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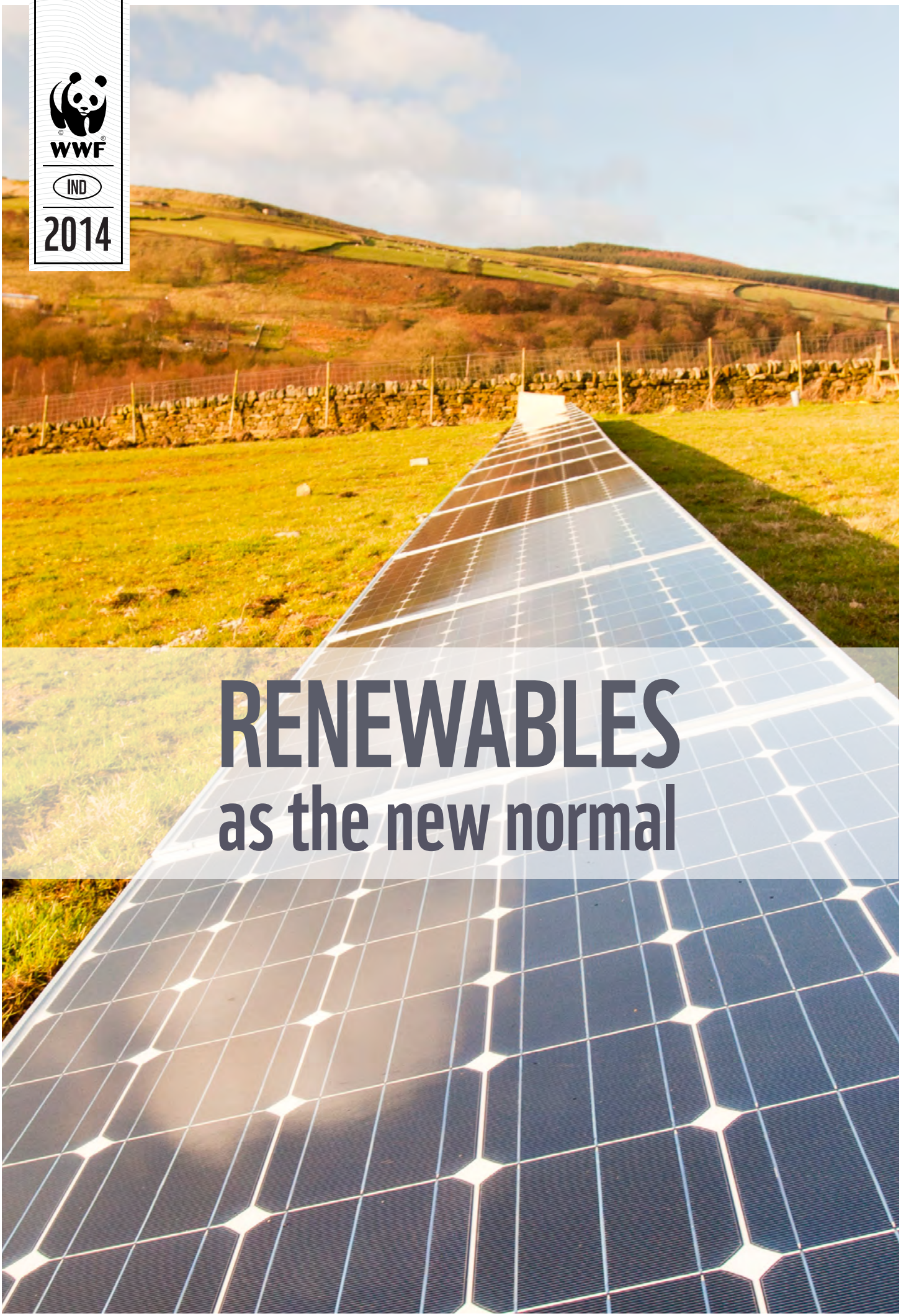

RENEWABLES
as the new normal

RENEWABLES AS THE NEW NORMAL

REPORTS BY WWF-INDIA

Our global vision is to create a safe and sustainable future for people, places and species in an equitable low-carbon society that is resilient to climate change. To work towards the vision, WWF-India promotes approaches to climate resilience that are science-based, scalable and have policy relevance for larger impact. The global vision translates for India to become a country where low carbon growth is mainstreamed into development planning and practices at state and national level, and energy supply from renewable sources is increased. This, in turn, helps reduce pressure on local natural resources and biodiversity, and also contributes to enhancing energy access. WWF-India advocates the need for scaling up renewables in the country and is striving to establish “renewable as the new normal”. We believe that renewable energy is the answer to our future energy demands and can solve one of the biggest problems: climate change. A series of studies by WWF-India emphasize on a renewable-energy-based pathway as the way forward.

The reports are a sequel to “The Energy Report: 100% Renewable Energy by 2050” released by WWF-International in 2011 that researched the technical potential and long term economic viability of a renewable-energy-based future at the global level. These recently launched reports provide a detailed analysis of Renewable Energy (RE) potential in India and contribute towards the vision for a renewable-energy-based world.

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INDIA'S RENEWABLE ENERGY SCENARIO

India has a tremendous scope for establishing renewables as the primary energy source. It is well endowed with diversified forms of renewable energy, such as, solar, wind, hydro and biomass. India is the first country to have set up a ministry of non-conventional energy way back in the 1980s. The country also has a strong institutional set up with a whole dedicated Ministry of New and Renewable Energy (MNRE) to its credit, under whose purview the renewable capacity of the country can get harnessed.

India had envisioned an average growth rate of 8 per cent in the last five years. However, even with a lower growth rate, the demand for energy has been posing serious pressure on its supply sources. The country faces difficult challenges in meeting its energy needs and in providing adequate energy of desired quality in various forms in a sustainable manner and at competitive prices. More than 30 per cent of India's population of 1.21 billion is now living in cities, and India is expected to top the world chart in urban growth for the next 40 years, bringing with it new challenges of providing energy and urban infrastructure for all. Fossil fuels have dominated the country's energy scene for the last many years. 70 per cent of our electricity is being generated by coal power plants, and the existing supply falls 10 per cent short during peak hours. In such a scenario, it is expected that there will be continued pressure on supply sources as well as the fiscal situation in the coming years.

There is now a dire need to re-strategize the energy roadmap of the country in view of high imports of fossil fuels (not only oil, but also coal in recent years) and the related energy security, environmental and financial issues. Some of the RE technology is increasingly becoming cost effective and is now readily available. Renewables are also being increasingly viewed as critical for providing access to energy, particularly in rural areas through decentralized generation.

A range of reports on renewables by WWF-India

The five reports by WWF-India encompass the national, state-level as well as district-level studies on renewable energy-based solutions. A focus on all the three levels provides for a holistic and lucid analysis of the renewable energy scenario in the country.

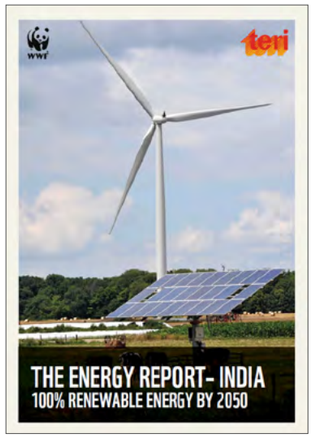
The five reports prepared jointly with various technical partners are:

1. The Energy Report – India : 100% Renewable Energy by 2050
2. The Energy Report – Kerala : 100% Renewable Energy by 2050
3. RE+: Renewables Beyond Electricity
4. Moradabad District Energy Plan
5. Mandla District Energy Plan

SUMMATIVE ANALYSIS: KEY FINDINGS

On the basis of the specific findings of the aforesaid reports, the following conclusions can be drawn:

1. Over 90 per cent of the country's total primary energy supply based on renewable sources can be met by 2050.
2. Aggressive efficiency improvements across the energy demand and supply sides have tremendous potential to reduce overall energy demand by about 59 per cent at the national level and about 60 per cent at the state level. The remaining demand can then be met by RE sources.
3. Multiple renewable sources will be required to make the shift to RE. A mix of different sources of RE would be required depending on the resource availability in the region. Solar, wind and hydro are considered to be the main fuels for electricity generation in the overall energy mix.
4. Biofuels will increasingly have a major role in meeting the increasing energy demand, especially in transport sector, with second-generation and third- generation (algal-based) biofuels playing a crucial role in making the shift.
5. Renewable energy-based scenario reduces the cumulative CO_2 emissions considerably. The emissions, at the country level, in the renewable energy scenario, decrease by four times in 2051 as compared to the current levels.
6. Case studies for RE applications (in heating, cooling, cooking and mechanical energy) have been documented (RE+: Renewables Beyond Electricity) that provide a range of information that provide readily available solutions having tremendous scope for replication across different regions in the country.
7. Apart from creating awareness regarding efficient renewable energy options, efforts are required for promoting research and development in these alternative technologies. Research and development in high potential RE target areas like biofuels and storage technologies need to be speeded up. Also, appropriate measures for grid enhancement, stability augmentation and modern load and grid management are required.
8. Renewable energy requires higher cost investment, which is around 4 per cent of the cumulative GDP during the period 2011-51 at the national level. This includes only technology-level substitutions and does not entail costs that need to be incurred for supporting infrastructure, R&D or improvements in regulatory and institutional set- ups.
9. A higher share of renewable energy would lead to significant benefits in terms of energy security, energy access, health impacts, environment and biodiversity conservation. But achieving such a scenario poses considerable challenges at this point in time and would require several transformational changes. These include not only the timely availability of alternative commercially viable technological solutions across sectors, but also a rapid scaling-up of these options, together with accelerated building-up of supporting infrastructure, appropriate skill-sets, regulatory and institutional frameworks and adequate renewable manufacturing capacities.
10. Apart from technology, political will and a shared vision are the most critical prerequisites for development of 100 per cent RE scenario. Higher levels of global and regional cooperation can play a key role in accelerating the pace and spread of renewable energy development.
11. Transformational technological and policy shifts would need to be effected with a sense of urgency if India has to realize a RE scenario by 2051. Most importantly, actual transformation will have to come about at the individual level with a quintessential change in the very mindsets and thought processes.
12. District Energy Plans, in particular, show a way forward in moving towards enhanced electricity generation as the costs involved are in a range that is at par with the political will. Hence, these plans can be used as models to make the shift to RE viable.



THE ENERGY REPORT – INDIA:

100% RENEWABLE ENERGY BY 2050

"The Energy Report – India: 100% Renewable Energy by 2050" report by WWF-India and TERI, was released on 23 December 2013 at the WWF-India Secretariat.

The report theoretically demonstrates that a renewable-energy-based economy can be achieved. The study examines the possibility of a near 100 per cent Renewable Energy Scenario (REN) for India by the middle of the century against a Reference Energy Scenario (REF) in which the economy is likely to be dependent primarily on fossil fuels – coal, oil and gas. 100% Renewable Energy by 2050 for India is a sequel report to 100% Renewable Energy by 2050 released by WWF International in 2011 that researched the technical potential and long term economic viability of a renewable-energy-based future at the global level.

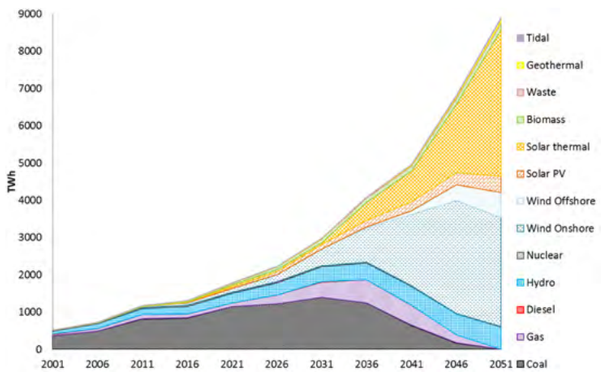
The study suggests that a sustainable, renewable-energy-based economy could theoretically be achieved, where as much as 90 per cent of India's total primary energy supply could technically be based on renewable sources. The remaining 10 per cent would still need to be fuelled by fossil-based sources that are required as feedstock and where a substitution by renewable energy forms is not possible.

In the REF scenario, the economy is likely to remain based primarily on coal, oil and gas. In the REN scenario, solar, wind and hydro are considered to be the main fuels for electricity generation, while second-generation and algal biofuels contribute to meet the demands of the transport sector.

Some of the key findings of the report include:

1. Aggressive efficiency improvements across the energy demand and supply sides bring in large savings – of the order of 59 per cent – by 2051.
2. On the supply side, fossil-based plants and technologies need to be phased out in the REN scenario much before the end of their economic lifetime.
3. Biofuels would need to play a key role by 2051; they would have to account for 330 Mtoe and meet 90 per cent of the transport fuel requirement in order to move towards the REN scenario.
4. The cumulative CO_2 emissions in the REN scenario are about one-third of those in the REF scenario.
5. The REN scenario involves the introduction of technologies, most of which are currently in the R&D phase, by 2031.
6. The REN scenario is clearly desirable from an environmental as well as an energy security perspective.
7. But achieving such a scenario poses considerable challenges at this point in time and would require several transformational changes, in all sectors, to be undertaken with a sense of urgency.

The Energy Report – India is available at www.wwfindia.org/energy



Resource-wise electricity generation in REN scenario

THE ENERGY REPORT – KERALA:

100% RENEWABLE ENERGY BY 2050

Energy Report – Kerala: 100% Renewable Energy by 2050 is a state specific report by WWF-India and World Institute of Sustainable Energy, Pune, launched in Thiruvananthapuram, Kerala. The report provides for a 100 per cent renewable and sustainable energy supply by 2050. The report is an attempt to model the energy requirements (across power, transport, agriculture, industry, domestic and commercial sectors) of Kerala up to 2050, in order to assess the feasibility of meeting 100 per cent of the state's energy demand through renewable sources

The key findings of the report are:

1. Overall, 95 per cent of the energy demand can be met from renewable sources by 2050.
2. 100 per cent electricity requirements for the state can be met with RE.
3. 100 per cent of transport fuel requirements can be met by second and third generation biofuels.
4. Over 70 per cent of the total heating requirements (both for cooking and industrial processes) are met by biogas, wood and surplus biofuels.
5. Aggressive demand side interventions in energy conservation, energy efficiency and carrier substitution have the potential to reduce energy demand by about 60 per cent.
6. There are various challenges to overcome in achieving a 100 per cent renewable scenario.
7. There are operational challenges in utilizing RE technologies, but these challenges can be overcome by future developments in the energy sector (high capacity corridors, generation forecasting, grid-scale storage, etc).

The Energy Report - Kerala is available at www.wwfindia.org/wwf_publications/?10341/The-Energy-Report--Kerala


Business Line

'Kerala must plan switchover to 100% renewable energy'

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Emissions affect forests and fragile marine ecosystems, says expert

THIRUVANANTHAPURAM, DEC. 30:
Kerala must plan for a transition to 100 per cent renewable energy for sustainable development and energy security.

THE NEW INDIAN EXPRESS

Wednesday, January 01, 2014 05:01 PM

Renewable Energy Prospects Bright: Report

Kerala can meet over 95 per cent of its energy demand using renewable energy sources by the year 2050, according to a report released the other day.

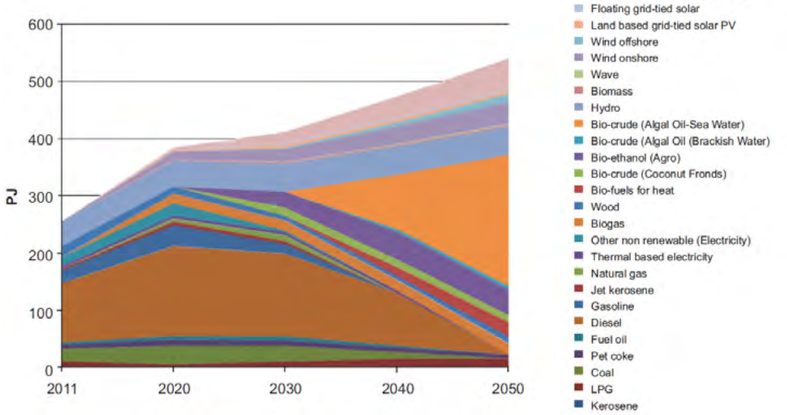
Kerala can meet over 95 per cent of its energy demand using renewable energy sources by the year 2050, according to a report released the other day. The Energy Report - Kerala, prepared by WWF-India and the World Institute of Sustainable Energy (WISE) Pune, is a state-specific report that provides a vision for a 100-per cent renewable and sustainable energy supply in another three decades.

THE HINDU

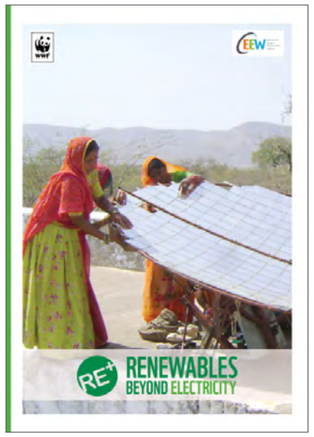
Today's Paper » NATIONAL » KERALA

Study calls for State's early transition to renewable fuels

Snapshots of the coverage of Energy Report - Kerala



Supply sources for final energy scenario



RE+: RENEWABLES BEYOND ELECTRICITY

"RE+: Renewables Beyond Electricity" report by WWF-India and Council on Energy, Environment and Water (CEEW), was released on 19 December 2013 in New Delhi. Dr Satish Balram Agnihotri, Honorable Secretary, Ministry of New and Renewable Energy (MNRE) along with Mr Suresh Prabhu, Former Union Minister and Chairperson, CEEW addressed the gathering and launched the report. Other panelists included Mr Ravi Singh, Secretary General & CEO, WWF India and Dr Arunabha Ghosh, CEO, CEEW.

The report is a compendium of innovative renewable energy applications (beyond electricity generation) which can be utilized for diverse societal needs. The 14 renewable energy applications documented in this report cover four renewable energy sources — biomass, wind, geothermal and solar energy. The report documents a wide variety of renewable energy applications and technologies from different parts of the country which can be used for heating, cooling, cooking and mechanical energy.

The key features of the report are:

1. The report documents a wide variety of renewable energy applications and technologies, such as improved biomass cook stoves, biogas digesters, solar space heating and cooling system, solar photovoltaic water pump, solar pasteurizer, solar desalinator, wind water pumps and similar technologies from different parts of the country, which have been successfully installed.
2. 14 different renewable energy applications have been analyzed with respect to different parameters such as technology, cost, market potential and policy scenario.
3. The report dwells on the issue of various bottlenecks/ gaps that need to be overcome for replication of each of these applications on a larger scale.
4. Case studies of actual applications on ground are also documented for a better understanding of renewable energy applications.

The report launch received fairly good coverage in reputed national dailies and news portals.

RE+: Renewables Beyond Electricity report is available at:

www.wwfindia.org/re

Publication: State Times **Date:** 20/12/2013

Edition : New Delhi **Page:** 5

'Renewable energy beyond electricity'

STATE TIMES NEWS

NEW DELHI: An awareness of the potential of renewables beyond power-generation, particularly for heating, cooling, cooking and mechanical applications would greatly enhance their acceptance amongst the public, according to a report released today by WWF-India and Council on Energy, Environment and Water (CEEW) at WWF-India, New Delhi.

Renewable Energy beyond electricity is a compendium of innovative renewable energy applications beyond electricity generation. The fourteen renewable energy applications documented in this report cover four different renewable energy sources - biomass, wind, grotthermal, and solar - in a variety of renewable energy applications like improved biomass cook stoves, solar space heating and cooling systems, solar photovoltaic water pumps, solar pasteurizers, solar desalinators and wind water pumps, among others in operation across the country.

The compendium analyses each application with respect to various parameters such as technology, cost, market potential and the current policy scenario. An example of this is the reverse osmosis (RO) plant at the Kotri village in Rajasthan that produces 600 liters of water per hour, for six hours each day and meets the drinking water needs of more than 1,000 men, women and children.

In the spirit of moving towards renewable energy and to illustrate the ease and importance of adopting such technologies, the launch event was preceded by a solar-cooked lunch for the guests.

CEO of CEEW, Dr Arunabha Ghosh said, "The potential of renewable energy to transform our lives and ways of living is underestimated and under-appreciated. By examining its applications beyond simply switching on lights and fans, we can begin to broaden our technological horizons, deepen the foundations of business models offering a range of additional energy services, strengthen the financial ecosystem to support decentralised energy, and most importantly, fuel our imaginations to develop solutions to everyday challenges. RE+ should be a new mantra for empowering people to take control of their energy destinies."

Speaking about the potential of renewable energy beyond electricity, Secretary General and CEO, WWF-India, Ravi Singh said, "This compendium advocates multivariate applications of renewable energy. It celebrates and encourages innovations while documenting existing applications with the purpose of replicating them on a larger scale. Applications like these could ensure that renewable energy is accessible for use in even the remotest of areas, benefiting communities and ecosystems. WWF believes that 'Renewable energy as the new normal' would happen only when applications like these are primordial in our daily lives. While current policies and activities focus primarily on power generation through renewables, there is a greater need to explore the potential of applications of renewable energy beyond electricity generation."

Links to some other coverage are listed below:

http://timesofindia.indiatimes.com/home/environment/globalwarming/Green-energy-catching-on/articleshow/27668345.cms

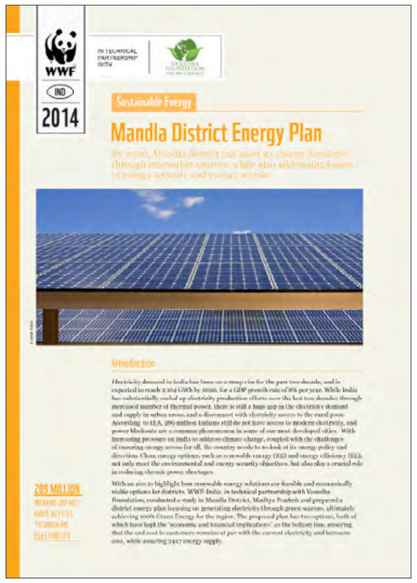
http://www.thehindu.com/todays-paper/tp-national/tp-newdelhi/broadeninghorizons-with-renewable-energy-sources/article5481185.ece

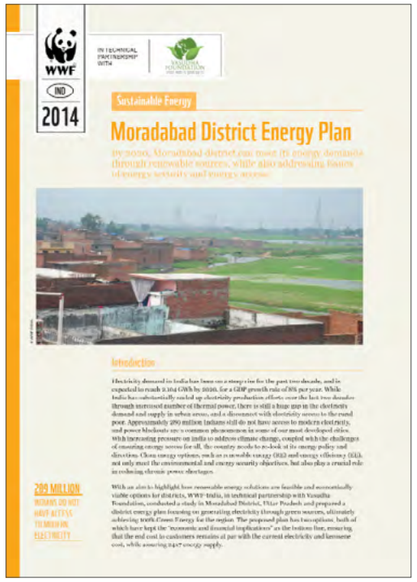
http://www.dailypioneer.com/vivacity/green-goals.html

http://www.energynext.in/ceew-wwf-release-report-re-renewables-beyond-electricity/

http://www.statetimes.in/news/renewable-energy-beyond-electricity/

http://news.lotsbuzz.com/renewable-energy-beyond-electricity/





DISTRICT ENERGY PLANS:

MANDLA AND MORADABAD

With an aim to highlight how renewable energy solutions are feasible and economically viable options for districts, WWF-India along with Vasudha Foundation, conducted a study in Mandla District, Madhya Pradesh and Moradabad District, Uttar Pradesh. Both "Mandla District Energy Plan and Moradabad District Energy Plan" focus on generating electricity through green sources, ultimately achieving 100 per cent renewable energy for the regions. The proposed plans have two options, both of which have kept the "economic and financial implications" as the bottom line, ensuring that the end cost to customers remain at par with the current electricity and kerosene cost, while assessing 24x7 energy supply.

Key findings of the Energy Plans include:

1. By 2020, Mandla and Moradabad can meet their energy demands through renewable sources, while also addressing issues of energy security and energy access.
2. Biomass dominant energy plan for Mandla looks at generating 55 MW of electricity through biomass by the year 2020 while solar contributes 5 MW only. On the other hand, solar power dominant energy plan looks at generating 33 MW of electricity through solar power by the year 2020, and keeps the use of bio-mass at 25 MW.
3. The proposed plans for Mandla, entirely dependent on renewable energy, will reduce the carbon emissions of the electricity sector from 15,504 tonnes to zero.
4. Solar Energy Plan to generate surplus electricity for Moradabad provides 175 MW of Solar Roof Top systems over a period of 10 years through a phased in approach, 200 MW of large solar grid based systems and 20 MW of bio-mass and cogeneration projects. Another scenario that just meets the energy demand, based on solar energy plan, looks at 125 MW of solar roof top, 160 MW of large grid based systems and 15 MW of biomass and cogeneration projects. The costs for implementing above two scenarios over a period of ten years are Rs 75,420 million and Rs 57,200 million, respectively.

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Solar water heaters in high altitude villages of Sikkim

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The micro solar plant set up by WWF-India and CAT Projects Australia in the Sundarbans delta region

About WWF-India

WWF-India is one of the largest conservation organizations in the country dealing with nature conservation, environment protection and development-related issues. Established as a Charitable Trust in 1969, it has an experience of over four decades in the field. Its mission is to stop the degradation of the planet's natural environment, which it addresses through its work in biodiversity conservation and reduction of humanity's ecological footprint.

WWF-India works across different geographical regions in the country to implement focused conservation strategies on issues like conservation of key wildlife species, protection of habitats, management of rivers, wetlands and their ecosystems, climate change mitigation, enhancing energy access, sustainable livelihood alternatives for local communities, water and carbon footprint reduction in industries, and combating illegal wildlife trade. WWF-India is actively engaged in promoting renewable energy uptake, enabling energy access, demonstrating renewable energy projects in critical landscapes, and overall promoting clean energy solutions. The Climate Change and Energy Programme of WWF-India is working towards climate resilient future for people, places and species that support pathways for sustainable and equitable economic growth.

To know more, log on to: www.wwfindia.org

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Why we are here
To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

www.wwfindia.org

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