 1.2 | -0.9 | -0.3 | 0.2 |
| Transport | 342901 | 368665 | 367191 | 371987 | 358443 | 352759 | 354602 | 354943 | 359206 | 362096 | 366986 | 0.7 | -0.2 | -0.1 | 0.2 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48396 | 46049 | 43058 | 41182 | 39790 | 37899 | 36225 | 34454 | -2.2 | -0.8 | -1.1 | -0.9 |
| Oil | 485890 | 502788 | 457366 | 440656 | 407882 | 391518 | 379332 | 370260 | 365014 | 363481 | 361555 | -0.6 | -1.1 | -0.7 | -0.2 |
| Gas | 266925 | 285438 | 269920 | 271580 | 251689 | 251363 | 248334 | 247896 | 247261 | 245785 | 249377 | 0.1 | -0.7 | -0.1 | 0.0 |
| Electricity | 217599 | 239418 | 245271 | 254509 | 254919 | 264128 | 275763 | 286183 | 299289 | 314052 | 323069 | 1.2 | 0.4 | 0.8 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 55781 | 56041 | 55856 | 56417 | 57242 | 58019 | 58386 | 1.5 | 0.4 | 0.0 | 0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100154 | 119123 | 123004 | 124620 | 124896 | 125946 | 125902 | 122809 | 5.2 | 3.8 | 0.5 | -0.1 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1858 | 2261 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194876** | **245063** | **264319** | **282449** | **299844** | **316529** | **330560** | **342242** | **5.4** | **5.1** | **1.4** | **1.0** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.2** | **4285.8** | **4111.8** | **3785.7** | **3540.4** | **3385.4** | **3208.5** | **3125.4** | **-0.7** | **-1.2** | **-1.2** | **-1.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.3 | 1903.9 | 1829.4 | 1603.2 | 1395.2 | 1265.6 | 1097.0 | 1017.9 | | -1.3 | -1.7 | -2.2 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2382.0 | 2282.4 | 2182.5 | 2145.2 | 2119.8 | 2111.5 | 2107.5 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.2** | **3254.6** | **3114.0** | **2872.9** | **2644.0** | **2503.9** | **2425.0** | **2357.1** | **-0.5** | **-1.5** | **-1.2** | **-1.0** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.0 | 1037.0 | 969.8 | 790.8 | 618.5 | 518.0 | 459.9 | 400.7 | -0.5 | -2.5 | -2.7 | -3.3 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.4 | 130.8 | 124.3 | 116.3 | 110.5 | 106.1 | 103.4 | -0.6 | -1.4 | -1.1 | -0.9 |
| Industry | 693.6 | 640.7 | 520.3 | 538.9 | 508.4 | 492.9 | 483.8 | 457.0 | 433.4 | 425.6 | 424.0 | -2.8 | -0.2 | -0.5 | -0.7 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.2 | 350.0 | 339.2 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.4 | 181.5 | 159.5 | 151.7 | 144.9 | 140.5 | 137.5 | -0.3 | -2.4 | -2.0 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.3 | 955.3 | 950.4 | 958.0 | 960.7 | 968.4 | 0.5 | -0.7 | -0.3 | 0.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.8** | **238.5** | **225.6** | **210.1** | **105.5** | **84.2** | **-1.0** | **1.5** | **-1.4** | **-5.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **72.3** | **66.6** | **62.3** | **59.6** | **56.4** | **55.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: REF2012tplusF | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.6 | 96.7 | 89.9 | 84.2 | 79.4 | 74.4 | -1.2 | -2.1 | -1.9 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.78 | 1.65 | 1.55 | 1.49 | 1.44 | -0.7 | -0.9 | -0.9 | -1.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.2 | 55.1 | 54.7 | 54.7 | 55.4 | 56.5 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.3 | 1716.1 | 1775.1 | 1847.1 | 1895.1 | 1961.5 | 2038.9 | 2100.2 | 3.4 | 1.9 | 0.7 | 0.6 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.1 | 10.6 | 10.2 | 9.9 | 9.6 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 81.1 | 76.9 | 73.3 | 70.8 | 68.3 | | -0.9 | -1.2 | -0.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.8 | 62.5 | 58.5 | 54.1 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.8 | 64.6 | 60.2 | 56.2 | 53.0 | 49.3 | 0.0 | -2.4 | -2.0 | -1.3 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.8 | 24.3 | 24.0 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.18 | 0.13 | 0.11 | 0.09 | 0.08 | -1.6 | -2.8 | -3.2 | -4.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.74 | 1.69 | 1.65 | 1.62 | 1.61 | -0.8 | -0.7 | -0.5 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.58 | 1.50 | 1.42 | 1.39 | 1.37 | -1.5 | -0.7 | -0.5 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.09 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.95 | 0.90 | 0.85 | 0.81 | 0.80 | -1.5 | -1.6 | -1.7 | -0.9 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 22.7 | 24.4 | 25.8 | 27.0 | 27.9 | 28.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.0 | 12.5 | 12.9 | 13.4 | 14.1 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887133 | 744275 | 700745 | 798536 | 868963 | 899072 | 923584 | 925368 | -0.3 | -2.1 | 0.7 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 802985 | 695187 | 634705 | 475408 | 338823 | 316001 | 348162 | 364411 | -1.2 | -1.8 | -3.7 | -1.3 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46047 | 26351 | 24719 | 20367 | 20887 | 21379 | 22072 | 21396 | -7.1 | -11.2 | -2.5 | 0.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752612 | 707159 | 724245 | 738503 | 771635 | 789791 | 800906 | 787806 | 4.5 | -1.2 | 0.4 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190537 | 221059 | 232213 | 244380 | 272146 | 315813 | 329348 | 341583 | 12.0 | 4.2 | 1.0 | 1.7 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383199 | 396304 | 408416 | 415190 | 418892 | 425350 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263519 | 493091 | 635340 | 771467 | 857183 | 909025 | 994478 | 1085475 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 176869 | 206134 | 250245 | 305813 | 332001 | 347866 | 68.9 | 20.4 | 3.7 | 2.7 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 14959 | 15945 | 22307 | 27156 | 40804 | 48243 | 2.5 | 5.9 | 2.8 | 5.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930091** | **1020608** | **1068184** | **1139437** | **1200565** | **1276176** | **1332501** | **1384829** | **2.6** | **2.0** | **1.1** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96620 | 107067 | 115262 | 119221 | 122229 | 122236 | -0.4 | -1.7 | -0.4 | 0.7 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439930 | 518253 | 583930 | 638972 | 695773 | 745304 | 788875 | 7.1 | 6.9 | 2.9 | 1.5 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122425 | 124880 | 128891 | 130589 | 132262 | 134472 | 1.0 | 0.7 | 0.3 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206837 | 259330 | 306665 | 336105 | 356156 | 386066 | 416514 | 20.7 | 9.4 | 4.0 | 1.5 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 133698 | 149351 | 170783 | 205486 | 220708 | 230983 | 66.7 | 14.0 | 3.0 | 2.2 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2800 | 3033 | 3193 | 3542 | 6268 | 6906 | 0.0 | 21.3 | 6.2 | 4.2 |
| Thermal power | 398853 | 429386 | 480034 | 488042 | 469516 | 453312 | 448440 | 446331 | 461183 | 464968 | 473718 | 1.9 | -0.2 | -0.5 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102082 | 112459 | 114394 | 114917 | 120643 | 127184 | 136115 | 138177 | 0.9 | 1.1 | 0.2 | 0.9 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1614 | 7554 | 18146 | 34422 | 38409 | 0.0 | 0.0 | 6.0 | 17.2 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 121308 | 103796 | 90400 | 87684 | 86635 | 81361 | -0.6 | -2.1 | -3.1 | -1.2 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259228 | 266067 | 280845 | 291675 | 296751 | 298216 | 302087 | 5.7 | 1.4 | 0.8 | 0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 33187 | 27457 | 23519 | 19708 | 20759 | 19695 | 21359 | -2.2 | -4.8 | -3.4 | -0.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34666 | 37570 | 39320 | 42903 | 53878 | 57521 | 65334 | 5.0 | 3.5 | 1.3 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 960 | 1645 | 2109 | 2901 | 3576 | 2.5 | 2.2 | 0.6 | 6.8 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 36.2 | 35.4 | 35.0 | 34.5 | 34.7 | 34.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.3 | 42.7 | 43.1 | 43.7 | 43.9 | 44.2 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.5 | 16.1 | 16.4 | 16.8 | 16.7 | 16.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.7 | 3.4 | 5.0 | 6.9 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 60.8 | 66.3 | 70.3 | 71.8 | 72.2 | 73.0 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.9 | 21.8 | 22.8 | 22.5 | 21.9 | 21.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 40.9 | 44.6 | 47.5 | 49.3 | 50.2 | 51.7 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7494.3** | **7964.8** | **8291.0** | **8630.6** | **8887.9** | **9151.0** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.3 | 600.9 | 620.7 | 642.2 | 656.8 | 671.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.8 | 5711.8 | 5881.1 | 6051.7 | 6176.6 | 6302.7 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.0 | 720.7 | 775.2 | 829.4 | 867.0 | 904.4 | 1.0 | 1.6 | 2.1 | 1.1 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 775.3 | 886.4 | 967.5 | 1059.2 | 1138.1 | 1221.5 | 1.4 | 2.6 | 2.7 | 1.6 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.6 | 48.1 | 49.4 | 50.6 | -0.9 | 0.7 | 0.9 | 0.6 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.8** | **3564.2** | **3709.0** | **3806.2** | **3904.6** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.2 | 2492.9 | 2593.3 | 2659.8 | 2731.0 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.9 | 631.8 | 663.1 | 684.1 | 702.1 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.6 | 439.5 | 452.6 | 462.3 | 471.5 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350138** | **351907** | **352189** | **356402** | **359261** | **364112** | **0.7** | **-0.3** | **-0.1** | **0.2** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7915 | 7986 | 8113 | 8157 | 8235 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145691 | 141615 | 140285 | 140674 | 141079 | 142285 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122576 | 127381 | 129214 | 131227 | 132138 | 133971 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9823 | 9955 | 10003 | 9856 | 9635 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58139 | 58115 | 57554 | 59065 | 60644 | 62563 | 0.9 | 1.2 | 0.4 | 0.4 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7059 | 7195 | 7320 | 7386 | 7423 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EEREF2012tp | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831603** | **807039** | **768617** | **759481** | **762551** | **773611** | **772270** | **756520** | **-1.2** | **-0.4** | **-0.6** | **0.0** |
| Solids | 214627 | 196059 | 163855 | 149978 | 139407 | 124742 | 85254 | 68644 | 68188 | 65787 | 70844 | -2.7 | -1.6 | -4.8 | -0.9 |
| Oil | 176084 | 136469 | 103565 | 90791 | 77413 | 65119 | 55076 | 43039 | 33760 | 22939 | 16155 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149149 | 140909 | 124742 | 107197 | 99034 | 94013 | 82152 | 69868 | -2.7 | -1.2 | -2.7 | -2.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212593 | 257179 | 281188 | 327166 | 362268 | 383030 | 404022 | 404702 | 5.6 | 3.7 | 2.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33035 | 34543 | 35845 | 36525 | 36945 | 37347 | 0.4 | 0.0 | 0.7 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136223 | 150582 | 151760 | 170091 | 174442 | 181727 | 186996 | 179818 | 6.5 | 1.9 | 1.2 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42384 | 58213 | 74562 | 84338 | 88134 | 95665 | 100008 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22785 | 28727 | 33075 | 38333 | 43412 | 46834 | 47258 | 24.0 | 20.0 | 3.8 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9247 | 9453 | 14895 | 29310 | 33231 | 37582 | 40271 | 2.3 | 4.6 | 4.9 | 5.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967983** | **909455** | **911750** | **890923** | **885671** | **892039** | **906624** | **937124** | **1.4** | **-0.5** | **-0.2** | **0.3** |
| Solids | 98273 | 125211 | 110927 | 116118 | 94901 | 86721 | 75633 | 56766 | 46073 | 42460 | 48371 | 1.2 | -1.5 | -2.2 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551740 | 527919 | 519052 | 515366 | 517145 | 518000 | 526469 | 531046 | 0.5 | -0.7 | -0.2 | 0.1 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527800 | 506550 | 496323 | 489514 | 488315 | 485583 | 488871 | 487639 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23940 | 21370 | 22729 | 25852 | 28830 | 32417 | 37597 | 43407 | 2.8 | -0.6 | 1.9 | 2.6 |
| Natural gas | 193432 | 257849 | 276001 | 286216 | 266445 | 284172 | 273437 | 283704 | 297630 | 305955 | 326010 | 3.6 | -0.4 | 0.3 | 0.9 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746112** | **1660971** | **1622617** | **1590334** | **1585625** | **1601066** | **1611178** | **1622558** | **0.2** | **-0.6** | **-0.4** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266096 | 234308 | 211463 | 160887 | 125410 | 114262 | 108248 | 119215 | -1.3 | -1.8 | -3.7 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589276 | 550730 | 528423 | 513078 | 501948 | 493067 | 489287 | 485218 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435148 | 406434 | 406912 | 377929 | 378376 | 385751 | 380511 | 386774 | 1.2 | -0.9 | -0.7 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226630 | 278971 | 304500 | 355144 | 392066 | 415184 | 437641 | 438502 | 5.9 | 4.2 | 2.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.0 | 10.1 | 7.9 | 7.1 | 6.7 | 7.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.6 | 32.3 | 31.7 | 30.8 | 30.4 | 29.9 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 23.8 | 23.9 | 24.1 | 23.6 | 23.8 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 10.7 | 11.6 | 12.0 | 12.2 | 12.3 | 12.0 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.8 | 22.3 | 24.7 | 25.9 | 27.2 | 27.0 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369057 | 352584 | 355557 | 360733 | 379366 | 423931 | 450668 | 490285 | -0.5 | -0.7 | 0.2 | 1.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383287** | **350708** | **332646** | **288803** | **277186** | **288098** | **292659** | **303342** | **0.8** | **-1.7** | **-1.9** | **0.2** |
| Solids | 223038 | 228941 | 197605 | 186820 | 158055 | 139972 | 94843 | 63404 | 54962 | 53043 | 66290 | -1.2 | -2.2 | -5.0 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10882 | 5905 | 5166 | 4432 | 4145 | 3946 | 3881 | 3933 | -6.5 | -11.7 | -2.8 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131875 | 124913 | 124644 | 107638 | 104907 | 112247 | 110239 | 109159 | 3.8 | -1.8 | -1.5 | 0.1 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47734 | 55038 | 56010 | 69740 | 78362 | 86837 | 91211 | 86960 | 11.7 | 2.0 | 2.4 | 1.1 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 12149 | 26368 | 30105 | 34285 | 37000 | 1.6 | 3.5 | 6.0 | 5.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971267** | **907652** | **863046** | **853513** | **842500** | **833304** | **827128** | **817913** | **-0.7** | **-1.0** | **-0.6** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646746 | 614553 | 592625 | 576768 | 564502 | 552799 | 545771 | 537607 | -1.0 | -0.9 | -0.6 | -0.4 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26358 | 26693 | 26752 | 26670 | 27518 | 28765 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22356 | 20225 | 19400 | 20165 | 19713 | 19207 | 18301 | 19022 | 1.1 | -0.3 | 0.0 | -0.3 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283933 | 246672 | 224664 | 229887 | 231533 | 234629 | 235539 | 232520 | -0.6 | -1.9 | -0.7 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82441** | **77114** | **73358** | **69035** | **67496** | **68305** | **68067** | **69841** | **0.2** | **-1.3** | **-1.1** | **0.1** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122303** | **121539** | **121555** | **121161** | **119760** | **119345** | **119914** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170647** | **1135779** | **1128931** | **1122601** | **1123096** | **1133454** | **1140807** | **1146350** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304797 | 306480 | 305658 | 304669 | 303472 | 306200 | 306833 | 309171 | -1.3 | 0.5 | -0.1 | 0.1 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197107 | 197778 | 195190 | 193640 | 191295 | 192262 | 189981 | 188173 | -1.5 | 0.5 | -0.2 | -0.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107689 | 108701 | 110468 | 111029 | 112177 | 113938 | 116852 | 120998 | -1.0 | 0.5 | 0.2 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311942 | 298600 | 299525 | 296866 | 298046 | 300500 | 302878 | 302160 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181920 | 172256 | 171034 | 166580 | 167238 | 168512 | 171020 | 171155 | 1.2 | -0.9 | -0.3 | 0.1 |
| Transport | 342901 | 368665 | 367191 | 371988 | 358443 | 352714 | 354487 | 354340 | 358241 | 360076 | 363863 | 0.7 | -0.2 | -0.1 | 0.1 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48387 | 46039 | 43054 | 40853 | 39199 | 37796 | 35424 | 33225 | -2.2 | -0.8 | -1.2 | -1.0 |
| Oil | 485890 | 502788 | 457366 | 440593 | 407865 | 391561 | 379259 | 370256 | 364917 | 362479 | 359464 | -0.6 | -1.1 | -0.7 | -0.3 |
| Gas | 266925 | 285438 | 269920 | 271625 | 251721 | 251100 | 239185 | 241483 | 241473 | 238544 | 244010 | 0.1 | -0.7 | -0.5 | 0.1 |
| Electricity | 217599 | 239418 | 245271 | 254518 | 254958 | 263298 | 273814 | 283397 | 299364 | 311037 | 319921 | 1.2 | 0.4 | 0.7 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 55800 | 56261 | 57373 | 57090 | 57454 | 57545 | 56575 | 1.5 | 0.4 | 0.3 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100144 | 119133 | 123229 | 131465 | 130736 | 131057 | 133922 | 130898 | 5.2 | 3.8 | 1.0 | 0.0 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1856 | 2257 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194777** | **245087** | **269100** | **315349** | **338256** | **357293** | **373697** | **372667** | **5.4** | **5.1** | **2.6** | **0.8** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.3** | **4285.9** | **4088.6** | **3657.4** | **3380.7** | **3093.8** | **2980.3** | **2920.6** | **-0.7** | **-1.2** | **-1.6** | **-1.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.6 | 1903.8 | 1806.5 | 1491.9 | 1244.5 | 981.4 | 885.9 | 826.5 | | -1.3 | -2.4 | -2.9 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2382.1 | 2282.0 | 2165.6 | 2136.2 | 2112.4 | 2094.4 | 2094.2 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.3** | **3254.7** | **3091.1** | **2748.3** | **2487.2** | **2316.4** | **2227.3** | **2173.0** | **-0.5** | **-1.5** | **-1.7** | **-1.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.3 | 1037.1 | 948.5 | 700.2 | 488.8 | 348.8 | 291.3 | 246.1 | -0.5 | -2.5 | -3.9 | -5.1 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.5 | 130.2 | 118.8 | 113.4 | 108.9 | 104.9 | 102.7 | -0.6 | -1.4 | -1.6 | -0.7 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 508.3 | 491.3 | 454.5 | 432.6 | 417.1 | 400.8 | 401.0 | -2.8 | -0.2 | -1.1 | -0.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.1 | 349.9 | 339.1 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.5 | 182.1 | 160.7 | 153.8 | 147.1 | 143.1 | 140.3 | -0.3 | -2.4 | -1.9 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.2 | 955.0 | 948.7 | 955.3 | 955.1 | 959.7 | 0.5 | -0.7 | -0.3 | 0.0 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.5** | **234.8** | **222.7** | **106.0** | **75.0** | **63.6** | **-1.0** | **1.5** | **-1.5** | **-6.3** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **71.9** | **64.3** | **59.5** | **54.4** | **52.4** | **51.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EEREF2012tp | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.0 | 95.4 | 88.7 | 83.6 | 78.5 | 73.9 | -1.2 | -2.1 | -2.0 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.90 | 1.73 | 1.57 | 1.45 | 1.38 | 1.34 | -0.7 | -0.9 | -1.2 | -1.3 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.3 | 54.0 | 53.7 | 53.6 | 54.0 | 55.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.2 | 1715.7 | 1777.9 | 1850.0 | 1900.7 | 1978.7 | 2042.6 | 2097.7 | 3.4 | 1.9 | 0.8 | 0.6 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.1 | 10.6 | 10.3 | 10.0 | 9.6 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 80.5 | 76.6 | 73.7 | 70.7 | 68.3 | | -0.9 | -1.2 | -0.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.7 | 62.4 | 58.3 | 53.9 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.7 | 64.3 | 59.8 | 55.9 | 52.6 | 48.9 | 0.0 | -2.4 | -2.0 | -1.4 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.7 | 24.2 | 23.7 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.11 | 0.07 | 0.06 | 0.05 | -1.6 | -2.8 | -4.4 | -5.8 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.68 | 1.64 | 1.61 | 1.59 | -0.8 | -0.7 | -0.6 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.49 | 1.43 | 1.36 | 1.31 | 1.30 | -1.5 | -0.8 | -1.1 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.10 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.96 | 0.92 | 0.87 | 0.84 | 0.82 | -1.5 | -1.5 | -1.6 | -0.8 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 23.2 | 27.3 | 29.2 | 30.5 | 31.6 | 31.3 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.2 | 12.9 | 13.2 | 13.8 | 14.3 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887134 | 744027 | 674641 | 728730 | 757233 | 793580 | 819198 | 830918 | -0.3 | -2.1 | -0.2 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 803284 | 694245 | 616329 | 423482 | 286975 | 279546 | 289864 | 383486 | -1.2 | -1.8 | -4.8 | -0.5 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46006 | 26248 | 24143 | 21609 | 21936 | 20680 | 21092 | 21014 | -7.1 | -11.3 | -1.9 | -0.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752631 | 709359 | 712182 | 650916 | 656965 | 698438 | 685021 | 684939 | 4.5 | -1.1 | -0.9 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190393 | 220804 | 230831 | 301859 | 347900 | 395384 | 411046 | 386208 | 12.0 | 4.2 | 3.2 | 1.2 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384124 | 401665 | 416802 | 424714 | 429587 | 434269 | 0.4 | 0.0 | 0.7 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 492833 | 676897 | 867003 | 980678 | 1024811 | 1112385 | 1162884 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 177766 | 215788 | 257904 | 316342 | 342089 | 352437 | 68.9 | 20.4 | 4.2 | 2.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 24101 | 42581 | 52683 | 64351 | 69255 | 2.5 | 5.9 | 7.1 | 5.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930079** | **1020452** | **1083464** | **1176138** | **1248640** | **1330980** | **1376611** | **1411747** | **2.6** | **2.0** | **1.4** | **0.9** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96796 | 98875 | 100424 | 104980 | 108188 | 109688 | -0.4 | -1.7 | -1.2 | 0.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439843 | 535831 | 627363 | 695178 | 751925 | 801282 | 828136 | 7.1 | 6.8 | 3.6 | 1.4 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122643 | 127080 | 132075 | 134547 | 136767 | 138749 | 1.0 | 0.7 | 0.5 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206749 | 276105 | 342752 | 383896 | 402069 | 432537 | 449562 | 20.7 | 9.4 | 5.2 | 1.4 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 134048 | 153503 | 174390 | 208118 | 221989 | 229103 | 66.7 | 14.0 | 3.3 | 2.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 4029 | 4817 | 7192 | 9989 | 10722 | 0.0 | 21.3 | 9.3 | 5.0 |
| Thermal power | 398853 | 429386 | 480034 | 488029 | 469448 | 450838 | 449899 | 453037 | 474075 | 467141 | 473922 | 1.9 | -0.2 | -0.4 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102095 | 112523 | 115228 | 121759 | 127854 | 135206 | 144381 | 147777 | 0.9 | 1.1 | 0.8 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1217 | 11168 | 46040 | 53428 | 76417 | 0.0 | 0.0 | 3.0 | 23.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 120625 | 99240 | 84100 | 80329 | 76657 | 76662 | -0.6 | -2.1 | -3.5 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259247 | 263993 | 272388 | 285689 | 296238 | 284709 | 282117 | 5.7 | 1.4 | 0.5 | 0.2 |
| Oil fired | 67499 | 59434 | 54039 | 42242 | 33119 | 27379 | 23315 | 19619 | 19190 | 19793 | 22407 | -2.2 | -4.8 | -3.4 | -0.2 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34646 | 37931 | 53343 | 60129 | 74321 | 81430 | 87824 | 5.0 | 3.5 | 4.4 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1613 | 3500 | 3996 | 4551 | 4912 | 2.5 | 2.2 | 6.0 | 5.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 35.6 | 34.1 | 33.3 | 33.0 | 33.2 | 33.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.2 | 42.1 | 41.7 | 42.7 | 42.5 | 43.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.7 | 17.8 | 17.8 | 17.0 | 15.8 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 2.5 | 6.2 | 7.3 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 61.5 | 69.8 | 74.4 | 75.1 | 76.1 | 74.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.2 | 20.0 | 20.1 | 19.8 | 19.6 | 19.2 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 42.3 | 49.8 | 54.3 | 55.3 | 56.5 | 55.6 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7493.9** | **7963.7** | **8283.6** | **8618.3** | **8861.3** | **9109.6** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.4 | 601.0 | 621.5 | 643.4 | 659.5 | 675.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.7 | 5711.6 | 5879.5 | 6048.7 | 6170.1 | 6292.1 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.1 | 720.9 | 776.4 | 831.5 | 871.5 | 911.6 | 1.0 | 1.6 | 2.1 | 1.2 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 774.9 | 885.2 | 959.4 | 1046.3 | 1110.3 | 1178.7 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.8 | 48.4 | 49.9 | 51.4 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.4** | **3563.5** | **3708.0** | **3804.2** | **3902.3** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.3 | 2493.0 | 2593.4 | 2659.9 | 2730.9 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.5 | 631.1 | 662.2 | 682.4 | 700.3 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.5 | 439.4 | 452.4 | 461.9 | 471.1 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350095** | **351819** | **351611** | **355469** | **357288** | **361034** | **0.7** | **-0.3** | **-0.1** | **0.1** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7917 | 7993 | 8124 | 8179 | 8267 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145688 | 141628 | 140278 | 140656 | 140994 | 142096 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122573 | 127385 | 129218 | 131228 | 132137 | 133974 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9818 | 9947 | 9991 | 9841 | 9620 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58101 | 58010 | 56970 | 58131 | 58713 | 59598 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7060 | 7206 | 7338 | 7423 | 7478 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE25DEC_c | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831444** | **803947** | **765326** | **741079** | **792186** | **865854** | **914808** | **969301** | **-1.2** | **-0.5** | **-0.8** | **1.4** |
| Solids | 214627 | 196059 | 163855 | 149857 | 138706 | 123526 | 79364 | 75176 | 86364 | 85004 | 95055 | -2.7 | -1.7 | -5.4 | 0.9 |
| Oil | 176084 | 136469 | 103565 | 90650 | 77089 | 63740 | 52994 | 38066 | 26283 | 15501 | 9717 | -5.2 | -2.9 | -3.7 | -8.1 |
| Natural gas | 209437 | 190678 | 158525 | 149175 | 139739 | 117107 | 98366 | 86336 | 77911 | 72198 | 62656 | -2.7 | -1.3 | -3.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212656 | 256956 | 280618 | 320040 | 376215 | 437494 | 495696 | 542420 | 5.6 | 3.7 | 2.2 | 2.7 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33025 | 34206 | 35763 | 36482 | 36980 | 37600 | 0.4 | 0.0 | 0.6 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136284 | 150330 | 150673 | 162906 | 184375 | 212922 | 244428 | 268747 | 6.5 | 1.9 | 0.8 | 2.5 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42397 | 59186 | 76354 | 87526 | 103384 | 113076 | 122446 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22796 | 28247 | 34224 | 42054 | 51533 | 60737 | 65708 | 24.0 | 20.0 | 4.1 | 3.3 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9252 | 9486 | 12350 | 26497 | 33173 | 40474 | 47919 | 2.3 | 4.6 | 2.9 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967825** | **903668** | **875647** | **835281** | **771247** | **697164** | **652326** | **609655** | **1.4** | **-0.6** | **-0.8** | **-1.6** |
| Solids | 98273 | 125211 | 110927 | 115959 | 93849 | 84961 | 66850 | 50931 | 42165 | 47070 | 54267 | 1.2 | -1.7 | -3.3 | -1.0 |
| Oil | 535238 | 604030 | 563977 | 551776 | 526129 | 506067 | 490765 | 445719 | 380361 | 311606 | 250227 | 0.5 | -0.7 | -0.7 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527783 | 505240 | 486722 | 471795 | 436711 | 386824 | 335671 | 286898 | 0.4 | -0.7 | -0.7 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23992 | 20889 | 19345 | 18970 | 9008 | -6462 | -24065 | -36671 | 2.8 | -0.8 | -1.0 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286170 | 263551 | 262916 | 252177 | 243394 | 236661 | 248595 | 253511 | 3.6 | -0.5 | -0.4 | 0.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745803** | **1652199** | **1583545** | **1517682** | **1502789** | **1502564** | **1505976** | **1516655** | **0.2** | **-0.7** | **-0.8** | **0.0** |
| Solids | 321277 | 317986 | 280653 | 265816 | 232554 | 208487 | 146214 | 126107 | 128529 | 132074 | 149323 | -1.3 | -1.9 | -4.5 | 0.1 |
| Oil | 665142 | 683909 | 620735 | 589177 | 548720 | 514369 | 487727 | 427419 | 351879 | 273200 | 206253 | -0.7 | -1.2 | -1.2 | -4.2 |
| Natural gas | 396145 | 448380 | 444428 | 435128 | 402372 | 378032 | 347896 | 325453 | 308882 | 313541 | 307557 | 1.2 | -1.0 | -1.4 | -0.6 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226705 | 278698 | 303830 | 347021 | 409159 | 477290 | 542631 | 596166 | 5.9 | 4.2 | 2.2 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 9.6 | 8.4 | 8.6 | 8.8 | 9.8 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.5 | 32.1 | 28.4 | 23.4 | 18.1 | 13.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.4 | 23.9 | 22.9 | 21.7 | 20.6 | 20.8 | 20.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.4 | 12.5 | 14.4 | 15.8 | 16.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.2 | 22.9 | 27.2 | 31.8 | 36.0 | 39.3 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 349448 | 346313 | 354118 | 384977 | 469412 | 537575 | 628480 | -0.5 | -0.8 | 0.1 | 2.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383167** | **347005** | **319581** | **263260** | **276844** | **318740** | **355937** | **387617** | **0.8** | **-1.8** | **-2.7** | **2.0** |
| Solids | 223038 | 228941 | 197605 | 186548 | 156397 | 139728 | 83915 | 71852 | 83291 | 92584 | 113913 | -1.2 | -2.3 | -6.0 | 1.5 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10903 | 5853 | 4753 | 3682 | 3106 | 2605 | 2131 | 1453 | -6.5 | -11.8 | -4.5 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131882 | 122847 | 107176 | 93753 | 98940 | 105870 | 115096 | 114231 | 3.8 | -1.9 | -2.7 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47857 | 55113 | 61019 | 72167 | 79529 | 91656 | 101837 | 106318 | 11.7 | 2.0 | 2.7 | 2.0 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6905 | 9744 | 23417 | 29558 | 36119 | 41961 | 1.6 | 3.5 | 3.7 | 7.6 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5760 | 8170 | 9741 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971028** | **905006** | **855510** | **834844** | **839867** | **831019** | **800692** | **783325** | **-0.7** | **-1.0** | **-0.8** | **-0.3** |
| Refineries | 740500 | 763156 | 670015 | 646609 | 612971 | 581569 | 556452 | 505593 | 441463 | 375620 | 318228 | -1.0 | -0.9 | -1.0 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24912 | 60738 | 102228 | 133347 | 162195 | 34.1 | 6.9 | -0.4 | 9.8 |
| District heating | 18667 | 19517 | 20813 | 22253 | 20061 | 17368 | 17959 | 16226 | 13430 | 11832 | 12670 | 1.1 | -0.4 | -1.1 | -1.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283945 | 245945 | 231217 | 235520 | 257309 | 273897 | 279893 | 290233 | -0.6 | -1.9 | -0.4 | 1.0 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76779** | **70555** | **65335** | **61094** | **59588** | **57117** | **57871** | **0.2** | **-1.4** | **-1.6** | **-0.6** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122348** | **121118** | **118980** | **116711** | **112934** | **111914** | **111803** | **-0.2** | **0.6** | **-0.3** | **-0.3** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170526** | **1129628** | **1091988** | **1064222** | **1027644** | **996806** | **976814** | **963921** | **0.3** | **-0.2** | **-0.6** | **-0.5** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304773 | 305551 | 296688 | 287661 | 275233 | 262820 | 258400 | 255269 | -1.3 | 0.5 | -0.6 | -0.6 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197085 | 197311 | 189748 | 182711 | 174499 | 167879 | 163910 | 159223 | -1.5 | 0.5 | -0.8 | -0.7 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107688 | 108240 | 106940 | 104950 | 100734 | 94941 | 94490 | 96046 | -1.0 | 0.5 | -0.3 | -0.4 |
| Residential | 286291 | 311793 | 311545 | 311966 | 297301 | 287029 | 280591 | 270390 | 269207 | 267629 | 266350 | 0.8 | -0.5 | -0.6 | -0.3 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 169791 | 164596 | 157477 | 154657 | 154035 | 152932 | 153116 | 1.2 | -1.0 | -0.8 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356986 | 343675 | 338492 | 327364 | 310744 | 297853 | 289186 | 0.7 | -0.3 | -0.5 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48406 | 45963 | 41407 | 37989 | 32461 | 26404 | 21976 | 19050 | -2.2 | -0.8 | -1.9 | -3.4 |
| Oil | 485890 | 502788 | 457366 | 440511 | 406073 | 379371 | 357925 | 306473 | 247536 | 194098 | 145528 | -0.6 | -1.2 | -1.3 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271611 | 249818 | 241390 | 226204 | 197505 | 167812 | 146177 | 128524 | 0.1 | -0.8 | -1.0 | -2.8 |
| Electricity | 217599 | 239418 | 245271 | 254494 | 253109 | 257380 | 264688 | 276023 | 299154 | 318899 | 336301 | 1.2 | 0.3 | 0.4 | 1.2 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55505 | 53991 | 55135 | 53738 | 54700 | 54578 | 55243 | 1.5 | 0.4 | -0.1 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100141 | 118900 | 117853 | 121427 | 146472 | 172345 | 204206 | 232560 | 5.2 | 3.8 | 0.2 | 3.3 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 855 | 14970 | 28854 | 36880 | 46715 | 0.0 | 0.0 | 12.6 | 22.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194892** | **244883** | **266631** | **307278** | **353668** | **410539** | **463124** | **506893** | **5.4** | **5.1** | **2.3** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4622.9** | **4263.0** | **3966.6** | **3444.7** | **2814.6** | **2108.3** | **1679.8** | **1346.0** | **-0.7** | **-1.3** | **-2.1** | **-4.6** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.3 | 1890.3 | 1744.7 | 1371.1 | 1130.5 | 751.5 | 553.9 | 394.4 | | -1.4 | -3.2 | -6.0 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2372.6 | 2221.9 | 2073.5 | 1684.1 | 1356.7 | 1125.9 | 951.7 | | -1.2 | -1.3 | -3.8 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.0** | **3231.8** | **2970.1** | **2538.8** | **2100.8** | **1608.9** | **1255.4** | **960.5** | **-0.5** | **-1.6** | **-2.4** | **-4.7** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.1 | 1025.1 | 904.7 | 609.5 | 443.4 | 248.2 | 141.8 | 61.6 | -0.5 | -2.7 | -5.1 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.9 | 123.3 | 111.9 | 98.8 | 83.5 | 70.9 | 60.1 | -0.6 | -1.4 | -2.1 | -3.1 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 506.5 | 472.0 | 423.0 | 356.9 | 281.9 | 239.3 | 206.4 | -2.8 | -0.3 | -1.8 | -3.5 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 390.8 | 363.8 | 339.1 | 285.8 | 238.1 | 191.5 | 143.5 | -0.1 | -1.6 | -1.4 | -4.2 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 192.5 | 175.3 | 151.5 | 125.7 | 107.6 | 88.0 | 68.6 | -0.3 | -2.5 | -2.4 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.1 | 903.8 | 790.3 | 649.5 | 524.0 | 420.1 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.6** | **276.5** | **231.6** | **222.7** | **100.1** | **61.9** | **34.4** | **-1.0** | **1.5** | **-1.7** | **-9.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **75.0** | **69.8** | **60.6** | **49.5** | **37.1** | **29.6** | **23.7** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE25DEC_c | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.0 | 102.5 | 91.1 | 84.1 | 78.5 | 73.4 | 69.1 | -1.2 | -2.1 | -2.4 | -1.4 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.88 | 1.67 | 1.40 | 1.07 | 0.83 | 0.63 | -0.7 | -0.9 | -1.6 | -4.7 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 53.0 | 49.3 | 44.6 | 41.6 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.2 | 1710.7 | 1769.4 | 1863.4 | 1944.7 | 2100.4 | 2229.7 | 2353.1 | 3.4 | 1.9 | 0.9 | 1.2 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.2 | 10.9 | 11.0 | 10.9 | 10.7 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.0 | 82.9 | 76.0 | 69.4 | 63.3 | 59.6 | 56.4 | | -0.9 | -1.8 | -1.5 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.6 | 74.6 | 67.5 | 60.5 | 55.9 | 51.5 | 47.5 | -0.5 | -1.8 | -2.1 | -1.7 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.6 | 69.0 | 60.8 | 55.3 | 51.1 | 47.0 | 43.8 | 0.0 | -2.5 | -2.4 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.9 | 23.9 | 21.5 | 19.8 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.14 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -5.3 | -12.4 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.52 | 1.28 | 1.07 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.47 | 1.30 | 1.07 | 0.93 | 0.81 | -1.5 | -0.8 | -1.2 | -2.9 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.06 | 0.88 | 0.72 | 0.54 | -0.9 | -1.1 | -0.8 | -4.0 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.07 | 0.96 | 0.81 | 0.70 | 0.58 | 0.45 | -1.5 | -1.6 | -1.6 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.09 | 1.76 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.7 | 28.0 | 33.3 | 39.3 | 44.8 | 49.2 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.6 | 24.6 | 39.0 | 52.8 | 64.6 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 741418 | 704452 | 752816 | 874405 | 983767 | 1035489 | 1115566 | -0.3 | -2.1 | 0.2 | 2.0 |
| Solids | 933660 | 974939 | 830048 | 802058 | 685246 | 606329 | 359147 | 279629 | 355482 | 439716 | 580505 | -1.2 | -1.9 | -6.3 | 2.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46072 | 26110 | 21836 | 17087 | 16396 | 13294 | 10941 | 7080 | -7.1 | -11.3 | -4.2 | -4.3 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752907 | 695759 | 592916 | 548708 | 606114 | 654270 | 701570 | 741852 | 4.5 | -1.3 | -2.3 | 1.5 |
| Biomass-waste | 46848 | 83787 | 145901 | 190811 | 221073 | 245047 | 302579 | 343878 | 398663 | 436508 | 452663 | 12.0 | 4.2 | 3.2 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384015 | 397739 | 415852 | 424213 | 429997 | 437204 | 0.4 | 0.0 | 0.6 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 492988 | 688212 | 887839 | 1017740 | 1202144 | 1314840 | 1423788 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 174692 | 232960 | 281339 | 384382 | 459385 | 497917 | 68.9 | 20.4 | 5.0 | 3.9 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 16485 | 22193 | 42213 | 51146 | 65067 | 78412 | 2.5 | 5.9 | 6.2 | 6.5 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29989 | 39947 | 43095 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930134** | **1019630** | **1078153** | **1177866** | **1253288** | **1434303** | **1517723** | **1605698** | **2.6** | **2.0** | **1.5** | **1.6** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96480 | 101529 | 115363 | 129789 | 136412 | 146220 | -0.4 | -1.7 | -0.9 | 1.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439905 | 536700 | 641546 | 721130 | 857145 | 952070 | 1018172 | 7.1 | 6.9 | 3.8 | 2.3 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122569 | 125387 | 131897 | 134294 | 136796 | 139263 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206812 | 279169 | 348044 | 394609 | 463825 | 504441 | 542322 | 20.7 | 9.4 | 5.3 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 131564 | 163724 | 188558 | 252207 | 301387 | 324358 | 66.7 | 14.0 | 4.0 | 3.5 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3397 | 4391 | 6066 | 6818 | 9446 | 12229 | 0.0 | 21.3 | 10.2 | 5.3 |
| Thermal power | 398853 | 429386 | 480034 | 488085 | 468562 | 444973 | 434790 | 416796 | 447369 | 429241 | 441306 | 1.9 | -0.2 | -0.7 | 0.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102144 | 112030 | 112469 | 119635 | 124845 | 134219 | 141086 | 145414 | 0.9 | 1.0 | 0.7 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 2914 | 17342 | 86936 | 140736 | 205417 | 0.0 | 0.0 | 12.4 | 23.7 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141212 | 120935 | 103545 | 87105 | 95824 | 99277 | 105655 | -0.6 | -2.2 | -3.1 | 0.1 |
| Gas fired | 129190 | 169054 | 224922 | 253079 | 258989 | 258688 | 258402 | 252743 | 266496 | 238259 | 236467 | 5.7 | 1.4 | 0.0 | -0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42257 | 32824 | 26311 | 22176 | 17903 | 15113 | 11806 | 10104 | -2.2 | -4.9 | -3.8 | -3.9 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34635 | 38121 | 49373 | 55936 | 66012 | 75104 | 83510 | 5.0 | 3.5 | 3.6 | 2.7 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 917 | 1294 | 3109 | 3924 | 4795 | 5570 | 2.5 | 2.2 | 3.7 | 7.6 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.4 | 34.9 | 33.0 | 34.1 | 34.3 | 35.4 | 36.2 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.6 | 39.7 | 40.5 | 39.6 | 40.1 | 40.4 | 41.6 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.4 | 17.1 | 16.6 | 15.7 | 14.9 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.7 | 1.7 | 7.3 | 9.9 | 15.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.5 | 64.4 | 73.7 | 76.7 | 77.1 | 76.5 | 75.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.5 | 21.4 | 22.6 | 22.0 | 21.2 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.7 | 43.9 | 52.4 | 54.2 | 55.1 | 55.3 | 54.2 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.1** | **7866.6** | **8129.5** | **8371.8** | **8563.6** | **8768.3** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.5 | 624.3 | 649.7 | 666.0 | 688.2 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.0 | 5613.5 | 5719.4 | 5791.3 | 5857.5 | 5930.9 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.3 | 724.4 | 783.1 | 844.4 | 889.4 | 936.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.3 | 880.2 | 955.9 | 1037.7 | 1100.4 | 1161.1 | 1.4 | 2.6 | 2.6 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.1 | 46.9 | 48.7 | 50.3 | 51.8 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.1** | **3510.2** | **3635.2** | **3713.0** | **3799.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.9 | 2426.9 | 2502.0 | 2545.1 | 2598.4 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.2 | 639.9 | 674.4 | 698.6 | 719.9 | -0.3 | 2.2 | 2.2 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.0 | 443.4 | 458.8 | 469.3 | 481.3 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341091** | **335882** | **324776** | **308209** | **295372** | **286747** | **0.7** | **-0.3** | **-0.5** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7830 | 7417 | 7126 | 6765 | 6517 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141051 | 132491 | 123761 | 108956 | 98351 | 91716 | 0.2 | -1.5 | -1.7 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120893 | 119505 | 116870 | 114453 | 112314 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9891 | 10058 | 10158 | 10059 | 9897 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 57978 | 57687 | 56798 | 57704 | 58264 | 58739 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7090 | 7237 | 7394 | 7479 | 7564 | -0.1 | 0.8 | 1.1 | 0.3 |

*Source: PRIMES*

| EU28: EE28DEC_c | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831437** | **801762** | **755841** | **725478** | **752677** | **809776** | **844531** | **893883** | **-1.2** | **-0.5** | **-1.0** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149869 | 138232 | 123154 | 90202 | 72964 | 82829 | 79852 | 87778 | -2.7 | -1.7 | -4.2 | -0.1 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77048 | 63601 | 52502 | 37441 | 25814 | 15218 | 9563 | -5.2 | -2.9 | -3.8 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149171 | 139082 | 113313 | 91950 | 80998 | 72555 | 64788 | 56354 | -2.7 | -1.3 | -4.1 | -2.4 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212646 | 256569 | 275950 | 303517 | 358323 | 410842 | 462472 | 499849 | 5.6 | 3.7 | 1.7 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33018 | 34250 | 35506 | 36325 | 36829 | 37369 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136273 | 149839 | 148537 | 152949 | 174836 | 200774 | 226912 | 246363 | 6.5 | 1.9 | 0.2 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42476 | 57343 | 72675 | 82478 | 95714 | 106730 | 114608 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27677 | 32338 | 39917 | 48264 | 54969 | 58808 | 24.0 | 20.0 | 3.6 | 3.0 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9375 | 11305 | 25586 | 29765 | 37033 | 42702 | 2.3 | 4.6 | 2.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967839** | **900458** | **866965** | **807173** | **734965** | **658732** | **602199** | **548661** | **1.4** | **-0.6** | **-1.1** | **-1.9** |
| Solids | 98273 | 125211 | 110927 | 115992 | 93136 | 88046 | 69163 | 49599 | 39910 | 41369 | 42222 | 1.2 | -1.7 | -2.9 | -2.4 |
| Oil | 535238 | 604030 | 563977 | 551766 | 525490 | 503628 | 482210 | 434054 | 369310 | 302311 | 243972 | 0.5 | -0.7 | -0.9 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504790 | 485072 | 465782 | 428610 | 379144 | 329168 | 282412 | 0.4 | -0.7 | -0.8 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23990 | 20700 | 18556 | 16428 | 5444 | -9835 | -26856 | -38440 | 2.8 | -0.9 | -2.3 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286167 | 261728 | 253924 | 231722 | 221579 | 213435 | 216501 | 214771 | 3.6 | -0.5 | -1.2 | -0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745811** | **1646805** | **1565378** | **1473972** | **1426998** | **1408053** | **1385572** | **1380243** | **0.2** | **-0.7** | **-1.1** | **-0.3** |
| Solids | 321277 | 317986 | 280653 | 265860 | 231368 | 211199 | 159365 | 122563 | 122739 | 121221 | 130000 | -1.3 | -1.9 | -3.7 | -1.0 |
| Oil | 665142 | 683909 | 620735 | 589163 | 548041 | 511791 | 478681 | 415129 | 340359 | 263623 | 199845 | -0.7 | -1.2 | -1.3 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 399892 | 365248 | 321025 | 298299 | 280301 | 274037 | 262515 | 1.2 | -1.1 | -2.2 | -1.0 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226691 | 278276 | 298824 | 329085 | 389798 | 448738 | 506371 | 549642 | 5.9 | 4.2 | 1.7 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.5 | 10.8 | 8.6 | 8.7 | 8.7 | 9.4 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 32.7 | 32.5 | 29.1 | 24.2 | 19.0 | 14.5 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.3 | 23.3 | 21.8 | 20.9 | 19.9 | 19.8 | 19.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 12.7 | 14.2 | 15.5 | 16.0 | 17.4 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.3 | 27.3 | 31.9 | 36.5 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368945 | 347832 | 345068 | 347652 | 361511 | 432009 | 490276 | 567575 | -0.5 | -0.8 | 0.0 | 2.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383216** | **344914** | **318554** | **268464** | **269109** | **303605** | **329854** | **352983** | **0.8** | **-1.9** | **-2.5** | **1.4** |
| Solids | 223038 | 228941 | 197605 | 186589 | 155340 | 143922 | 99837 | 74431 | 84828 | 90376 | 104545 | -1.2 | -2.4 | -4.3 | 0.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5803 | 4686 | 3564 | 2920 | 2502 | 1907 | 1431 | -6.5 | -11.9 | -4.8 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131898 | 121704 | 101946 | 87327 | 91534 | 97445 | 99960 | 99748 | 3.8 | -2.0 | -3.3 | 0.7 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47866 | 55270 | 61147 | 68894 | 77562 | 87490 | 95746 | 99228 | 11.7 | 2.1 | 2.2 | 1.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8842 | 22662 | 26372 | 32968 | 37446 | 1.6 | 3.5 | 2.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4967 | 8898 | 10585 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970995** | **903441** | **851671** | **823574** | **813426** | **796188** | **762278** | **747900** | **-0.7** | **-1.0** | **-0.9** | **-0.5** |
| Refineries | 740500 | 763156 | 670015 | 646597 | 612472 | 579693 | 549709 | 496255 | 432678 | 368330 | 313275 | -1.0 | -0.9 | -1.1 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24801 | 58617 | 96526 | 127165 | 152884 | 34.1 | 6.9 | -0.5 | 9.5 |
| District heating | 18667 | 19517 | 20813 | 22232 | 19700 | 16928 | 17643 | 19353 | 19464 | 18876 | 20172 | 1.1 | -0.5 | -1.1 | 0.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283944 | 245240 | 229693 | 231421 | 239201 | 247520 | 247907 | 261570 | -0.6 | -1.9 | -0.6 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82418** | **76623** | **70107** | **64646** | **59052** | **56495** | **53300** | **52898** | **0.2** | **-1.4** | **-1.7** | **-1.0** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122382** | **120824** | **118046** | **112393** | **107013** | **102441** | **99350** | **-0.2** | **0.6** | **-0.4** | **-0.9** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170503** | **1125938** | **1074992** | **1019819** | **971214** | **932494** | **900118** | **875831** | **0.3** | **-0.3** | **-1.0** | **-0.8** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304755 | 304156 | 290815 | 278346 | 256170 | 238416 | 225347 | 217675 | -1.3 | 0.4 | -0.9 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197065 | 196528 | 186844 | 178020 | 162912 | 152944 | 142970 | 133937 | -1.5 | 0.5 | -1.0 | -1.4 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107628 | 103972 | 100326 | 93258 | 85471 | 82377 | 83738 | -1.0 | 0.4 | -0.7 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311961 | 295956 | 279524 | 261677 | 248674 | 244598 | 238965 | 230897 | 0.8 | -0.5 | -1.2 | -0.6 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 168844 | 160950 | 142207 | 140414 | 139763 | 138463 | 138593 | 1.2 | -1.1 | -1.7 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356983 | 343702 | 337590 | 325955 | 309718 | 297343 | 288666 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48409 | 45883 | 40364 | 35492 | 27909 | 21324 | 16194 | 12956 | -2.2 | -0.8 | -2.5 | -4.9 |
| Oil | 485890 | 502788 | 457366 | 440538 | 405482 | 377234 | 349893 | 298038 | 240280 | 188670 | 142341 | -0.6 | -1.2 | -1.5 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271576 | 248550 | 234260 | 206680 | 177468 | 147177 | 124456 | 103580 | 0.1 | -0.8 | -1.8 | -3.4 |
| Electricity | 217599 | 239418 | 245271 | 254489 | 252048 | 254540 | 260468 | 262824 | 281431 | 296228 | 312482 | 1.2 | 0.3 | 0.3 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55197 | 52788 | 53266 | 56559 | 59270 | 59540 | 60160 | 1.5 | 0.3 | -0.4 | 0.6 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100128 | 118517 | 115209 | 113098 | 134845 | 157626 | 183641 | 205790 | 5.2 | 3.8 | -0.5 | 3.0 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 922 | 13571 | 25387 | 31390 | 38522 | 0.0 | 0.0 | 13.4 | 20.5 |
| **RES in Gross Final Energy Consumption (A)** | **88147** | **104692** | **149354** | **194992** | **244149** | **261570** | **290397** | **334459** | **385558** | **431496** | **468980** | **5.4** | **5.0** | **1.7** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.0** | **4250.0** | **3940.0** | **3431.6** | **2718.0** | **2031.0** | **1605.5** | **1250.7** | **-0.7** | **-1.3** | **-2.1** | **-4.9** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.7 | 1881.1 | 1740.8 | 1427.5 | 1106.0 | 738.9 | 542.1 | 360.3 | | -1.5 | -2.7 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2368.8 | 2199.2 | 2004.1 | 1612.0 | 1292.2 | 1063.4 | 890.4 | | -1.2 | -1.7 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.1** | **3218.9** | **2944.3** | **2519.7** | **2006.2** | **1518.8** | **1169.6** | **864.8** | **-0.5** | **-1.6** | **-2.4** | **-5.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.3 | 1017.4 | 908.1 | 668.7 | 445.7 | 256.1 | 156.1 | 69.3 | -0.5 | -2.7 | -4.1 | -10.7 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.8 | 122.2 | 111.3 | 95.4 | 79.6 | 66.4 | 54.8 | -0.6 | -1.4 | -2.2 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 504.2 | 461.7 | 414.3 | 328.4 | 248.9 | 199.2 | 160.9 | -2.8 | -0.3 | -1.9 | -4.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 389.0 | 351.9 | 307.1 | 247.6 | 200.2 | 155.0 | 107.1 | -0.1 | -1.6 | -2.3 | -5.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 191.4 | 169.2 | 118.0 | 103.9 | 88.4 | 71.2 | 54.8 | -0.3 | -2.6 | -4.7 | -3.8 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.2 | 900.3 | 785.1 | 645.7 | 521.7 | 417.9 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.7** | **237.6** | **220.8** | **113.0** | **73.4** | **34.8** | **-1.0** | **1.5** | **-1.4** | **-9.2** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.8** | **69.3** | **60.4** | **47.8** | **35.7** | **28.2** | **22.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE28DEC_c | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.6 | 101.3 | 88.4 | 79.9 | 73.5 | 67.5 | 62.9 | -1.2 | -2.2 | -2.6 | -1.7 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.71 | 1.41 | 1.08 | 0.84 | 0.63 | -0.7 | -0.9 | -1.3 | -4.9 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.4 | 44.9 | 41.6 | 38.0 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.2 | 1709.7 | 1767.4 | 1864.0 | 1942.9 | 2094.0 | 2223.3 | 2340.1 | 3.4 | 1.9 | 0.9 | 1.1 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.4 | 11.2 | 10.9 | 10.9 | 10.8 | 10.7 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.6 | 81.2 | 73.6 | 64.6 | 57.4 | 52.0 | 48.1 | | -1.0 | -2.1 | -2.1 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.2 | 72.6 | 62.9 | 55.6 | 50.8 | 46.0 | 41.2 | -0.5 | -1.8 | -2.8 | -2.1 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.2 | 67.4 | 54.9 | 50.2 | 46.4 | 42.6 | 39.6 | 0.0 | -2.6 | -3.3 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.8 | 23.7 | 21.4 | 19.7 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -4.2 | -12.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.51 | 1.27 | 1.05 | 0.85 | -0.8 | -0.7 | -0.7 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.49 | 1.28 | 1.04 | 0.88 | 0.74 | -1.5 | -0.8 | -1.1 | -3.4 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.26 | 1.17 | 1.00 | 0.82 | 0.65 | 0.46 | -0.9 | -1.1 | -1.1 | -4.5 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.05 | 0.83 | 0.74 | 0.63 | 0.51 | 0.40 | -1.5 | -1.6 | -3.1 | -3.6 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.08 | 1.75 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.7 | 27.7 | 33.4 | 39.5 | 45.3 | 50.1 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.7 | 24.9 | 39.4 | 53.4 | 65.2 | | | | |
| **Gross Electricity generation by source (in GWh$_e$** | **3007267** | **3287285** | **3328110** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887191 | 738989 | 702340 | 740054 | 816776 | 896746 | 928842 | 1031485 | -0.3 | -2.1 | 0.0 | 1.7 |
| Solids | 933660 | 974939 | 830048 | 802211 | 680083 | 629832 | 432779 | 288140 | 349610 | 413849 | 527273 | -1.2 | -2.0 | -4.4 | 1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45943 | 25921 | 21502 | 16650 | 15385 | 12995 | 9758 | 5890 | -7.1 | -11.4 | -4.3 | -5.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752725 | 688399 | 562102 | 508135 | 550300 | 591950 | 622355 | 631414 | 4.5 | -1.4 | -3.0 | 1.1 |
| Biomass-waste | 46848 | 83787 | 145901 | 190910 | 221182 | 246702 | 288607 | 330875 | 376774 | 399427 | 416538 | 12.0 | 4.2 | 2.7 | 1.9 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383935 | 398253 | 412865 | 422378 | 428244 | 434522 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 493905 | 666774 | 845061 | 959050 | 1112954 | 1241041 | 1332651 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 170576 | 218794 | 264894 | 358113 | 413029 | 443996 | 68.9 | 20.4 | 4.3 | 3.6 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 18395 | 39374 | 44906 | 55857 | 67319 | 2.5 | 5.9 | 4.3 | 6.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23588 | 39255 | 43996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930139** | **1019358** | **1060619** | **1144729** | **1201223** | **1350698** | **1414248** | **1479188** | **2.6** | **2.0** | **1.2** | **1.3** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 95269 | 99226 | 107997 | 118651 | 122740 | 135749 | -0.4 | -1.7 | -1.1 | 1.6 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440313 | 522735 | 614650 | 686494 | 805206 | 887091 | 941755 | 7.1 | 6.9 | 3.4 | 2.2 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122535 | 125565 | 131188 | 133642 | 136131 | 138195 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207219 | 268269 | 330274 | 371379 | 429150 | 474066 | 506362 | 20.7 | 9.4 | 4.8 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128896 | 155543 | 178669 | 236628 | 269739 | 287359 | 66.7 | 14.0 | 3.4 | 3.1 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5258 | 5785 | 7154 | 9839 | 0.0 | 21.3 | 7.0 | 5.7 |
| Thermal power | 398853 | 429386 | 480034 | 488089 | 467884 | 442615 | 430853 | 406733 | 426841 | 404417 | 401685 | 1.9 | -0.3 | -0.8 | -0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102206 | 111262 | 111094 | 114309 | 120483 | 126026 | 128250 | 131587 | 0.9 | 1.0 | 0.3 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1783 | 16078 | 78375 | 121021 | 176213 | 0.0 | 0.0 | 7.0 | 25.8 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141039 | 120703 | 102985 | 87183 | 93454 | 94747 | 99301 | -0.6 | -2.2 | -3.1 | -0.2 |
| Gas fired | 129190 | 169054 | 224922 | 253085 | 258726 | 256881 | 258153 | 246702 | 252869 | 226531 | 212698 | 5.7 | 1.4 | 0.0 | -1.0 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 32648 | 26149 | 22149 | 17516 | 14575 | 11145 | 9053 | -2.2 | -4.9 | -3.8 | -4.4 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34568 | 37972 | 46393 | 52324 | 62443 | 67618 | 75663 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1174 | 3009 | 3501 | 4376 | 4971 | 2.5 | 2.2 | 2.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.3 | 35.1 | 33.3 | 33.8 | 34.0 | 35.1 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.6 | 40.3 | 38.7 | 39.3 | 39.7 | 40.7 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 16.9 | 16.8 | 16.7 | 15.5 | 14.6 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.4 | 6.4 | 9.5 | 13.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 64.3 | 72.4 | 76.8 | 77.1 | 76.8 | 76.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 21.3 | 22.2 | 21.5 | 20.6 | 21.1 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 43.6 | 51.0 | 54.6 | 55.6 | 56.2 | 55.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.5** | **7862.8** | **8125.9** | **8368.6** | **8567.1** | **8778.8** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.3 | 624.3 | 650.1 | 666.0 | 687.8 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.1 | 5606.3 | 5714.1 | 5784.8 | 5856.4 | 5936.6 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.2 | 724.1 | 783.0 | 844.4 | 888.8 | 934.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.7 | 884.0 | 957.6 | 1040.6 | 1105.8 | 1168.1 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.9 | 48.6 | 50.2 | 51.7 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.8** | **3510.3** | **3635.2** | **3713.3** | **3801.1** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.7 | 2426.9 | 2502.0 | 2545.1 | 2599.1 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.0 | 640.0 | 674.4 | 698.8 | 720.4 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341130** | **335023** | **323408** | **307230** | **294916** | **286281** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7826 | 7413 | 7123 | 6756 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141053 | 131328 | 122232 | 107730 | 97534 | 90905 | 0.2 | -1.5 | -1.8 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120885 | 119497 | 116860 | 114419 | 112190 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9900 | 10061 | 10161 | 10062 | 9908 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58016 | 57997 | 56968 | 57966 | 58674 | 59224 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7087 | 7237 | 7390 | 7472 | 7558 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE30EC_c | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831440** | **799875** | **743685** | **701180** | **705973** | **762343** | **788381** | **831896** | **-1.2** | **-0.5** | **-1.3** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149881 | 137862 | 122299 | 91633 | 70653 | 78043 | 73804 | 81348 | -2.7 | -1.7 | -4.0 | -0.6 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77001 | 63361 | 51913 | 36860 | 25431 | 15030 | 9475 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149167 | 138308 | 109242 | 86359 | 72823 | 66612 | 60095 | 52276 | -2.7 | -1.4 | -4.6 | -2.5 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212643 | 256335 | 270153 | 292441 | 339288 | 395213 | 439951 | 468564 | 5.6 | 3.7 | 1.3 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33015 | 34057 | 35347 | 36238 | 36724 | 37241 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136270 | 149552 | 144438 | 147330 | 164985 | 192847 | 216951 | 232725 | 6.5 | 1.9 | -0.1 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42529 | 56256 | 70034 | 79190 | 91665 | 101234 | 107079 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22800 | 27188 | 30766 | 37543 | 45490 | 50444 | 52829 | 24.0 | 20.0 | 3.0 | 2.7 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9272 | 9255 | 10254 | 22224 | 28973 | 34597 | 38691 | 2.3 | 4.6 | 1.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967865** | **896858** | **851897** | **781960** | **703647** | **622500** | **568983** | **516147** | **1.4** | **-0.6** | **-1.4** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115986 | 92085 | 88383 | 69208 | 48698 | 34135 | 34684 | 37988 | 1.2 | -1.8 | -2.8 | -3.0 |
| Oil | 535238 | 604030 | 563977 | 551783 | 524921 | 499562 | 474115 | 424096 | 360728 | 296187 | 241093 | 0.5 | -0.7 | -1.0 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527785 | 504377 | 482326 | 460142 | 421475 | 373059 | 324755 | 280194 | 0.4 | -0.7 | -0.9 | -2.4 |
| - Oil products | 17192 | 18909 | 22737 | 23998 | 20544 | 17236 | 13972 | 2621 | -12331 | -28568 | -39101 | 2.8 | -1.0 | -3.8 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286182 | 259779 | 243145 | 215430 | 202788 | 192843 | 197665 | 191804 | 3.6 | -0.6 | -1.9 | -0.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745840** | **1641318** | **1538154** | **1424462** | **1348976** | **1324389** | **1296206** | **1285743** | **0.2** | **-0.7** | **-1.4** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265867 | 229947 | 210682 | 160840 | 119352 | 112178 | 108488 | 119336 | -1.3 | -2.0 | -3.5 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589181 | 547424 | 507485 | 469996 | 404589 | 331395 | 257310 | 196877 | -0.7 | -1.2 | -1.5 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435131 | 397168 | 350396 | 299142 | 271333 | 253765 | 250508 | 235469 | 1.2 | -1.1 | -2.8 | -1.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226686 | 278011 | 292467 | 317138 | 369094 | 431823 | 482274 | 515911 | 5.9 | 4.2 | 1.3 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.7 | 11.3 | 8.8 | 8.5 | 8.4 | 9.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.0 | 33.0 | 30.0 | 25.0 | 19.9 | 15.3 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.8 | 21.0 | 20.1 | 19.2 | 19.3 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.6 | 12.6 | 13.8 | 14.9 | 15.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.0 | 22.3 | 27.4 | 32.6 | 37.2 | 40.1 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368960 | 346100 | 341018 | 327452 | 325368 | 369662 | 414848 | 477805 | -0.5 | -0.9 | -0.6 | 1.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383240** | **342669** | **314342** | **262790** | **250347** | **285890** | **309431** | **324588** | **0.8** | **-2.0** | **-2.6** | **1.1** |
| Solids | 223038 | 228941 | 197605 | 186586 | 154012 | 144346 | 103084 | 72208 | 76026 | 79294 | 94598 | -1.2 | -2.5 | -3.9 | -0.4 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5748 | 4534 | 3408 | 2846 | 2364 | 1856 | 1411 | -6.5 | -12.0 | -5.1 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131885 | 120828 | 98403 | 80926 | 81726 | 88245 | 92479 | 85378 | 3.8 | -2.1 | -3.9 | 0.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47906 | 55284 | 60204 | 67359 | 73896 | 88093 | 96433 | 99088 | 11.7 | 2.1 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8014 | 19671 | 26030 | 31164 | 34353 | 1.6 | 3.5 | 1.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5133 | 8204 | 9760 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971007** | **902315** | **846802** | **808194** | **784669** | **760011** | **723080** | **711920** | **-0.7** | **-1.0** | **-1.1** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646610 | 612017 | 576578 | 543143 | 488133 | 425887 | 363546 | 310943 | -1.0 | -0.9 | -1.2 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24665 | 56942 | 93286 | 121756 | 146384 | 34.1 | 6.9 | -0.5 | 9.3 |
| District heating | 18667 | 19517 | 20813 | 22233 | 19528 | 16633 | 17491 | 16697 | 15087 | 13577 | 13157 | 1.1 | -0.6 | -1.1 | -1.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244740 | 228234 | 222894 | 222898 | 225752 | 224200 | 241436 | -0.6 | -1.9 | -0.9 | 0.4 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76470** | **69593** | **63435** | **57201** | **52873** | **49874** | **49702** | **0.2** | **-1.4** | **-1.9** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122388** | **120219** | **115589** | **108895** | **103746** | **99548** | **98032** | **-0.2** | **0.6** | **-0.6** | **-0.8** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170516** | **1122037** | **1051763** | **982544** | **921756** | **879825** | **844651** | **818430** | **0.3** | **-0.3** | **-1.3** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304758 | 303324 | 288362 | 272460 | 249504 | 231894 | 219876 | 215796 | -1.3 | 0.4 | -1.1 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197068 | 196069 | 185031 | 172991 | 156761 | 146989 | 137759 | 132040 | -1.5 | 0.4 | -1.2 | -1.3 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107691 | 107255 | 103331 | 99469 | 92743 | 84905 | 82117 | 83757 | -1.0 | 0.4 | -0.8 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311965 | 293837 | 265513 | 244073 | 224369 | 217458 | 208100 | 194938 | 0.8 | -0.6 | -1.8 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181919 | 167895 | 154151 | 129807 | 123577 | 122353 | 120513 | 119851 | 1.2 | -1.1 | -2.5 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343737 | 336203 | 324307 | 308120 | 296163 | 287844 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48418 | 45836 | 39463 | 33608 | 26598 | 20367 | 15504 | 12819 | -2.2 | -0.8 | -3.1 | -4.7 |
| Oil | 485890 | 502788 | 457366 | 440563 | 404972 | 373700 | 343639 | 290716 | 234082 | 184001 | 140138 | -0.6 | -1.2 | -1.6 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271582 | 246780 | 223631 | 192715 | 162950 | 132572 | 111236 | 92936 | 0.1 | -0.9 | -2.4 | -3.6 |
| Electricity | 217599 | 239418 | 245271 | 254495 | 250988 | 251095 | 251802 | 250167 | 267207 | 280010 | 293861 | 1.2 | 0.2 | 0.0 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55298 | 54920 | 52113 | 52793 | 52191 | 54294 | 53734 | 52884 | 1.5 | 0.3 | -0.4 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100093 | 118281 | 111163 | 107002 | 126549 | 148234 | 171980 | 191234 | 5.2 | 3.8 | -1.0 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 984 | 12586 | 23069 | 28187 | 34558 | 0.0 | 0.0 | 14.2 | 19.5 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194862** | **244210** | **255521** | **279728** | **318093** | **370608** | **410496** | **439323** | **5.4** | **5.0** | **1.4** | **2.3** |
| **TOTAL GHG emissions (Mt of $CO_2$ eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4235.7** | **3892.8** | **3407.3** | **2708.3** | **1990.8** | **1554.3** | **1219.1** | **-0.7** | **-1.3** | **-2.2** | **-5.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.4 | 1872.2 | 1731.4 | 1454.7 | 1147.7 | 750.6 | 532.2 | 360.2 | | -1.5 | -2.5 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2363.5 | 2161.4 | 1952.6 | 1560.6 | 1240.2 | 1022.1 | 858.9 | | -1.2 | -1.9 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3204.7** | **2897.3** | **2464.6** | **1990.7** | **1472.4** | **1107.6** | **826.3** | **-0.5** | **-1.6** | **-2.6** | **-5.3** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.2 | 1009.5 | 901.1 | 674.8 | 481.7 | 269.4 | 143.8 | 63.3 | -0.5 | -2.8 | -3.9 | -11.2 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 121.4 | 109.5 | 95.3 | 77.3 | 64.8 | 54.2 | -0.6 | -1.4 | -2.3 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 502.9 | 457.8 | 404.1 | 330.8 | 240.3 | 193.9 | 164.4 | -2.8 | -0.3 | -2.2 | -4.4 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 326.6 | 276.3 | 216.0 | 170.7 | 127.9 | 84.2 | -0.1 | -1.7 | -3.3 | -5.8 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.4 | 159.0 | 104.6 | 88.2 | 75.2 | 59.9 | 45.5 | -0.3 | -2.7 | -5.8 | -4.1 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 895.3 | 778.7 | 639.6 | 517.4 | 414.7 | 0.5 | -0.7 | -0.9 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.6** | **268.3** | **226.5** | **119.1** | **84.2** | **41.6** | **-1.0** | **1.5** | **-0.2** | **-8.9** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.5** | **59.9** | **47.6** | **35.0** | **27.3** | **21.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | | | | | EU28: EE30EC_c |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 99.6 | 85.5 | 75.5 | 69.2 | 63.2 | 58.6 | -1.2 | -2.2 | -2.9 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.73 | 1.48 | 1.11 | 0.85 | 0.64 | -0.7 | -0.9 | -1.2 | -4.8 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.9 | 45.0 | 41.9 | 38.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.1 | 1706.9 | 1771.5 | 1888.5 | 1974.9 | 2129.8 | 2295.3 | 2413.1 | 3.4 | 1.9 | 1.0 | 1.2 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.3 | 11.1 | 11.1 | 11.2 | 11.0 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 80.5 | 72.0 | 63.0 | 55.8 | 50.7 | 47.7 | | -1.0 | -2.2 | -2.0 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.6 | 69.0 | 58.7 | 50.2 | 45.2 | 40.1 | 34.7 | -0.5 | -1.9 | -3.4 | -2.6 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.6 | 50.1 | 44.2 | 40.6 | 37.1 | 34.2 | 0.0 | -2.6 | -4.2 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.5 | 21.2 | 19.7 | 18.5 | -0.6 | -1.6 | -2.2 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.24 | 0.22 | 0.17 | 0.12 | 0.06 | 0.03 | 0.01 | -1.6 | -3.0 | -3.8 | -12.3 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.53 | 1.28 | 1.06 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.04 | 0.88 | 0.76 | -1.5 | -0.8 | -1.1 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.13 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.40 | 2.08 | 1.75 | 1.44 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.2 | 23.6 | 27.7 | 33.6 | 40.5 | 46.3 | 50.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.0 | 25.5 | 40.3 | 54.3 | 66.0 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 737206 | 697551 | 703936 | 745532 | 805231 | 828021 | 942094 | -0.3 | -2.2 | -0.5 | 1.5 |
| Solids | 933660 | 974939 | 830048 | 802248 | 672875 | 633340 | 445974 | 290407 | 296392 | 343369 | 460318 | -1.2 | -2.1 | -4.0 | 0.2 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46138 | 25643 | 21236 | 15863 | 15003 | 12161 | 9521 | 6818 | -7.1 | -11.5 | -4.7 | -4.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752506 | 682930 | 535702 | 461222 | 485358 | 527364 | 561565 | 537679 | 4.5 | -1.5 | -3.8 | 0.8 |
| Biomass-waste | 46848 | 83787 | 145901 | 190998 | 221100 | 243967 | 279555 | 316897 | 383126 | 404743 | 419314 | 12.0 | 4.2 | 2.4 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383900 | 396014 | 411008 | 421373 | 427027 | 433031 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 494523 | 654141 | 814344 | 920816 | 1065871 | 1177141 | 1245105 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 169222 | 210907 | 256819 | 347455 | 389884 | 415082 | 68.9 | 20.4 | 3.9 | 3.4 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17408 | 35745 | 44467 | 52941 | 58842 | 2.5 | 5.9 | 3.7 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25514 | 35468 | 41738 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930117** | **1019066** | **1051883** | **1118578** | **1159634** | **1289256** | **1335777** | **1381991** | **2.6** | **2.0** | **0.9** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94547 | 95440 | 99378 | 106810 | 109859 | 124496 | -0.4 | -1.7 | -1.5 | 1.3 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440528 | 516836 | 598131 | 666532 | 779590 | 847363 | 887761 | 7.1 | 6.9 | 3.1 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122519 | 124892 | 129931 | 133343 | 135775 | 137741 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207434 | 263223 | 319570 | 357961 | 412770 | 451631 | 475383 | 20.7 | 9.4 | 4.4 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128059 | 150414 | 173458 | 227705 | 253137 | 266843 | 66.7 | 14.0 | 3.1 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5772 | 6819 | 7794 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488067 | 467376 | 440499 | 425007 | 393724 | 402856 | 378555 | 369733 | 1.9 | -0.3 | -0.9 | -0.7 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102193 | 110999 | 110785 | 112357 | 116951 | 122443 | 123037 | 127535 | 0.9 | 0.9 | 0.1 | 0.6 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 929 | 7041 | 54353 | 109237 | 152359 | 0.0 | 0.0 | 0.3 | 29.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140915 | 120678 | 101809 | 84889 | 86940 | 86592 | 90109 | -0.6 | -2.2 | -3.2 | -0.6 |
| Gas fired | 129190 | 169054 | 224922 | 253060 | 258508 | 255100 | 253809 | 236957 | 233930 | 208106 | 189793 | 5.7 | 1.4 | -0.2 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42258 | 32481 | 25979 | 21937 | 17295 | 14324 | 10933 | 8658 | -2.2 | -5.0 | -3.8 | -4.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34570 | 37832 | 46389 | 51971 | 64207 | 68787 | 76613 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1064 | 2612 | 3455 | 4137 | 4560 | 2.5 | 2.2 | 1.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 35.0 | 32.9 | 33.1 | 33.5 | 34.7 | 35.8 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.5 | 39.7 | 38.8 | 38.4 | 38.7 | 39.9 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 17.0 | 16.8 | 17.1 | 15.9 | 15.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.5 | 3.5 | 7.4 | 11.8 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.5 | 72.4 | 77.3 | 78.6 | 78.2 | 77.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.8 | 21.0 | 21.4 | 20.6 | 19.7 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.7 | 51.4 | 55.8 | 58.0 | 58.5 | 56.9 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7855.0** | **8124.7** | **8368.9** | **8550.3** | **8780.6** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.4 | 623.9 | 650.1 | 668.2 | 688.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5595.7 | 5706.9 | 5781.9 | 5833.5 | 5930.2 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.0 | 782.0 | 843.7 | 890.5 | 934.3 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.0 | 965.1 | 1044.6 | 1108.1 | 1176.5 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.7 | 48.5 | 50.1 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.6** | **3635.4** | **3713.0** | **3801.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.6 | 2426.9 | 2502.1 | 2544.8 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.2 | 640.2 | 674.5 | 698.7 | 720.5 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **333676** | **321809** | **305674** | **293781** | **285504** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7827 | 7408 | 7126 | 6777 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129744 | 120077 | 105833 | 96151 | 89639 | 0.2 | -1.5 | -1.9 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120880 | 119493 | 116856 | 114368 | 112069 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9902 | 10060 | 10154 | 10066 | 9912 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58237 | 57543 | 58324 | 58951 | 59842 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7086 | 7228 | 7382 | 7469 | 7546 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE32DEC_c | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831468** | **799964** | **740446** | **686479** | **697777** | **753848** | **786422** | **826944** | **-1.2** | **-0.5** | **-1.5** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149901 | 137886 | 121487 | 92642 | 71589 | 77783 | 74783 | 80855 | -2.7 | -1.7 | -3.9 | -0.7 |
| Oil | 176084 | 136469 | 103565 | 90643 | 77000 | 63188 | 51467 | 36453 | 24996 | 14671 | 9255 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149164 | 138410 | 108293 | 82862 | 72235 | 66426 | 60400 | 52290 | -2.7 | -1.3 | -5.0 | -2.3 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212653 | 256326 | 269236 | 288211 | 335647 | 388977 | 434247 | 462008 | 5.6 | 3.7 | 1.2 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33016 | 34060 | 35321 | 36238 | 36754 | 37250 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136279 | 149547 | 143841 | 145115 | 162264 | 189122 | 211665 | 226728 | 6.5 | 1.9 | -0.3 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42525 | 56066 | 69039 | 78836 | 91364 | 101175 | 106983 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27070 | 30051 | 37033 | 43931 | 50108 | 52354 | 24.0 | 20.0 | 2.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9242 | 9945 | 22193 | 28322 | 34545 | 38693 | 2.3 | 4.6 | 0.7 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967842** | **896951** | **845485** | **767260** | **697431** | **610672** | **560112** | **510299** | **1.4** | **-0.6** | **-1.5** | **-2.0** |
| Solids | 98273 | 125211 | 110927 | 115977 | 92086 | 86603 | 71563 | 50346 | 33547 | 35484 | 39779 | 1.2 | -1.8 | -2.5 | -2.9 |
| Oil | 535238 | 604030 | 563977 | 551775 | 524913 | 497891 | 468781 | 418135 | 352234 | 285209 | 231795 | 0.5 | -0.7 | -1.1 | -3.5 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527771 | 504350 | 481251 | 456554 | 417176 | 366720 | 316376 | 272960 | 0.4 | -0.7 | -1.0 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24004 | 20563 | 16640 | 12228 | 959 | -14487 | -31167 | -41165 | 2.8 | -1.0 | -5.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286173 | 259880 | 240341 | 203996 | 201265 | 190777 | 200167 | 194805 | 3.6 | -0.6 | -2.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745845** | **1641499** | **1528503** | **1395061** | **1334563** | **1304066** | **1285376** | **1274943** | **0.2** | **-0.7** | **-1.6** | **-0.4** |
| Solids | 321277 | 317986 | 280653 | 265879 | 229971 | 208090 | 164205 | 121935 | 111331 | 110267 | 120634 | -1.3 | -2.0 | -3.3 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589170 | 547415 | 505642 | 464217 | 398221 | 322465 | 245974 | 187359 | -0.7 | -1.2 | -1.6 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 397373 | 346644 | 284212 | 269222 | 251512 | 253315 | 238485 | 1.2 | -1.1 | -3.3 | -0.9 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226699 | 278001 | 291393 | 312616 | 365073 | 424907 | 475377 | 508027 | 5.9 | 4.2 | 1.2 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.6 | 11.8 | 9.1 | 8.5 | 8.6 | 9.5 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 33.1 | 33.3 | 29.8 | 24.7 | 19.1 | 14.7 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.7 | 20.4 | 20.2 | 19.3 | 19.7 | 18.7 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.7 | 12.3 | 13.6 | 15.0 | 15.7 | 17.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.4 | 27.4 | 32.6 | 37.0 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 346243 | 339638 | 322853 | 325994 | 372051 | 422057 | 486850 | -0.5 | -0.9 | -0.7 | 2.1 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383270** | **342902** | **311500** | **260315** | **253664** | **283396** | **315940** | **329255** | **0.8** | **-1.9** | **-2.7** | **1.2** |
| Solids | 223038 | 228941 | 197605 | 186612 | 154047 | 142724 | 108644 | 75790 | 75764 | 81507 | 95989 | -1.2 | -2.5 | -3.4 | -0.6 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10894 | 5780 | 4530 | 3342 | 2862 | 2326 | 1774 | 1382 | -6.5 | -11.9 | -5.3 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131897 | 121019 | 96899 | 72885 | 82284 | 87917 | 97108 | 89307 | 3.8 | -2.1 | -4.9 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47890 | 55259 | 60493 | 67659 | 73056 | 87612 | 96763 | 99208 | 11.7 | 2.0 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7785 | 19671 | 25422 | 31164 | 34436 | 1.6 | 3.5 | 1.4 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4354 | 7624 | 8933 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971003** | **902264** | **844055** | **794081** | **773655** | **747918** | **711552** | **700279** | **-0.7** | **-1.0** | **-1.3** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646602 | 612015 | 575176 | 538738 | 483283 | 419083 | 354850 | 303582 | -1.0 | -0.9 | -1.3 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24592 | 56290 | 90339 | 117093 | 140679 | 34.1 | 6.9 | -0.6 | 9.1 |
| District heating | 18667 | 19517 | 20813 | 22236 | 19511 | 16517 | 17100 | 16519 | 14649 | 13006 | 12337 | 1.1 | -0.6 | -1.3 | -1.6 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244709 | 227005 | 213651 | 217563 | 223847 | 226602 | 243681 | -0.6 | -1.9 | -1.3 | 0.7 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82417** | **76473** | **69205** | **62612** | **56616** | **52250** | **49421** | **49582** | **0.2** | **-1.4** | **-2.0** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122386** | **118832** | **112517** | **107050** | **102422** | **98660** | **98024** | **-0.2** | **0.6** | **-0.8** | **-0.7** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170498** | **1122131** | **1045780** | **961900** | **910592** | **865633** | **829576** | **804488** | **0.3** | **-0.3** | **-1.5** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304746 | 303294 | 284070 | 264250 | 244678 | 227059 | 218180 | 215824 | -1.3 | 0.4 | -1.4 | -1.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197056 | 196038 | 182527 | 167633 | 153488 | 142215 | 136075 | 131971 | -1.5 | 0.4 | -1.6 | -1.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107256 | 101543 | 96618 | 91190 | 84844 | 82105 | 83853 | -1.0 | 0.4 | -1.0 | -0.7 |
| Residential | 286291 | 311793 | 311545 | 311966 | 293951 | 264442 | 237183 | 222346 | 215230 | 205525 | 191961 | 0.8 | -0.6 | -2.1 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181912 | 167904 | 153537 | 124963 | 122181 | 121073 | 119121 | 118281 | 1.2 | -1.1 | -2.9 | -0.3 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343731 | 335504 | 321387 | 302271 | 286749 | 278421 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48401 | 45820 | 38896 | 32222 | 25970 | 20044 | 15289 | 12806 | -2.2 | -0.8 | -3.5 | -4.5 |
| Oil | 485890 | 502788 | 457366 | 440528 | 404993 | 373025 | 340679 | 286063 | 226544 | 173713 | 131120 | -0.6 | -1.2 | -1.7 | -4.7 |
| Gas | 266925 | 285438 | 269920 | 271568 | 246738 | 221648 | 186717 | 160769 | 131160 | 110035 | 92259 | 0.1 | -0.9 | -2.7 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254490 | 251071 | 249644 | 246274 | 249412 | 266659 | 283267 | 296658 | 1.2 | 0.2 | -0.2 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 54931 | 51874 | 51261 | 51518 | 53599 | 53119 | 52135 | 1.5 | 0.3 | -0.7 | 0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100133 | 118316 | 110095 | 103700 | 124219 | 144397 | 165330 | 184049 | 5.2 | 3.8 | -1.3 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1048 | 12642 | 23231 | 28823 | 35460 | 0.0 | 0.0 | 14.9 | 19.3 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194912** | **244213** | **254336** | **275168** | **313975** | **364278** | **403415** | **430964** | **5.4** | **5.0** | **1.2** | **2.3** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4236.3** | **3870.9** | **3380.1** | **2700.2** | **2081.7** | **1524.7** | **1198.9** | **-0.7** | **-1.3** | **-2.2** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1872.8 | 1714.7 | 1447.8 | 1156.1 | 865.4 | 535.4 | 368.1 | | -1.5 | -2.5 | -6.6 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2363.4 | 2156.1 | 1932.2 | 1544.1 | 1216.4 | 989.3 | 830.7 | | -1.2 | -2.0 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3205.3** | **2875.5** | **2434.4** | **1982.1** | **1478.9** | **1078.0** | **802.9** | **-0.5** | **-1.6** | **-2.7** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.4 | 1010.2 | 890.0 | 676.1 | 496.0 | 304.2 | 150.2 | 69.2 | -0.5 | -2.8 | -3.9 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.4 | 120.7 | 107.7 | 94.1 | 76.1 | 63.4 | 53.3 | -0.6 | -1.4 | -2.5 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 502.9 | 450.5 | 391.8 | 324.8 | 238.6 | 193.1 | 165.7 | -2.8 | -0.3 | -2.5 | -4.2 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 324.7 | 266.2 | 213.4 | 168.2 | 125.6 | 82.2 | -0.1 | -1.7 | -3.6 | -5.7 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.3 | 158.2 | 100.6 | 86.9 | 74.0 | 58.9 | 44.7 | -0.3 | -2.7 | -6.2 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 892.1 | 766.9 | 617.8 | 486.7 | 387.7 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.4** | **271.3** | **227.1** | **203.6** | **84.3** | **44.8** | **-1.0** | **1.5** | **-0.1** | **-8.6** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.1** | **59.5** | **47.5** | **36.6** | **26.8** | **21.1** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE32DEC_c | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 98.9 | 83.7 | 74.7 | 68.1 | 62.6 | 58.1 | -1.2 | -2.2 | -3.1 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.75 | 1.49 | 1.13 | 0.84 | 0.63 | -0.7 | -0.9 | -1.1 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.3 | 52.8 | 50.0 | 44.8 | 41.6 | 38.2 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.0 | 1707.0 | 1772.9 | 1908.2 | 1987.8 | 2156.5 | 2327.0 | 2428.3 | 3.4 | 1.9 | 1.1 | 1.2 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.4 | 11.1 | 11.3 | 11.3 | 11.1 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 79.3 | 69.9 | 61.7 | 54.7 | 50.3 | 47.7 | | -1.0 | -2.5 | -1.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.7 | 68.7 | 57.1 | 49.8 | 44.7 | 39.6 | 34.2 | -0.5 | -1.9 | -3.6 | -2.5 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.3 | 48.2 | 43.7 | 40.2 | 36.6 | 33.8 | 0.0 | -2.6 | -4.5 | -1.8 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.17 | 0.12 | 0.07 | 0.03 | 0.01 | -1.6 | -3.0 | -3.6 | -12.0 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.53 | 1.27 | 1.04 | 0.85 | -0.8 | -0.7 | -0.7 | -3.5 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.05 | 0.89 | 0.77 | -1.5 | -0.8 | -1.1 | -3.2 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.12 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.80 | 0.71 | 0.61 | 0.49 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.2 | 23.6 | 27.8 | 33.5 | 40.5 | 46.3 | 50.6 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 41.7 | 56.1 | 67.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 737094 | 695966 | 671581 | 726105 | 798952 | 840125 | 951928 | -0.3 | -2.2 | -0.9 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802441 | 673122 | 626542 | 472340 | 309132 | 296674 | 353066 | 471389 | -1.2 | -2.1 | -3.5 | 0.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46090 | 25933 | 20996 | 15476 | 14946 | 11957 | 9079 | 6804 | -7.1 | -11.4 | -5.0 | -4.0 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752382 | 683775 | 527858 | 412106 | 489498 | 545965 | 585388 | 564000 | 4.5 | -1.5 | -4.9 | 1.6 |
| Biomass-waste | 46848 | 83787 | 145901 | 190886 | 220979 | 244742 | 280971 | 313979 | 382009 | 408675 | 423080 | 12.0 | 4.2 | 2.4 | 2.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383908 | 396051 | 410707 | 421369 | 427378 | 433145 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263516 | 494482 | 651933 | 802781 | 916701 | 1062374 | 1176449 | 1243985 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 168544 | 207575 | 253072 | 332020 | 389257 | 413030 | 68.9 | 20.4 | 3.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17165 | 35769 | 43673 | 52941 | 59113 | 2.5 | 5.9 | 3.5 | 6.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21447 | 34196 | 37477 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930133** | **1019117** | **1050394** | **1107267** | **1151276** | **1276755** | **1336932** | **1383221** | **2.6** | **2.0** | **0.8** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94355 | 93074 | 97019 | 106069 | 111559 | 125868 | -0.4 | -1.7 | -1.8 | 1.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440507 | 515248 | 593178 | 662294 | 769161 | 846491 | 885789 | 7.1 | 6.9 | 3.0 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122525 | 124926 | 129886 | 133333 | 135857 | 137763 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207413 | 262092 | 316799 | 356039 | 411094 | 450743 | 474229 | 20.7 | 9.4 | 4.3 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 127596 | 148184 | 171173 | 219008 | 253072 | 265913 | 66.7 | 14.0 | 2.9 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5195 | 5726 | 6819 | 7884 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488084 | 467448 | 440791 | 421015 | 391964 | 401526 | 378882 | 371565 | 1.9 | -0.3 | -1.0 | -0.6 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102201 | 110979 | 109605 | 109469 | 114625 | 121685 | 123473 | 127484 | 0.9 | 0.9 | -0.1 | 0.8 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 7017 | 39838 | 112916 | 155344 | 0.0 | 0.0 | 0.0 | 29.3 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140919 | 120425 | 101448 | 85067 | 86716 | 86825 | 91099 | -0.6 | -2.2 | -3.2 | -0.5 |
| Gas fired | 129190 | 169054 | 224922 | 253082 | 258579 | 255752 | 250579 | 235342 | 233215 | 208211 | 190620 | 5.7 | 1.4 | -0.3 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32474 | 25963 | 21926 | 17249 | 14258 | 10845 | 8525 | -2.2 | -5.0 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34574 | 37740 | 46029 | 51694 | 63962 | 68864 | 76749 | 5.0 | 3.5 | 2.9 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1034 | 2612 | 3375 | 4137 | 4571 | 2.5 | 2.2 | 1.4 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.8 | 32.6 | 33.3 | 33.8 | 35.0 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.4 | 39.3 | 39.0 | 39.1 | 38.8 | 40.3 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.2 | 16.9 | 16.6 | 17.0 | 15.9 | 15.0 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.6 | 3.5 | 7.4 | 12.3 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.8 | 72.5 | 76.6 | 78.1 | 77.7 | 77.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.9 | 20.5 | 20.9 | 20.5 | 19.8 | 20.8 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.9 | 52.0 | 55.6 | 57.5 | 57.9 | 56.3 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7847.0** | **8107.3** | **8321.8** | **8497.6** | **8736.7** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.7 | 624.8 | 654.3 | 672.4 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5586.5 | 5687.5 | 5727.4 | 5774.6 | 5882.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.5 | 783.0 | 847.4 | 893.7 | 936.1 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.4 | 965.2 | 1044.0 | 1106.6 | 1175.4 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.8 | 48.7 | 50.3 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.8** | **3635.2** | **3713.2** | **3802.0** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.7 | 2501.4 | 2544.6 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.3 | 640.5 | 674.9 | 699.1 | 720.7 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 458.9 | 469.5 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **332999** | **318900** | **299836** | **284378** | **276091** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7830 | 7409 | 7150 | 6799 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129020 | 117139 | 99984 | 86786 | 80259 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120869 | 119477 | 116806 | 114305 | 112009 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9908 | 10070 | 10174 | 10083 | 9922 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58282 | 57569 | 58330 | 58926 | 59834 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7090 | 7236 | 7393 | 7480 | 7553 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE35DEC_c | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831443** | **798097** | **721554** | **649102** | **655124** | **708686** | **738516** | **772731** | **-1.2** | **-0.5** | **-2.0** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149894 | 138022 | 120411 | 95355 | 73147 | 68307 | 66481 | 74661 | -2.7 | -1.7 | -3.6 | -1.2 |
| Oil | 176084 | 136469 | 103565 | 90642 | 76989 | 62929 | 51072 | 36190 | 24841 | 14597 | 9226 | -5.2 | -2.9 | -4.0 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149166 | 137906 | 104415 | 74720 | 66446 | 60892 | 56113 | 48137 | -2.7 | -1.4 | -5.9 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212638 | 255227 | 261891 | 270431 | 312924 | 377010 | 420735 | 443046 | 5.6 | 3.6 | 0.6 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32948 | 33863 | 35274 | 36210 | 36682 | 37175 | 0.4 | 0.0 | 0.5 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136264 | 148525 | 138975 | 135192 | 152282 | 183737 | 206664 | 219019 | 6.5 | 1.8 | -0.9 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42457 | 54230 | 64111 | 73226 | 88366 | 97331 | 102001 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14051 | 22799 | 26599 | 27969 | 34472 | 41317 | 46941 | 48311 | 24.0 | 20.0 | 2.1 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9139 | 9295 | 17669 | 27380 | 33117 | 36540 | 2.3 | 4.6 | 0.0 | 7.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967878** | **896579** | **832192** | **746859** | **678342** | **588415** | **532890** | **485823** | **1.4** | **-0.6** | **-1.8** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115995 | 91872 | 88795 | 77135 | 54512 | 33614 | 28266 | 33117 | 1.2 | -1.9 | -1.7 | -4.1 |
| Oil | 535238 | 604030 | 563977 | 551794 | 524754 | 493926 | 462831 | 413413 | 348476 | 282617 | 230928 | 0.5 | -0.7 | -1.2 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527781 | 504232 | 478665 | 452504 | 413957 | 364112 | 314538 | 272306 | 0.4 | -0.7 | -1.1 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20523 | 15260 | 10326 | -544 | -15636 | -31921 | -41378 | 2.8 | -1.0 | -6.6 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286177 | 260000 | 229334 | 184913 | 183587 | 172925 | 183431 | 179054 | 3.6 | -0.6 | -3.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745856** | **1639260** | **1496318** | **1337283** | **1272821** | **1236646** | **1210247** | **1196253** | **0.2** | **-0.8** | **-2.0** | **-0.6** |
| Solids | 321277 | 317986 | 280653 | 265889 | 229894 | 209206 | 172490 | 127659 | 101921 | 94747 | 107778 | -1.3 | -2.0 | -2.8 | -2.3 |
| Oil | 665142 | 683909 | 620735 | 589188 | 547246 | 501416 | 457872 | 393237 | 318552 | 243308 | 186463 | -0.7 | -1.3 | -1.8 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435126 | 396988 | 331758 | 256986 | 245755 | 228128 | 232291 | 218580 | 1.2 | -1.1 | -4.3 | -0.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226679 | 276783 | 283537 | 293899 | 341494 | 412229 | 461192 | 487866 | 5.9 | 4.1 | 0.6 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 14.0 | 12.9 | 10.0 | 8.2 | 7.8 | 9.0 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.5 | 34.2 | 30.9 | 25.8 | 20.1 | 15.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 19.2 | 19.3 | 18.4 | 19.2 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.8 | 13.1 | 14.4 | 14.9 | 16.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.9 | 22.0 | 26.8 | 33.3 | 38.1 | 40.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368917 | 345669 | 330896 | 293605 | 293130 | 321803 | 358103 | 402709 | -0.5 | -0.9 | -1.6 | 1.6 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383290** | **342379** | **306462** | **251160** | **240293** | **263396** | **292881** | **305139** | **0.8** | **-2.0** | **-3.1** | **1.0** |
| Solids | 223038 | 228941 | 197605 | 186639 | 153980 | 145683 | 118800 | 82691 | 67484 | 67081 | 83372 | -1.2 | -2.5 | -2.6 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10891 | 5772 | 4526 | 3246 | 2877 | 2261 | 1759 | 1324 | -6.5 | -11.9 | -5.6 | -4.4 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131871 | 121328 | 90859 | 60242 | 71658 | 76118 | 87162 | 78514 | 3.8 | -2.0 | -6.8 | 1.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47914 | 54502 | 58541 | 61455 | 67591 | 87430 | 98490 | 99061 | 11.7 | 1.9 | 1.2 | 2.4 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7416 | 15477 | 24875 | 30256 | 32981 | 1.6 | 3.5 | 0.9 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5227 | 8133 | 9887 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970990** | **901576** | **834079** | **774053** | **751647** | **722264** | **680808** | **668964** | **-0.7** | **-1.0** | **-1.5** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646614 | 611888 | 572137 | 534023 | 479539 | 416152 | 352855 | 302891 | -1.0 | -0.9 | -1.4 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25358 | 24591 | 55183 | 89206 | 114770 | 138649 | 34.1 | 6.9 | -0.6 | 9.0 |
| District heating | 18667 | 19517 | 20813 | 22214 | 19374 | 16880 | 16836 | 15392 | 11457 | 9032 | 8466 | 1.1 | -0.7 | -1.4 | -3.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283940 | 244285 | 219705 | 198604 | 201533 | 205449 | 204150 | 218957 | -0.6 | -1.9 | -2.0 | 0.5 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82413** | **76461** | **68614** | **61707** | **55594** | **50071** | **46854** | **46409** | **0.2** | **-1.4** | **-2.1** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119320** | **122392** | **117523** | **110687** | **105453** | **101389** | **98061** | **98032** | **-0.2** | **0.6** | **-1.0** | **-0.6** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170499** | **1120502** | **1022200** | **920075** | **870767** | **825095** | **786402** | **758883** | **0.3** | **-0.3** | **-2.0** | **-1.0** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304745 | 302877 | 280054 | 258754 | 240404 | 224866 | 216668 | 215641 | -1.3 | 0.4 | -1.6 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197049 | 195802 | 180295 | 164999 | 151021 | 140128 | 134921 | 132017 | -1.5 | 0.4 | -1.7 | -1.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107696 | 107075 | 99759 | 93755 | 89383 | 84738 | 81747 | 83624 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293092 | 251791 | 215196 | 200746 | 191367 | 179003 | 162158 | 0.8 | -0.6 | -3.0 | -1.4 |
| Tertiary | 166083 | 179768 | 187856 | 181914 | 167514 | 146543 | 110285 | 107949 | 106466 | 103915 | 102487 | 1.2 | -1.1 | -4.1 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357021 | 343813 | 335840 | 321668 | 302395 | 286817 | 278598 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48392 | 45791 | 37307 | 30784 | 24756 | 19349 | 15032 | 12838 | -2.2 | -0.8 | -3.9 | -4.3 |
| Oil | 485890 | 502788 | 457366 | 440511 | 404794 | 370041 | 336053 | 282475 | 223560 | 171624 | 130236 | -0.6 | -1.2 | -1.8 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271648 | 246107 | 212814 | 172720 | 148895 | 120968 | 100246 | 84352 | 0.1 | -0.9 | -3.5 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254475 | 250763 | 243009 | 232195 | 235980 | 252502 | 267515 | 277267 | 1.2 | 0.2 | -0.8 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55309 | 54749 | 52233 | 49602 | 48996 | 49000 | 48086 | 47269 | 1.5 | 0.2 | -1.0 | -0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100099 | 118037 | 106198 | 97670 | 117922 | 138284 | 157500 | 174420 | 5.2 | 3.7 | -1.9 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1050 | 11743 | 21433 | 26399 | 32502 | 0.0 | 0.0 | 14.9 | 18.7 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194885** | **243413** | **247548** | **258410** | **295279** | **352999** | **390762** | **412300** | **5.4** | **5.0** | **0.6** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.2** | **4234.8** | **3831.5** | **3346.3** | **2731.5** | **2034.1** | **1473.0** | **1167.3** | **-0.7** | **-1.3** | **-2.3** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1873.1 | 1708.6 | 1462.8 | 1226.1 | 851.2 | 513.1 | 358.2 | | -1.5 | -2.4 | -6.8 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2361.7 | 2123.0 | 1883.6 | 1505.4 | 1182.8 | 959.9 | 809.1 | | -1.2 | -2.2 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.3** | **3203.6** | **2836.0** | **2391.9** | **1987.8** | **1421.7** | **1025.6** | **770.7** | **-0.5** | **-1.6** | **-2.9** | **-5.5** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.5 | 1010.1 | 887.4 | 682.7 | 544.4 | 283.7 | 129.8 | 58.1 | -0.5 | -2.8 | -3.8 | -11.6 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.6 | 138.6 | 119.8 | 106.6 | 92.7 | 75.0 | 62.0 | 53.0 | -0.6 | -1.4 | -2.6 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.0 | 445.3 | 390.3 | 322.6 | 235.8 | 191.3 | 167.5 | -2.8 | -0.3 | -2.5 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 301.2 | 230.4 | 184.0 | 143.8 | 103.9 | 65.0 | -0.1 | -1.7 | -5.0 | -6.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.8 | 150.8 | 88.9 | 76.4 | 65.3 | 51.8 | 39.0 | -0.3 | -2.7 | -7.3 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.1 | 931.6 | 893.1 | 767.6 | 618.1 | 486.8 | 388.0 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **275.5** | **280.0** | **252.6** | **213.1** | **85.0** | **45.4** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **67.4** | **58.9** | **48.1** | **35.8** | **25.9** | **20.5** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE35DEC_c | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 96.9 | 80.2 | 71.2 | 64.6 | 59.0 | 54.5 | -1.2 | -2.2 | -3.5 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.90 | 1.79 | 1.56 | 1.15 | 0.85 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 53.5 | 50.9 | 45.4 | 41.9 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.2 | 1705.8 | 1781.2 | 1971.4 | 2046.8 | 2229.5 | 2421.3 | 2543.6 | 3.4 | 1.9 | 1.5 | 1.3 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 11.8 | 11.5 | 11.6 | 11.8 | 11.6 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 78.2 | 68.4 | 60.7 | 54.1 | 50.0 | 47.6 | | -1.0 | -2.7 | -1.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.4 | 51.8 | 44.9 | 39.8 | 34.5 | 28.9 | -0.5 | -1.9 | -4.5 | -2.9 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 42.6 | 38.6 | 35.3 | 32.0 | 29.3 | 0.0 | -2.6 | -5.7 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.18 | 0.14 | 0.07 | 0.03 | 0.01 | -1.6 | -2.9 | -3.0 | -12.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.74 | 1.55 | 1.29 | 1.06 | 0.87 | -0.8 | -0.7 | -0.5 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.51 | 1.34 | 1.05 | 0.88 | 0.78 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.20 | 1.07 | 0.92 | 0.75 | 0.58 | 0.40 | -0.9 | -1.1 | -2.0 | -4.8 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.3 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.6 | 27.4 | 33.1 | 41.4 | 47.7 | 51.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 42.3 | 57.0 | 68.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887184 | 735586 | 669229 | 614947 | 659774 | 720713 | 744717 | 842447 | -0.3 | -2.2 | -1.8 | 1.6 |
| Solids | 933660 | 974939 | 830048 | 802585 | 672393 | 640613 | 512510 | 347072 | 254027 | 279264 | 383058 | -1.2 | -2.1 | -2.7 | -1.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46106 | 25934 | 20837 | 15014 | 14592 | 11325 | 9041 | 6365 | -7.1 | -11.4 | -5.3 | -4.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 751990 | 686270 | 486846 | 332572 | 422612 | 470687 | 517385 | 495099 | 4.5 | -1.5 | -7.0 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190927 | 217341 | 235321 | 251362 | 287318 | 385914 | 420958 | 423826 | 12.0 | 4.1 | 1.5 | 2.6 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383119 | 393758 | 410167 | 421052 | 426538 | 432263 | 0.4 | 0.0 | 0.5 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 493685 | 630586 | 745477 | 851466 | 1027510 | 1131758 | 1186061 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166774 | 199365 | 242347 | 324463 | 380512 | 399815 | 68.9 | 20.4 | 3.3 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 16590 | 30867 | 42970 | 51601 | 56662 | 2.5 | 5.9 | 3.2 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26696 | 37510 | 41357 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930099** | **1018489** | **1034966** | **1069732** | **1102173** | **1232199** | **1284806** | **1313671** | **2.6** | **2.0** | **0.5** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 92030 | 88076 | 89123 | 95965 | 99041 | 111503 | -0.4 | -1.7 | -2.3 | 1.2 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440177 | 507020 | 569290 | 632812 | 751015 | 824198 | 856398 | 7.1 | 6.9 | 2.6 | 2.1 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122324 | 124437 | 129518 | 133244 | 135613 | 137475 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207087 | 255211 | 297577 | 333051 | 397636 | 434546 | 453476 | 20.7 | 9.4 | 3.7 | 2.1 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126450 | 144021 | 165061 | 214442 | 247367 | 257956 | 66.7 | 14.0 | 2.7 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5692 | 6672 | 7490 | 0.0 | 21.3 | 7.0 | 4.3 |
| Thermal power | 398853 | 429386 | 480034 | 488050 | 467150 | 435917 | 412366 | 380238 | 385220 | 361567 | 345770 | 1.9 | -0.3 | -1.2 | -0.9 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102482 | 110690 | 107069 | 106056 | 106727 | 116105 | 120128 | 122405 | 0.9 | 0.9 | -0.4 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 2079 | 31330 | 100998 | 136082 | 0.0 | 0.0 | 0.0 | 28.5 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140957 | 120336 | 101121 | 83728 | 81636 | 80081 | 80781 | -0.6 | -2.2 | -3.3 | -1.1 |
| Gas fired | 129190 | 169054 | 224922 | 253051 | 258083 | 251352 | 242831 | 225181 | 219910 | 195644 | 173275 | 5.7 | 1.4 | -0.6 | -1.7 |
| Oil fired | 67499 | 59434 | 54039 | 42249 | 32633 | 25945 | 21971 | 17654 | 14598 | 10928 | 8598 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34575 | 37374 | 45454 | 51620 | 65773 | 70898 | 78739 | 5.0 | 3.5 | 2.8 | 2.8 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 989 | 2055 | 3302 | 4016 | 4378 | 2.5 | 2.2 | 0.9 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.4 | 31.7 | 32.7 | 33.0 | 34.2 | 35.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.1 | 38.4 | 39.0 | 38.5 | 38.2 | 39.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 15.9 | 16.3 | 16.4 | 17.1 | 16.2 | 15.2 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 2.3 | 6.2 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.8 | 64.7 | 72.1 | 76.0 | 79.9 | 79.7 | 79.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.6 | 20.0 | 20.2 | 19.7 | 18.8 | 19.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 44.1 | 52.1 | 55.8 | 60.2 | 60.9 | 59.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.0** | **7452.1** | **7851.0** | **8111.2** | **8322.6** | **8497.1** | **8737.4** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.3 | 603.2 | 624.5 | 654.3 | 672.3 | 690.5 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.6 | 5410.5 | 5587.2 | 5688.6 | 5727.3 | 5773.8 | 5881.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.9 | 723.7 | 782.3 | 847.2 | 893.4 | 935.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.4 | 775.4 | 892.0 | 969.1 | 1045.2 | 1107.3 | 1178.7 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 44.9 | 46.7 | 48.6 | 50.3 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.4** | **3511.3** | **3635.6** | **3713.0** | **3801.5** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.6 | 2501.4 | 2545.0 | 2599.8 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.7 | 641.0 | 675.2 | 698.7 | 720.2 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 459.0 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354504** | **341294** | **333375** | **319214** | **299991** | **284477** | **276292** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7806 | 7825 | 7403 | 7147 | 6800 | 6514 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156774 | 141065 | 129021 | 117140 | 99985 | 86784 | 80261 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118271 | 120872 | 119462 | 116791 | 114294 | 111986 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9231 | 9910 | 10073 | 10178 | 10078 | 9918 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56124 | 58173 | 58663 | 57906 | 58498 | 59044 | 60067 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6749 | 7083 | 7229 | 7391 | 7476 | 7548 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE40DEC_c | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831467** | **798182** | **721654** | **594126** | **601760** | **645922** | **686502** | **725722** | **-1.2** | **-0.5** | **-2.9** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149909 | 138357 | 122588 | 88013 | 75580 | 67117 | 60562 | 71523 | -2.7 | -1.7 | -4.4 | -1.0 |
| Oil | 176084 | 136469 | 103565 | 90639 | 76992 | 62871 | 50594 | 35891 | 24685 | 14526 | 9193 | -5.2 | -2.9 | -4.1 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149168 | 137818 | 104402 | 65593 | 59388 | 56195 | 53182 | 45391 | -2.7 | -1.4 | -7.2 | -1.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212647 | 254989 | 258925 | 252117 | 285731 | 346347 | 397618 | 420849 | 5.6 | 3.6 | -0.1 | 2.6 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32956 | 33532 | 34287 | 35802 | 36254 | 36918 | 0.4 | 0.0 | 0.4 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136274 | 148474 | 138011 | 124759 | 141967 | 166669 | 198037 | 212409 | 6.5 | 1.8 | -1.7 | 2.7 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42272 | 52303 | 60668 | 65752 | 81456 | 90026 | 94075 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22796 | 26526 | 24785 | 30544 | 37164 | 41902 | 42969 | 24.0 | 20.0 | 0.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9129 | 8374 | 13182 | 25256 | 31400 | 34479 | 2.3 | 4.6 | -1.0 | 7.3 |
| **Net Imports** | **829314** | **988719** | **956735** | **967871** | **897192** | **834294** | **707942** | **653319** | **571662** | **512780** | **465308** | **1.4** | **-0.6** | **-2.3** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 116028 | 92380 | 91837 | 65754 | 54356 | 39287 | 28264 | 32001 | 1.2 | -1.8 | -3.3 | -3.5 |
| Oil | 535238 | 604030 | 563977 | 551788 | 524779 | 492943 | 455032 | 407527 | 344764 | 280202 | 229748 | 0.5 | -0.7 | -1.4 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504240 | 477965 | 447164 | 409846 | 361424 | 312739 | 271449 | 0.4 | -0.7 | -1.2 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20538 | 14978 | 7868 | -2320 | -16660 | -32538 | -41702 | 2.8 | -1.0 | -9.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286142 | 260089 | 229511 | 166466 | 166071 | 156056 | 166898 | 161971 | 3.6 | -0.6 | -4.4 | -0.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745873** | **1639958** | **1498520** | **1243389** | **1194435** | **1157129** | **1138123** | **1128729** | **0.2** | **-0.7** | **-2.7** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265938 | 230738 | 214425 | 153767 | 129936 | 106403 | 88826 | 103524 | -1.3 | -1.9 | -4.0 | -2.0 |
| Oil | 665142 | 683909 | 620735 | 589179 | 547273 | 500376 | 449594 | 387052 | 314684 | 240821 | 185250 | -0.7 | -1.3 | -1.9 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435092 | 396989 | 331922 | 229412 | 221181 | 206561 | 212827 | 198752 | 1.2 | -1.1 | -5.3 | -0.7 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226690 | 276534 | 280435 | 274298 | 312833 | 379722 | 436921 | 464526 | 5.9 | 4.1 | -0.1 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 14.3 | 12.4 | 10.9 | 9.2 | 7.8 | 9.2 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.4 | 36.2 | 32.4 | 27.2 | 21.2 | 16.4 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 18.5 | 18.5 | 17.9 | 18.7 | 17.6 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.1 | 12.2 | 13.1 | 14.1 | 15.8 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.7 | 22.1 | 26.2 | 32.8 | 38.4 | 41.2 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368936 | 346142 | 334042 | 261356 | 268879 | 295275 | 321605 | 369255 | -0.5 | -0.9 | -2.8 | 1.7 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383320** | **343115** | **312621** | **223213** | **227200** | **247274** | **275839** | **290789** | **0.8** | **-1.9** | **-4.2** | **1.3** |
| Solids | 223038 | 228941 | 197605 | 186660 | 154839 | 151933 | 103497 | 86710 | 71848 | 61126 | 79650 | -1.2 | -2.4 | -3.9 | -1.3 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5786 | 4352 | 3158 | 2918 | 2269 | 1707 | 1313 | -6.5 | -11.9 | -5.9 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131886 | 121199 | 91115 | 52958 | 62634 | 67127 | 79340 | 69361 | 3.8 | -2.1 | -7.9 | 1.4 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47910 | 54494 | 58369 | 56735 | 63527 | 77803 | 97239 | 99097 | 11.7 | 1.9 | 0.4 | 2.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6851 | 6864 | 11411 | 23228 | 29110 | 31632 | 1.6 | 3.5 | 0.1 | 7.9 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4999 | 7317 | 9736 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970986** | **901663** | **832719** | **742152** | **719594** | **686953** | **651670** | **641675** | **-0.7** | **-1.0** | **-1.9** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646606 | 611902 | 571290 | 527852 | 474892 | 413249 | 350939 | 301978 | -1.0 | -0.9 | -1.5 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25359 | 24595 | 53757 | 86249 | 110546 | 134920 | 34.1 | 6.9 | -0.6 | 8.9 |
| District heating | 18667 | 19517 | 20813 | 22216 | 19390 | 16564 | 12685 | 11810 | 7176 | 5305 | 4734 | 1.1 | -0.7 | -4.2 | -4.8 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283942 | 244341 | 219506 | 177020 | 179134 | 180279 | 184880 | 200043 | -0.6 | -1.9 | -3.2 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82408** | **76506** | **68665** | **59458** | **54181** | **48840** | **44715** | **44598** | **0.2** | **-1.4** | **-2.5** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122391** | **116695** | **108596** | **103913** | **100940** | **97869** | **98038** | **-0.2** | **0.6** | **-1.2** | **-0.5** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170494** | **1120654** | **1020866** | **858690** | **816464** | **776267** | **738226** | **711900** | **0.3** | **-0.3** | **-2.6** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304739 | 302929 | 278925 | 255989 | 238419 | 224364 | 216224 | 215251 | -1.3 | 0.4 | -1.7 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197042 | 195821 | 179152 | 161968 | 148782 | 139680 | 134616 | 131840 | -1.5 | 0.4 | -1.9 | -1.0 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107697 | 107107 | 99773 | 94021 | 89636 | 84684 | 81608 | 83411 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293086 | 251356 | 180244 | 169433 | 161469 | 149291 | 133559 | 0.8 | -0.6 | -4.7 | -1.5 |
| Tertiary | 166083 | 179768 | 187856 | 181915 | 167577 | 146523 | 86398 | 86442 | 87331 | 85438 | 84513 | 1.2 | -1.1 | -6.4 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357063 | 344062 | 336059 | 322170 | 303104 | 287273 | 278578 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48413 | 45741 | 36612 | 28972 | 23511 | 19266 | 14984 | 12769 | -2.2 | -0.8 | -4.5 | -4.0 |
| Oil | 485890 | 502788 | 457366 | 440495 | 404845 | 369931 | 330059 | 278025 | 220184 | 169503 | 129150 | -0.6 | -1.2 | -2.0 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271612 | 246200 | 212909 | 153899 | 134429 | 110162 | 90003 | 74938 | 0.1 | -0.9 | -4.6 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254471 | 250887 | 243332 | 211399 | 217179 | 235509 | 249796 | 258410 | 1.2 | 0.2 | -1.7 | 1.0 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 54725 | 52089 | 42745 | 42851 | 43173 | 42133 | 41944 | 1.5 | 0.2 | -2.4 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100121 | 117994 | 105396 | 90561 | 109905 | 128800 | 148145 | 165222 | 5.2 | 3.7 | -2.6 | 3.1 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1055 | 10564 | 19173 | 23662 | 29468 | 0.0 | 0.0 | 15.0 | 18.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194970** | **242986** | **244446** | **239514** | **270796** | **323447** | **366990** | **389609** | **5.4** | **5.0** | **-0.1** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.3** | **4238.7** | **3853.8** | **3185.7** | **2711.2** | **2133.0** | **1451.4** | **1123.8** | **-0.7** | **-1.3** | **-2.8** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.0 | 1876.7 | 1731.6 | 1367.8 | 1256.2 | 986.8 | 522.7 | 339.2 | | -1.5 | -3.1 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2362.0 | 2122.2 | 1817.9 | 1455.0 | 1146.2 | 928.7 | 784.6 | | -1.2 | -2.6 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.4** | **3207.3** | **2857.0** | **2230.9** | **1938.4** | **1516.5** | **1002.0** | **727.4** | **-0.5** | **-1.6** | **-3.6** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.6 | 1013.0 | 908.7 | 593.9 | 543.4 | 407.5 | 136.4 | 41.3 | -0.5 | -2.8 | -5.2 | -12.5 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 118.7 | 103.9 | 91.5 | 75.6 | 61.8 | 52.3 | -0.6 | -1.4 | -2.8 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.7 | 447.5 | 385.1 | 325.8 | 246.9 | 193.8 | 165.6 | -2.8 | -0.3 | -2.6 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 300.2 | 182.2 | 146.4 | 112.7 | 79.0 | 47.5 | -0.1 | -1.7 | -7.2 | -6.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.7 | 149.5 | 71.9 | 62.0 | 53.9 | 43.2 | 32.8 | -0.3 | -2.7 | -9.2 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.3 | 932.3 | 893.9 | 769.2 | 619.9 | 487.8 | 387.9 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.9** | **276.8** | **280.4** | **281.7** | **217.2** | **87.0** | **45.2** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.6** | **67.8** | **56.0** | **47.7** | **37.5** | **25.5** | **19.8** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE40DEC_c | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 97.0 | 74.6 | 66.9 | 60.4 | 55.5 | 51.4 | -1.2 | -2.2 | -4.2 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.79 | 1.62 | 1.31 | 0.88 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 54.4 | 52.1 | 47.0 | 42.8 | 39.1 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1017.7 | 1222.4 | 1419.5 | 1580.2 | 1706.5 | 1782.8 | 2167.0 | 2217.6 | 2389.6 | 2608.0 | 2760.9 | 3.4 | 1.9 | 2.4 | 1.2 |
| as % of GDP | 9.5 | 10.4 | 11.5 | 12.0 | 12.0 | 11.5 | 13.0 | 12.4 | 12.5 | 12.7 | 12.6 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 77.9 | 67.7 | 60.2 | 54.0 | 49.9 | 47.6 | | -1.0 | -2.8 | -1.7 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.3 | 43.4 | 37.9 | 33.5 | 28.7 | 23.8 | -0.5 | -1.9 | -6.2 | -3.0 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 33.4 | 30.9 | 29.0 | 26.3 | 24.2 | 0.0 | -2.6 | -8.0 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.3 | 20.7 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.17 | 0.15 | 0.10 | 0.03 | 0.01 | -1.6 | -2.9 | -3.4 | -13.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.79 | 1.60 | 1.33 | 1.09 | 0.89 | -0.8 | -0.7 | -0.3 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.60 | 1.50 | 1.37 | 1.10 | 0.90 | 0.77 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.19 | 1.01 | 0.86 | 0.70 | 0.53 | 0.36 | -0.9 | -1.1 | -2.6 | -5.1 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.02 | 0.83 | 0.72 | 0.62 | 0.51 | 0.39 | -1.5 | -1.6 | -3.0 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.05 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.3 | 27.4 | 32.6 | 40.5 | 48.0 | 52.4 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.4 | 26.3 | 42.3 | 57.5 | 68.9 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 735874 | 673556 | 536430 | 570593 | 608066 | 658356 | 759401 | -0.3 | -2.2 | -3.1 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802733 | 676404 | 666387 | 433376 | 368393 | 312489 | 244337 | 355684 | -1.2 | -2.0 | -4.4 | -1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45969 | 26009 | 19984 | 14419 | 14214 | 11321 | 8686 | 5273 | -7.1 | -11.4 | -5.7 | -4.9 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752003 | 685820 | 487963 | 290207 | 364085 | 405726 | 463517 | 434346 | 4.5 | -1.5 | -8.2 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190884 | 217533 | 234409 | 232058 | 271052 | 349523 | 422133 | 424394 | 12.0 | 4.1 | 0.6 | 3.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383210 | 389910 | 398682 | 416298 | 421554 | 429275 | 0.4 | 0.0 | 0.4 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 491540 | 608172 | 705437 | 764556 | 947168 | 1046811 | 1093895 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166878 | 186689 | 227932 | 307285 | 356600 | 373788 | 68.9 | 20.4 | 2.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15368 | 15783 | 24859 | 39611 | 48636 | 52932 | 2.5 | 5.9 | 2.7 | 6.2 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25755 | 33225 | 39996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930117** | **1017665** | **1025340** | **1040514** | **1041376** | **1159956** | **1208177** | **1231823** | **2.6** | **2.0** | **0.2** | **0.8** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 91595 | 85077 | 81388 | 81611 | 87645 | 100457 | -0.4 | -1.7 | -2.6 | 0.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439349 | 498334 | 548216 | 592728 | 708714 | 776055 | 806035 | 7.1 | 6.8 | 2.2 | 1.9 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122346 | 124018 | 126767 | 131195 | 133426 | 136486 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206259 | 246614 | 283136 | 303191 | 367918 | 402833 | 418949 | 20.7 | 9.3 | 3.2 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126407 | 137873 | 158087 | 204541 | 233861 | 244110 | 66.7 | 14.0 | 2.2 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2967 | 3188 | 4683 | 5061 | 5936 | 6491 | 0.0 | 21.3 | 6.8 | 3.6 |
| Thermal power | 398853 | 429386 | 480034 | 488068 | 467155 | 435411 | 407222 | 367261 | 369631 | 344477 | 325331 | 1.9 | -0.3 | -1.4 | -1.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102224 | 110690 | 106163 | 101682 | 99932 | 110710 | 115158 | 115917 | 0.9 | 0.9 | -0.8 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 904 | 11046 | 84221 | 127005 | 0.0 | 0.0 | 0.0 | 28.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141085 | 120710 | 101239 | 83482 | 80448 | 76328 | 77196 | -0.6 | -2.2 | -3.3 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253066 | 257793 | 250302 | 240038 | 216231 | 209465 | 183114 | 157776 | 5.7 | 1.4 | -0.7 | -2.1 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32647 | 25926 | 21875 | 17342 | 14391 | 10933 | 8611 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34727 | 37564 | 43154 | 48690 | 62243 | 70237 | 77547 | 5.0 | 3.5 | 2.2 | 3.0 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 915 | 1515 | 3084 | 3864 | 4199 | 2.5 | 2.2 | 0.1 | 7.9 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.2 | 34.8 | 29.7 | 31.8 | 32.6 | 33.7 | 35.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.0 | 37.7 | 39.0 | 39.4 | 37.6 | 38.4 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.6 | 15.5 | 16.2 | 16.2 | 17.4 | 16.6 | 15.3 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 1.3 | 4.6 | 10.2 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 63.9 | 73.7 | 75.1 | 78.5 | 80.5 | 79.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 19.1 | 19.0 | 17.9 | 17.9 | 19.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.8 | 43.2 | 54.6 | 56.2 | 60.6 | 62.5 | 60.4 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.3** | **7454.4** | **7853.0** | **8116.4** | **8331.3** | **8502.4** | **8734.5** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.8 | 575.0 | 603.0 | 623.9 | 653.4 | 671.9 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.7 | 5411.0 | 5587.4 | 5689.2 | 5730.0 | 5775.2 | 5879.3 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.4 | 722.9 | 781.4 | 845.4 | 892.1 | 935.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.8 | 778.0 | 894.9 | 975.3 | 1054.1 | 1113.0 | 1176.9 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 42.9 | 44.8 | 46.6 | 48.5 | 50.1 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.4** | **3385.7** | **3511.9** | **3635.6** | **3712.7** | **3801.2** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.2 | 2346.6 | 2426.5 | 2501.7 | 2545.0 | 2600.0 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.9 | 641.6 | 674.9 | 698.2 | 719.7 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.8 | 459.0 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354546** | **341541** | **333642** | **319752** | **300729** | **284965** | **276309** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7803 | 7826 | 7395 | 7136 | 6791 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156777 | 141081 | 129027 | 117154 | 100042 | 86814 | 80247 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118899 | 118275 | 120887 | 119476 | 116805 | 114271 | 111965 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9230 | 9895 | 10075 | 10170 | 10074 | 9915 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56163 | 58408 | 58933 | 58431 | 59201 | 59549 | 60118 | 0.9 | 1.2 | 0.5 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6745 | 7074 | 7220 | 7375 | 7467 | 7550 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

# Cost reporting method: d

| EU28: REF2012tplusF | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831587** | **806999** | **774028** | **750386** | **756269** | **758942** | **756325** | **741591** | **-1.2** | **-0.4** | **-0.7** | **-0.1** |
| Solids | 214627 | 196059 | 163855 | 149946 | 139419 | 127372 | 88814 | 78810 | 74257 | 72656 | 68963 | -2.7 | -1.6 | -4.4 | -1.3 |
| Oil | 176084 | 136469 | 103565 | 90795 | 77412 | 65152 | 55157 | 43065 | 33789 | 22982 | 16197 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149165 | 140761 | 124871 | 110507 | 103426 | 97087 | 84365 | 71349 | -2.7 | -1.2 | -2.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212589 | 257212 | 277033 | 294950 | 315867 | 335310 | 355412 | 368835 | 5.6 | 3.7 | 1.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 32955 | 34082 | 35124 | 35706 | 36025 | 36580 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136218 | 150600 | 151413 | 152531 | 154423 | 160741 | 163611 | 162741 | 6.5 | 1.9 | 0.1 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42406 | 54639 | 66346 | 73718 | 78176 | 85525 | 93351 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22777 | 28573 | 32011 | 37261 | 41669 | 45099 | 45953 | 24.0 | 20.0 | 3.5 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9248 | 9453 | 9979 | 15341 | 19017 | 25152 | 30210 | 2.3 | 4.6 | 0.8 | 5.7 |
| **Net Imports** | **829314** | **988719** | **956735** | **967965** | **909430** | **914865** | **920857** | **911994** | **917314** | **940317** | **961688** | **1.4** | **-0.5** | **0.1** | **0.2** |
| Solids | 98273 | 125211 | 110927 | 116119 | 95051 | 87995 | 85092 | 61658 | 54216 | 54638 | 54894 | 1.2 | -1.5 | -1.1 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551754 | 527894 | 519346 | 516402 | 517466 | 518318 | 527807 | 532886 | 0.5 | -0.7 | -0.2 | 0.2 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527813 | 506534 | 496537 | 490142 | 488282 | 485469 | 489278 | 488275 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23941 | 21361 | 22809 | 26260 | 29184 | 32849 | 38529 | 44612 | 2.8 | -0.6 | 2.1 | 2.7 |
| Natural gas | 193432 | 257849 | 276001 | 286188 | 266292 | 285786 | 295737 | 308333 | 317942 | 330144 | 345370 | 3.6 | -0.4 | 1.1 | 0.8 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746078** | **1660906** | **1631144** | **1611172** | **1605665** | **1611671** | **1628926** | **1632192** | **0.2** | **-0.6** | **-0.3** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266064 | 234470 | 215366 | 173905 | 140468 | 128472 | 127295 | 123857 | -1.3 | -1.8 | -2.9 | -1.7 |
| Oil | 665142 | 683909 | 620735 | 589293 | 550703 | 528750 | 514194 | 502296 | 493414 | 490670 | 487100 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435135 | 406133 | 408655 | 403538 | 407397 | 409137 | 406913 | 407615 | 1.2 | -0.9 | -0.1 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229091 | 192194 | 179601 | 200958 | 215101 | 218499 | 220909 | 216248 | -0.3 | -2.1 | 0.4 | 0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1489 | -1740 | -1819 | -1880 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226624 | 279007 | 300279 | 320066 | 342143 | 363967 | 385020 | 399468 | 5.9 | 4.2 | 1.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 10.8 | 8.7 | 8.0 | 7.8 | 7.6 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.4 | 31.9 | 31.3 | 30.6 | 30.1 | 29.8 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 25.0 | 25.4 | 25.4 | 25.0 | 25.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.0 | 12.5 | 13.4 | 13.6 | 13.6 | 13.2 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.4 | 19.9 | 21.3 | 22.6 | 23.6 | 24.5 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369020 | 352626 | 359642 | 367834 | 384934 | 414973 | 448155 | 474233 | -0.5 | -0.7 | 0.4 | 1.3 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383279** | **350653** | **338227** | **299628** | **283107** | **287705** | **299279** | **300677** | **0.8** | **-1.7** | **-1.6** | **0.0** |
| Solids | 223038 | 228941 | 197605 | 186789 | 158213 | 143833 | 105916 | 76434 | 68124 | 69913 | 68236 | -1.2 | -2.2 | -3.9 | -2.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5907 | 5284 | 4524 | 4024 | 4157 | 4106 | 3999 | -6.5 | -11.7 | -2.6 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131860 | 124637 | 126186 | 124553 | 127862 | 129233 | 128779 | 124793 | 3.8 | -1.8 | 0.0 | 0.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47765 | 55099 | 56071 | 57403 | 62394 | 70305 | 74626 | 76713 | 11.7 | 2.0 | 0.4 | 1.5 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7232 | 12393 | 15886 | 21855 | 26937 | 1.6 | 3.5 | 0.6 | 6.8 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971213** | **907635** | **869885** | **873784** | **869927** | **857971** | **852563** | **841625** | **-0.7** | **-1.0** | **-0.4** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646759 | 614530 | 592841 | 577534 | 564620 | 552898 | 546497 | 538635 | -1.0 | -0.9 | -0.6 | -0.3 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26359 | 26690 | 26750 | 26670 | 27551 | 28879 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22289 | 20164 | 19238 | 19339 | 18308 | 17120 | 16930 | 17867 | 1.1 | -0.3 | -0.4 | -0.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283934 | 246737 | 231448 | 250222 | 260249 | 261282 | 261585 | 256244 | -0.6 | -1.8 | 0.1 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82447** | **77111** | **73795** | **70810** | **68774** | **68154** | **68439** | **68633** | **0.2** | **-1.3** | **-0.8** | **-0.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119317** | **122300** | **121539** | **121545** | **121156** | **119756** | **119349** | **119926** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170679** | **1135707** | **1129540** | **1125739** | **1126378** | **1134045** | **1145322** | **1151911** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304790 | 306458 | 305818 | 306946 | 304679 | 304286 | 307156 | 309068 | -1.3 | 0.5 | 0.0 | 0.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197097 | 197798 | 195317 | 194779 | 192244 | 190028 | 190299 | 188589 | -1.5 | 0.5 | -0.2 | -0.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107693 | 108660 | 110501 | 112167 | 112436 | 114258 | 116857 | 120479 | -1.0 | 0.5 | 0.3 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311971 | 298542 | 299594 | 296933 | 298540 | 301009 | 303725 | 303245 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181930 | 172265 | 171368 | 167259 | 168215 | 169544 | 172346 | 172611 | 1.2 | -0.9 | -0.3 | 0.2 |
| Transport | 342901 | 368665 | 367191 | 371987 | 358443 | 352759 | 354602 | 354943 | 359206 | 362096 | 366986 | 0.7 | -0.2 | -0.1 | 0.2 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48396 | 46049 | 43058 | 41182 | 39790 | 37899 | 36225 | 34454 | -2.2 | -0.8 | -1.1 | -0.9 |
| Oil | 485890 | 502788 | 457366 | 440656 | 407882 | 391518 | 379332 | 370260 | 365014 | 363481 | 361555 | -0.6 | -1.1 | -0.7 | -0.2 |
| Gas | 266925 | 285438 | 269920 | 271580 | 251689 | 251363 | 248334 | 247896 | 247261 | 245785 | 249377 | 0.1 | -0.7 | -0.1 | 0.0 |
| Electricity | 217599 | 239418 | 245271 | 254509 | 254919 | 264128 | 275763 | 286183 | 299289 | 314052 | 323069 | 1.2 | 0.4 | 0.8 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 55781 | 56041 | 55856 | 56417 | 57242 | 58019 | 58386 | 1.5 | 0.4 | 0.0 | 0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100154 | 119123 | 123004 | 124620 | 124896 | 125946 | 125902 | 122809 | 5.2 | 3.8 | 0.5 | -0.1 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1858 | 2261 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194876** | **245063** | **264319** | **282449** | **299844** | **316529** | **330560** | **342242** | **5.4** | **5.1** | **1.4** | **1.0** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.2** | **4285.8** | **4111.8** | **3785.7** | **3540.4** | **3385.4** | **3208.5** | **3125.4** | **-0.7** | **-1.2** | **-1.2** | **-1.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.3 | 1903.9 | 1829.4 | 1603.2 | 1395.2 | 1265.6 | 1097.0 | 1017.9 | | -1.3 | -1.7 | -2.2 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2382.0 | 2282.4 | 2182.5 | 2145.2 | 2119.8 | 2111.5 | 2107.5 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.2** | **3254.6** | **3114.0** | **2872.9** | **2644.0** | **2503.9** | **2425.0** | **2357.1** | **-0.5** | **-1.5** | **-1.2** | **-1.0** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.0 | 1037.0 | 969.8 | 790.8 | 618.5 | 518.0 | 459.9 | 400.7 | -0.5 | -2.5 | -2.7 | -3.3 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.4 | 130.8 | 124.3 | 116.3 | 110.5 | 106.1 | 103.4 | -0.6 | -1.4 | -1.1 | -0.9 |
| Industry | 693.6 | 640.7 | 520.3 | 538.9 | 508.4 | 492.9 | 483.8 | 457.0 | 433.4 | 425.6 | 424.0 | -2.8 | -0.2 | -0.5 | -0.7 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.2 | 350.0 | 339.2 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.4 | 181.5 | 159.5 | 151.7 | 144.9 | 140.5 | 137.5 | -0.3 | -2.4 | -2.0 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.3 | 955.3 | 950.4 | 958.0 | 960.7 | 968.4 | 0.5 | -0.7 | -0.3 | 0.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.8** | **238.5** | **225.6** | **210.1** | **105.5** | **84.2** | **-1.0** | **1.5** | **-1.4** | **-5.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **72.3** | **66.6** | **62.3** | **59.6** | **56.4** | **55.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: REF2012tplusF | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.6 | 96.7 | 89.9 | 84.2 | 79.4 | 74.4 | -1.2 | -2.1 | -1.9 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.78 | 1.65 | 1.55 | 1.49 | 1.44 | -0.7 | -0.9 | -0.9 | -1.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.2 | 55.1 | 54.7 | 54.7 | 55.4 | 56.5 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.5 | 2042.1 | 2151.7 | 2252.0 | 2318.1 | 2406.7 | 2509.3 | 2596.8 | 3.7 | 2.7 | 1.0 | 0.7 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 13.9 | 13.5 | 13.0 | 12.6 | 12.2 | 11.8 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 81.1 | 76.9 | 73.3 | 70.8 | 68.3 | | -0.9 | -1.2 | -0.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.8 | 62.5 | 58.5 | 54.1 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.8 | 64.6 | 60.2 | 56.2 | 53.0 | 49.3 | 0.0 | -2.4 | -2.0 | -1.3 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.8 | 24.3 | 24.0 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.18 | 0.13 | 0.11 | 0.09 | 0.08 | -1.6 | -2.8 | -3.2 | -4.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.74 | 1.69 | 1.65 | 1.62 | 1.61 | -0.8 | -0.7 | -0.5 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.58 | 1.50 | 1.42 | 1.39 | 1.37 | -1.5 | -0.7 | -0.5 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.09 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.95 | 0.90 | 0.85 | 0.81 | 0.80 | -1.5 | -1.6 | -1.7 | -0.9 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 22.7 | 24.4 | 25.8 | 27.0 | 27.9 | 28.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.0 | 12.5 | 12.9 | 13.4 | 14.1 | | | | |
| **Gross Electricity generation by source (in GWh$_e$** | **3007267** | **3287285** | **3328110** | **3416143** | **3417103** | **3526993** | **3667044** | **3810604** | **3999241** | **4210248** | **4347499** | **1.0** | **0.3** | **0.7** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887133 | 744275 | 700745 | 798536 | 868963 | 899072 | 923584 | 925368 | -0.3 | -2.1 | 0.7 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 802985 | 695187 | 634705 | 475408 | 338823 | 316001 | 348162 | 364411 | -1.2 | -1.8 | -3.7 | -1.3 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46047 | 26351 | 24719 | 20367 | 20887 | 21379 | 22072 | 21396 | -7.1 | -11.2 | -2.5 | 0.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752612 | 707159 | 724245 | 738503 | 771635 | 789791 | 800906 | 787806 | 4.5 | -1.2 | 0.4 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190537 | 221059 | 232213 | 244380 | 272146 | 315813 | 329348 | 341583 | 12.0 | 4.2 | 1.0 | 1.7 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383199 | 396304 | 408416 | 415190 | 418892 | 425350 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263519 | 493091 | 635340 | 771467 | 857183 | 909025 | 994478 | 1085475 | 21.0 | 12.7 | 4.6 | 1.7 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 176869 | 206134 | 250245 | 305813 | 332001 | 347866 | 68.9 | 20.4 | 3.7 | 2.7 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 14959 | 15945 | 22307 | 27156 | 40804 | 48243 | 2.5 | 5.9 | 2.8 | 5.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930091** | **1020608** | **1068184** | **1139437** | **1200565** | **1276176** | **1332501** | **1384829** | **2.6** | **2.0** | **1.1** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96620 | 107067 | 115262 | 119221 | 122229 | 122236 | -0.4 | -1.7 | -0.4 | 0.7 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439930 | 518253 | 583930 | 638972 | 695773 | 745304 | 788875 | 7.1 | 6.9 | 2.9 | 1.5 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122425 | 124880 | 128891 | 130589 | 132262 | 134472 | 1.0 | 0.7 | 0.3 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206837 | 259330 | 306665 | 336105 | 356156 | 386066 | 416514 | 20.7 | 9.4 | 4.0 | 1.5 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 133698 | 149351 | 170783 | 205486 | 220708 | 230983 | 66.7 | 14.0 | 3.0 | 2.2 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2800 | 3033 | 3193 | 3542 | 6268 | 6906 | 0.0 | 21.3 | 6.2 | 4.2 |
| Thermal power | 398853 | 429386 | 480034 | 488042 | 469516 | 453312 | 448440 | 446331 | 461183 | 464968 | 473718 | 1.9 | -0.2 | -0.5 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102082 | 112459 | 114394 | 114917 | 120643 | 127184 | 136115 | 138177 | 0.9 | 1.1 | 0.2 | 0.9 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1614 | 7554 | 18146 | 34422 | 38409 | 0.0 | 0.0 | 6.0 | 17.2 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 121308 | 103796 | 90400 | 87684 | 86635 | 81361 | -0.6 | -2.1 | -3.1 | -1.2 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259228 | 266067 | 280845 | 291675 | 296751 | 298216 | 302087 | 5.7 | 1.4 | 0.8 | 0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 33187 | 27457 | 23519 | 19708 | 20759 | 19695 | 21359 | -2.2 | -4.8 | -3.4 | -0.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34666 | 37570 | 39320 | 42903 | 53878 | 57521 | 65334 | 5.0 | 3.5 | 1.3 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 960 | 1645 | 2109 | 2901 | 3576 | 2.5 | 2.2 | 0.6 | 6.8 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 36.2 | 35.4 | 35.0 | 34.5 | 34.7 | 34.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.3 | 42.7 | 43.1 | 43.7 | 43.9 | 44.2 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.5 | 16.1 | 16.4 | 16.8 | 16.7 | 16.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.7 | 3.4 | 5.0 | 6.9 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 60.8 | 66.3 | 70.3 | 71.8 | 72.2 | 73.0 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.9 | 21.8 | 22.8 | 22.5 | 21.9 | 21.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 40.9 | 44.6 | 47.5 | 49.3 | 50.2 | 51.7 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7494.3** | **7964.8** | **8291.0** | **8630.6** | **8887.9** | **9151.0** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.3 | 600.9 | 620.7 | 642.2 | 656.8 | 671.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.8 | 5711.8 | 5881.1 | 6051.7 | 6176.6 | 6302.7 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.0 | 720.7 | 775.2 | 829.4 | 867.0 | 904.4 | 1.0 | 1.6 | 2.1 | 1.1 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 775.3 | 886.4 | 967.5 | 1059.2 | 1138.1 | 1221.5 | 1.4 | 2.6 | 2.7 | 1.6 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.6 | 48.1 | 49.4 | 50.6 | -0.9 | 0.7 | 0.9 | 0.6 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.8** | **3564.2** | **3709.0** | **3806.2** | **3904.6** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.2 | 2492.9 | 2593.3 | 2659.8 | 2731.0 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.9 | 631.8 | 663.1 | 684.1 | 702.1 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.6 | 439.5 | 452.6 | 462.3 | 471.5 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350138** | **351907** | **352189** | **356402** | **359261** | **364112** | **0.7** | **-0.3** | **-0.1** | **0.2** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7915 | 7986 | 8113 | 8157 | 8235 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145691 | 141615 | 140285 | 140674 | 141079 | 142285 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122576 | 127381 | 129214 | 131227 | 132138 | 133971 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9823 | 9955 | 10003 | 9856 | 9635 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58139 | 58115 | 57554 | 59065 | 60644 | 62563 | 0.9 | 1.2 | 0.4 | 0.4 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7059 | 7195 | 7320 | 7386 | 7423 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EEREF2012tp | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831603** | **807039** | **768617** | **759481** | **762551** | **773611** | **772270** | **756520** | **-1.2** | **-0.4** | **-0.6** | **0.0** |
| Solids | 214627 | 196059 | 163855 | 149978 | 139407 | 124742 | 85254 | 68644 | 68188 | 65787 | 70844 | -2.7 | -1.6 | -4.8 | -0.9 |
| Oil | 176084 | 136469 | 103565 | 90791 | 77413 | 65119 | 55076 | 43039 | 33760 | 22939 | 16155 | -5.2 | -2.9 | -3.3 | -5.9 |
| Natural gas | 209437 | 190678 | 158525 | 149149 | 140909 | 124742 | 107197 | 99034 | 94013 | 82152 | 69868 | -2.7 | -1.2 | -2.7 | -2.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212593 | 257179 | 281188 | 327166 | 362268 | 383030 | 404022 | 404702 | 5.6 | 3.7 | 2.4 | 1.1 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33035 | 34543 | 35845 | 36525 | 36945 | 37347 | 0.4 | 0.0 | 0.7 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136223 | 150582 | 151760 | 170091 | 174442 | 181727 | 186996 | 179818 | 6.5 | 1.9 | 1.2 | 0.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42384 | 58213 | 74562 | 84338 | 88134 | 95665 | 100008 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar and others | 430 | 806 | 3691 | 14047 | 22785 | 28727 | 33075 | 38333 | 43412 | 46834 | 47258 | 24.0 | 20.0 | 3.8 | 1.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9247 | 9453 | 14895 | 29310 | 33231 | 37582 | 40271 | 2.3 | 4.6 | 4.9 | 5.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967983** | **909455** | **911750** | **890923** | **885671** | **892039** | **906624** | **937124** | **1.4** | **-0.5** | **-0.2** | **0.3** |
| Solids | 98273 | 125211 | 110927 | 116118 | 94901 | 86721 | 75633 | 56766 | 46073 | 42460 | 48371 | 1.2 | -1.5 | -2.2 | -2.2 |
| Oil | 535238 | 604030 | 563977 | 551740 | 527919 | 519052 | 515366 | 517145 | 518000 | 526469 | 531046 | 0.5 | -0.7 | -0.2 | 0.1 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527800 | 506550 | 496323 | 489514 | 488315 | 485583 | 488871 | 487639 | 0.4 | -0.7 | -0.3 | 0.0 |
| - Oil products | 17192 | 18909 | 22737 | 23940 | 21370 | 22729 | 25852 | 28830 | 32417 | 37597 | 43407 | 2.8 | -0.6 | 1.9 | 2.6 |
| Natural gas | 193432 | 257849 | 276001 | 286216 | 266445 | 284172 | 273437 | 283704 | 297630 | 305955 | 326010 | 3.6 | -0.4 | 0.3 | 0.9 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1746112** | **1660971** | **1622617** | **1590334** | **1585625** | **1601066** | **1611178** | **1622558** | **0.2** | **-0.6** | **-0.4** | **0.1** |
| Solids | 321277 | 317986 | 280653 | 266096 | 234308 | 211463 | 160887 | 125410 | 114262 | 108248 | 119215 | -1.3 | -1.8 | -3.7 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589276 | 550730 | 528423 | 513078 | 501948 | 493067 | 489287 | 485218 | -0.7 | -1.2 | -0.7 | -0.3 |
| Natural gas | 396145 | 448380 | 444428 | 435148 | 406434 | 406912 | 377929 | 378376 | 385751 | 380511 | 386774 | 1.2 | -0.9 | -0.7 | 0.1 |
| Nuclear | 243841 | 257516 | 236563 | 229092 | 192130 | 172826 | 184787 | 189566 | 194621 | 197371 | 194952 | -0.3 | -2.1 | -0.4 | 0.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1492 | -1742 | -1819 | -1880 | -2103 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226630 | 278971 | 304500 | 355144 | 392066 | 415184 | 437641 | 438502 | 5.9 | 4.2 | 2.4 | 1.1 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.0 | 10.1 | 7.9 | 7.1 | 6.7 | 7.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.6 | 32.3 | 31.7 | 30.8 | 30.4 | 29.9 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.5 | 25.1 | 23.8 | 23.9 | 24.1 | 23.6 | 23.8 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 10.7 | 11.6 | 12.0 | 12.2 | 12.3 | 12.0 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.8 | 18.8 | 22.3 | 24.7 | 25.9 | 27.2 | 27.0 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 369057 | 352584 | 355557 | 360733 | 379366 | 423931 | 450668 | 490285 | -0.5 | -0.7 | 0.2 | 1.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383287** | **350708** | **332646** | **288803** | **277186** | **288098** | **292659** | **303342** | **0.8** | **-1.7** | **-1.9** | **0.2** |
| Solids | 223038 | 228941 | 197605 | 186820 | 158055 | 139972 | 94843 | 63404 | 54962 | 53043 | 66290 | -1.2 | -2.2 | -5.0 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10882 | 5905 | 5166 | 4432 | 4145 | 3946 | 3881 | 3933 | -6.5 | -11.7 | -2.8 | -0.6 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131875 | 124913 | 124644 | 107638 | 104907 | 112247 | 110239 | 109159 | 3.8 | -1.8 | -1.5 | 0.1 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47734 | 55038 | 56010 | 69740 | 78362 | 86837 | 91211 | 86960 | 11.7 | 2.0 | 2.4 | 1.1 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 12149 | 26368 | 30105 | 34285 | 37000 | 1.6 | 3.5 | 6.0 | 5.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971267** | **907652** | **863046** | **853513** | **842500** | **833304** | **827128** | **817913** | **-0.7** | **-1.0** | **-0.6** | **-0.2** |
| Refineries | 740500 | 763156 | 670015 | 646746 | 614553 | 592625 | 576768 | 564502 | 552799 | 545771 | 537607 | -1.0 | -0.9 | -0.6 | -0.4 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18232 | 26203 | 26358 | 26693 | 26752 | 26670 | 27518 | 28765 | 34.1 | 7.0 | 0.2 | 0.4 |
| District heating | 18667 | 19517 | 20813 | 22356 | 20225 | 19400 | 20165 | 19713 | 19207 | 18301 | 19022 | 1.1 | -0.3 | 0.0 | -0.3 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283933 | 246672 | 224664 | 229887 | 231533 | 234629 | 235539 | 232520 | -0.6 | -1.9 | -0.7 | 0.1 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82441** | **77114** | **73358** | **69035** | **67496** | **68305** | **68067** | **69841** | **0.2** | **-1.3** | **-1.1** | **0.1** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122303** | **121539** | **121555** | **121161** | **119760** | **119345** | **119914** | **-0.2** | **0.6** | **-0.1** | **-0.1** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170647** | **1135779** | **1128931** | **1122601** | **1123096** | **1133454** | **1140807** | **1146350** | **0.3** | **-0.2** | **-0.1** | **0.1** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304797 | 306480 | 305658 | 304669 | 303472 | 306200 | 306833 | 309171 | -1.3 | 0.5 | -0.1 | 0.1 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197107 | 197778 | 195190 | 193640 | 191295 | 192262 | 189981 | 188173 | -1.5 | 0.5 | -0.2 | -0.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107689 | 108701 | 110468 | 111029 | 112177 | 113938 | 116852 | 120998 | -1.0 | 0.5 | 0.2 | 0.4 |
| Residential | 286291 | 311793 | 311545 | 311942 | 298600 | 299525 | 296866 | 298046 | 300500 | 302878 | 302160 | 0.8 | -0.4 | -0.1 | 0.1 |
| Tertiary | 166083 | 179768 | 187856 | 181920 | 172256 | 171034 | 166580 | 167238 | 168512 | 171020 | 171155 | 1.2 | -0.9 | -0.3 | 0.1 |
| Transport | 342901 | 368665 | 367191 | 371988 | 358443 | 352714 | 354487 | 354340 | 358241 | 360076 | 363863 | 0.7 | -0.2 | -0.1 | 0.1 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48387 | 46039 | 43054 | 40853 | 39199 | 37796 | 35424 | 33225 | -2.2 | -0.8 | -1.2 | -1.0 |
| Oil | 485890 | 502788 | 457366 | 440593 | 407865 | 391561 | 379259 | 370256 | 364917 | 362479 | 359464 | -0.6 | -1.1 | -0.7 | -0.3 |
| Gas | 266925 | 285438 | 269920 | 271625 | 251721 | 251100 | 239185 | 241483 | 241473 | 238544 | 244010 | 0.1 | -0.7 | -0.5 | 0.1 |
| Electricity | 217599 | 239418 | 245271 | 254518 | 254958 | 263298 | 273814 | 283397 | 299364 | 311037 | 319921 | 1.2 | 0.4 | 0.7 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 55800 | 56261 | 57373 | 57090 | 57454 | 57545 | 56575 | 1.5 | 0.4 | 0.3 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100144 | 119133 | 123229 | 131465 | 130736 | 131057 | 133922 | 130898 | 5.2 | 3.8 | 1.0 | 0.0 |
| Other | 0 | 0 | 0 | 67 | 264 | 428 | 652 | 935 | 1394 | 1856 | 2257 | 0.0 | 0.0 | 9.5 | 6.4 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194777** | **245087** | **269100** | **315349** | **338256** | **357293** | **373697** | **372667** | **5.4** | **5.1** | **2.6** | **0.8** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4624.3** | **4285.9** | **4088.6** | **3657.4** | **3380.7** | **3093.8** | **2980.3** | **2920.6** | **-0.7** | **-1.2** | **-1.6** | **-1.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.6 | 1903.8 | 1806.5 | 1491.9 | 1244.5 | 981.4 | 885.9 | 826.5 | | -1.3 | -2.4 | -2.9 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2382.1 | 2282.0 | 2165.6 | 2136.2 | 2112.4 | 2094.4 | 2094.2 | | -1.1 | -0.9 | -0.2 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3591.3** | **3254.7** | **3091.1** | **2748.3** | **2487.2** | **2316.4** | **2227.3** | **2173.0** | **-0.5** | **-1.5** | **-1.7** | **-1.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1201.3 | 1037.1 | 948.5 | 700.2 | 488.8 | 348.8 | 291.3 | 246.1 | -0.5 | -2.5 | -3.9 | -5.1 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.8 | 139.5 | 130.2 | 118.8 | 113.4 | 108.9 | 104.9 | 102.7 | -0.6 | -1.4 | -1.6 | -0.7 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 508.3 | 491.3 | 454.5 | 432.6 | 417.1 | 400.8 | 401.0 | -2.8 | -0.2 | -1.1 | -0.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.8 | 392.4 | 379.8 | 359.1 | 349.9 | 339.1 | 332.2 | 323.2 | -0.1 | -1.5 | -0.9 | -0.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.6 | 195.5 | 182.1 | 160.7 | 153.8 | 147.1 | 143.1 | 140.3 | -0.3 | -2.4 | -1.9 | -0.7 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1050.1 | 982.0 | 959.2 | 955.0 | 948.7 | 955.3 | 955.1 | 959.7 | 0.5 | -0.7 | -0.3 | 0.0 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **277.5** | **234.8** | **222.7** | **106.0** | **75.0** | **63.6** | **-1.0** | **1.5** | **-1.5** | **-6.3** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **670.8** | **671.4** | **678.0** | **684.1** | **-1.5** | **-0.9** | **-1.2** | **0.1** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.4** | **75.4** | **71.9** | **64.3** | **59.5** | **54.4** | **52.4** | **51.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EEREF2012tp | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.6 | 105.0 | 95.4 | 88.7 | 83.6 | 78.5 | 73.9 | -1.2 | -2.1 | -2.0 | -1.3 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.90 | 1.73 | 1.57 | 1.45 | 1.38 | 1.34 | -0.7 | -0.9 | -1.2 | -1.3 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 53.0 | 54.3 | 54.0 | 53.7 | 53.6 | 54.0 | 55.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.5 | 2041.6 | 2155.4 | 2256.0 | 2326.1 | 2426.0 | 2515.7 | 2597.6 | 3.7 | 2.7 | 1.0 | 0.7 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 13.5 | 13.0 | 12.7 | 12.3 | 11.8 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.3 | 85.4 | 80.5 | 76.6 | 73.7 | 70.7 | 68.3 | | -0.9 | -1.2 | -0.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 84.0 | 77.8 | 71.4 | 66.7 | 62.4 | 58.3 | 53.9 | -0.5 | -1.7 | -1.6 | -1.4 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 78.7 | 71.7 | 64.3 | 59.8 | 55.9 | 52.6 | 48.9 | 0.0 | -2.4 | -2.0 | -1.4 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.1 | 29.0 | 26.8 | 25.5 | 24.7 | 24.2 | 23.7 | -0.6 | -1.6 | -1.8 | -0.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.8 | 44.2 | 41.9 | 40.4 | 39.4 | 38.4 | 37.7 | 37.1 | 0.3 | -0.9 | -0.9 | -0.4 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.11 | 0.07 | 0.06 | 0.05 | -1.6 | -2.8 | -4.4 | -5.8 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.68 | 1.64 | 1.61 | 1.59 | -0.8 | -0.7 | -0.6 | -0.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.61 | 1.49 | 1.43 | 1.36 | 1.31 | 1.30 | -1.5 | -0.8 | -1.1 | -0.7 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.17 | 1.13 | 1.10 | 1.07 | -0.9 | -1.1 | -0.8 | -0.6 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.06 | 0.96 | 0.92 | 0.87 | 0.84 | 0.82 | -1.5 | -1.5 | -1.6 | -0.8 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.72 | 2.69 | 2.68 | 2.67 | 2.65 | 2.64 | -0.2 | -0.4 | -0.2 | -0.1 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.0 | 23.2 | 27.3 | 29.2 | 30.5 | 31.6 | 31.3 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.2 | 12.2 | 12.9 | 13.2 | 13.8 | 14.3 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3416273** | **3417499** | **3512449** | **3635152** | **3768975** | **4006180** | **4174632** | **4325409** | **1.0** | **0.3** | **0.6** | **0.9** |
| Nuclear energy | 945027 | 997733 | 916685 | 887134 | 744027 | 674641 | 728730 | 757233 | 793580 | 819198 | 830918 | -0.3 | -2.1 | -0.2 | 0.7 |
| Solids | 933660 | 974939 | 830048 | 803284 | 694245 | 616329 | 423482 | 286975 | 279546 | 289864 | 383486 | -1.2 | -1.8 | -4.8 | -0.5 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46006 | 26248 | 24143 | 21609 | 21936 | 20680 | 21092 | 21014 | -7.1 | -11.3 | -1.9 | -0.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752631 | 709359 | 712182 | 650916 | 656965 | 698438 | 685021 | 684939 | 4.5 | -1.1 | -0.9 | 0.3 |
| Biomass-waste | 46848 | 83787 | 145901 | 190393 | 220804 | 230831 | 301859 | 347900 | 395384 | 411046 | 386208 | 12.0 | 4.2 | 3.2 | 1.2 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384124 | 401665 | 416802 | 424714 | 429587 | 434269 | 0.4 | 0.0 | 0.7 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 492833 | 676897 | 867003 | 980678 | 1024811 | 1112385 | 1162884 | 21.0 | 12.7 | 5.8 | 1.5 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 177766 | 215788 | 257904 | 316342 | 342089 | 352437 | 68.9 | 20.4 | 4.2 | 2.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 24101 | 42581 | 52683 | 64351 | 69255 | 2.5 | 5.9 | 7.1 | 5.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930079** | **1020452** | **1083464** | **1176138** | **1248640** | **1330980** | **1376611** | **1411747** | **2.6** | **2.0** | **1.4** | **0.9** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96796 | 98875 | 100424 | 104980 | 108188 | 109688 | -0.4 | -1.7 | -1.2 | 0.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439843 | 535831 | 627363 | 695178 | 751925 | 801282 | 828136 | 7.1 | 6.8 | 3.6 | 1.4 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122643 | 127080 | 132075 | 134547 | 136767 | 138749 | 1.0 | 0.7 | 0.5 | 0.4 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206749 | 276105 | 342752 | 383896 | 402069 | 432537 | 449562 | 20.7 | 9.4 | 5.2 | 1.4 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 134048 | 153503 | 174390 | 208118 | 221989 | 229103 | 66.7 | 14.0 | 3.3 | 2.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 4029 | 4817 | 7192 | 9989 | 10722 | 0.0 | 21.3 | 9.3 | 5.0 |
| Thermal power | 398853 | 429386 | 480034 | 488029 | 469448 | 450838 | 449899 | 453037 | 474075 | 467141 | 473922 | 1.9 | -0.2 | -0.4 | 0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102095 | 112523 | 115228 | 121759 | 127854 | 135206 | 144381 | 147777 | 0.9 | 1.1 | 0.8 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1217 | 11168 | 46040 | 53428 | 76417 | 0.0 | 0.0 | 3.0 | 23.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141533 | 120625 | 99240 | 84100 | 80329 | 76657 | 76662 | -0.6 | -2.1 | -3.5 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253067 | 259247 | 263993 | 272388 | 285689 | 296238 | 284709 | 282117 | 5.7 | 1.4 | 0.5 | 0.2 |
| Oil fired | 67499 | 59434 | 54039 | 42242 | 33119 | 27379 | 23315 | 19619 | 19190 | 19793 | 22407 | -2.2 | -4.8 | -3.4 | -0.2 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28716 | 34646 | 37931 | 53343 | 60129 | 74321 | 81430 | 87824 | 5.0 | 3.5 | 4.4 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1613 | 3500 | 3996 | 4551 | 4912 | 2.5 | 2.2 | 6.0 | 5.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.6 | 35.6 | 34.1 | 33.3 | 33.0 | 33.2 | 33.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.7 | 41.2 | 42.1 | 41.7 | 42.7 | 42.5 | 43.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.7 | 17.8 | 17.8 | 17.0 | 15.8 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 2.5 | 6.2 | 7.3 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.2 | 61.5 | 69.8 | 74.4 | 75.1 | 76.1 | 74.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.8 | 19.2 | 20.0 | 20.1 | 19.8 | 19.6 | 19.2 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.1 | 36.4 | 42.3 | 49.8 | 54.3 | 55.3 | 56.5 | 55.6 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6756.2** | **7047.8** | **7493.9** | **7963.7** | **8283.6** | **8618.3** | **8861.3** | **9109.6** | **0.9** | **0.9** | **1.2** | **0.7** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.4 | 550.2 | 574.4 | 601.0 | 621.5 | 643.4 | 659.5 | 675.8 | -0.1 | 0.7 | 0.9 | 0.6 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5053.0 | 5195.5 | 5454.7 | 5711.6 | 5879.5 | 6048.7 | 6170.1 | 6292.1 | 1.0 | 0.6 | 1.0 | 0.5 |
| Rail | 447.8 | 459.7 | 496.4 | 536.6 | 583.4 | 647.1 | 720.9 | 776.4 | 831.5 | 871.5 | 911.6 | 1.0 | 1.6 | 2.1 | 1.2 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.7 | 677.8 | 774.9 | 885.2 | 959.4 | 1046.3 | 1110.3 | 1178.7 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.4 | 41.0 | 42.9 | 45.0 | 46.8 | 48.4 | 49.9 | 51.4 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.9** | **2937.3** | **3173.4** | **3426.4** | **3563.5** | **3708.0** | **3804.2** | **3902.3** | **1.1** | **1.7** | **1.6** | **0.7** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1921.1 | 2074.7 | 2232.5 | 2397.3 | 2493.0 | 2593.4 | 2659.9 | 2730.9 | 1.5 | 1.6 | 1.5 | 0.7 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.0 | 540.3 | 601.5 | 631.1 | 662.2 | 682.4 | 700.3 | -0.3 | 2.2 | 2.2 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 356.1 | 376.6 | 400.6 | 427.5 | 439.4 | 452.4 | 461.9 | 471.1 | 1.2 | 1.1 | 1.3 | 0.5 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369510** | **355913** | **350095** | **351819** | **351611** | **355469** | **357288** | **361034** | **0.7** | **-0.3** | **-0.1** | **0.1** |
| Public road transport | 7580 | 7663 | 7522 | 7716 | 7793 | 7841 | 7917 | 7993 | 8124 | 8179 | 8267 | -0.1 | 0.4 | 0.2 | 0.2 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 176044 | 157092 | 145688 | 141628 | 140278 | 140656 | 140994 | 142096 | 0.2 | -1.5 | -1.0 | 0.0 |
| Trucks | 95660 | 111643 | 112043 | 117814 | 120021 | 122573 | 127385 | 129218 | 131228 | 132137 | 133974 | 1.6 | 0.7 | 0.6 | 0.3 |
| Rail | 8093 | 7855 | 7399 | 7954 | 8553 | 9177 | 9818 | 9947 | 9991 | 9841 | 9620 | -0.9 | 1.5 | 1.4 | -0.1 |
| Aviation | 45492 | 50512 | 49820 | 53837 | 56062 | 58101 | 58010 | 56970 | 58131 | 58713 | 59598 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6145 | 6392 | 6715 | 7060 | 7206 | 7338 | 7423 | 7478 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE25DEC_d | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831444** | **803947** | **765326** | **741079** | **792186** | **865854** | **914808** | **969301** | **-1.2** | **-0.5** | **-0.8** | **1.4** |
| Solids | 214627 | 196059 | 163855 | 149857 | 138706 | 123526 | 79364 | 75176 | 86364 | 85004 | 95055 | -2.7 | -1.7 | -5.4 | 0.9 |
| Oil | 176084 | 136469 | 103565 | 90650 | 77089 | 63740 | 52994 | 38066 | 26283 | 15501 | 9717 | -5.2 | -2.9 | -3.7 | -8.1 |
| Natural gas | 209437 | 190678 | 158525 | 149175 | 139739 | 117107 | 98366 | 86336 | 77911 | 72198 | 62656 | -2.7 | -1.3 | -3.4 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212656 | 256956 | 280618 | 320040 | 376215 | 437494 | 495696 | 542420 | 5.6 | 3.7 | 2.2 | 2.7 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33025 | 34206 | 35763 | 36482 | 36980 | 37600 | 0.4 | 0.0 | 0.6 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136284 | 150330 | 150673 | 162906 | 184375 | 212922 | 244428 | 268747 | 6.5 | 1.9 | 0.8 | 2.5 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42397 | 59186 | 76354 | 87526 | 103384 | 113076 | 122446 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22796 | 28247 | 34224 | 42054 | 51533 | 60737 | 65708 | 24.0 | 20.0 | 4.1 | 3.3 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9252 | 9486 | 12350 | 26497 | 33173 | 40474 | 47919 | 2.3 | 4.6 | 2.9 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967825** | **903668** | **875647** | **835281** | **771247** | **697164** | **652326** | **609655** | **1.4** | **-0.6** | **-0.8** | **-1.6** |
| Solids | 98273 | 125211 | 110927 | 115959 | 93849 | 84961 | 66850 | 50931 | 42165 | 47070 | 54267 | 1.2 | -1.7 | -3.3 | -1.0 |
| Oil | 535238 | 604030 | 563977 | 551776 | 526129 | 506067 | 490765 | 445719 | 380361 | 311606 | 250227 | 0.5 | -0.7 | -0.7 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527783 | 505240 | 486722 | 471795 | 436711 | 386824 | 335671 | 286898 | 0.4 | -0.7 | -0.7 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23992 | 20889 | 19345 | 18970 | 9008 | -6462 | -24065 | -36671 | 2.8 | -0.8 | -1.0 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286170 | 263551 | 262916 | 252177 | 243394 | 236661 | 248595 | 253511 | 3.6 | -0.5 | -0.4 | 0.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745803** | **1652199** | **1583545** | **1517682** | **1502789** | **1502564** | **1505976** | **1516655** | **0.2** | **-0.7** | **-0.8** | **0.0** |
| Solids | 321277 | 317986 | 280653 | 265816 | 232554 | 208487 | 146214 | 126107 | 128529 | 132074 | 149323 | -1.3 | -1.9 | -4.5 | 0.1 |
| Oil | 665142 | 683909 | 620735 | 589177 | 548720 | 514369 | 487727 | 427419 | 351879 | 273200 | 206253 | -0.7 | -1.2 | -1.2 | -4.2 |
| Natural gas | 396145 | 448380 | 444428 | 435128 | 402372 | 378032 | 347896 | 325453 | 308882 | 313541 | 307557 | 1.2 | -1.0 | -1.4 | -0.6 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 191457 | 180335 | 190315 | 216393 | 237802 | 246410 | 259453 | -0.3 | -2.1 | -0.1 | 1.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1740 | -1818 | -1879 | -2096 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226705 | 278698 | 303830 | 347021 | 409159 | 477290 | 542631 | 596166 | 5.9 | 4.2 | 2.2 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 13.2 | 9.6 | 8.4 | 8.6 | 8.8 | 9.8 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.2 | 32.5 | 32.1 | 28.4 | 23.4 | 18.1 | 13.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.4 | 23.9 | 22.9 | 21.7 | 20.6 | 20.8 | 20.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.4 | 12.5 | 14.4 | 15.8 | 16.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.2 | 22.9 | 27.2 | 31.8 | 36.0 | 39.3 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 349448 | 346313 | 354118 | 384977 | 469412 | 537575 | 628480 | -0.5 | -0.8 | 0.1 | 2.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383167** | **347005** | **319581** | **263260** | **276844** | **318740** | **355937** | **387617** | **0.8** | **-1.8** | **-2.7** | **2.0** |
| Solids | 223038 | 228941 | 197605 | 186548 | 156397 | 139728 | 83915 | 71852 | 83291 | 92584 | 113913 | -1.2 | -2.3 | -6.0 | 1.5 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10903 | 5853 | 4753 | 3682 | 3106 | 2605 | 2131 | 1453 | -6.5 | -11.8 | -4.5 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131882 | 122847 | 107176 | 93753 | 98940 | 105870 | 115096 | 114231 | 3.8 | -1.9 | -2.7 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47857 | 55113 | 61019 | 72167 | 79529 | 91656 | 101837 | 106318 | 11.7 | 2.0 | 2.7 | 2.0 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6905 | 9744 | 23417 | 29558 | 36119 | 41961 | 1.6 | 3.5 | 3.7 | 7.6 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5760 | 8170 | 9741 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971028** | **905006** | **855510** | **834844** | **839867** | **831019** | **800692** | **783325** | **-0.7** | **-1.0** | **-0.8** | **-0.3** |
| Refineries | 740500 | 763156 | 670015 | 646609 | 612971 | 581569 | 556452 | 505593 | 441463 | 375620 | 318228 | -1.0 | -0.9 | -1.0 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24912 | 60738 | 102228 | 133347 | 162195 | 34.1 | 6.9 | -0.4 | 9.8 |
| District heating | 18667 | 19517 | 20813 | 22253 | 20061 | 17368 | 17959 | 16226 | 13430 | 11832 | 12670 | 1.1 | -0.4 | -1.1 | -1.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283945 | 245945 | 231217 | 235520 | 257309 | 273897 | 279893 | 290233 | -0.6 | -1.9 | -0.4 | 1.0 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76779** | **70555** | **65335** | **61094** | **59588** | **57117** | **57871** | **0.2** | **-1.4** | **-1.6** | **-0.6** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122348** | **121118** | **118980** | **116711** | **112934** | **111914** | **111803** | **-0.2** | **0.6** | **-0.3** | **-0.3** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170526** | **1129628** | **1091988** | **1064222** | **1027644** | **996806** | **976814** | **963921** | **0.3** | **-0.2** | **-0.6** | **-0.5** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304773 | 305551 | 296688 | 287661 | 275233 | 262820 | 258400 | 255269 | -1.3 | 0.5 | -0.6 | -0.6 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197085 | 197311 | 189748 | 182711 | 174499 | 167879 | 163910 | 159223 | -1.5 | 0.5 | -0.8 | -0.7 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107688 | 108240 | 106940 | 104950 | 100734 | 94941 | 94490 | 96046 | -1.0 | 0.5 | -0.3 | -0.4 |
| Residential | 286291 | 311793 | 311545 | 311966 | 297301 | 287029 | 280591 | 270390 | 269207 | 267629 | 266350 | 0.8 | -0.5 | -0.6 | -0.3 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 169791 | 164596 | 157477 | 154657 | 154035 | 152932 | 153116 | 1.2 | -1.0 | -0.8 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356986 | 343675 | 338492 | 327364 | 310744 | 297853 | 289186 | 0.7 | -0.3 | -0.5 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48406 | 45963 | 41407 | 37989 | 32461 | 26404 | 21976 | 19050 | -2.2 | -0.8 | -1.9 | -3.4 |
| Oil | 485890 | 502788 | 457366 | 440511 | 406073 | 379371 | 357925 | 306473 | 247536 | 194098 | 145528 | -0.6 | -1.2 | -1.3 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271611 | 249818 | 241390 | 226204 | 197505 | 167812 | 146177 | 128524 | 0.1 | -0.8 | -1.0 | -2.8 |
| Electricity | 217599 | 239418 | 245271 | 254494 | 253109 | 257380 | 264688 | 276023 | 299154 | 318899 | 336301 | 1.2 | 0.3 | 0.4 | 1.2 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55505 | 53991 | 55135 | 53738 | 54700 | 54578 | 55243 | 1.5 | 0.4 | -0.1 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100141 | 118900 | 117853 | 121427 | 146472 | 172345 | 204206 | 232560 | 5.2 | 3.8 | 0.2 | 3.3 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 855 | 14970 | 28854 | 36880 | 46715 | 0.0 | 0.0 | 12.6 | 22.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194892** | **244883** | **266631** | **307278** | **353668** | **410539** | **463124** | **506893** | **5.4** | **5.1** | **2.3** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4622.9** | **4263.0** | **3966.6** | **3444.7** | **2814.6** | **2108.3** | **1679.8** | **1346.0** | **-0.7** | **-1.3** | **-2.1** | **-4.6** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.3 | 1890.3 | 1744.7 | 1371.1 | 1130.5 | 751.5 | 553.9 | 394.4 | | -1.4 | -3.2 | -6.0 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2372.6 | 2221.9 | 2073.5 | 1684.1 | 1356.7 | 1125.9 | 951.7 | | -1.2 | -1.3 | -3.8 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.0** | **3231.8** | **2970.1** | **2538.8** | **2100.8** | **1608.9** | **1255.4** | **960.5** | **-0.5** | **-1.6** | **-2.4** | **-4.7** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.1 | 1025.1 | 904.7 | 609.5 | 443.4 | 248.2 | 141.8 | 61.6 | -0.5 | -2.7 | -5.1 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.9 | 123.3 | 111.9 | 98.8 | 83.5 | 70.9 | 60.1 | -0.6 | -1.4 | -2.1 | -3.1 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 506.5 | 472.0 | 423.0 | 356.9 | 281.9 | 239.3 | 206.4 | -2.8 | -0.3 | -1.8 | -3.5 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 390.8 | 363.8 | 339.1 | 285.8 | 238.1 | 191.5 | 143.5 | -0.1 | -1.6 | -1.4 | -4.2 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 192.5 | 175.3 | 151.5 | 125.7 | 107.6 | 88.0 | 68.6 | -0.3 | -2.5 | -2.4 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.1 | 903.8 | 790.3 | 649.5 | 524.0 | 420.1 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.6** | **276.5** | **231.6** | **222.7** | **100.1** | **61.9** | **34.4** | **-1.0** | **1.5** | **-1.7** | **-9.1** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **75.0** | **69.8** | **60.6** | **49.5** | **37.1** | **29.6** | **23.7** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE25DEC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 116.0 | 102.5 | 91.1 | 84.1 | 78.5 | 73.4 | 69.1 | -1.2 | -2.1 | -2.4 | -1.4 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.88 | 1.67 | 1.40 | 1.07 | 0.83 | 0.63 | -0.7 | -0.9 | -1.6 | -4.7 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 53.0 | 49.3 | 44.6 | 41.6 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.4 | 2037.6 | 2156.4 | 2291.1 | 2408.7 | 2619.3 | 2807.1 | 2982.0 | 3.7 | 2.6 | 1.2 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 13.7 | 13.5 | 13.7 | 13.7 | 13.6 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 91.0 | 82.9 | 76.0 | 69.4 | 63.3 | 59.6 | 56.4 | | -0.9 | -1.8 | -1.5 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.6 | 74.6 | 67.5 | 60.5 | 55.9 | 51.5 | 47.5 | -0.5 | -1.8 | -2.1 | -1.7 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.6 | 69.0 | 60.8 | 55.3 | 51.1 | 47.0 | 43.8 | 0.0 | -2.5 | -2.4 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.9 | 23.9 | 21.5 | 19.8 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.14 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -5.3 | -12.4 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.52 | 1.28 | 1.07 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.47 | 1.30 | 1.07 | 0.93 | 0.81 | -1.5 | -0.8 | -1.2 | -2.9 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.27 | 1.21 | 1.06 | 0.88 | 0.72 | 0.54 | -0.9 | -1.1 | -0.8 | -4.0 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.07 | 0.96 | 0.81 | 0.70 | 0.58 | 0.45 | -1.5 | -1.6 | -1.6 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.09 | 1.76 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.7 | 28.0 | 33.3 | 39.3 | 44.8 | 49.2 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.6 | 24.6 | 39.0 | 52.8 | 64.6 | | | | |
| **Gross Electricity generation by source (in GWh$_e$)** | **3007267** | **3287285** | **3328110** | **3415864** | **3392575** | **3433983** | **3521066** | **3877566** | **4497350** | **4933460** | **5378081** | **1.0** | **0.2** | **0.4** | **2.1** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 741418 | 704452 | 752816 | 874405 | 983767 | 1035489 | 1115566 | -0.3 | -2.1 | 0.2 | 2.0 |
| Solids | 933660 | 974939 | 830048 | 802058 | 685246 | 606329 | 359147 | 279629 | 355482 | 439716 | 580505 | -1.2 | -1.9 | -6.3 | 2.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46072 | 26110 | 21836 | 17087 | 16396 | 13294 | 10941 | 7080 | -7.1 | -11.3 | -4.2 | -4.3 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752907 | 695759 | 592916 | 548708 | 606114 | 654270 | 701570 | 741852 | 4.5 | -1.3 | -2.3 | 1.5 |
| Biomass-waste | 46848 | 83787 | 145901 | 190811 | 221073 | 245047 | 302579 | 343878 | 398663 | 436508 | 452663 | 12.0 | 4.2 | 3.2 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 384015 | 397739 | 415852 | 424213 | 429997 | 437204 | 0.4 | 0.0 | 0.6 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 492988 | 688212 | 887839 | 1017740 | 1202144 | 1314840 | 1423788 | 21.0 | 12.7 | 6.1 | 2.4 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 174692 | 232960 | 281339 | 384382 | 459385 | 497917 | 68.9 | 20.4 | 5.0 | 3.9 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 16485 | 22193 | 42213 | 51146 | 65067 | 78412 | 2.5 | 5.9 | 6.2 | 6.5 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29989 | 39947 | 43095 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in MW$_e$** | **650058** | **711660** | **838114** | **930134** | **1019630** | **1078153** | **1177866** | **1253288** | **1434303** | **1517723** | **1605698** | **2.6** | **2.0** | **1.5** | **1.6** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 96480 | 101529 | 115363 | 129789 | 136412 | 146220 | -0.4 | -1.7 | -0.9 | 1.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439905 | 536700 | 641546 | 721130 | 857145 | 952070 | 1018172 | 7.1 | 6.9 | 3.8 | 2.3 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122569 | 125387 | 131897 | 134294 | 136796 | 139263 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206812 | 279169 | 348044 | 394609 | 463825 | 504441 | 542322 | 20.7 | 9.4 | 5.3 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 131564 | 163724 | 188558 | 252207 | 301387 | 324358 | 66.7 | 14.0 | 4.0 | 3.5 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3397 | 4391 | 6066 | 6818 | 9446 | 12229 | 0.0 | 21.3 | 10.2 | 5.3 |
| Thermal power | 398853 | 429386 | 480034 | 488085 | 468562 | 444973 | 434790 | 416796 | 447369 | 429241 | 441306 | 1.9 | -0.2 | -0.7 | 0.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102144 | 112030 | 112469 | 119635 | 124845 | 134219 | 141086 | 145414 | 0.9 | 1.0 | 0.7 | 1.0 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 2914 | 17342 | 86936 | 140736 | 205417 | 0.0 | 0.0 | 12.4 | 23.7 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141212 | 120935 | 103545 | 87105 | 95824 | 99277 | 105655 | -0.6 | -2.2 | -3.1 | 0.1 |
| Gas fired | 129190 | 169054 | 224922 | 253079 | 258989 | 258688 | 258402 | 252743 | 266496 | 238259 | 236467 | 5.7 | 1.4 | 0.0 | -0.4 |
| Oil fired | 67499 | 59434 | 54039 | 42257 | 32824 | 26311 | 22176 | 17903 | 15113 | 11806 | 10104 | -2.2 | -4.9 | -3.8 | -3.9 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34635 | 38121 | 49373 | 55936 | 66012 | 75104 | 83510 | 5.0 | 3.5 | 3.6 | 2.7 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 917 | 1294 | 3109 | 3924 | 4795 | 5570 | 2.5 | 2.2 | 3.7 | 7.6 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.4 | 34.9 | 33.0 | 34.1 | 34.3 | 35.4 | 36.2 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.6 | 39.7 | 40.5 | 39.6 | 40.1 | 40.4 | 41.6 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.3 | 17.4 | 17.1 | 16.6 | 15.7 | 14.9 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.7 | 1.7 | 7.3 | 9.9 | 15.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.5 | 64.4 | 73.7 | 76.7 | 77.1 | 76.5 | 75.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.5 | 21.4 | 22.6 | 22.0 | 21.2 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.7 | 43.9 | 52.4 | 54.2 | 55.1 | 55.3 | 54.2 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.1** | **7866.6** | **8129.5** | **8371.8** | **8563.6** | **8768.3** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.5 | 624.3 | 649.7 | 666.0 | 688.2 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.0 | 5613.5 | 5719.4 | 5791.3 | 5857.5 | 5930.9 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.3 | 724.4 | 783.1 | 844.4 | 889.4 | 936.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.3 | 880.2 | 955.9 | 1037.7 | 1100.4 | 1161.1 | 1.4 | 2.6 | 2.6 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.1 | 46.9 | 48.7 | 50.3 | 51.8 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.1** | **3510.2** | **3635.2** | **3713.0** | **3799.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.9 | 2426.9 | 2502.0 | 2545.1 | 2598.4 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.2 | 639.9 | 674.4 | 698.6 | 719.9 | -0.3 | 2.2 | 2.2 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.0 | 443.4 | 458.8 | 469.3 | 481.3 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341091** | **335882** | **324776** | **308209** | **295372** | **286747** | **0.7** | **-0.3** | **-0.5** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7830 | 7417 | 7126 | 6765 | 6517 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141051 | 132491 | 123761 | 108956 | 98351 | 91716 | 0.2 | -1.5 | -1.7 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120893 | 119505 | 116870 | 114453 | 112314 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9891 | 10058 | 10158 | 10059 | 9897 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 57978 | 57687 | 56798 | 57704 | 58264 | 58739 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7090 | 7237 | 7394 | 7479 | 7564 | -0.1 | 0.8 | 1.1 | 0.3 |

*Source: PRIMES*

| EU28: EE28DEC_d | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831437** | **801762** | **755841** | **725478** | **752677** | **809776** | **844531** | **893883** | **-1.2** | **-0.5** | **-1.0** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149869 | 138232 | 123154 | 90202 | 72964 | 82829 | 79852 | 87778 | -2.7 | -1.7 | -4.2 | -0.1 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77048 | 63601 | 52502 | 37441 | 25814 | 15218 | 9563 | -5.2 | -2.9 | -3.8 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149171 | 139082 | 113313 | 91950 | 80998 | 72555 | 64788 | 56354 | -2.7 | -1.3 | -4.1 | -2.4 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212646 | 256569 | 275950 | 303517 | 358323 | 410842 | 462472 | 499849 | 5.6 | 3.7 | 1.7 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33018 | 34250 | 35506 | 36325 | 36829 | 37369 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136273 | 149839 | 148537 | 152949 | 174836 | 200774 | 226912 | 246363 | 6.5 | 1.9 | 0.2 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42476 | 57343 | 72675 | 82478 | 95714 | 106730 | 114608 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27677 | 32338 | 39917 | 48264 | 54969 | 58808 | 24.0 | 20.0 | 3.6 | 3.0 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9375 | 11305 | 25586 | 29765 | 37033 | 42702 | 2.3 | 4.6 | 2.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967839** | **900458** | **866965** | **807173** | **734965** | **658732** | **602199** | **548661** | **1.4** | **-0.6** | **-1.1** | **-1.9** |
| Solids | 98273 | 125211 | 110927 | 115992 | 93136 | 88046 | 69163 | 49599 | 39910 | 41369 | 42222 | 1.2 | -1.7 | -2.9 | -2.4 |
| Oil | 535238 | 604030 | 563977 | 551766 | 525490 | 503628 | 482210 | 434054 | 369310 | 302311 | 243972 | 0.5 | -0.7 | -0.9 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504790 | 485072 | 465782 | 428610 | 379144 | 329168 | 282412 | 0.4 | -0.7 | -0.8 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 23990 | 20700 | 18556 | 16428 | 5444 | -9835 | -26856 | -38440 | 2.8 | -0.9 | -2.3 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286167 | 261728 | 253924 | 231722 | 221579 | 213435 | 216501 | 214771 | 3.6 | -0.5 | -1.2 | -0.4 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745811** | **1646805** | **1565378** | **1473972** | **1426998** | **1408053** | **1385572** | **1380243** | **0.2** | **-0.7** | **-1.1** | **-0.3** |
| Solids | 321277 | 317986 | 280653 | 265860 | 231368 | 211199 | 159365 | 122563 | 122739 | 121221 | 130000 | -1.3 | -1.9 | -3.7 | -1.0 |
| Oil | 665142 | 683909 | 620735 | 589163 | 548041 | 511791 | 478681 | 415129 | 340359 | 263623 | 199845 | -0.7 | -1.2 | -1.3 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 399892 | 365248 | 321025 | 298299 | 280301 | 274037 | 262515 | 1.2 | -1.1 | -2.2 | -1.0 |
| Nuclear | 243841 | 257516 | 236563 | 229105 | 190830 | 179824 | 187307 | 202952 | 217736 | 222201 | 240338 | -0.3 | -2.1 | -0.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1491 | -1741 | -1819 | -1881 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226691 | 278276 | 298824 | 329085 | 389798 | 448738 | 506371 | 549642 | 5.9 | 4.2 | 1.7 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.5 | 10.8 | 8.6 | 8.7 | 8.7 | 9.4 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 32.7 | 32.5 | 29.1 | 24.2 | 19.0 | 14.5 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.3 | 23.3 | 21.8 | 20.9 | 19.9 | 19.8 | 19.0 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 12.7 | 14.2 | 15.5 | 16.0 | 17.4 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.3 | 27.3 | 31.9 | 36.5 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368945 | 347832 | 345068 | 347652 | 361511 | 432009 | 490276 | 567575 | -0.5 | -0.8 | 0.0 | 2.5 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383216** | **344914** | **318554** | **268464** | **269109** | **303605** | **329854** | **352983** | **0.8** | **-1.9** | **-2.5** | **1.4** |
| Solids | 223038 | 228941 | 197605 | 186589 | 155340 | 143922 | 99837 | 74431 | 84828 | 90376 | 104545 | -1.2 | -2.4 | -4.3 | 0.2 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10888 | 5803 | 4686 | 3564 | 2920 | 2502 | 1907 | 1431 | -6.5 | -11.9 | -4.8 | -4.5 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131898 | 121704 | 101946 | 87327 | 91534 | 97445 | 99960 | 99748 | 3.8 | -2.0 | -3.3 | 0.7 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47866 | 55270 | 61147 | 68894 | 77562 | 87490 | 95746 | 99228 | 11.7 | 2.1 | 2.2 | 1.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8842 | 22662 | 26372 | 32968 | 37446 | 1.6 | 3.5 | 2.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4967 | 8898 | 10585 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970995** | **903441** | **851671** | **823574** | **813426** | **796188** | **762278** | **747900** | **-0.7** | **-1.0** | **-0.9** | **-0.5** |
| Refineries | 740500 | 763156 | 670015 | 646597 | 612472 | 579693 | 549709 | 496255 | 432678 | 368330 | 313275 | -1.0 | -0.9 | -1.1 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24801 | 58617 | 96526 | 127165 | 152884 | 34.1 | 6.9 | -0.5 | 9.5 |
| District heating | 18667 | 19517 | 20813 | 22232 | 19700 | 16928 | 17643 | 19353 | 19464 | 18876 | 20172 | 1.1 | -0.5 | -1.1 | 0.7 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283944 | 245240 | 229693 | 231421 | 239201 | 247520 | 247907 | 261570 | -0.6 | -1.9 | -0.6 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82418** | **76623** | **70107** | **64646** | **59052** | **56495** | **53300** | **52898** | **0.2** | **-1.4** | **-1.7** | **-1.0** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122382** | **120824** | **118046** | **112393** | **107013** | **102441** | **99350** | **-0.2** | **0.6** | **-0.4** | **-0.9** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170503** | **1125938** | **1074992** | **1019819** | **971214** | **932494** | **900118** | **875831** | **0.3** | **-0.3** | **-1.0** | **-0.8** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304755 | 304156 | 290815 | 278346 | 256170 | 238416 | 225347 | 217675 | -1.3 | 0.4 | -0.9 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197065 | 196528 | 186844 | 178020 | 162912 | 152944 | 142970 | 133937 | -1.5 | 0.5 | -1.0 | -1.4 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107628 | 103972 | 100326 | 93258 | 85471 | 82377 | 83738 | -1.0 | 0.4 | -0.7 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311961 | 295956 | 279524 | 261677 | 248674 | 244598 | 238965 | 230897 | 0.8 | -0.5 | -1.2 | -0.6 |
| Tertiary | 166083 | 179768 | 187856 | 181913 | 168844 | 160950 | 142207 | 140414 | 139763 | 138463 | 138593 | 1.2 | -1.1 | -1.7 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356983 | 343702 | 337590 | 325955 | 309718 | 297343 | 288666 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48409 | 45883 | 40364 | 35492 | 27909 | 21324 | 16194 | 12956 | -2.2 | -0.8 | -2.5 | -4.9 |
| Oil | 485890 | 502788 | 457366 | 440538 | 405482 | 377234 | 349893 | 298038 | 240280 | 188670 | 142341 | -0.6 | -1.2 | -1.5 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271576 | 248550 | 234260 | 206680 | 177468 | 147177 | 124456 | 103580 | 0.1 | -0.8 | -1.8 | -3.4 |
| Electricity | 217599 | 239418 | 245271 | 254489 | 252048 | 254540 | 260468 | 262824 | 281431 | 296228 | 312482 | 1.2 | 0.3 | 0.3 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55297 | 55197 | 52788 | 53266 | 56559 | 59270 | 59540 | 60160 | 1.5 | 0.3 | -0.4 | 0.6 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100128 | 118517 | 115209 | 113098 | 134845 | 157626 | 183641 | 205790 | 5.2 | 3.8 | -0.5 | 3.0 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 922 | 13571 | 25387 | 31390 | 38522 | 0.0 | 0.0 | 13.4 | 20.5 |
| **RES in Gross Final Energy Consumption (A)** | **88147** | **104692** | **149354** | **194992** | **244149** | **261570** | **290397** | **334459** | **385558** | **431496** | **468980** | **5.4** | **5.0** | **1.7** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.0** | **4250.0** | **3940.0** | **3431.6** | **2718.0** | **2031.0** | **1605.5** | **1250.7** | **-0.7** | **-1.3** | **-2.1** | **-4.9** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.7 | 1881.1 | 1740.8 | 1427.5 | 1106.0 | 738.9 | 542.1 | 360.3 | | -1.5 | -2.7 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2368.8 | 2199.2 | 2004.1 | 1612.0 | 1292.2 | 1063.4 | 890.4 | | -1.2 | -1.7 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.1** | **3218.9** | **2944.3** | **2519.7** | **2006.2** | **1518.8** | **1169.6** | **864.8** | **-0.5** | **-1.6** | **-2.4** | **-5.2** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.3 | 1017.4 | 908.1 | 668.7 | 445.7 | 256.1 | 156.1 | 69.3 | -0.5 | -2.7 | -4.1 | -10.7 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.8 | 122.2 | 111.3 | 95.4 | 79.6 | 66.4 | 54.8 | -0.6 | -1.4 | -2.2 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.7 | 504.2 | 461.7 | 414.3 | 328.4 | 248.9 | 199.2 | 160.9 | -2.8 | -0.3 | -1.9 | -4.6 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 389.0 | 351.9 | 307.1 | 247.6 | 200.2 | 155.0 | 107.1 | -0.1 | -1.6 | -2.3 | -5.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 191.4 | 169.2 | 118.0 | 103.9 | 88.4 | 71.2 | 54.8 | -0.3 | -2.6 | -4.7 | -3.8 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.2 | 900.3 | 785.1 | 645.7 | 521.7 | 417.9 | 0.5 | -0.7 | -0.8 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.7** | **237.6** | **220.8** | **113.0** | **73.4** | **34.8** | **-1.0** | **1.5** | **-1.4** | **-9.2** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.8** | **69.3** | **60.4** | **47.8** | **35.7** | **28.2** | **22.0** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE28DEC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.6 | 101.3 | 88.4 | 79.9 | 73.5 | 67.5 | 62.9 | -1.2 | -2.2 | -2.6 | -1.7 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.71 | 1.41 | 1.08 | 0.84 | 0.63 | -0.7 | -0.9 | -1.3 | -4.9 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.4 | 44.9 | 41.6 | 38.0 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.4 | 2037.6 | 2154.9 | 2282.9 | 2396.0 | 2603.5 | 2797.2 | 2966.8 | 3.7 | 2.6 | 1.1 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 13.9 | 13.7 | 13.4 | 13.6 | 13.6 | 13.5 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.6 | 81.2 | 73.6 | 64.6 | 57.4 | 52.0 | 48.1 | | -1.0 | -2.1 | -2.1 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 83.2 | 72.6 | 62.9 | 55.6 | 50.8 | 46.0 | 41.2 | -0.5 | -1.8 | -2.8 | -2.1 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 77.2 | 67.4 | 54.9 | 50.2 | 46.4 | 42.6 | 39.6 | 0.0 | -2.6 | -3.3 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.8 | 23.7 | 21.4 | 19.7 | 18.6 | -0.6 | -1.6 | -2.1 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.5 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.16 | 0.10 | 0.05 | 0.03 | 0.01 | -1.6 | -2.9 | -4.2 | -12.1 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.51 | 1.27 | 1.05 | 0.85 | -0.8 | -0.7 | -0.7 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.49 | 1.28 | 1.04 | 0.88 | 0.74 | -1.5 | -0.8 | -1.1 | -3.4 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.26 | 1.17 | 1.00 | 0.82 | 0.65 | 0.46 | -0.9 | -1.1 | -1.1 | -4.5 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.05 | 0.83 | 0.74 | 0.63 | 0.51 | 0.40 | -1.5 | -1.6 | -3.1 | -3.6 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.67 | 2.41 | 2.08 | 1.75 | 1.45 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.7 | 27.7 | 33.4 | 39.5 | 45.3 | 50.1 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 13.7 | 24.9 | 39.4 | 53.4 | 65.2 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415806** | **3378459** | **3399299** | **3466728** | **3677657** | **4190014** | **4551660** | **4935085** | **1.0** | **0.2** | **0.3** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887191 | 738989 | 702340 | 740054 | 816776 | 896746 | 928842 | 1031485 | -0.3 | -2.1 | 0.0 | 1.7 |
| Solids | 933660 | 974939 | 830048 | 802211 | 680083 | 629832 | 432779 | 288140 | 349610 | 413849 | 527273 | -1.2 | -2.0 | -4.4 | 1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45943 | 25921 | 21502 | 16650 | 15385 | 12995 | 9758 | 5890 | -7.1 | -11.4 | -4.3 | -5.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752725 | 688399 | 562102 | 508135 | 550300 | 591950 | 622355 | 631414 | 4.5 | -1.4 | -3.0 | 1.1 |
| Biomass-waste | 46848 | 83787 | 145901 | 190910 | 221182 | 246702 | 288607 | 330875 | 376774 | 399427 | 416538 | 12.0 | 4.2 | 2.7 | 1.9 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383935 | 398253 | 412865 | 422378 | 428244 | 434522 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 493905 | 666774 | 845061 | 959050 | 1112954 | 1241041 | 1332651 | 21.0 | 12.7 | 5.5 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 170576 | 218794 | 264894 | 358113 | 413029 | 443996 | 68.9 | 20.4 | 4.3 | 3.6 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 18395 | 39374 | 44906 | 55857 | 67319 | 2.5 | 5.9 | 4.3 | 6.7 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23588 | 39255 | 43996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930139** | **1019358** | **1060619** | **1144729** | **1201223** | **1350698** | **1414248** | **1479188** | **2.6** | **2.0** | **1.2** | **1.3** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 95269 | 99226 | 107997 | 118651 | 122740 | 135749 | -0.4 | -1.7 | -1.1 | 1.6 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440313 | 522735 | 614650 | 686494 | 805206 | 887091 | 941755 | 7.1 | 6.9 | 3.4 | 2.2 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122535 | 125565 | 131188 | 133642 | 136131 | 138195 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207219 | 268269 | 330274 | 371379 | 429150 | 474066 | 506362 | 20.7 | 9.4 | 4.8 | 2.2 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128896 | 155543 | 178669 | 236628 | 269739 | 287359 | 66.7 | 14.0 | 3.4 | 3.1 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5258 | 5785 | 7154 | 9839 | 0.0 | 21.3 | 7.0 | 5.7 |
| Thermal power | 398853 | 429386 | 480034 | 488089 | 467884 | 442615 | 430853 | 406733 | 426841 | 404417 | 401685 | 1.9 | -0.3 | -0.8 | -0.3 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102206 | 111262 | 111094 | 114309 | 120483 | 126026 | 128250 | 131587 | 0.9 | 1.0 | 0.3 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 1783 | 16078 | 78375 | 121021 | 176213 | 0.0 | 0.0 | 7.0 | 25.8 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141039 | 120703 | 102985 | 87183 | 93454 | 94747 | 99301 | -0.6 | -2.2 | -3.1 | -0.2 |
| Gas fired | 129190 | 169054 | 224922 | 253085 | 258726 | 256881 | 258153 | 246702 | 252869 | 226531 | 212698 | 5.7 | 1.4 | 0.0 | -1.0 |
| Oil fired | 67499 | 59434 | 54039 | 42254 | 32648 | 26149 | 22149 | 17516 | 14575 | 11145 | 9053 | -2.2 | -4.9 | -3.8 | -4.4 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28744 | 34568 | 37972 | 46393 | 52324 | 62443 | 67618 | 75663 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1174 | 3009 | 3501 | 4376 | 4971 | 2.5 | 2.2 | 2.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.3 | 35.1 | 33.3 | 33.8 | 34.0 | 35.1 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.6 | 40.3 | 38.7 | 39.3 | 39.7 | 40.7 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 16.9 | 16.8 | 16.7 | 15.5 | 14.6 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.5 | 1.4 | 6.4 | 9.5 | 13.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 64.3 | 72.4 | 76.8 | 77.1 | 76.8 | 76.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 21.3 | 22.2 | 21.5 | 20.6 | 21.1 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 43.6 | 51.0 | 54.6 | 55.6 | 56.2 | 55.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7450.5** | **7862.8** | **8125.9** | **8368.6** | **8567.1** | **8778.8** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.5 | 603.3 | 624.3 | 650.1 | 666.0 | 687.8 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.1 | 5606.3 | 5714.1 | 5784.8 | 5856.4 | 5936.6 | 1.0 | 0.6 | 0.8 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.2 | 724.1 | 783.0 | 844.4 | 888.8 | 934.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 773.7 | 884.0 | 957.6 | 1040.6 | 1105.8 | 1168.1 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.9 | 48.6 | 50.2 | 51.7 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3385.8** | **3510.3** | **3635.2** | **3713.3** | **3801.1** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.7 | 2426.9 | 2502.0 | 2545.1 | 2599.1 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.0 | 640.0 | 674.4 | 698.8 | 720.4 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341130** | **335023** | **323408** | **307230** | **294916** | **286281** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7808 | 7826 | 7413 | 7123 | 6756 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141053 | 131328 | 122232 | 107730 | 97534 | 90905 | 0.2 | -1.5 | -1.8 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118269 | 120885 | 119497 | 116860 | 114419 | 112190 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9900 | 10061 | 10161 | 10062 | 9908 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58016 | 57997 | 56968 | 57966 | 58674 | 59224 | 0.9 | 1.2 | 0.3 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6752 | 7087 | 7237 | 7390 | 7472 | 7558 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE30EC_d | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | **Annual % Change** | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831440** | **799875** | **743685** | **701180** | **705973** | **762343** | **788381** | **831896** | **-1.2** | **-0.5** | **-1.3** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149881 | 137862 | 122299 | 91633 | 70653 | 78043 | 73804 | 81348 | -2.7 | -1.7 | -4.0 | -0.6 |
| Oil | 176084 | 136469 | 103565 | 90646 | 77001 | 63361 | 51913 | 36860 | 25431 | 15030 | 9475 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149167 | 138308 | 109242 | 86359 | 72823 | 66612 | 60095 | 52276 | -2.7 | -1.4 | -4.6 | -2.5 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212643 | 256335 | 270153 | 292441 | 339288 | 395213 | 439951 | 468564 | 5.6 | 3.7 | 1.3 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33015 | 34057 | 35347 | 36238 | 36724 | 37241 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136270 | 149552 | 144438 | 147330 | 164985 | 192847 | 216951 | 232725 | 6.5 | 1.9 | -0.1 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22663 | 42529 | 56256 | 70034 | 79190 | 91665 | 101234 | 107079 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar and others | 430 | 806 | 3691 | 14049 | 22800 | 27188 | 30766 | 37543 | 45490 | 50444 | 52829 | 24.0 | 20.0 | 3.0 | 2.7 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9272 | 9255 | 10254 | 22224 | 28973 | 34597 | 38691 | 2.3 | 4.6 | 1.0 | 6.9 |
| **Net Imports** | **829314** | **988719** | **956735** | **967865** | **896858** | **851897** | **781960** | **703647** | **622500** | **568983** | **516147** | **1.4** | **-0.6** | **-1.4** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115986 | 92085 | 88383 | 69208 | 48698 | 34135 | 34684 | 37988 | 1.2 | -1.8 | -2.8 | -3.0 |
| Oil | 535238 | 604030 | 563977 | 551783 | 524921 | 499562 | 474115 | 424096 | 360728 | 296187 | 241093 | 0.5 | -0.7 | -1.0 | -3.3 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527785 | 504377 | 482326 | 460142 | 421475 | 373059 | 324755 | 280194 | 0.4 | -0.7 | -0.9 | -2.4 |
| - Oil products | 17192 | 18909 | 22737 | 23998 | 20544 | 17236 | 13972 | 2621 | -12331 | -28568 | -39101 | 2.8 | -1.0 | -3.8 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286182 | 259779 | 243145 | 215430 | 202788 | 192843 | 197665 | 191804 | 3.6 | -0.6 | -1.9 | -0.6 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745840** | **1641318** | **1538154** | **1424462** | **1348976** | **1324389** | **1296206** | **1285743** | **0.2** | **-0.7** | **-1.4** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265867 | 229947 | 210682 | 160840 | 119352 | 112178 | 108488 | 119336 | -1.3 | -2.0 | -3.5 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589181 | 547424 | 507485 | 469996 | 404589 | 331395 | 257310 | 196877 | -0.7 | -1.2 | -1.5 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435131 | 397168 | 350396 | 299142 | 271333 | 253765 | 250508 | 235469 | 1.2 | -1.1 | -2.8 | -1.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190370 | 178631 | 178835 | 186348 | 197044 | 199502 | 220234 | -0.3 | -2.1 | -0.6 | 1.0 |
| Electricity | 2029 | 1412 | 707 | -129 | -1603 | -1508 | -1489 | -1740 | -1816 | -1876 | -2084 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226686 | 278011 | 292467 | 317138 | 369094 | 431823 | 482274 | 515911 | 5.9 | 4.2 | 1.3 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.7 | 11.3 | 8.8 | 8.5 | 8.4 | 9.3 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.0 | 33.0 | 30.0 | 25.0 | 19.9 | 15.3 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.8 | 21.0 | 20.1 | 19.2 | 19.3 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.6 | 12.6 | 13.8 | 14.9 | 15.4 | 17.1 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.0 | 22.3 | 27.4 | 32.6 | 37.2 | 40.1 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368960 | 346100 | 341018 | 327452 | 325368 | 369662 | 414848 | 477805 | -0.5 | -0.9 | -0.6 | 1.9 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383240** | **342669** | **314342** | **262790** | **250347** | **285890** | **309431** | **324588** | **0.8** | **-2.0** | **-2.6** | **1.1** |
| Solids | 223038 | 228941 | 197605 | 186586 | 154012 | 144346 | 103084 | 72208 | 76026 | 79294 | 94598 | -1.2 | -2.5 | -3.9 | -0.4 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5748 | 4534 | 3408 | 2846 | 2364 | 1856 | 1411 | -6.5 | -12.0 | -5.1 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131885 | 120828 | 98403 | 80926 | 81726 | 88245 | 92479 | 85378 | 3.8 | -2.1 | -3.9 | 0.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47906 | 55284 | 60204 | 67359 | 73896 | 88093 | 96433 | 99088 | 11.7 | 2.1 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 8014 | 19671 | 26030 | 31164 | 34353 | 1.6 | 3.5 | 1.7 | 7.5 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5133 | 8204 | 9760 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971007** | **902315** | **846802** | **808194** | **784669** | **760011** | **723080** | **711920** | **-0.7** | **-1.0** | **-1.1** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646610 | 612017 | 576578 | 543143 | 488133 | 425887 | 363546 | 310943 | -1.0 | -0.9 | -1.2 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24665 | 56942 | 93286 | 121756 | 146384 | 34.1 | 6.9 | -0.5 | 9.3 |
| District heating | 18667 | 19517 | 20813 | 22233 | 19528 | 16633 | 17491 | 16697 | 15087 | 13577 | 13157 | 1.1 | -0.6 | -1.1 | -1.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244740 | 228234 | 222894 | 222898 | 225752 | 224200 | 241436 | -0.6 | -1.9 | -0.9 | 0.4 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82420** | **76470** | **69593** | **63435** | **57201** | **52873** | **49874** | **49702** | **0.2** | **-1.4** | **-1.9** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119319** | **122388** | **120219** | **115589** | **108895** | **103746** | **99548** | **98032** | **-0.2** | **0.6** | **-0.6** | **-0.8** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170516** | **1122037** | **1051763** | **982544** | **921756** | **879825** | **844651** | **818430** | **0.3** | **-0.3** | **-1.3** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304758 | 303324 | 288362 | 272460 | 249504 | 231894 | 219876 | 215796 | -1.3 | 0.4 | -1.1 | -1.2 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197068 | 196069 | 185031 | 172991 | 156761 | 146989 | 137759 | 132040 | -1.5 | 0.4 | -1.2 | -1.3 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107691 | 107255 | 103331 | 99469 | 92743 | 84905 | 82117 | 83757 | -1.0 | 0.4 | -0.8 | -0.9 |
| Residential | 286291 | 311793 | 311545 | 311965 | 293837 | 265513 | 244073 | 224369 | 217458 | 208100 | 194938 | 0.8 | -0.6 | -1.8 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181919 | 167895 | 154151 | 129807 | 123577 | 122353 | 120513 | 119851 | 1.2 | -1.1 | -2.5 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343737 | 336203 | 324307 | 308120 | 296163 | 287844 | 0.7 | -0.3 | -0.6 | -0.8 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48418 | 45836 | 39463 | 33608 | 26598 | 20367 | 15504 | 12819 | -2.2 | -0.8 | -3.1 | -4.7 |
| Oil | 485890 | 502788 | 457366 | 440563 | 404972 | 373700 | 343639 | 290716 | 234082 | 184001 | 140138 | -0.6 | -1.2 | -1.6 | -4.4 |
| Gas | 266925 | 285438 | 269920 | 271582 | 246780 | 223631 | 192715 | 162950 | 132572 | 111236 | 92936 | 0.1 | -0.9 | -2.4 | -3.6 |
| Electricity | 217599 | 239418 | 245271 | 254495 | 250988 | 251095 | 251802 | 250167 | 267207 | 280010 | 293861 | 1.2 | 0.2 | 0.0 | 0.8 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55298 | 54920 | 52113 | 52793 | 52191 | 54294 | 53734 | 52884 | 1.5 | 0.3 | -0.4 | 0.0 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100093 | 118281 | 111163 | 107002 | 126549 | 148234 | 171980 | 191234 | 5.2 | 3.8 | -1.0 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 984 | 12586 | 23069 | 28187 | 34558 | 0.0 | 0.0 | 14.2 | 19.5 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194862** | **244210** | **255521** | **279728** | **318093** | **370608** | **410496** | **439323** | **5.4** | **5.0** | **1.4** | **2.3** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4235.7** | **3892.8** | **3407.3** | **2708.3** | **1990.8** | **1554.3** | **1219.1** | **-0.7** | **-1.3** | **-2.2** | **-5.0** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.4 | 1872.2 | 1731.4 | 1454.7 | 1147.7 | 750.6 | 532.2 | 360.2 | | -1.5 | -2.5 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.8 | 2363.5 | 2161.4 | 1952.6 | 1560.6 | 1240.2 | 1022.1 | 858.9 | | -1.2 | -1.9 | -4.0 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3204.7** | **2897.3** | **2464.6** | **1990.7** | **1472.4** | **1107.6** | **826.3** | **-0.5** | **-1.6** | **-2.6** | **-5.3** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.2 | 1009.5 | 901.1 | 674.8 | 481.7 | 269.4 | 143.8 | 63.3 | -0.5 | -2.8 | -3.9 | -11.2 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 121.4 | 109.5 | 95.3 | 77.3 | 64.8 | 54.2 | -0.6 | -1.4 | -2.3 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.8 | 502.9 | 457.8 | 404.1 | 330.8 | 240.3 | 193.9 | 164.4 | -2.8 | -0.3 | -2.2 | -4.4 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 326.6 | 276.3 | 216.0 | 170.7 | 127.9 | 84.2 | -0.1 | -1.7 | -3.3 | -5.8 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.4 | 159.0 | 104.6 | 88.2 | 75.2 | 59.9 | 45.5 | -0.3 | -2.7 | -5.8 | -4.1 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 895.3 | 778.7 | 639.6 | 517.4 | 414.7 | 0.5 | -0.7 | -0.9 | -3.8 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.6** | **268.3** | **226.5** | **119.1** | **84.2** | **41.6** | **-1.0** | **1.5** | **-0.2** | **-8.9** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.5** | **59.9** | **47.6** | **35.0** | **27.3** | **21.4** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | | EU28: EE30EC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 99.6 | 85.5 | 75.5 | 69.2 | 63.2 | 58.6 | -1.2 | -2.2 | -2.9 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.73 | 1.48 | 1.11 | 0.85 | 0.64 | -0.7 | -0.9 | -1.2 | -4.8 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.4 | 52.7 | 49.9 | 45.0 | 41.9 | 38.3 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.3 | 2035.4 | 2157.6 | 2318.2 | 2440.0 | 2642.8 | 2880.9 | 3048.4 | 3.7 | 2.6 | 1.3 | 1.4 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 13.9 | 13.7 | 13.8 | 14.0 | 13.9 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 80.5 | 72.0 | 63.0 | 55.8 | 50.7 | 47.7 | | -1.0 | -2.2 | -2.0 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.6 | 69.0 | 58.7 | 50.2 | 45.2 | 40.1 | 34.7 | -0.5 | -1.9 | -3.4 | -2.6 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.6 | 50.1 | 44.2 | 40.6 | 37.1 | 34.2 | 0.0 | -2.6 | -4.2 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.5 | 21.2 | 19.7 | 18.5 | -0.6 | -1.6 | -2.2 | -1.6 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.9 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.24 | 0.22 | 0.17 | 0.12 | 0.06 | 0.03 | 0.01 | -1.6 | -3.0 | -3.8 | -12.3 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.71 | 1.53 | 1.28 | 1.06 | 0.87 | -0.8 | -0.7 | -0.7 | -3.3 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.04 | 0.88 | 0.76 | -1.5 | -0.8 | -1.1 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.13 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.40 | 2.08 | 1.75 | 1.44 | -0.2 | -0.4 | -0.3 | -3.0 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.2 | 23.6 | 27.7 | 33.6 | 40.5 | 46.3 | 50.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.0 | 25.5 | 40.3 | 54.3 | 66.0 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415901** | **3364258** | **3354597** | **3345224** | **3477585** | **3928955** | **4229680** | **4560022** | **1.0** | **0.1** | **-0.1** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 737206 | 697551 | 703936 | 745532 | 805231 | 828021 | 942094 | -0.3 | -2.2 | -0.5 | 1.5 |
| Solids | 933660 | 974939 | 830048 | 802248 | 672875 | 633340 | 445974 | 290407 | 296392 | 343369 | 460318 | -1.2 | -2.1 | -4.0 | 0.2 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46138 | 25643 | 21236 | 15863 | 15003 | 12161 | 9521 | 6818 | -7.1 | -11.5 | -4.7 | -4.1 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752506 | 682930 | 535702 | 461222 | 485358 | 527364 | 561565 | 537679 | 4.5 | -1.5 | -3.8 | 0.8 |
| Biomass-waste | 46848 | 83787 | 145901 | 190998 | 221100 | 243967 | 279555 | 316897 | 383126 | 404743 | 419314 | 12.0 | 4.2 | 2.4 | 2.0 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383900 | 396014 | 411008 | 421373 | 427027 | 433031 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263517 | 494523 | 654141 | 814344 | 920816 | 1065871 | 1177141 | 1245105 | 21.0 | 12.7 | 5.1 | 2.1 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 169222 | 210907 | 256819 | 347455 | 389884 | 415082 | 68.9 | 20.4 | 3.9 | 3.4 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17408 | 35745 | 44467 | 52941 | 58842 | 2.5 | 5.9 | 3.7 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25514 | 35468 | 41738 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930117** | **1019066** | **1051883** | **1118578** | **1159634** | **1289256** | **1335777** | **1381991** | **2.6** | **2.0** | **0.9** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94547 | 95440 | 99378 | 106810 | 109859 | 124496 | -0.4 | -1.7 | -1.5 | 1.3 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440528 | 516836 | 598131 | 666532 | 779590 | 847363 | 887761 | 7.1 | 6.9 | 3.1 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122519 | 124892 | 129931 | 133343 | 135775 | 137741 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207434 | 263223 | 319570 | 357961 | 412770 | 451631 | 475383 | 20.7 | 9.4 | 4.4 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 128059 | 150414 | 173458 | 227705 | 253137 | 266843 | 66.7 | 14.0 | 3.1 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5772 | 6819 | 7794 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488067 | 467376 | 440499 | 425007 | 393724 | 402856 | 378555 | 369733 | 1.9 | -0.3 | -0.9 | -0.7 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102193 | 110999 | 110785 | 112357 | 116951 | 122443 | 123037 | 127535 | 0.9 | 0.9 | 0.1 | 0.6 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 929 | 7041 | 54353 | 109237 | 152359 | 0.0 | 0.0 | 0.3 | 29.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140915 | 120678 | 101809 | 84889 | 86940 | 86592 | 90109 | -0.6 | -2.2 | -3.2 | -0.6 |
| Gas fired | 129190 | 169054 | 224922 | 253060 | 258508 | 255100 | 253809 | 236957 | 233930 | 208106 | 189793 | 5.7 | 1.4 | -0.2 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42258 | 32481 | 25979 | 21937 | 17295 | 14324 | 10933 | 8658 | -2.2 | -5.0 | -3.8 | -4.5 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34570 | 37832 | 46389 | 51971 | 64207 | 68787 | 76613 | 5.0 | 3.5 | 3.0 | 2.5 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1064 | 2612 | 3455 | 4137 | 4560 | 2.5 | 2.2 | 1.7 | 7.5 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 35.0 | 32.9 | 33.1 | 33.5 | 34.7 | 35.8 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.5 | 39.7 | 38.8 | 38.4 | 38.7 | 39.9 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.1 | 17.0 | 16.8 | 17.1 | 15.9 | 15.1 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.5 | 3.5 | 7.4 | 11.8 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.5 | 72.4 | 77.3 | 78.6 | 78.2 | 77.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.8 | 21.0 | 21.4 | 20.6 | 19.7 | 20.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.7 | 51.4 | 55.8 | 58.0 | 58.5 | 56.9 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7855.0** | **8124.7** | **8368.9** | **8550.3** | **8780.6** | **0.9** | **0.9** | **1.1** | **0.6** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.4 | 623.9 | 650.1 | 668.2 | 688.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5595.7 | 5706.9 | 5781.9 | 5833.5 | 5930.2 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.0 | 782.0 | 843.7 | 890.5 | 934.3 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.0 | 965.1 | 1044.6 | 1108.1 | 1176.5 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.7 | 48.5 | 50.1 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.6** | **3635.4** | **3713.0** | **3801.7** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.6 | 2426.9 | 2502.1 | 2544.8 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.2 | 640.2 | 674.5 | 698.7 | 720.5 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.5 | 458.8 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **333676** | **321809** | **305674** | **293781** | **285504** | **0.7** | **-0.3** | **-0.6** | **-0.8** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7827 | 7408 | 7126 | 6777 | 6497 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129744 | 120077 | 105833 | 96151 | 89639 | 0.2 | -1.5 | -1.9 | -1.8 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120880 | 119493 | 116856 | 114368 | 112069 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9902 | 10060 | 10154 | 10066 | 9912 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58237 | 57543 | 58324 | 58951 | 59842 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7086 | 7228 | 7382 | 7469 | 7546 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE32DEC_d | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831468** | **799964** | **740446** | **686479** | **697777** | **753848** | **786422** | **826944** | **-1.2** | **-0.5** | **-1.5** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149901 | 137886 | 121487 | 92642 | 71589 | 77783 | 74783 | 80855 | -2.7 | -1.7 | -3.9 | -0.7 |
| Oil | 176084 | 136469 | 103565 | 90643 | 77000 | 63188 | 51467 | 36453 | 24996 | 14671 | 9255 | -5.2 | -2.9 | -3.9 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149164 | 138410 | 108293 | 82862 | 72235 | 66426 | 60400 | 52290 | -2.7 | -1.3 | -5.0 | -2.3 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212653 | 256326 | 269236 | 288211 | 335647 | 388977 | 434247 | 462008 | 5.6 | 3.7 | 1.2 | 2.4 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32181 | 33016 | 34060 | 35321 | 36238 | 36754 | 37250 | 0.4 | 0.0 | 0.6 | 0.4 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136279 | 149547 | 143841 | 145115 | 162264 | 189122 | 211665 | 226728 | 6.5 | 1.9 | -0.3 | 2.3 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42525 | 56066 | 69039 | 78836 | 91364 | 101175 | 106983 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22800 | 27070 | 30051 | 37033 | 43931 | 50108 | 52354 | 24.0 | 20.0 | 2.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9273 | 9242 | 9945 | 22193 | 28322 | 34545 | 38693 | 2.3 | 4.6 | 0.7 | 7.0 |
| **Net Imports** | **829314** | **988719** | **956735** | **967842** | **896951** | **845485** | **767260** | **697431** | **610672** | **560112** | **510299** | **1.4** | **-0.6** | **-1.5** | **-2.0** |
| Solids | 98273 | 125211 | 110927 | 115977 | 92086 | 86603 | 71563 | 50346 | 33547 | 35484 | 39779 | 1.2 | -1.8 | -2.5 | -2.9 |
| Oil | 535238 | 604030 | 563977 | 551775 | 524913 | 497891 | 468781 | 418135 | 352234 | 285209 | 231795 | 0.5 | -0.7 | -1.1 | -3.5 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527771 | 504350 | 481251 | 456554 | 417176 | 366720 | 316376 | 272960 | 0.4 | -0.7 | -1.0 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24004 | 20563 | 16640 | 12228 | 959 | -14487 | -31167 | -41165 | 2.8 | -1.0 | -5.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286173 | 259880 | 240341 | 203996 | 201265 | 190777 | 200167 | 194805 | 3.6 | -0.6 | -2.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745845** | **1641499** | **1528503** | **1395061** | **1334563** | **1304066** | **1285376** | **1274943** | **0.2** | **-0.7** | **-1.6** | **-0.4** |
| Solids | 321277 | 317986 | 280653 | 265879 | 229971 | 208090 | 164205 | 121935 | 111331 | 110267 | 120634 | -1.3 | -2.0 | -3.3 | -1.5 |
| Oil | 665142 | 683909 | 620735 | 589170 | 547415 | 505642 | 464217 | 398221 | 322465 | 245974 | 187359 | -0.7 | -1.2 | -1.6 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435120 | 397373 | 346644 | 284212 | 269222 | 251512 | 253315 | 238485 | 1.2 | -1.1 | -3.3 | -0.9 |
| Nuclear | 243841 | 257516 | 236563 | 229106 | 190341 | 178241 | 171298 | 181853 | 195667 | 202321 | 222536 | -0.3 | -2.2 | -1.0 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1486 | -1740 | -1816 | -1878 | -2099 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226699 | 278001 | 291393 | 312616 | 365073 | 424907 | 475377 | 508027 | 5.9 | 4.2 | 1.2 | 2.5 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 13.6 | 11.8 | 9.1 | 8.5 | 8.6 | 9.5 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.3 | 33.1 | 33.3 | 29.8 | 24.7 | 19.1 | 14.7 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.7 | 20.4 | 20.2 | 19.3 | 19.7 | 18.7 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.7 | 12.3 | 13.6 | 15.0 | 15.7 | 17.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 19.1 | 22.4 | 27.4 | 32.6 | 37.0 | 39.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368942 | 346243 | 339638 | 322853 | 325994 | 372051 | 422057 | 486850 | -0.5 | -0.9 | -0.7 | 2.1 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383270** | **342902** | **311500** | **260315** | **253664** | **283396** | **315940** | **329255** | **0.8** | **-1.9** | **-2.7** | **1.2** |
| Solids | 223038 | 228941 | 197605 | 186612 | 154047 | 142724 | 108644 | 75790 | 75764 | 81507 | 95989 | -1.2 | -2.5 | -3.4 | -0.6 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10894 | 5780 | 4530 | 3342 | 2862 | 2326 | 1774 | 1382 | -6.5 | -11.9 | -5.3 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131897 | 121019 | 96899 | 72885 | 82284 | 87917 | 97108 | 89307 | 3.8 | -2.1 | -4.9 | 1.0 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47890 | 55259 | 60493 | 67659 | 73056 | 87612 | 96763 | 99208 | 11.7 | 2.0 | 2.0 | 1.9 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7785 | 19671 | 25422 | 31164 | 34436 | 1.6 | 3.5 | 1.4 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4354 | 7624 | 8933 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **971003** | **902264** | **844055** | **794081** | **773655** | **747918** | **711552** | **700279** | **-0.7** | **-1.0** | **-1.3** | **-0.6** |
| Refineries | 740500 | 763156 | 670015 | 646602 | 612015 | 575176 | 538738 | 483283 | 419083 | 354850 | 303582 | -1.0 | -0.9 | -1.3 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25357 | 24592 | 56290 | 90339 | 117093 | 140679 | 34.1 | 6.9 | -0.6 | 9.1 |
| District heating | 18667 | 19517 | 20813 | 22236 | 19511 | 16517 | 17100 | 16519 | 14649 | 13006 | 12337 | 1.1 | -0.6 | -1.3 | -1.6 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283943 | 244709 | 227005 | 213651 | 217563 | 223847 | 226602 | 243681 | -0.6 | -1.9 | -1.3 | 0.7 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82417** | **76473** | **69205** | **62612** | **56616** | **52250** | **49421** | **49582** | **0.2** | **-1.4** | **-2.0** | **-1.2** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122386** | **118832** | **112517** | **107050** | **102422** | **98660** | **98024** | **-0.2** | **0.6** | **-0.8** | **-0.7** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170498** | **1122131** | **1045780** | **961900** | **910592** | **865633** | **829576** | **804488** | **0.3** | **-0.3** | **-1.5** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304746 | 303294 | 284070 | 264250 | 244678 | 227059 | 218180 | 215824 | -1.3 | 0.4 | -1.4 | -1.0 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197056 | 196038 | 182527 | 167633 | 153488 | 142215 | 136075 | 131971 | -1.5 | 0.4 | -1.6 | -1.2 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107690 | 107256 | 101543 | 96618 | 91190 | 84844 | 82105 | 83853 | -1.0 | 0.4 | -1.0 | -0.7 |
| Residential | 286291 | 311793 | 311545 | 311966 | 293951 | 264442 | 237183 | 222346 | 215230 | 205525 | 191961 | 0.8 | -0.6 | -2.1 | -1.1 |
| Tertiary | 166083 | 179768 | 187856 | 181912 | 167904 | 153537 | 124963 | 122181 | 121073 | 119121 | 118281 | 1.2 | -1.1 | -2.9 | -0.3 |
| Transport | 342901 | 368665 | 367191 | 371873 | 356981 | 343731 | 335504 | 321387 | 302271 | 286749 | 278421 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48401 | 45820 | 38896 | 32222 | 25970 | 20044 | 15289 | 12806 | -2.2 | -0.8 | -3.5 | -4.5 |
| Oil | 485890 | 502788 | 457366 | 440528 | 404993 | 373025 | 340679 | 286063 | 226544 | 173713 | 131120 | -0.6 | -1.2 | -1.7 | -4.7 |
| Gas | 266925 | 285438 | 269920 | 271568 | 246738 | 221648 | 186717 | 160769 | 131160 | 110035 | 92259 | 0.1 | -0.9 | -2.7 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254490 | 251071 | 249644 | 246274 | 249412 | 266659 | 283267 | 296658 | 1.2 | 0.2 | -0.2 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55313 | 54931 | 51874 | 51261 | 51518 | 53599 | 53119 | 52135 | 1.5 | 0.3 | -0.7 | 0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100133 | 118316 | 110095 | 103700 | 124219 | 144397 | 165330 | 184049 | 5.2 | 3.8 | -1.3 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1048 | 12642 | 23231 | 28823 | 35460 | 0.0 | 0.0 | 14.9 | 19.3 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194912** | **244213** | **254336** | **275168** | **313975** | **364278** | **403415** | **430964** | **5.4** | **5.0** | **1.2** | **2.3** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.1** | **4236.3** | **3870.9** | **3380.1** | **2700.2** | **2081.7** | **1524.7** | **1198.9** | **-0.7** | **-1.3** | **-2.2** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1872.8 | 1714.7 | 1447.8 | 1156.1 | 865.4 | 535.4 | 368.1 | | -1.5 | -2.5 | -6.6 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.6 | 2363.4 | 2156.1 | 1932.2 | 1544.1 | 1216.4 | 989.3 | 830.7 | | -1.2 | -2.0 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.2** | **3205.3** | **2875.5** | **2434.4** | **1982.1** | **1478.9** | **1078.0** | **802.9** | **-0.5** | **-1.6** | **-2.7** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.4 | 1010.2 | 890.0 | 676.1 | 496.0 | 304.2 | 150.2 | 69.2 | -0.5 | -2.8 | -3.9 | -10.8 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.4 | 120.7 | 107.7 | 94.1 | 76.1 | 63.4 | 53.3 | -0.6 | -1.4 | -2.5 | -3.5 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 502.9 | 450.5 | 391.8 | 324.8 | 238.6 | 193.1 | 165.7 | -2.8 | -0.3 | -2.5 | -4.2 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 385.4 | 324.7 | 266.2 | 213.4 | 168.2 | 125.6 | 82.2 | -0.1 | -1.7 | -3.6 | -5.7 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 190.3 | 158.2 | 100.6 | 86.9 | 74.0 | 58.9 | 44.7 | -0.3 | -2.7 | -6.2 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.0 | 931.3 | 892.1 | 766.9 | 617.8 | 486.7 | 387.7 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.5** | **275.4** | **271.3** | **227.1** | **203.6** | **84.3** | **44.8** | **-1.0** | **1.5** | **-0.1** | **-8.6** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **68.1** | **59.5** | **47.5** | **36.6** | **26.8** | **21.1** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE32DEC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.2 | 98.9 | 83.7 | 74.7 | 68.1 | 62.6 | 58.1 | -1.2 | -2.2 | -3.1 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.88 | 1.75 | 1.49 | 1.13 | 0.84 | 0.63 | -0.7 | -0.9 | -1.1 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.3 | 52.8 | 50.0 | 44.8 | 41.6 | 38.2 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.2 | 2035.4 | 2161.7 | 2352.0 | 2462.9 | 2686.4 | 2926.6 | 3068.6 | 3.7 | 2.6 | 1.5 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 14.1 | 13.8 | 14.0 | 14.3 | 14.0 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.3 | 79.3 | 69.9 | 61.7 | 54.7 | 50.3 | 47.7 | | -1.0 | -2.5 | -1.9 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.7 | 68.7 | 57.1 | 49.8 | 44.7 | 39.6 | 34.2 | -0.5 | -1.9 | -3.6 | -2.5 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.7 | 64.3 | 48.2 | 43.7 | 40.2 | 36.6 | 33.8 | 0.0 | -2.6 | -4.5 | -1.8 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.17 | 0.12 | 0.07 | 0.03 | 0.01 | -1.6 | -3.0 | -3.6 | -12.0 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.78 | 1.72 | 1.53 | 1.27 | 1.04 | 0.85 | -0.8 | -0.7 | -0.7 | -3.5 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.48 | 1.33 | 1.05 | 0.89 | 0.77 | -1.5 | -0.8 | -1.1 | -3.2 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.23 | 1.12 | 0.96 | 0.78 | 0.61 | 0.43 | -0.9 | -1.1 | -1.5 | -4.7 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.80 | 0.71 | 0.61 | 0.49 | 0.38 | -1.5 | -1.6 | -3.4 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.2 | 23.6 | 27.8 | 33.5 | 40.5 | 46.3 | 50.6 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 41.7 | 56.1 | 67.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415816** | **3365366** | **3336026** | **3276046** | **3469911** | **3916439** | **4276554** | **4603950** | **1.0** | **0.1** | **-0.3** | **1.7** |
| Nuclear energy | 945027 | 997733 | 916685 | 887192 | 737094 | 695966 | 671581 | 726105 | 798952 | 840125 | 951928 | -0.3 | -2.2 | -0.9 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802441 | 673122 | 626542 | 472340 | 309132 | 296674 | 353066 | 471389 | -1.2 | -2.1 | -3.5 | 0.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46090 | 25933 | 20996 | 15476 | 14946 | 11957 | 9079 | 6804 | -7.1 | -11.4 | -5.0 | -4.0 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752382 | 683775 | 527858 | 412106 | 489498 | 545965 | 585388 | 564000 | 4.5 | -1.5 | -4.9 | 1.6 |
| Biomass-waste | 46848 | 83787 | 145901 | 190886 | 220979 | 244742 | 280971 | 313979 | 382009 | 408675 | 423080 | 12.0 | 4.2 | 2.4 | 2.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374203 | 383908 | 396051 | 410707 | 421369 | 427378 | 433145 | 0.4 | 0.0 | 0.6 | 0.4 |
| Wind | 22253 | 70453 | 149202 | 263516 | 494482 | 651933 | 802781 | 916701 | 1062374 | 1176449 | 1243985 | 21.0 | 12.7 | 5.0 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 168544 | 207575 | 253072 | 332020 | 389257 | 413030 | 68.9 | 20.4 | 3.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 17165 | 35769 | 43673 | 52941 | 59113 | 2.5 | 5.9 | 3.5 | 6.4 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21447 | 34196 | 37477 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930133** | **1019117** | **1050394** | **1107267** | **1151276** | **1276755** | **1336932** | **1383221** | **2.6** | **2.0** | **0.8** | **1.1** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 94355 | 93074 | 97019 | 106069 | 111559 | 125868 | -0.4 | -1.7 | -1.8 | 1.5 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440507 | 515248 | 593178 | 662294 | 769161 | 846491 | 885789 | 7.1 | 6.9 | 3.0 | 2.0 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120602 | 122525 | 124926 | 129886 | 133333 | 135857 | 137763 | 1.0 | 0.7 | 0.4 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207413 | 262092 | 316799 | 356039 | 411094 | 450743 | 474229 | 20.7 | 9.4 | 4.3 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 127596 | 148184 | 171173 | 219008 | 253072 | 265913 | 66.7 | 14.0 | 2.9 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3268 | 5195 | 5726 | 6819 | 7884 | 0.0 | 21.3 | 7.0 | 4.5 |
| Thermal power | 398853 | 429386 | 480034 | 488084 | 467448 | 440791 | 421015 | 391964 | 401526 | 378882 | 371565 | 1.9 | -0.3 | -1.0 | -0.6 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102201 | 110979 | 109605 | 109469 | 114625 | 121685 | 123473 | 127484 | 0.9 | 0.9 | -0.1 | 0.8 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 7017 | 39838 | 112916 | 155344 | 0.0 | 0.0 | 0.0 | 29.3 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140919 | 120425 | 101448 | 85067 | 86716 | 86825 | 91099 | -0.6 | -2.2 | -3.2 | -0.5 |
| Gas fired | 129190 | 169054 | 224922 | 253082 | 258579 | 255752 | 250579 | 235342 | 233215 | 208211 | 190620 | 5.7 | 1.4 | -0.3 | -1.4 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32474 | 25963 | 21926 | 17249 | 14258 | 10845 | 8525 | -2.2 | -5.0 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34574 | 37740 | 46029 | 51694 | 63962 | 68864 | 76749 | 5.0 | 3.5 | 2.9 | 2.6 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 1034 | 2612 | 3375 | 4137 | 4571 | 2.5 | 2.2 | 1.4 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.8 | 32.6 | 33.3 | 33.8 | 35.0 | 36.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.4 | 39.3 | 39.0 | 39.1 | 38.8 | 40.3 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 16.2 | 16.9 | 16.6 | 17.0 | 15.9 | 15.0 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.6 | 3.5 | 7.4 | 12.3 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.9 | 64.8 | 72.5 | 76.6 | 78.1 | 77.7 | 77.2 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.9 | 20.5 | 20.9 | 20.5 | 19.8 | 20.8 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 37.0 | 43.9 | 52.0 | 55.6 | 57.5 | 57.9 | 56.3 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7049.6** | **7451.1** | **7847.0** | **8107.3** | **8321.8** | **8497.6** | **8736.7** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.4 | 603.7 | 624.8 | 654.3 | 672.4 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.5 | 5410.2 | 5586.5 | 5687.5 | 5727.4 | 5774.6 | 5882.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.2 | 648.1 | 724.5 | 783.0 | 847.4 | 893.7 | 936.1 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.0 | 774.4 | 887.4 | 965.2 | 1044.0 | 1106.6 | 1175.4 | 1.4 | 2.6 | 2.7 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 45.0 | 46.8 | 48.7 | 50.3 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.0** | **3510.8** | **3635.2** | **3713.2** | **3802.0** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.7 | 2501.4 | 2544.6 | 2599.7 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.3 | 640.5 | 674.9 | 699.1 | 720.7 | -0.3 | 2.2 | 2.3 | 0.9 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 458.9 | 469.5 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354463** | **341190** | **332999** | **318900** | **299836** | **284378** | **276091** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7771 | 7807 | 7830 | 7409 | 7150 | 6799 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156771 | 141057 | 129020 | 117139 | 99984 | 86786 | 80259 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118270 | 120869 | 119477 | 116806 | 114305 | 112009 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9232 | 9908 | 10070 | 10174 | 10083 | 9922 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56084 | 58073 | 58282 | 57569 | 58330 | 58926 | 59834 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6387 | 6751 | 7090 | 7236 | 7393 | 7480 | 7553 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE35DEC_d | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831443** | **798097** | **721554** | **649102** | **655124** | **708686** | **738516** | **772731** | **-1.2** | **-0.5** | **-2.0** | **0.9** |
| Solids | 214627 | 196059 | 163855 | 149894 | 138022 | 120411 | 95355 | 73147 | 68307 | 66481 | 74661 | -2.7 | -1.7 | -3.6 | -1.2 |
| Oil | 176084 | 136469 | 103565 | 90642 | 76989 | 62929 | 51072 | 36190 | 24841 | 14597 | 9226 | -5.2 | -2.9 | -4.0 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149166 | 137906 | 104415 | 74720 | 66446 | 60892 | 56113 | 48137 | -2.7 | -1.4 | -5.9 | -2.2 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212638 | 255227 | 261891 | 270431 | 312924 | 377010 | 420735 | 443046 | 5.6 | 3.6 | 0.6 | 2.5 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32948 | 33863 | 35274 | 36210 | 36682 | 37175 | 0.4 | 0.0 | 0.5 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136264 | 148525 | 138975 | 135192 | 152282 | 183737 | 206664 | 219019 | 6.5 | 1.8 | -0.9 | 2.4 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42457 | 54230 | 64111 | 73226 | 88366 | 97331 | 102001 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar and others | 430 | 806 | 3691 | 14051 | 22799 | 26599 | 27969 | 34472 | 41317 | 46941 | 48311 | 24.0 | 20.0 | 2.1 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9139 | 9295 | 17669 | 27380 | 33117 | 36540 | 2.3 | 4.6 | 0.0 | 7.1 |
| **Net Imports** | **829314** | **988719** | **956735** | **967878** | **896579** | **832192** | **746859** | **678342** | **588415** | **532890** | **485823** | **1.4** | **-0.6** | **-1.8** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 115995 | 91872 | 88795 | 77135 | 54512 | 33614 | 28266 | 33117 | 1.2 | -1.9 | -1.7 | -4.1 |
| Oil | 535238 | 604030 | 563977 | 551794 | 524754 | 493926 | 462831 | 413413 | 348476 | 282617 | 230928 | 0.5 | -0.7 | -1.2 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527781 | 504232 | 478665 | 452504 | 413957 | 364112 | 314538 | 272306 | 0.4 | -0.7 | -1.1 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20523 | 15260 | 10326 | -544 | -15636 | -31921 | -41378 | 2.8 | -1.0 | -6.6 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286177 | 260000 | 229334 | 184913 | 183587 | 172925 | 183431 | 179054 | 3.6 | -0.6 | -3.4 | -0.2 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745856** | **1639260** | **1496318** | **1337283** | **1272821** | **1236646** | **1210247** | **1196253** | **0.2** | **-0.8** | **-2.0** | **-0.6** |
| Solids | 321277 | 317986 | 280653 | 265889 | 229894 | 209206 | 172490 | 127659 | 101921 | 94747 | 107778 | -1.3 | -2.0 | -2.8 | -2.3 |
| Oil | 665142 | 683909 | 620735 | 589188 | 547246 | 501416 | 457872 | 393237 | 318552 | 243308 | 186463 | -0.7 | -1.3 | -1.8 | -4.4 |
| Natural gas | 396145 | 448380 | 444428 | 435126 | 396988 | 331758 | 256986 | 245755 | 228128 | 232291 | 218580 | 1.2 | -1.1 | -4.3 | -0.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 189952 | 171908 | 157524 | 166417 | 177634 | 180590 | 197663 | -0.3 | -2.2 | -1.9 | 1.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1508 | -1488 | -1740 | -1819 | -1880 | -2097 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226679 | 276783 | 283537 | 293899 | 341494 | 412229 | 461192 | 487866 | 5.9 | 4.1 | 0.6 | 2.6 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.0 | 14.0 | 12.9 | 10.0 | 8.2 | 7.8 | 9.0 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.5 | 34.2 | 30.9 | 25.8 | 20.1 | 15.6 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 19.2 | 19.3 | 18.4 | 19.2 | 18.3 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.8 | 13.1 | 14.4 | 14.9 | 16.5 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.9 | 22.0 | 26.8 | 33.3 | 38.1 | 40.8 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368917 | 345669 | 330896 | 293605 | 293130 | 321803 | 358103 | 402709 | -0.5 | -0.9 | -1.6 | 1.6 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383290** | **342379** | **306462** | **251160** | **240293** | **263396** | **292881** | **305139** | **0.8** | **-2.0** | **-3.1** | **1.0** |
| Solids | 223038 | 228941 | 197605 | 186639 | 153980 | 145683 | 118800 | 82691 | 67484 | 67081 | 83372 | -1.2 | -2.5 | -2.6 | -1.8 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10891 | 5772 | 4526 | 3246 | 2877 | 2261 | 1759 | 1324 | -6.5 | -11.9 | -5.6 | -4.4 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131871 | 121328 | 90859 | 60242 | 71658 | 76118 | 87162 | 78514 | 3.8 | -2.0 | -6.8 | 1.3 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47914 | 54502 | 58541 | 61455 | 67591 | 87430 | 98490 | 99061 | 11.7 | 1.9 | 1.2 | 2.4 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6853 | 7416 | 15477 | 24875 | 30256 | 32981 | 1.6 | 3.5 | 0.9 | 7.7 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5227 | 8133 | 9887 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970990** | **901576** | **834079** | **774053** | **751647** | **722264** | **680808** | **668964** | **-0.7** | **-1.0** | **-1.5** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646614 | 611888 | 572137 | 534023 | 479539 | 416152 | 352855 | 302891 | -1.0 | -0.9 | -1.4 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25358 | 24591 | 55183 | 89206 | 114770 | 138649 | 34.1 | 6.9 | -0.6 | 9.0 |
| District heating | 18667 | 19517 | 20813 | 22214 | 19374 | 16880 | 16836 | 15392 | 11457 | 9032 | 8466 | 1.1 | -0.7 | -1.4 | -3.4 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283940 | 244285 | 219705 | 198604 | 201533 | 205449 | 204150 | 218957 | -0.6 | -1.9 | -2.0 | 0.5 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82413** | **76461** | **68614** | **61707** | **55594** | **50071** | **46854** | **46409** | **0.2** | **-1.4** | **-2.1** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119320** | **122392** | **117523** | **110687** | **105453** | **101389** | **98061** | **98032** | **-0.2** | **0.6** | **-1.0** | **-0.6** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170499** | **1120502** | **1022200** | **920075** | **870767** | **825095** | **786402** | **758883** | **0.3** | **-0.3** | **-2.0** | **-1.0** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304745 | 302877 | 280054 | 258754 | 240404 | 224866 | 216668 | 215641 | -1.3 | 0.4 | -1.6 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197049 | 195802 | 180295 | 164999 | 151021 | 140128 | 134921 | 132017 | -1.5 | 0.4 | -1.7 | -1.1 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107696 | 107075 | 99759 | 93755 | 89383 | 84738 | 81747 | 83624 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293092 | 251791 | 215196 | 200746 | 191367 | 179003 | 162158 | 0.8 | -0.6 | -3.0 | -1.4 |
| Tertiary | 166083 | 179768 | 187856 | 181914 | 167514 | 146543 | 110285 | 107949 | 106466 | 103915 | 102487 | 1.2 | -1.1 | -4.1 | -0.4 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357021 | 343813 | 335840 | 321668 | 302395 | 286817 | 278598 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48392 | 45791 | 37307 | 30784 | 24756 | 19349 | 15032 | 12838 | -2.2 | -0.8 | -3.9 | -4.3 |
| Oil | 485890 | 502788 | 457366 | 440511 | 404794 | 370041 | 336053 | 282475 | 223560 | 171624 | 130236 | -0.6 | -1.2 | -1.8 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271648 | 246107 | 212814 | 172720 | 148895 | 120968 | 100246 | 84352 | 0.1 | -0.9 | -3.5 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254475 | 250763 | 243009 | 232195 | 235980 | 252502 | 267515 | 277267 | 1.2 | 0.2 | -0.8 | 0.9 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55309 | 54749 | 52233 | 49602 | 48996 | 49000 | 48086 | 47269 | 1.5 | 0.2 | -1.0 | -0.2 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100099 | 118037 | 106198 | 97670 | 117922 | 138284 | 157500 | 174420 | 5.2 | 3.7 | -1.9 | 2.9 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1050 | 11743 | 21433 | 26399 | 32502 | 0.0 | 0.0 | 14.9 | 18.7 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194885** | **243413** | **247548** | **258410** | **295279** | **352999** | **390762** | **412300** | **5.4** | **5.0** | **0.6** | **2.4** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.2** | **4234.8** | **3831.5** | **3346.3** | **2731.5** | **2034.1** | **1473.0** | **1167.3** | **-0.7** | **-1.3** | **-2.3** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2088.5 | 1873.1 | 1708.6 | 1462.8 | 1226.1 | 851.2 | 513.1 | 358.2 | | -1.5 | -2.4 | -6.8 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.7 | 2361.7 | 2123.0 | 1883.6 | 1505.4 | 1182.8 | 959.9 | 809.1 | | -1.2 | -2.2 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.3** | **3203.6** | **2836.0** | **2391.9** | **1987.8** | **1421.7** | **1025.6** | **770.7** | **-0.5** | **-1.6** | **-2.9** | **-5.5** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.5 | 1010.1 | 887.4 | 682.7 | 544.4 | 283.7 | 129.8 | 58.1 | -0.5 | -2.8 | -3.8 | -11.6 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.6 | 138.6 | 119.8 | 106.6 | 92.7 | 75.0 | 62.0 | 53.0 | -0.6 | -1.4 | -2.6 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.0 | 445.3 | 390.3 | 322.6 | 235.8 | 191.3 | 167.5 | -2.8 | -0.3 | -2.5 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 301.2 | 230.4 | 184.0 | 143.8 | 103.9 | 65.0 | -0.1 | -1.7 | -5.0 | -6.1 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.8 | 150.8 | 88.9 | 76.4 | 65.3 | 51.8 | 39.0 | -0.3 | -2.7 | -7.3 | -4.0 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.1 | 931.6 | 893.1 | 767.6 | 618.1 | 486.8 | 388.0 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.7** | **275.5** | **280.0** | **252.6** | **213.1** | **85.0** | **45.4** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.5** | **67.4** | **58.9** | **48.1** | **35.8** | **25.9** | **20.5** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE35DEC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 96.9 | 80.2 | 71.2 | 64.6 | 59.0 | 54.5 | -1.2 | -2.2 | -3.5 | -1.9 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.95 | 1.90 | 1.79 | 1.56 | 1.15 | 0.85 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 53.5 | 50.9 | 45.4 | 41.9 | 38.6 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.4 | 2034.3 | 2162.7 | 2449.4 | 2540.3 | 2791.1 | 3058.3 | 3227.2 | 3.7 | 2.6 | 1.9 | 1.4 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 14.7 | 14.2 | 14.6 | 14.9 | 14.7 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 78.2 | 68.4 | 60.7 | 54.1 | 50.0 | 47.6 | | -1.0 | -2.7 | -1.8 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.4 | 51.8 | 44.9 | 39.8 | 34.5 | 28.9 | -0.5 | -1.9 | -4.5 | -2.9 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 42.6 | 38.6 | 35.3 | 32.0 | 29.3 | 0.0 | -2.6 | -5.7 | -1.9 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.6 | 23.2 | 20.6 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.18 | 0.14 | 0.07 | 0.03 | 0.01 | -1.6 | -2.9 | -3.0 | -12.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.74 | 1.55 | 1.29 | 1.06 | 0.87 | -0.8 | -0.7 | -0.5 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.59 | 1.51 | 1.34 | 1.05 | 0.88 | 0.78 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.20 | 1.07 | 0.92 | 0.75 | 0.58 | 0.40 | -0.9 | -1.1 | -2.0 | -4.8 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.03 | 0.81 | 0.71 | 0.61 | 0.50 | 0.38 | -1.5 | -1.6 | -3.3 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.04 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.1 | 21.1 | 23.6 | 27.4 | 33.1 | 41.4 | 47.7 | 51.7 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.2 | 26.2 | 42.3 | 57.0 | 68.6 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415616** | **3361174** | **3248860** | **3081596** | **3266216** | **3685356** | **3999283** | **4266953** | **1.0** | **0.1** | **-0.9** | **1.6** |
| Nuclear energy | 945027 | 997733 | 916685 | 887184 | 735586 | 669229 | 614947 | 659774 | 720713 | 744717 | 842447 | -0.3 | -2.2 | -1.8 | 1.6 |
| Solids | 933660 | 974939 | 830048 | 802585 | 672393 | 640613 | 512510 | 347072 | 254027 | 279264 | 383058 | -1.2 | -2.1 | -2.7 | -1.4 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 46106 | 25934 | 20837 | 15014 | 14592 | 11325 | 9041 | 6365 | -7.1 | -11.4 | -5.3 | -4.2 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 751990 | 686270 | 486846 | 332572 | 422612 | 470687 | 517385 | 495099 | 4.5 | -1.5 | -7.0 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190927 | 217341 | 235321 | 251362 | 287318 | 385914 | 420958 | 423826 | 12.0 | 4.1 | 1.5 | 2.6 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383119 | 393758 | 410167 | 421052 | 426538 | 432263 | 0.4 | 0.0 | 0.5 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 493685 | 630586 | 745477 | 851466 | 1027510 | 1131758 | 1186061 | 21.0 | 12.7 | 4.2 | 2.3 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166774 | 199365 | 242347 | 324463 | 380512 | 399815 | 68.9 | 20.4 | 3.3 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15536 | 16590 | 30867 | 42970 | 51601 | 56662 | 2.5 | 5.9 | 3.2 | 6.3 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26696 | 37510 | 41357 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930099** | **1018489** | **1034966** | **1069732** | **1102173** | **1232199** | **1284806** | **1313671** | **2.6** | **2.0** | **0.5** | **1.0** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 92030 | 88076 | 89123 | 95965 | 99041 | 111503 | -0.4 | -1.7 | -2.3 | 1.2 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 440177 | 507020 | 569290 | 632812 | 751015 | 824198 | 856398 | 7.1 | 6.9 | 2.6 | 2.1 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122324 | 124437 | 129518 | 133244 | 135613 | 137475 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 207087 | 255211 | 297577 | 333051 | 397636 | 434546 | 453476 | 20.7 | 9.4 | 3.7 | 2.1 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126450 | 144021 | 165061 | 214442 | 247367 | 257956 | 66.7 | 14.0 | 2.7 | 3.0 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 3035 | 3256 | 5182 | 5692 | 6672 | 7490 | 0.0 | 21.3 | 7.0 | 4.3 |
| Thermal power | 398853 | 429386 | 480034 | 488050 | 467150 | 435917 | 412366 | 380238 | 385220 | 361567 | 345770 | 1.9 | -0.3 | -1.2 | -0.9 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102482 | 110690 | 107069 | 106056 | 106727 | 116105 | 120128 | 122405 | 0.9 | 0.9 | -0.4 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 2079 | 31330 | 100998 | 136082 | 0.0 | 0.0 | 0.0 | 28.5 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 140957 | 120336 | 101121 | 83728 | 81636 | 80081 | 80781 | -0.6 | -2.2 | -3.3 | -1.1 |
| Gas fired | 129190 | 169054 | 224922 | 253051 | 258083 | 251352 | 242831 | 225181 | 219910 | 195644 | 173275 | 5.7 | 1.4 | -0.6 | -1.7 |
| Oil fired | 67499 | 59434 | 54039 | 42249 | 32633 | 25945 | 21971 | 17654 | 14598 | 10928 | 8598 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34575 | 37374 | 45454 | 51620 | 65773 | 70898 | 78739 | 5.0 | 3.5 | 2.8 | 2.8 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 989 | 2055 | 3302 | 4016 | 4378 | 2.5 | 2.2 | 0.9 | 7.7 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.1 | 34.4 | 31.7 | 32.7 | 33.0 | 34.2 | 35.4 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.4 | 39.1 | 38.4 | 39.0 | 38.5 | 38.2 | 39.1 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.7 | 15.9 | 16.3 | 16.4 | 17.1 | 16.2 | 15.2 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 2.3 | 6.2 | 10.6 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.8 | 64.7 | 72.1 | 76.0 | 79.9 | 79.7 | 79.1 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.6 | 20.0 | 20.2 | 19.7 | 18.8 | 19.9 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.9 | 44.1 | 52.1 | 55.8 | 60.2 | 60.9 | 59.1 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.0** | **7452.1** | **7851.0** | **8111.2** | **8322.6** | **8497.1** | **8737.4** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.9 | 575.3 | 603.2 | 624.5 | 654.3 | 672.3 | 690.5 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.6 | 5410.5 | 5587.2 | 5688.6 | 5727.3 | 5773.8 | 5881.4 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.9 | 723.7 | 782.3 | 847.2 | 893.4 | 935.2 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.4 | 775.4 | 892.0 | 969.1 | 1045.2 | 1107.3 | 1178.7 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 43.0 | 44.9 | 46.7 | 48.6 | 50.3 | 51.5 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.3** | **3386.4** | **3511.3** | **3635.6** | **3713.0** | **3801.5** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.1 | 2346.4 | 2426.6 | 2501.4 | 2545.0 | 2599.8 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 608.7 | 641.0 | 675.2 | 698.7 | 720.2 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.3 | 443.6 | 459.0 | 469.4 | 481.6 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354504** | **341294** | **333375** | **319214** | **299991** | **284477** | **276292** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7806 | 7825 | 7403 | 7147 | 6800 | 6514 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156774 | 141065 | 129021 | 117140 | 99985 | 86784 | 80261 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118898 | 118271 | 120872 | 119462 | 116791 | 114294 | 111986 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9231 | 9910 | 10073 | 10178 | 10078 | 9918 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56124 | 58173 | 58663 | 57906 | 58498 | 59044 | 60067 | 0.9 | 1.2 | 0.4 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6749 | 7083 | 7229 | 7391 | 7476 | 7548 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*

| EU28: EE40DEC_d | | | | | | | | | | | | SUMMARY ENERGY BALANCE AND INDICATORS (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ktoe** | **2000** | **2005** | **2010** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **'00-'10** | **'10-'20** | **'20-'30** | **'30-'50** |
| | | | | | | | | | | | | Annual % Change | | | |
| **Production (incl.recovery of products)** | **947932** | **904640** | **841485** | **831467** | **798182** | **721654** | **594126** | **601760** | **645922** | **686502** | **725722** | **-1.2** | **-0.5** | **-2.9** | **1.0** |
| Solids | 214627 | 196059 | 163855 | 149909 | 138357 | 122588 | 88013 | 75580 | 67117 | 60562 | 71523 | -2.7 | -1.7 | -4.4 | -1.0 |
| Oil | 176084 | 136469 | 103565 | 90639 | 76992 | 62871 | 50594 | 35891 | 24685 | 14526 | 9193 | -5.2 | -2.9 | -4.1 | -8.2 |
| Natural gas | 209437 | 190678 | 158525 | 149168 | 137818 | 104402 | 65593 | 59388 | 56195 | 53182 | 45391 | -2.7 | -1.4 | -7.2 | -1.8 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Renewable energy sources | 103944 | 123918 | 178977 | 212647 | 254989 | 258925 | 252117 | 285731 | 346347 | 397618 | 420849 | 5.6 | 3.6 | -0.1 | 2.6 |
| Hydro | 30818 | 26817 | 32208 | 31687 | 32180 | 32956 | 33532 | 34287 | 35802 | 36254 | 36918 | 0.4 | 0.0 | 0.4 | 0.5 |
| Biomass & Waste | 66071 | 84883 | 124361 | 136274 | 148474 | 138011 | 124759 | 141967 | 166669 | 198037 | 212409 | 6.5 | 1.8 | -1.7 | 2.7 |
| Wind | 1913 | 6058 | 12829 | 22662 | 42272 | 52303 | 60668 | 65752 | 81456 | 90026 | 94075 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar and others | 430 | 806 | 3691 | 14050 | 22796 | 26526 | 24785 | 30544 | 37164 | 41902 | 42969 | 24.0 | 20.0 | 0.8 | 2.8 |
| Geothermal | 4712 | 5354 | 5888 | 7974 | 9267 | 9129 | 8374 | 13182 | 25256 | 31400 | 34479 | 2.3 | 4.6 | -1.0 | 7.3 |
| **Net Imports** | **829314** | **988719** | **956735** | **967871** | **897192** | **834294** | **707942** | **653319** | **571662** | **512780** | **465308** | **1.4** | **-0.6** | **-2.3** | **-2.1** |
| Solids | 98273 | 125211 | 110927 | 116028 | 92380 | 91837 | 65754 | 54356 | 39287 | 28264 | 32001 | 1.2 | -1.8 | -3.3 | -3.5 |
| Oil | 535238 | 604030 | 563977 | 551788 | 524779 | 492943 | 455032 | 407527 | 344764 | 280202 | 229748 | 0.5 | -0.7 | -1.4 | -3.4 |
| - Crude oil and Feedstocks | 518046 | 585121 | 541240 | 527775 | 504240 | 477965 | 447164 | 409846 | 361424 | 312739 | 271449 | 0.4 | -0.7 | -1.2 | -2.5 |
| - Oil products | 17192 | 18909 | 22737 | 24013 | 20538 | 14978 | 7868 | -2320 | -16660 | -32538 | -41702 | 2.8 | -1.0 | -9.1 | 0.0 |
| Natural gas | 193432 | 257849 | 276001 | 286142 | 260089 | 229511 | 166466 | 166071 | 156056 | 166898 | 161971 | 3.6 | -0.6 | -4.4 | -0.1 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| **Gross Inland Consumption** | **1732712** | **1833269** | **1767474** | **1745873** | **1639958** | **1498520** | **1243389** | **1194435** | **1157129** | **1138123** | **1128729** | **0.2** | **-0.7** | **-2.7** | **-0.5** |
| Solids | 321277 | 317986 | 280653 | 265938 | 230738 | 214425 | 153767 | 129936 | 106403 | 88826 | 103524 | -1.3 | -1.9 | -4.0 | -2.0 |
| Oil | 665142 | 683909 | 620735 | 589179 | 547273 | 500376 | 449594 | 387052 | 314684 | 240821 | 185250 | -0.7 | -1.3 | -1.9 | -4.3 |
| Natural gas | 396145 | 448380 | 444428 | 435092 | 396989 | 331922 | 229412 | 221181 | 206561 | 212827 | 198752 | 1.2 | -1.1 | -5.3 | -0.7 |
| Nuclear | 243841 | 257516 | 236563 | 229104 | 190026 | 172868 | 137809 | 145170 | 151578 | 160614 | 178766 | -0.3 | -2.2 | -3.2 | 1.3 |
| Electricity | 2029 | 1412 | 707 | -129 | -1602 | -1507 | -1490 | -1736 | -1819 | -1887 | -2089 | -10.0 | 0.0 | 0.0 | 0.0 |
| Renewable energy forms | 104278 | 124065 | 184389 | 226690 | 276534 | 280435 | 274298 | 312833 | 379722 | 436921 | 464526 | 5.9 | 4.1 | -0.1 | 2.7 |
| ***as % in Gross Inland Consumption*** | | | | | | | | | | | | | | | |
| Solids | 18.5 | 17.3 | 15.9 | 15.2 | 14.1 | 14.3 | 12.4 | 10.9 | 9.2 | 7.8 | 9.2 | | | | |
| Oil | 38.4 | 37.3 | 35.1 | 33.7 | 33.4 | 33.4 | 36.2 | 32.4 | 27.2 | 21.2 | 16.4 | | | | |
| Natural gas | 22.9 | 24.5 | 25.1 | 24.9 | 24.2 | 22.2 | 18.5 | 18.5 | 17.9 | 18.7 | 17.6 | | | | |
| Nuclear | 14.1 | 14.0 | 13.4 | 13.1 | 11.6 | 11.5 | 11.1 | 12.2 | 13.1 | 14.1 | 15.8 | | | | |
| Renewable energy forms | 6.0 | 6.8 | 10.4 | 13.0 | 16.9 | 18.7 | 22.1 | 26.2 | 32.8 | 38.4 | 41.2 | | | | |
| **Gross Electricity Generation in $GWh_e$** | **3006692** | **3286660** | **3327452** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Self consumption and grid losses | 396970 | 407042 | 377767 | 368936 | 346142 | 334042 | 261356 | 268879 | 295275 | 321605 | 369255 | -0.5 | -0.9 | -2.8 | 1.7 |
| **Fuel Inputs to Thermal Power Generation** | **384957** | **426995** | **417273** | **383320** | **343115** | **312621** | **223213** | **227200** | **247274** | **275839** | **290789** | **0.8** | **-1.9** | **-4.2** | **1.3** |
| Solids | 223038 | 228941 | 197605 | 186660 | 154839 | 151933 | 103497 | 86710 | 71848 | 61126 | 79650 | -1.2 | -2.4 | -3.9 | -1.3 |
| Oil (including refinery gas) | 40042 | 33244 | 20532 | 10887 | 5786 | 4352 | 3158 | 2918 | 2269 | 1707 | 1313 | -6.5 | -11.9 | -5.9 | -4.3 |
| Gas (including derived gases) | 102844 | 133713 | 149190 | 131886 | 121199 | 91115 | 52958 | 62634 | 67127 | 79340 | 69361 | 3.8 | -2.1 | -7.9 | 1.4 |
| Biomass & Waste | 14918 | 26452 | 45117 | 47910 | 54494 | 58369 | 56735 | 63527 | 77803 | 97239 | 99097 | 11.7 | 1.9 | 0.4 | 2.8 |
| Geothermal heat | 4114 | 4645 | 4828 | 5976 | 6796 | 6851 | 6864 | 11411 | 23228 | 29110 | 31632 | 1.6 | 3.5 | 0.1 | 7.9 |
| Hydrogen - Methanol | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4999 | 7317 | 9736 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fuel Input to other conversion processes** | **1076346** | **1110121** | **1001515** | **970986** | **901663** | **832719** | **742152** | **719594** | **686953** | **651670** | **641675** | **-0.7** | **-1.0** | **-1.9** | **-0.7** |
| Refineries | 740500 | 763156 | 670015 | 646606 | 611902 | 571290 | 527852 | 474892 | 413249 | 350939 | 301978 | -1.0 | -0.9 | -1.5 | -2.8 |
| Biofuels and hydrogen production | 705 | 3101 | 13296 | 18222 | 26029 | 25359 | 24595 | 53757 | 86249 | 110546 | 134920 | 34.1 | 6.9 | -0.6 | 8.9 |
| District heating | 18667 | 19517 | 20813 | 22216 | 19390 | 16564 | 12685 | 11810 | 7176 | 5305 | 4734 | 1.1 | -0.7 | -4.2 | -4.8 |
| Derived gases, cokeries etc. | 316475 | 324348 | 297391 | 283942 | 244341 | 219506 | 177020 | 179134 | 180279 | 184880 | 200043 | -0.6 | -1.9 | -3.2 | 0.6 |
| **Energy Branch Consumption** | **86990** | **91952** | **88327** | **82408** | **76506** | **68665** | **59458** | **54181** | **48840** | **44715** | **44598** | **0.2** | **-1.4** | **-2.5** | **-1.4** |
| **Non-Energy Uses** | **117117** | **120718** | **114884** | **119318** | **122391** | **116695** | **108596** | **103913** | **100940** | **97869** | **98038** | **-0.2** | **0.6** | **-1.2** | **-0.5** |
| **Final Energy Demand** | **1127687** | **1190674** | **1157570** | **1170494** | **1120654** | **1020866** | **858690** | **816464** | **776267** | **738226** | **711900** | **0.3** | **-0.3** | **-2.6** | **-0.9** |
| ***by sector*** | | | | | | | | | | | | | | | |
| Industry | 332412 | 330448 | 290978 | 304739 | 302929 | 278925 | 255989 | 238419 | 224364 | 216224 | 215251 | -1.3 | 0.4 | -1.7 | -0.9 |
| - energy intensive industries | 217920 | 216886 | 187894 | 197042 | 195821 | 179152 | 161968 | 148782 | 139680 | 134616 | 131840 | -1.5 | 0.4 | -1.9 | -1.0 |
| - other industrial sectors | 114492 | 113563 | 103085 | 107697 | 107107 | 99773 | 94021 | 89636 | 84684 | 81608 | 83411 | -1.0 | 0.4 | -1.3 | -0.6 |
| Residential | 286291 | 311793 | 311545 | 311967 | 293086 | 251356 | 180244 | 169433 | 161469 | 149291 | 133559 | 0.8 | -0.6 | -4.7 | -1.5 |
| Tertiary | 166083 | 179768 | 187856 | 181915 | 167577 | 146523 | 86398 | 86442 | 87331 | 85438 | 84513 | 1.2 | -1.1 | -6.4 | -0.1 |
| Transport | 342901 | 368665 | 367191 | 371873 | 357063 | 344062 | 336059 | 322170 | 303104 | 287273 | 278578 | 0.7 | -0.3 | -0.6 | -0.9 |
| ***by fuel*** | | | | | | | | | | | | | | | |
| Solids | 61779 | 54424 | 49673 | 48413 | 45741 | 36612 | 28972 | 23511 | 19266 | 14984 | 12769 | -2.2 | -0.8 | -4.5 | -4.0 |
| Oil | 485890 | 502788 | 457366 | 440495 | 404845 | 369931 | 330059 | 278025 | 220184 | 169503 | 129150 | -0.6 | -1.2 | -2.0 | -4.6 |
| Gas | 266925 | 285438 | 269920 | 271612 | 246200 | 212909 | 153899 | 134429 | 110162 | 90003 | 74938 | 0.1 | -0.9 | -4.6 | -3.5 |
| Electricity | 217599 | 239418 | 245271 | 254471 | 250887 | 243332 | 211399 | 217179 | 235509 | 249796 | 258410 | 1.2 | 0.2 | -1.7 | 1.0 |
| Heat (from CHP and District Heating) | 46015 | 52355 | 53515 | 55316 | 54725 | 52089 | 42745 | 42851 | 43173 | 42133 | 41944 | 1.5 | 0.2 | -2.4 | -0.1 |
| Renewable energy forms | 49480 | 56250 | 81825 | 100121 | 117994 | 105396 | 90561 | 109905 | 128800 | 148145 | 165222 | 5.2 | 3.7 | -2.6 | 3.1 |
| Other | 0 | 0 | 0 | 65 | 261 | 597 | 1055 | 10564 | 19173 | 23662 | 29468 | 0.0 | 0.0 | 15.0 | 18.1 |
| **RES in Gross Final Energy Consumption [A]** | **88147** | **104692** | **149354** | **194970** | **242986** | **244446** | **239514** | **270796** | **323447** | **366990** | **389609** | **5.4** | **5.0** | **-0.1** | **2.5** |
| **TOTAL GHG emissions (Mt of CO2 eq.)** | **5215.6** | **5321.9** | **4846.8** | **4623.3** | **4238.7** | **3853.8** | **3185.7** | **2711.2** | **2133.0** | **1451.4** | **1123.8** | **-0.7** | **-1.3** | **-2.8** | **-5.1** |
| of which ETS sectors (2013 scope) GHG emissions | | 2513.8 | 2180.0 | 2089.0 | 1876.7 | 1731.6 | 1367.8 | 1256.2 | 986.8 | 522.7 | 339.2 | | -1.5 | -3.1 | -6.7 |
| of which non ETS sectors GHG emissions | | 2808.1 | 2666.7 | 2534.3 | 2362.0 | 2122.2 | 1817.9 | 1455.0 | 1146.2 | 928.7 | 784.6 | | -1.2 | -2.6 | -4.1 |
| **$CO_2$ Emissions (energy related)** | **3985.8** | **4138.3** | **3779.7** | **3590.4** | **3207.3** | **2857.0** | **2230.9** | **1938.4** | **1516.5** | **1002.0** | **727.4** | **-0.5** | **-1.6** | **-3.6** | **-5.4** |
| Power generation/District heating | 1404.5 | 1483.1 | 1341.6 | 1200.6 | 1013.0 | 908.7 | 593.9 | 543.4 | 407.5 | 136.4 | 41.3 | -0.5 | -2.8 | -5.2 | -12.5 |
| Energy Branch | 170.1 | 174.2 | 159.8 | 149.7 | 138.5 | 118.7 | 103.9 | 91.5 | 75.6 | 61.8 | 52.3 | -0.6 | -1.4 | -2.8 | -3.4 |
| Industry | 693.6 | 640.7 | 520.3 | 538.6 | 503.7 | 447.5 | 385.1 | 325.8 | 246.9 | 193.8 | 165.6 | -2.8 | -0.3 | -2.6 | -4.1 |
| Residential | 461.0 | 491.2 | 457.9 | 430.9 | 384.1 | 300.2 | 182.2 | 146.4 | 112.7 | 79.0 | 47.5 | -0.1 | -1.7 | -7.2 | -6.5 |
| Tertiary | 255.7 | 266.4 | 249.2 | 220.7 | 189.7 | 149.5 | 71.9 | 62.0 | 53.9 | 43.2 | 32.8 | -0.3 | -2.7 | -9.2 | -3.9 |
| Transport | 1001.0 | 1082.7 | 1050.9 | 1049.9 | 978.3 | 932.3 | 893.9 | 769.2 | 619.9 | 487.8 | 387.9 | 0.5 | -0.7 | -0.9 | -4.1 |
| **$CO_2$ Emissions (non energy related)** | **262.3** | **280.3** | **236.1** | **257.0** | **273.9** | **276.8** | **280.4** | **281.7** | **217.2** | **87.0** | **45.2** | **-1.0** | **1.5** | **0.2** | **-8.7** |
| **Non-CO2 GHG emissions** | **967.4** | **903.3** | **830.9** | **775.9** | **757.5** | **720.0** | **674.4** | **491.1** | **399.3** | **362.4** | **351.2** | **-1.5** | **-0.9** | **-1.2** | **-3.2** |
| **TOTAL GHG emissions Index (1990=100)** | **91.8** | **93.6** | **85.3** | **81.3** | **74.6** | **67.8** | **56.0** | **47.7** | **37.5** | **25.5** | **19.8** | | | | |

*Source: PRIMES*

| SUMMARY ENERGY BALANCE AND INDICATORS (B) | | | | | | | | | | | EU28: EE40DEC_d | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | '00-'10 | '10-'20 | '20-'30 | '30-'50 |
| | | | | | | | | | | | | Annual % Change | | | |
| **Main Energy System Indicators** | | | | | | | | | | | | | | | |
| Population (Million) | 485.587 | 493.791 | 503.626 | 510.817 | 516.986 | 521.721 | 524.921 | 527.075 | 528.203 | 528.090 | 526.472 | 0.4 | 0.3 | 0.2 | 0.0 |
| GDP (in 000 M€10) | 10705.8 | 11766.2 | 12301.9 | 13210.2 | 14246.4 | 15448.3 | 16667.7 | 17866.6 | 19150.8 | 20517.0 | 21944.1 | 1.4 | 1.5 | 1.6 | 1.4 |
| Gross Inl. Cons./GDP (toe/M€10) | 161.8 | 155.8 | 143.7 | 132.2 | 115.1 | 97.0 | 74.6 | 66.9 | 60.4 | 55.5 | 51.4 | -1.2 | -2.2 | -4.2 | -1.8 |
| Carbon intensity (t of $CO_2$/toe of GIC) | 2.30 | 2.26 | 2.14 | 2.06 | 1.96 | 1.91 | 1.79 | 1.62 | 1.31 | 0.88 | 0.64 | -0.7 | -0.9 | -0.9 | -5.0 |
| Import Dependency % | 46.7 | 52.5 | 52.7 | 53.8 | 52.9 | 53.6 | 54.4 | 52.1 | 47.0 | 42.8 | 39.1 | | | | |
| Total energy-rel. and other mitigation costs (in 000 M | 1092.1 | 1338.5 | 1569.4 | 1864.4 | 2035.0 | 2164.6 | 2728.5 | 2774.1 | 3011.5 | 3311.1 | 3517.6 | 3.7 | 2.6 | 3.0 | 1.3 |
| as % of GDP | 10.2 | 11.4 | 12.8 | 14.1 | 14.3 | 14.0 | 16.4 | 15.5 | 15.7 | 16.1 | 16.0 | | | | |
| **Energy intensity indicators** | | | | | | | | | | | | | | | |
| Industry (Energy on Value added, index 2000=100) | | | 100.0 | 97.0 | 90.2 | 77.9 | 67.7 | 60.2 | 54.0 | 49.9 | 47.6 | | -1.0 | -2.8 | -1.7 |
| Residential (Energy on Private Income, index 2000=100) | 105.6 | 104.3 | 100.0 | 94.2 | 82.4 | 65.3 | 43.4 | 37.9 | 33.5 | 28.7 | 23.8 | -0.5 | -1.9 | -6.2 | -3.0 |
| Tertiary (Energy on Value added, index 2000=100) | 0.0 | 0.0 | 100.0 | 90.0 | 76.6 | 61.4 | 33.4 | 30.9 | 29.0 | 26.3 | 24.2 | 0.0 | -2.6 | -8.0 | -1.6 |
| Passenger transport (toe/Mpkm) | 40.0 | 39.2 | 37.8 | 35.9 | 32.0 | 28.5 | 25.7 | 23.3 | 20.7 | 18.7 | 17.5 | -0.6 | -1.6 | -2.2 | -1.9 |
| Freight transport (toe/Mtkm) | 47.1 | 47.5 | 48.4 | 46.9 | 43.8 | 40.9 | 39.0 | 37.3 | 35.3 | 33.8 | 32.4 | 0.3 | -1.0 | -1.1 | -0.9 |
| **Carbon Intensity indicators** | | | | | | | | | | | | | | | |
| Electricity and Steam production (t of $CO_2$/MWh) | 0.39 | 0.37 | 0.33 | 0.29 | 0.25 | 0.23 | 0.17 | 0.15 | 0.10 | 0.03 | 0.01 | -1.6 | -2.9 | -3.4 | -13.7 |
| Final energy demand (t of $CO_2$/toe) | 2.14 | 2.08 | 1.97 | 1.91 | 1.83 | 1.79 | 1.79 | 1.60 | 1.33 | 1.09 | 0.89 | -0.8 | -0.7 | -0.3 | -3.4 |
| Industry | 2.09 | 1.94 | 1.79 | 1.77 | 1.66 | 1.60 | 1.50 | 1.37 | 1.10 | 0.90 | 0.77 | -1.5 | -0.7 | -1.0 | -3.3 |
| Residential | 1.61 | 1.58 | 1.47 | 1.38 | 1.31 | 1.19 | 1.01 | 0.86 | 0.70 | 0.53 | 0.36 | -0.9 | -1.1 | -2.6 | -5.1 |
| Tertiary | 1.54 | 1.48 | 1.33 | 1.21 | 1.13 | 1.02 | 0.83 | 0.72 | 0.62 | 0.51 | 0.39 | -1.5 | -1.6 | -3.0 | -3.7 |
| Transport | 2.92 | 2.94 | 2.86 | 2.82 | 2.74 | 2.71 | 2.66 | 2.39 | 2.05 | 1.70 | 1.39 | -0.2 | -0.4 | -0.3 | -3.2 |
| **Indicators for renewables** | | | | | | | | | | | | | | | |
| Share of RES in Gross Final Energy Consumption (( | 7.5 | 8.4 | 12.4 | 16.2 | 21.1 | 23.3 | 27.4 | 32.6 | 40.5 | 48.0 | 52.4 | | | | |
| RES in transport (%) | 0.6 | 1.2 | 4.7 | 6.5 | 10.3 | 11.7 | 14.4 | 26.3 | 42.3 | 57.5 | 68.9 | | | | |
| **Gross Electricity generation by source (in $GWh_e$** | **3007267** | **3287285** | **3328110** | **3415599** | **3363144** | **3255927** | **2804308** | **3004366** | **3423242** | **3703855** | **3968984** | **1.0** | **0.1** | **-1.8** | **1.8** |
| Nuclear energy | 945027 | 997733 | 916685 | 887185 | 735874 | 673556 | 536430 | 570593 | 608066 | 658356 | 759401 | -0.3 | -2.2 | -3.1 | 1.8 |
| Solids | 933660 | 974939 | 830048 | 802733 | 676404 | 666387 | 433376 | 368393 | 312489 | 244337 | 355684 | -1.2 | -2.0 | -4.4 | -1.0 |
| Oil (including refinery gas) | 181203 | 141358 | 86851 | 45969 | 26009 | 19984 | 14419 | 14214 | 11321 | 8686 | 5273 | -7.1 | -11.4 | -5.7 | -4.9 |
| Gas (including derived gases) | 514392 | 699743 | 795653 | 752003 | 685820 | 487963 | 290207 | 364085 | 405726 | 463517 | 434346 | 4.5 | -1.5 | -8.2 | 2.0 |
| Biomass-waste | 46848 | 83787 | 145901 | 190884 | 217533 | 234409 | 232058 | 271052 | 349523 | 422133 | 424394 | 12.0 | 4.1 | 0.6 | 3.1 |
| Hydro (pumping excluded) | 358408 | 311883 | 374576 | 368453 | 374186 | 383210 | 389910 | 398682 | 416298 | 421554 | 429275 | 0.4 | 0.0 | 0.4 | 0.5 |
| Wind | 22253 | 70453 | 149202 | 263516 | 491540 | 608172 | 705437 | 764556 | 947168 | 1046811 | 1093895 | 21.0 | 12.7 | 3.7 | 2.2 |
| Solar | 118 | 1459 | 22363 | 96144 | 143662 | 166878 | 186689 | 227932 | 307285 | 356600 | 373788 | 68.9 | 20.4 | 2.7 | 3.5 |
| Geothermal and other renewables | 5358 | 5930 | 6831 | 8712 | 12116 | 15368 | 15783 | 24859 | 39611 | 48636 | 52932 | 2.5 | 5.9 | 2.7 | 6.2 |
| Other fuels (hydrogen, methanol) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25755 | 33225 | 39996 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Net Generation Capacity in $MW_e$** | **650058** | **711660** | **838114** | **930117** | **1017665** | **1025340** | **1040514** | **1041376** | **1159956** | **1208177** | **1231823** | **2.6** | **2.0** | **0.2** | **0.8** |
| Nuclear energy | 136924 | 134494 | 131323 | 123150 | 111162 | 91595 | 85077 | 81388 | 81611 | 87645 | 100457 | -0.4 | -1.7 | -2.6 | 0.8 |
| Renewable energy | 114281 | 147780 | 226757 | 318900 | 439349 | 498334 | 548216 | 592728 | 708714 | 776055 | 806035 | 7.1 | 6.8 | 2.2 | 1.9 |
| Hydro (pumping excluded) | 101207 | 105529 | 112159 | 118306 | 120598 | 122346 | 124018 | 126767 | 131195 | 133426 | 136486 | 1.0 | 0.7 | 0.3 | 0.5 |
| Wind | 12893 | 40510 | 84512 | 123698 | 206259 | 246614 | 283136 | 303191 | 367918 | 402833 | 418949 | 20.7 | 9.3 | 3.2 | 2.0 |
| Solar | 180 | 1740 | 29846 | 76309 | 110837 | 126407 | 137873 | 158087 | 204541 | 233861 | 244110 | 66.7 | 14.0 | 2.2 | 2.9 |
| Other renewables (tidal etc.) | 0 | 0 | 240 | 586 | 1655 | 2967 | 3188 | 4683 | 5061 | 5936 | 6491 | 0.0 | 21.3 | 6.8 | 3.6 |
| Thermal power | 398853 | 429386 | 480034 | 488068 | 467155 | 435411 | 407222 | 367261 | 369631 | 344477 | 325331 | 1.9 | -0.3 | -1.4 | -1.1 |
| of which cogeneration units | 92439 | 98998 | 101203 | 102224 | 110690 | 106163 | 101682 | 99932 | 110710 | 115158 | 115917 | 0.9 | 0.9 | -0.8 | 0.7 |
| of which CCS units | 0 | 0 | 0 | 0 | 904 | 904 | 904 | 904 | 11046 | 84221 | 127005 | 0.0 | 0.0 | 0.0 | 28.0 |
| Solids fired | 186470 | 180630 | 175756 | 163212 | 141085 | 120710 | 101239 | 83482 | 80448 | 76328 | 77196 | -0.6 | -2.2 | -3.3 | -1.3 |
| Gas fired | 129190 | 169054 | 224922 | 253066 | 257793 | 250302 | 240038 | 216231 | 209465 | 183114 | 157776 | 5.7 | 1.4 | -0.7 | -2.1 |
| Oil fired | 67499 | 59434 | 54039 | 42252 | 32647 | 25926 | 21875 | 17342 | 14391 | 10933 | 8611 | -2.2 | -4.9 | -3.9 | -4.6 |
| Biomass-waste fired | 15128 | 19615 | 24590 | 28745 | 34727 | 37564 | 43154 | 48690 | 62243 | 70237 | 77547 | 5.0 | 3.5 | 2.2 | 3.0 |
| Hydrogen plants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geothermal heat | 567 | 652 | 726 | 794 | 903 | 910 | 915 | 1515 | 3084 | 3864 | 4199 | 2.5 | 2.2 | 0.1 | 7.9 |
| Avg. Load factor of net power capacity (%) | 50.0 | 50.0 | 43.1 | 40.0 | 36.2 | 34.8 | 29.7 | 31.8 | 32.6 | 33.7 | 35.1 | | | | |
| Efficiency of gross thermal power generation (%) | 37.5 | 38.4 | 38.4 | 40.4 | 40.5 | 39.0 | 37.7 | 39.0 | 39.4 | 37.6 | 38.4 | | | | |
| % of gross electricity from CHP | 11.5 | 11.8 | 12.6 | 14.3 | 15.6 | 15.5 | 16.2 | 16.2 | 17.4 | 16.6 | 15.3 | | | | |
| % of electricity from CCS | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.3 | 1.3 | 4.6 | 10.2 | | | | |
| Carbon free gross electricity generation (%) | 45.8 | 44.8 | 48.5 | 53.1 | 58.7 | 63.9 | 73.7 | 75.1 | 78.5 | 80.5 | 79.8 | | | | |
| - nuclear | 31.4 | 30.4 | 27.5 | 26.0 | 21.9 | 20.7 | 19.1 | 19.0 | 17.9 | 17.9 | 19.3 | | | | |
| - renewable energy forms | 14.4 | 14.4 | 21.0 | 27.2 | 36.8 | 43.2 | 54.6 | 56.2 | 60.6 | 62.5 | 60.4 | | | | |
| **Transport sector** | | | | | | | | | | | | | | | |
| **Passenger transport activity (Gpkm)** | **5894.2** | **6251.6** | **6466.4** | **6757.2** | **7050.3** | **7454.4** | **7853.0** | **8116.4** | **8331.3** | **8502.4** | **8734.5** | **0.9** | **0.9** | **1.1** | **0.5** |
| Public road transport | 519.6 | 527.2 | 512.8 | 531.3 | 549.8 | 575.0 | 603.0 | 623.9 | 653.4 | 671.9 | 691.1 | -0.1 | 0.7 | 0.9 | 0.7 |
| Private cars and motorcycles | 4425.4 | 4694.5 | 4893.4 | 5054.2 | 5197.7 | 5411.0 | 5587.4 | 5689.2 | 5730.0 | 5775.2 | 5879.3 | 1.0 | 0.6 | 0.7 | 0.3 |
| Rail | 447.8 | 459.7 | 496.4 | 536.5 | 583.1 | 647.4 | 722.9 | 781.4 | 845.4 | 892.1 | 935.7 | 1.0 | 1.6 | 2.2 | 1.3 |
| Aviation | 459.7 | 530.7 | 525.6 | 595.8 | 678.8 | 778.0 | 894.9 | 975.3 | 1054.1 | 1113.0 | 1176.9 | 1.4 | 2.6 | 2.8 | 1.4 |
| Inland navigation | 41.7 | 39.5 | 38.1 | 39.5 | 41.0 | 42.9 | 44.8 | 46.6 | 48.5 | 50.1 | 51.6 | -0.9 | 0.7 | 0.9 | 0.7 |
| **Freight transport activity (Gtkm)** | **2227.6** | **2545.3** | **2493.4** | **2712.5** | **2938.4** | **3147.4** | **3385.7** | **3511.9** | **3635.6** | **3712.7** | **3801.2** | **1.1** | **1.7** | **1.4** | **0.6** |
| Trucks | 1522.0 | 1803.3 | 1764.4 | 1920.8 | 2076.5 | 2197.2 | 2346.6 | 2426.5 | 2501.7 | 2545.0 | 2600.0 | 1.5 | 1.6 | 1.2 | 0.5 |
| Rail | 405.5 | 416.0 | 392.5 | 435.7 | 486.2 | 545.1 | 607.9 | 641.6 | 674.9 | 698.2 | 719.7 | -0.3 | 2.2 | 2.3 | 0.8 |
| Inland navigation | 300.1 | 325.9 | 336.6 | 355.9 | 375.8 | 405.1 | 431.2 | 443.8 | 459.0 | 469.4 | 481.5 | 1.2 | 1.1 | 1.4 | 0.6 |
| **Energy demand in transport (ktoe)** | **340814** | **366066** | **364944** | **369396** | **354546** | **341541** | **333642** | **319752** | **300729** | **284965** | **276309** | **0.7** | **-0.3** | **-0.6** | **-0.9** |
| Public road transport | 7580 | 7663 | 7522 | 7714 | 7770 | 7803 | 7826 | 7395 | 7136 | 6791 | 6513 | -0.1 | 0.3 | 0.1 | -0.9 |
| Private cars and motorcycles | 178015 | 181818 | 182270 | 175746 | 156777 | 141081 | 129027 | 117154 | 100042 | 86814 | 80247 | 0.2 | -1.5 | -1.9 | -2.3 |
| Trucks | 95660 | 111643 | 112043 | 117988 | 118899 | 118275 | 120887 | 119476 | 116805 | 114271 | 111965 | 1.6 | 0.6 | 0.2 | -0.4 |
| Rail | 8093 | 7855 | 7399 | 7951 | 8552 | 9230 | 9895 | 10075 | 10170 | 10074 | 9915 | -0.9 | 1.5 | 1.5 | 0.0 |
| Aviation | 45492 | 50512 | 49820 | 53853 | 56163 | 58408 | 58933 | 58431 | 59201 | 59549 | 60118 | 0.9 | 1.2 | 0.5 | 0.1 |
| Inland navigation | 5973 | 6575 | 5892 | 6143 | 6386 | 6745 | 7074 | 7220 | 7375 | 7467 | 7550 | -0.1 | 0.8 | 1.0 | 0.3 |

*Source: PRIMES*