Corporate Finance

17 June 2014

Swedish Capital Allocated to Global Energy Investments

Commissioned by
WWF Sweden

pwc

Presentation of purpose of project and contributors to report

To assess:

a) Current capital allocation as well as distribution of financing for energy related systems globally from public and private financial actors in Sweden (i.e. what are we investing in today?).

b) Current standards for investment and financing processes for energy systems globally practiced by public and private financial actors in Sweden (i.e. how are we financing and investing today?).

To identify and analyse:

a) Potential barriers, structural misalignments, (lack of) instruments and financial products, regulatory requirements as well as indications of financial volumes required to financing energy systems in alignment with scientific recommendations for a stabilized climate in order to meet the 2°C target

b) Summarize findings and conclusions

Commissioned by WWF Sweden

Credits to contributors:

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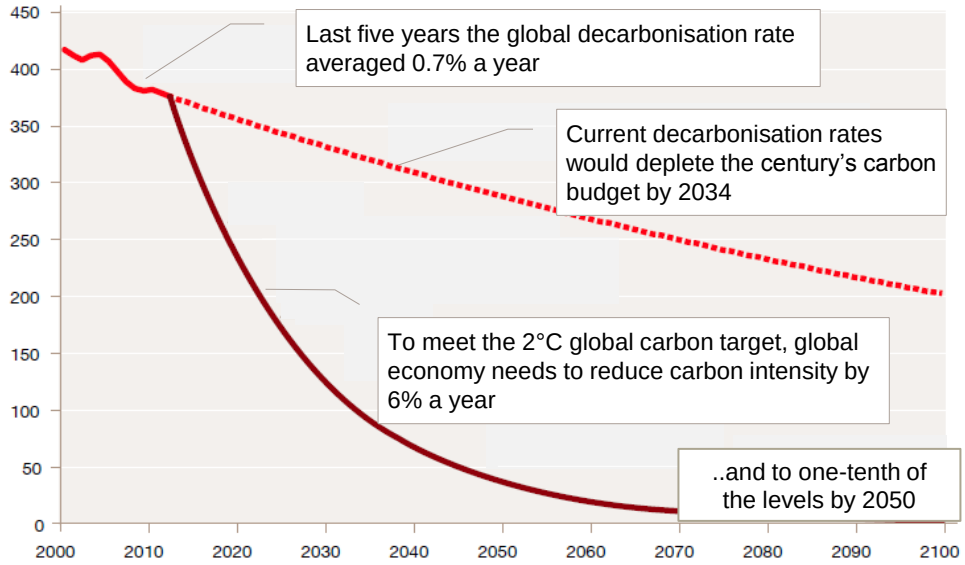
Setting the scene

Introduction

- According to PwC Low carbon economy index 2013, **the global economy would need to decarbonise by 6% per year during the period 2012-2100 to meet the 2°C target** and to stay within the carbon budget.
- The challenge is significant as the fossil fuel reserves held by the top 100 listed coal companies and the top 100 listed oil and gas companies are greater than the carbon budget for 2010-2050**.
- **If policy makers will commit to achieving the 2°C target, it would mean that investors have invested in assets that will become obsolete.** Investors would be exposed to the risk of un-burnable carbon and the reserves would be subject to impairment as the assets become stranded with a negative impact on the value of their investments.
- Although the exact size of investments required is difficult to estimate **significantly more capital needs to be invested in sectors that reduce carbon intensity – total investments required during the period 2010-20 have been estimated to around SEK 33-65trn.**
- The issue of stranded assets in carbon reserves presents challenges for investors globally but also to Swedish fund managers.
- Given this, it is interesting to understand how the Swedish capital is allocated to the energy sector, particularly to the companies with large carbon reserves. It is also key to understand how major investors act and if environmental issues are taken into account when making investment decisions.
- In this report we aim to highlight where and how Swedish capital is invested.

PwC Low carbon economy Index 2013
Carbon intensity (tCO2/USD)



The PwC Low Carbon Economy Index calculates the rate of decarbonisation of the global economy that is needed to limit warming to 2°C. This is based on a carbon budget that would stabilise atmospheric carbon dioxide concentrations at 450 ppm and give a 50% probability of limiting warming to 2°C

**The carbon budget places a restriction on the total amount of greenhouse gases the world can emit during the period 2010-2100. Under a system of carbon budgets, every tonne of greenhouse gases emitted between now and 2100 will count. Based on IPCC 5th Assessment Report*
***The fossil fuel reserves exceed the carbon budget by 180 $GtCO_2$ according to Carbon Tracker Initiative*

Source: PwC, Busting the carbon budget - Low Carbon Economy Index 2013, Carbon Tracker Initiative

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Section 1
Executive Summary

Swedish Invested Capital is estimated to c. SEK 4,000bn, of which c. SEK 370bn is allocated to energy related companies worldwide

Total invested capital

- Total Swedish Invested Capital* consisting of investments within listed and unlisted equity and corporate bonds is estimated to c. SEK 4,000bn at the end of 2012.
- Approximately **60%, corresponding to c. SEK 2,300bn, of the Swedish Invested Capital is estimated to be allocated outside Sweden.** Other large regions invested in is the rest of Europe (c. SEK 950bn) and the US (c. SEK 600bn).
- **Total capital invested in energy related companies is estimated at c. SEK 370bn** – this represents *9%* which is less than the 12% global average.
- The amount of capital allocated to the regions and the region's exposure to the energy sector are the main factors impacting the amount invested in energy related companies in the different regions. **Russia and the US stand out with an estimate of c. 40% of Swedish Invested Capital allocated to energy related companies.**
- Due to the economic composition of the countries, investments in Russia, Canada and China automatically imply higher exposure towards energy related companies.
- More than SEK 200 bn, or 66%, of Swedish Invested Capital in the energy sector is currently allocated to regions with significant carbon emissions.
- Estimated annual CO2 emissions from Swedish invested capital in major exchanges emit approximately **53 MtCO2. Which is roughly equal to Sweden's annual CO2-emissions** (58 MtCO2 in 2012). This is estimated based on the total Swedish Invested Capital and holdings in each of the major stock exchanges and their respective carbon intensities.
- Approximately SEK 65bn of Swedish Invested Capital has been allocated to the top 15 listed companies with the largest carbon reserves – thus **only a minor percentage (1.6%) of total Swedish Invested Capital is locked into the most carbon-intensive companies**.
- Of the SEK 65 bn Swedish mutual funds have invested **c. SEK 21bn in the top 15 listed** companies with the largest carbon reserves.
- As investments in the energy sector only account for 9% of total there should be scope for increasing exposure towards low carbon investments.

* See section 2.1 for definition

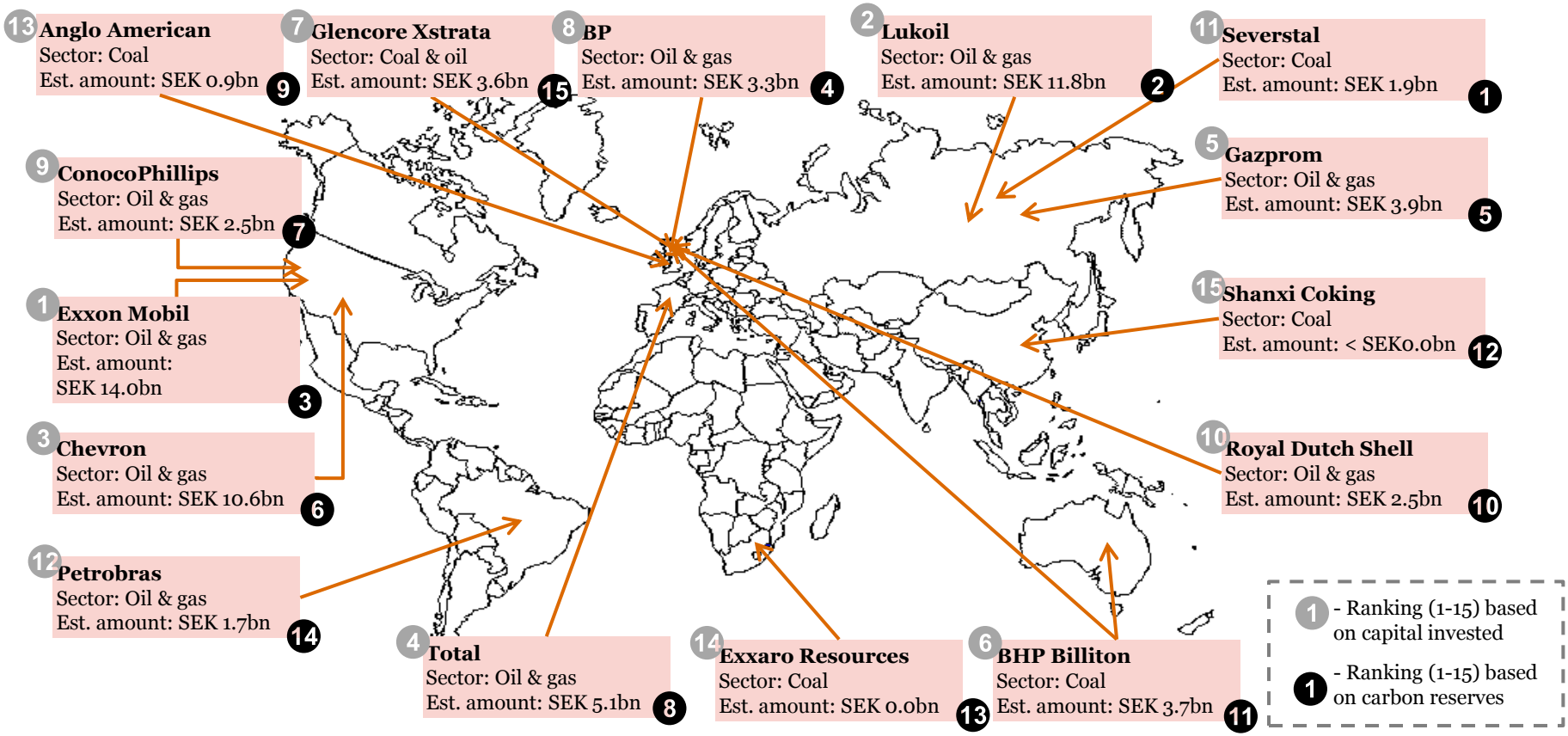
Of the capital invested in the energy sector nearly 17% has been invested in the top-15 companies with the largest carbon reserves

How Swedish capital is allocated today

- The majority of Swedish Invested Capital is allocated to Sweden and other sectors than energy. **Swedish financial institutions have a relatively high exposure towards the domestic market which reduces exposure to energy sector** as Sweden has limited energy related companies.
- Of the capital invested in the **energy sector nearly 17% has been invested in the top-15 companies** with the largest carbon reserves.
- The reason for this is typically that funds are driven by index-linked strategies resulting in **high proportion of capital being allocated to the largest companies on major listed exchanges**.
- Regional diversification strategies also drive capital to be invested in regions with growth potential and which typically have high carbon intensity such as China and Russia.
- There is limited focus among large investor groups (e.g. banks, insurance companies and state-owned pension funds) on allocating capital to sectors which support a sustainable development of the environment.
- Environmental aspects are in general taken into consideration in investment decisions among main investor groups, although with varying impact on the decision.
- Among organisations managing Swedish Invested Capital, there is a higher focus on environmental aspects in investments among asset managers with a strong connection to the government as the state owned pension funds.

Executive Summary

Approximately SEK 65bn has been allocated to the top 15 listed companies with the largest carbon reserves in the world



Note: Estimated investments refers to both equity and bond investments. Carbon reserves are estimated by Carbon Tracker. It is common for large companies to be listed at multiple stock exchanges. Mining companies are included due to coal mining operations, as coal being one of the main fossil fuels. Note that this differs from how "energy related companies" are defined in the report where capital attributable to coal mining in specific among mining companies is included

Executive Summary

Section 2
Recommendations

Main drivers to increase investments in low carbon energy…

Main drivers to increase investments in low carbon energy

- **Global agreement to stay below 2 degrees global warming** to enable a sustainable future rather than risking catastrophic climate change.
- **Break the fossil fuel dependency** to avoid the risk of future supply of a finite resource not being able to cope with increased demand
- **Improved risk return**, low carbon intensity has to prove its more profitable than high carbon intensity within the energy sector. When proven, investments will follow. Any signs of decreased growth and lower profitability among fossil fuel related companies will benefit arguments supporting investments in low carbon energy.
- **Increased regulations supporting low carbon energy** is effective and there are a number of different kinds available. Notably certificate systems, energy-tax, CO2 -tax and Emission Trading Schemes.
- **Avoiding investments in unconventional fossil fuel resources** (e.g. Tar sands, Shale gas, Shale oil) with significantly higher environmental and social impacts compared to conventional fossil fuels
- **Long-term investors** such as managers of pension capital **need to adopt a long-term strategy for their investments** . Climate change is a global risk factor for investors with long-term focus, thus needing to be addressed. E.g. through reallocating capital.
- Investments that are based on the value and returns from fossil sources must adhere to that all carbon in the reserve included in the investment is unlikely to be released. **The pricing for energy from fossil sources will be more about economic instruments than production costs, investors needs to weigh this into their calculations.**
- **Increased visibility of carbon exposure,** policies or schemes that enforce funds to publish carbon exposure will probably benefit a shift towards investments in low carbon energy.
- **Incentives to switching,** mechanisms to lower the switching cost from reallocation of capital or lower the threshold of investment in green energy.

..are today weaker than the uncertainties that are associated with investments in green energy…

Main barriers to increase investments in green energy

- The renewable energy sector is considered as **less attractive from a risk/reward perspective.** Lack of incentives among portfolio managers to reallocate from fossil fuel holdings to investments in the green sector with the same risk/reward profile.
- **Unclear climate policy environment, long term investments need long term politics**. Long term politics are seldom seen on current agendas.
- **Climate change risk is not included in traditional strategic asset allocation**. Consequently, allocation towards more sustainable holdings are not in focus.
- **Mismatch of needed capital and available capital**. As a consequence, a shortage of capital for investments in e.g. green energy, is expected.
- There is **little incentive for fund managers** to re-evaluate their investments and include CO2 intensity and leave the established investments, this "inactive capital" could very well be reallocated to investments with the same return- and risk profile but with focus on CO2 intensity.
- **Capital allocation based on index,** limiting allocation to the green sector**, favouring traditional investments.**
- **Lack of suitable financial instruments**, for e.g. pension capital, hinders allocation to the sector.

...though actionable measures to increase investments in green energy are plenty

PwC recommendation in order to increase investments in green energy

- **Work aggressively to revalue portfolios.** Weigh in carbon intensity as a factor in understanding the risk and return of the investments. Redefining risk in investment. Use NPV of carbon assets to cater for future risks.
- **Control and influence in current holdings** so that investee see and understand the development and evolution of risk in decisions with high carbon intensity and scope of decisions with low carbon intensity.
- **Work with regulations such as tax solutions**. Lower taxes if investment switches from high to low CO_2 intensity.
- **Extend the mandate of investments for funds**, for example it is difficult to find alternatives to investments in traditional large energy companies in a particular energy company with lower CO_2 intensity but it would be quite possible to get similar risk and return profile if allowing investments in green energy bonds.
- Swedish capital asset managers need **clear rules and incentive structures that actively encourages fund managers to seek out alternative securities with similar risk/return as current assets but with lower, or no, carbon intensity**. For example an existing portfolio of corporate bonds issued by companies with large carbon reserves could be rebalanced with green bonds of similar credit rating and duration.
- **Implement reporting requirements on carbon intensity** for institutional investors who want to follow PRI or global compact.
- **Calculate how much "inactive capital" there is in funds** (e.g. AP Funds) and how much this implies in carbon reserves and/or carbon emissions.

Section 3
Detailed Report Sections

Section 3.1
Swedish capital allocation to energy related companies

Overview of the Swedish financial market and financial flows

Main sources of capital for Swedish investments

Corporates, households/private investors and the Swedish state

- Large sources of capital are companies, in terms of financial investments as well as households/private investors in terms of private savings
- Additionally, pension capital from corporates and private individuals are significant sources of capital
- Moreover, the Swedish state is also a significant contributor of capital

Examples of main Swedish financial institutions

Insurance and pension companies

Folksam, skandia, Länsförsäkringar, if..., AMF, KPA PENSION, alecta, spp

State owned pension funds

FÖRSTA AP-FONDEN, Andra AP-fonden, AP3, FJÄRDE AP-FONDEN, Sjätte AP-fonden, AP7

Banks and fund companies

SEB, Nordea, Swedbank, Handelsbanken

Main financial instruments

Equity (Direct investment)

- Listed companies
- Unlisted companies

Debt (Direct investment)

- Government bonds
- Corporate bonds

Mutual funds

- Equity holdings
- Bond holdings

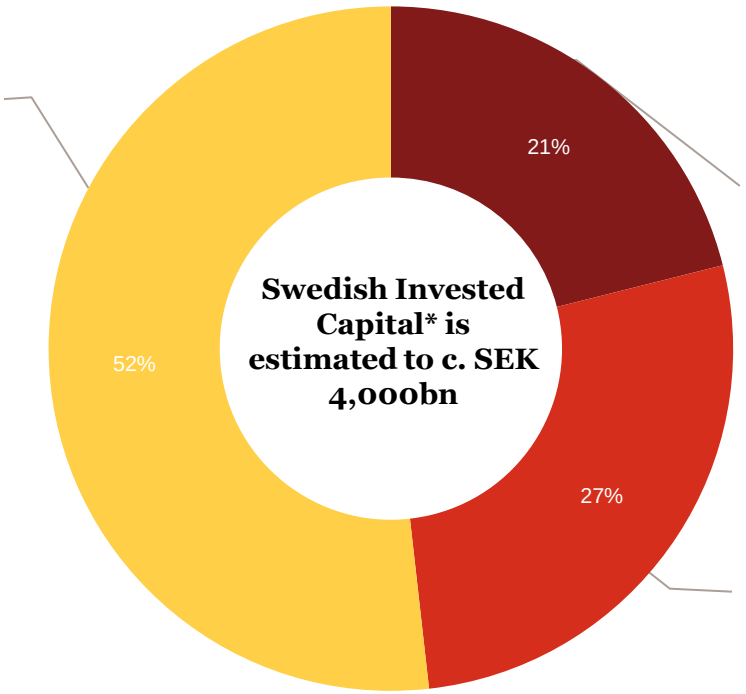
Overview of different types of investments instruments included in analysis of Swedish Invested Capital

Equity (Direct investment)	**Listed companies**	Includes shares listed on the stock exchange and is e.g. characterised by low entry barriers for investing, e.g. little capital is needed. In general it requires significant capital to assume a majority shareholder stake. Shareholders can e.g. have impact on the company via shareholders' general meeting or via a seat on the board of directors.
	Unlisted companies	Unlisted companies are companies not listed on the stock exchange. Investments are in general carried out by the private equity sector. Players range from e.g. small angel investors, being private persons, to large private equity funds, with e.g. institutional capital in their funds. Typically, the aim is to take a significant ownership in a company in order to be able to take on an active ownership role.
Debt (Direct investment)	**Government bonds**	A government bond is a debt security that is issued by a government in order to support government spending. Being a debt instrument, the holder receives interest payments. Government bonds are in general associated with lower risk compared to corporate bonds as they are issued with state-backed guarantees (Additionally, governmental entities at or below the state level can issue bonds, i.e. a municipal bond). Government bonds are not included in analysis of Swedish capital as they are government debt securities.
	Corporate bonds	A corporate bond is a debt security that is issued by a company in order to raise capital, e.g. to finance further expansion. The holder of the bond receives interest payments in return for lending capital.
Mutual funds		A mutual fund is a professionally managed collective investment structure, offered to investors, thus pooling money from different investors. The money is invested into different types of financial instruments. It exists different types of mutual funds, e.g. equity funds (investing in listed companies), fixed income funds (investing in bonds, e.g. government bonds, corporate bonds, or both) and mixed funds (investing in both equity and bonds). The mutual funds can have different focus, e.g. focusing on specific countries or regions, or different sectors. Example of companies offering mutual funds are e.g. banks, fund companies and insurance and pension companies.
Other		Besides main investment instruments listed on the financial market, capital can be invested in; Energy related companies through e.g. public or private research, development and demonstration funding, other public or private debt financing including specific debt solutions such as mezzanine debt (financial instrument with both equity and debt features) and use of grants e.g. reducing project costs for project owner

Swedish Invested Capital in 2012 is estimated to amount to c. SEK 4,000bn, where the majority is pension capital*

Breakdown of Swedish Invested Capital *

- The Swedish insurance sector (including the life insurance sector) is the largest single investor group with an estimated invested capital of c. SEK 2,050bn.
- Approximately 85% of the invested capital is pension capital, and the remaining share is paid in premiums for insurances.



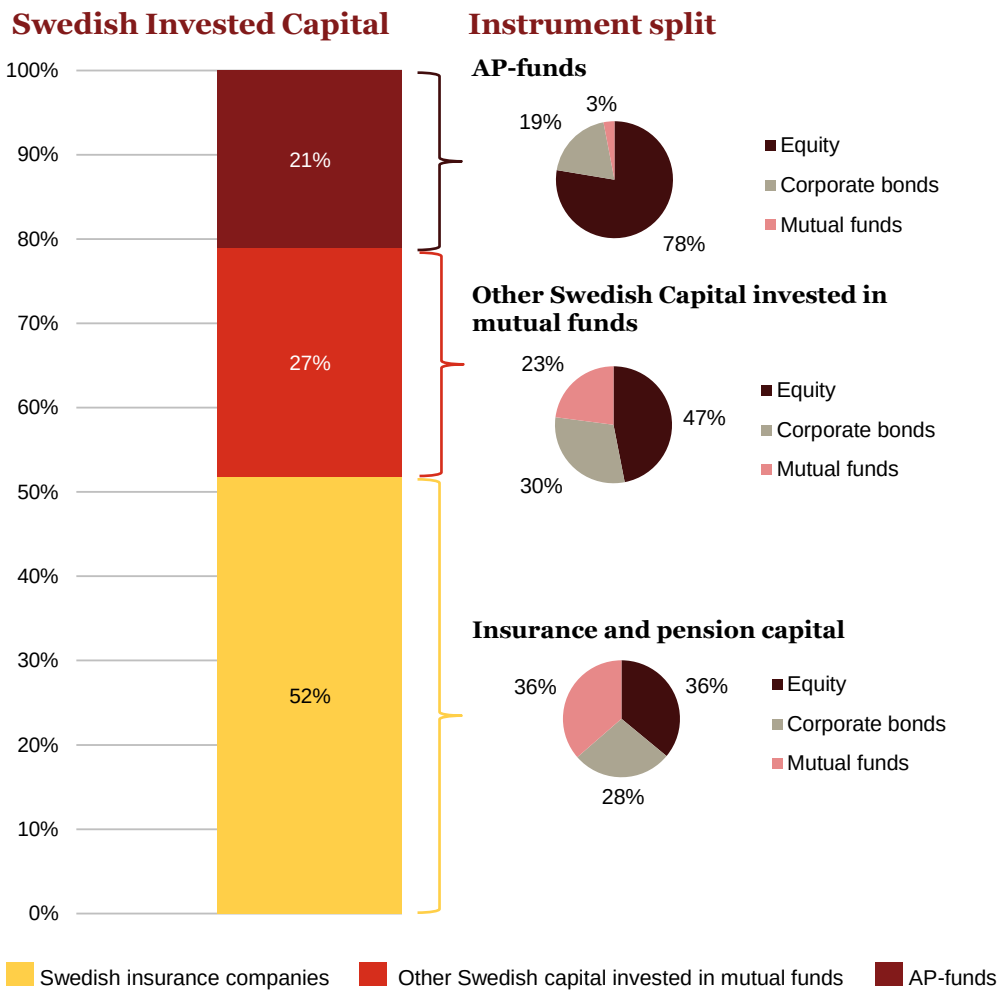
- Capital included in the report from the state-owned pension funds (Första AP-fonden, Andra AP-fonden, Tredje AP-fonden, Fjärde AP-fonden, Sjätte AP-fonden and Sjunde AP-fonden) is estimated to c. SEK 850bn.
- The pension funds are fairly similar in terms of total invested capital, except for Sjätte AP-fonden, which is a significantly smaller fund.

- Other Swedish capital invested in mutual funds is estimated to c. SEK 1,100bn.
- Sources of capital are e.g. corporations', households' direct investments and part of premium pension.

*Data is estimated as of year end 2012. Swedish Invested Capital is, in the report, defined as investments in listed and unlisted companies and corporate bonds. It includes investments via mutual funds from Swedish insurance companies (including life insurance/pension companies such as AMF and SPP) and AP-funds as well as other Swedish investments in mutual funds from e.g. corporates and households. Additionally, direct investments in equity and corporate bonds made by Swedish insurance companies and AP-funds are included. Swedish invested capital does not include investments in government bonds, companies' and private persons' direct investments in listed and unlisted equity or direct loans by the financial sector and corporate bonds (i.e. not carried out via mutual funds). Parts of this capital is managed by financial institutions such as banks

Source: PwC analysis, Fondbolagen, AP-fonderna, Svensk Försäkring

The majority of the Swedish invested capital is invested in equity, but the instruments differ between the capital sources



AP pension funds

- The **AP-funds** are required by law to invest at least 30% in fixed income instruments with low credit and liquidity risk.
- For the purpose of this study we have excluded the investments in government bonds* implying that equity investments represent approximately 78% of invested capital. Corporate bonds amounts to 19% and only 3% of the AP-funds capital is invested in mutual funds.

Mutual funds

- **Other Swedish Capital invested in mutual funds** consists primarily of investments in shares listed on the stock exchange (47%), followed by corporate bonds (30%) and mutual funds (23%).

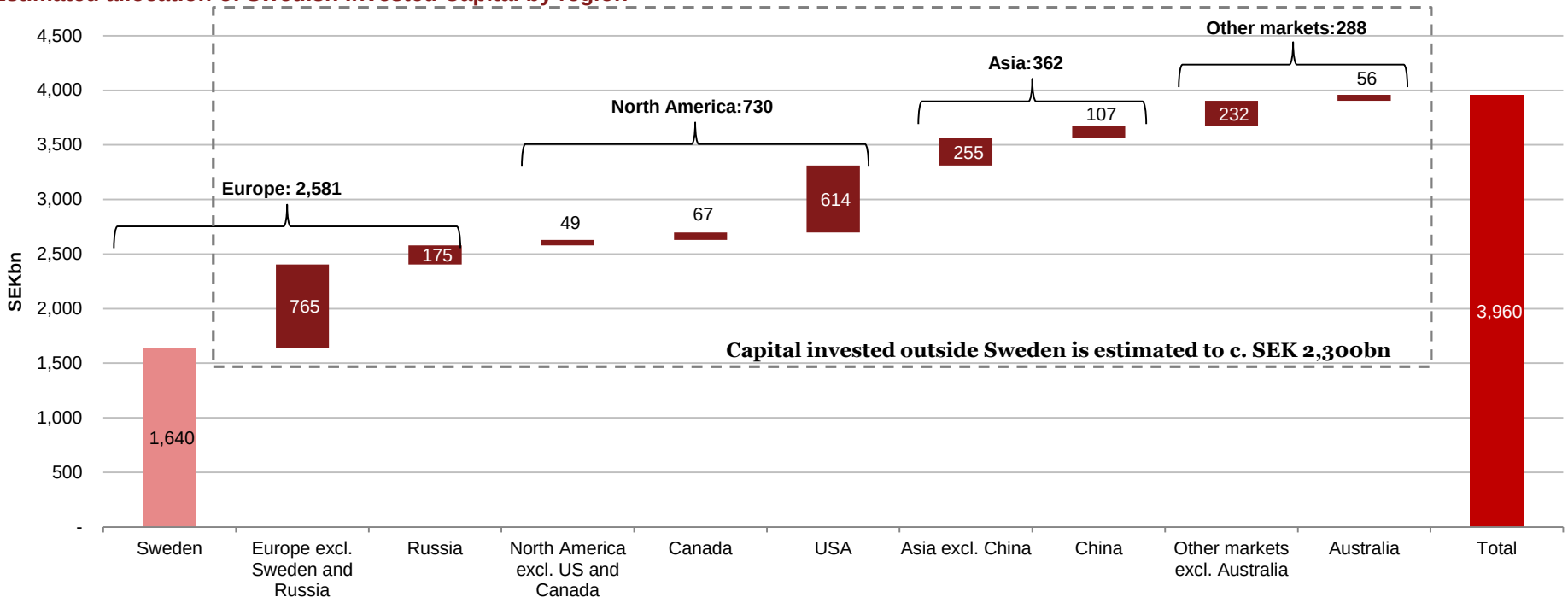
Insurance and pension capital

- Of the main capital sources, **insurance and pension capital** has the highest share invested in mutual funds corresponding to 36%.
- Shares listed on the stock exchange represent 36% of the Swedish insurance and pension capital, while corporate bonds amounts to 28%.

*as these are fixed income securities without impact on corporate or energy sector.

C. 60%, corresponding to c. SEK 2,300bn, of the Swedish Invested Capital is estimated to be invested outside Sweden

Estimated allocation of Swedish Invested Capital by region



- Main investment regions for Swedish Invested Capital are Sweden, accounting for approx. 40% or c. SEK 1,640bn of the capital, rest of Europe representing c. SEK 950bn and the US, where the allocation is estimated to c. SEK 600bn.
- Capital appears to be allocated to nearby regions, being Sweden and Europe, and to US being a large economy.

Note: Capital allocation by region refers to the financial markets, i.e. for example where a listed company is listed on the stock exchange, not where the company's underlying assets are located

Source: PwC analysis, Fondbolagen, AP-fonderna, Svensk Försäkring, Morningstar, IMF

On a global level, the capital share allocated to energy related companies is estimated to c. 12%

Energy related investments

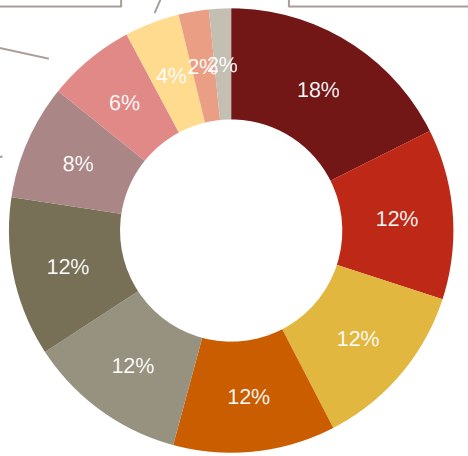
- In 2012, global energy investments amounted to approximately SEK 3 300 bn (USD 506 bn)
- Global allocations to energy related companies account for c. 12%
  - Throughout this report, investments in **"energy related companies"** are defined to include companies producing and delivering electricity, companies delivering gas, oil production, oil and gas refining, oilfield service and equipment and pipeline operators as well as estimated capital attributable to coal mining in specific among mining companies.
- The capital share allocated to energy related companies globally is estimated to be inline with the share allocated to e.g. the sectors:
  - industrials (including e.g. the chemical industry, the aircraft industry, the defence industry as well as production of machines and building material), and
  - healthcare (including healthcare services, medical equipment, medical research, biotechnology as well as the pharmaceutical business).

Estimated sector split for investments globally

Sectors relevant to the energy industry includes coal mining as coal is one of the major fossil fuels representing approximately 2%.

The utility sector covers companies producing and delivering electricity and gas.

The energy sector includes oil production, oil and gas refining, oilfield service and equipment and pipeline operators representing 8%.

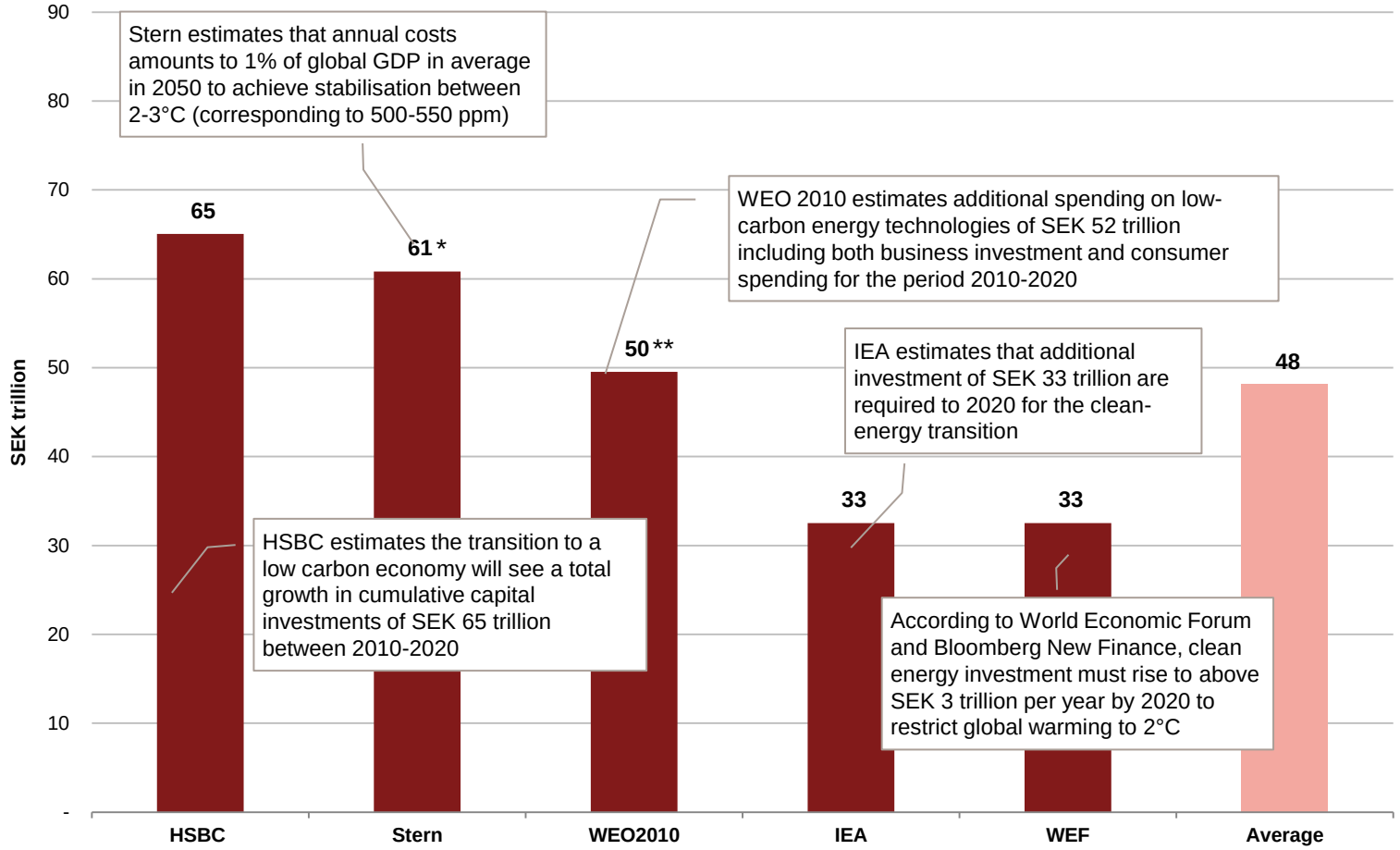


- Financials (18%)
- Consumer goods (cyclical) (12%)
- Technology (12%)
- Health care (12%)
- Consumer goods (non-cyclical) (12%)
- Industrials (12%)
- Energy (8%)
- Natural resources (6%)
- Communications (services) (4%)
- Utilities (2%)
- Real estate (2%)

Source: Morningstar, Industry experts, PwC analysis

To limit global warming to 2°C, additional investments in the range of SEK 3-7 trillion per year up to 2020 is required

Estimated investments required to limit global warning to 2°C target by 2020



Investments needed

Three broad technologies to reduce energy related emissions have been identified:

- Energy efficiency improvements
- Shift towards lower carbon power generation
- Carbon capture and storage

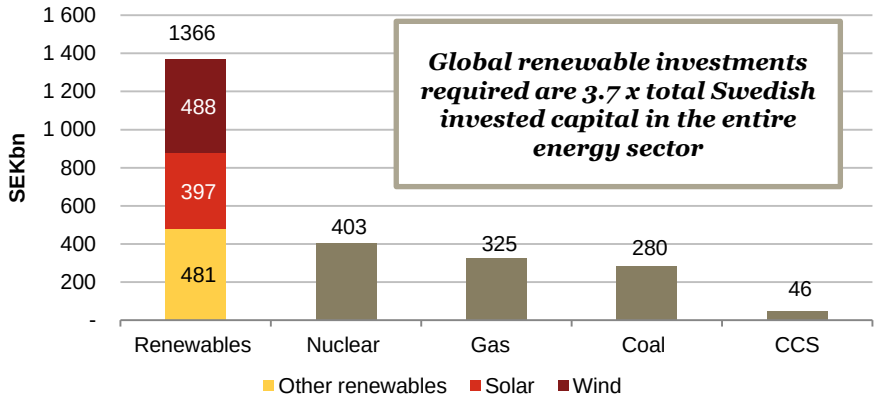
*Investment costs in the Stern scenario is calculated as 1% of global GDP in 2012 during the period 2007-20

**Investment costs in the WEO 2010 scenario are estimated to USD 18 trillion for 2010-2035. We assume that the investment rate is linear when calculating the investment level for 2010-20

Source: HSBC, Sizing the climate economy, Stern review, WEO2010, IEA Tracking Clean Energy Progress 2013, Green Investing 2010, World Bank

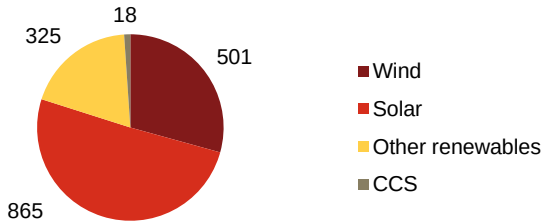
In 2012, global investments in renewable energy exceeded the IEA's estimated annual investments to meet 2°C target - however, fossil fuel investments also exceeded projections and by a wide margin

IEA estimations of annual power generation investment needed in 2010-20 to meet 2°C target



Except the investments in power generation, IEA model projection also assumes sharp increases in energy efficiency

Global investments in renewable energy per energy source and CCS in 2012
(SEK bn)



Low carbon investments

- IEA has estimated that the annual investment level of renewable energy sources must amount to approximately SEK 1.37 trillion between 2010-2020 to meet the 2°C target.
- In 2012, global investments in renewable energy was nearly SEK 1.7 trillion and thus almost 25% higher than projected requirements of the IEA's 2°C scenario.
  - The largest share was invested in solar energy, which followed by wind and other renewables (incl bio fuels, marine etc).
- Investments in Carbon Capture and Storage ('CCS') amounted to SEK 18 billion in 2012. The investment level has remained relatively stable during the last three years (+/- 5%).
  - The global CCS investment level only amounts to 40% of the projected investment need.

Investments in fossil fuel

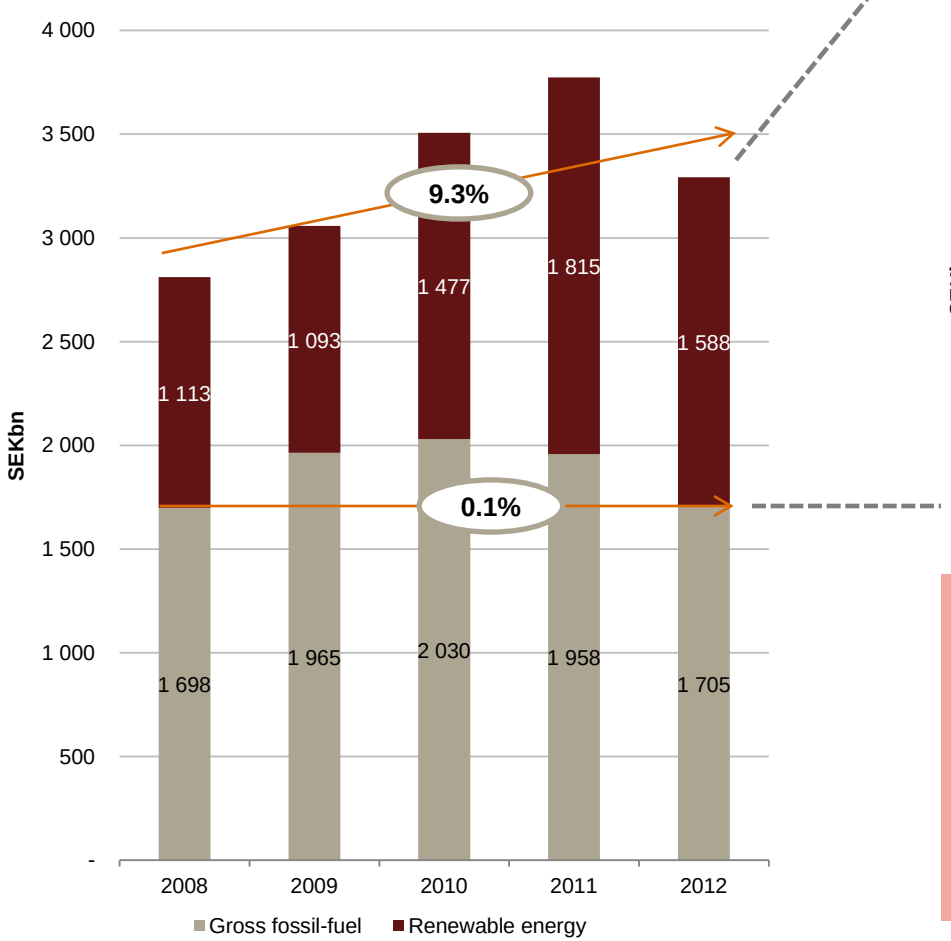
- Global investments in coal and gas corresponded to SEK 963 billion in 2012. The investment level exceeded the IEA model projection by nearly 60%.

If current investment trend continues, the risk of assets becoming stranded increases. Unburnable carbon have a negative impact on the value the fossil fuel investments and could at worst create a carbon bubble

Source: UNEP and Bloomberg New Energy Finance, Global trends in renewable energy investment 2013

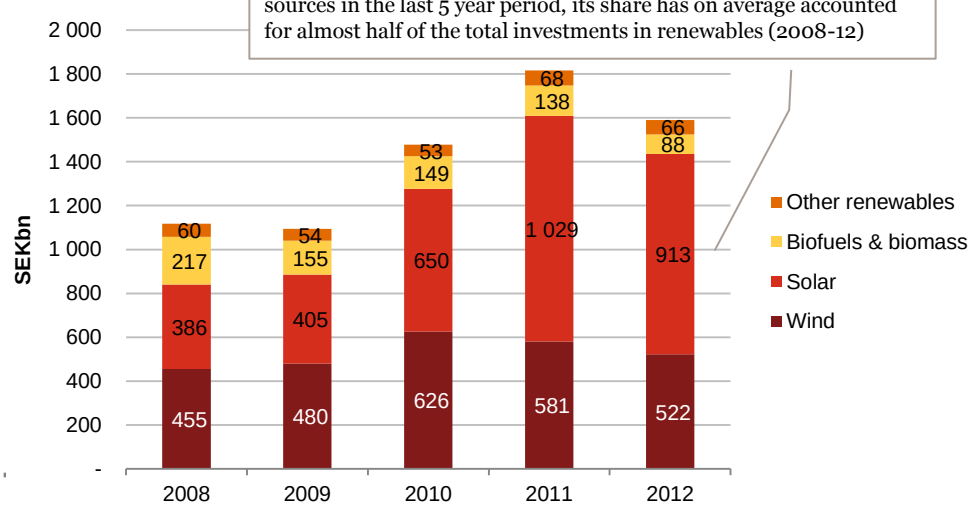
Global investments in fossil fuel energy is relatively stable whereas investments in renewables are increasing rapidly

Renewable energy investments compared to gross fossil-fuel power investments



New renewable energy investments per sector

Investments in solar has increased the most of the renewable energy sources in the last 5 year period, its share has on average accounted for almost half of the total investments in renewables (2008-12)

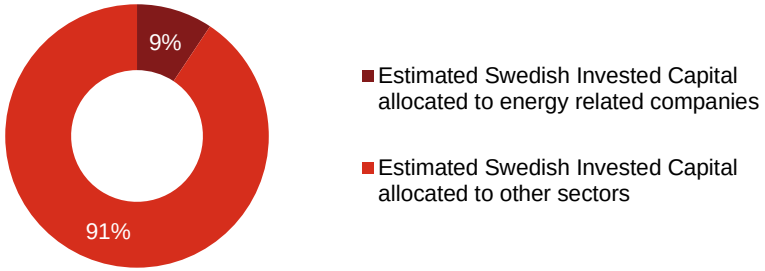


- ***Equity financing is only a minor share of total investments***
- ***Majority of investments in renewables sector is on the balance sheet by companies operating in the energy sector***
- ***Increasing or decreasing shareholding in energy related companies does not materially impact investment rates in renewables***

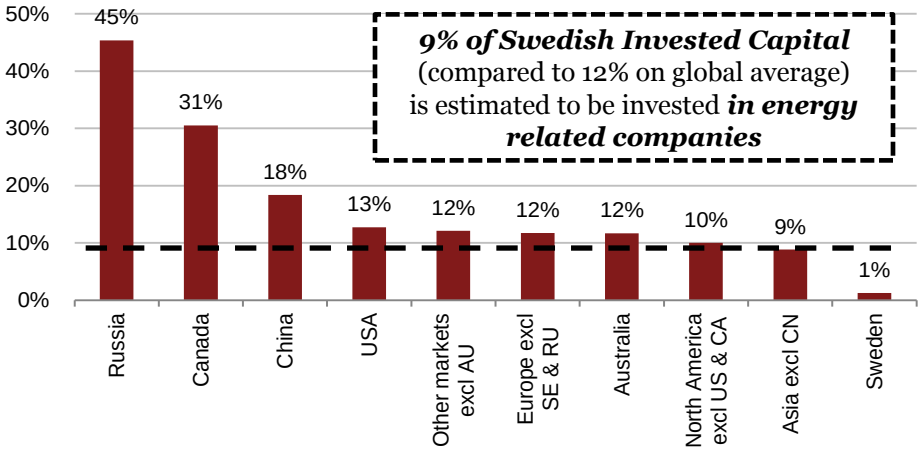
Source: Bloomberg New Energy Finance, Global trends in renewable energy investment 2013

Swedish capital has a lower exposure towards the energy sector (9%) than the global average (12%)

Estimated allocation of Swedish Invested Capital



Estimated share in each region which is attributable to energy related investments of Swedish Invested Capital



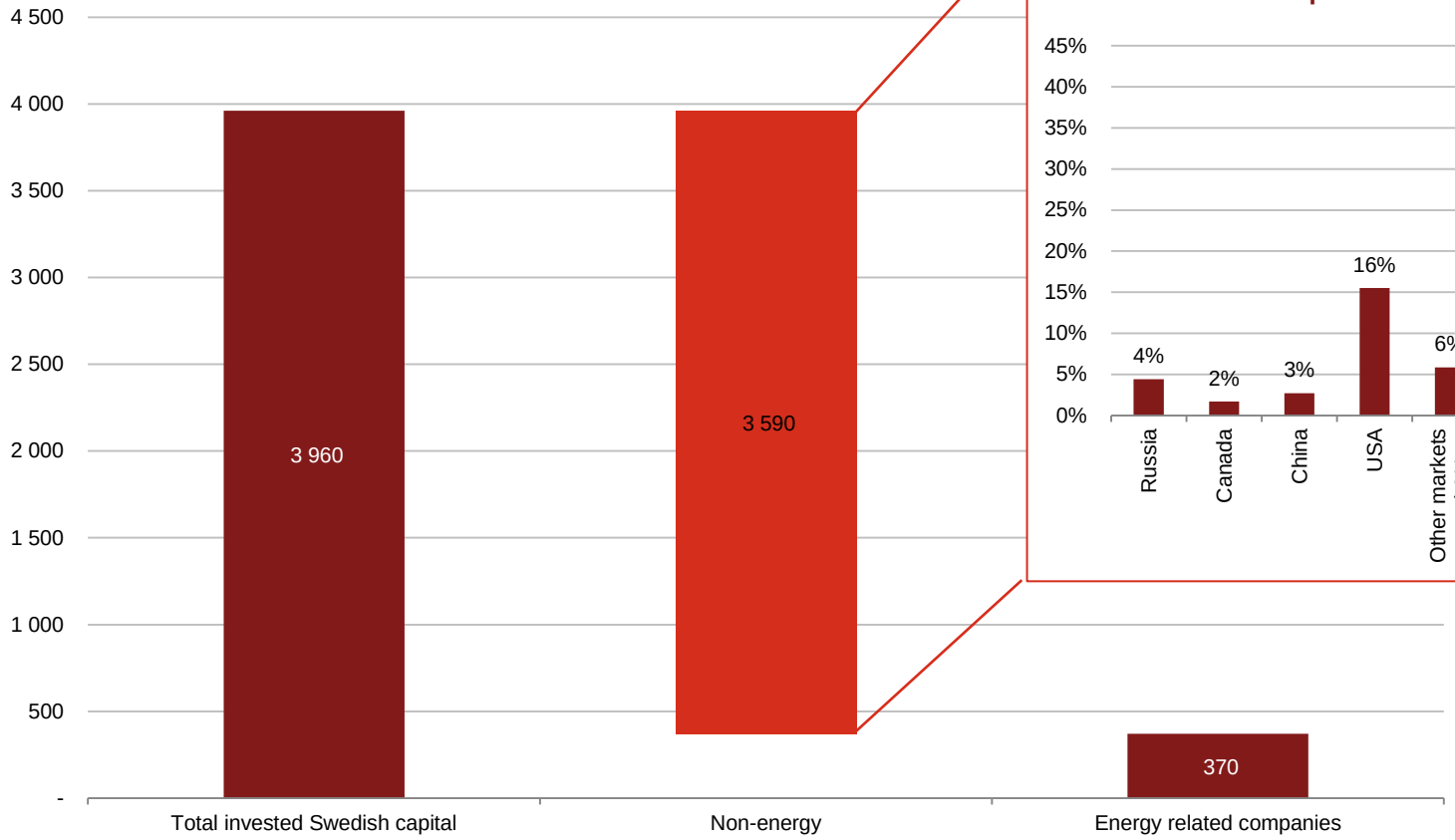
Swedish exposure towards energy sector

- Approximately 9% of Swedish Invested Capital is estimated to be invested in energy related companies. However, investments in Russia, Canada and China result in significantly higher shares, due to the nature of the respective countries' industry focus.
- **Russia** has vast natural resources and is a leading oil and natural gas producer. The country also has the world's second largest coal reserves. Consequently, the country is a large exporter of e.g. petroleum products and natural gas. As a result, close to 50% of Swedish Invested Capital invested in Russia is allocated to energy related companies.
- **Canada** has large exposure towards the logging and petroleum industry. The country holds vast deposits of oil but also gas and the sector is growing in importance for the economy. Consequently, a large share, estimated at c. 30%, of Swedish Invested Capital allocated to Canada is invested in energy related companies.
- Together with the energy related sector **China** also has a significant technology and financial sector listed on the stock exchange. China has a significant mining sector, being a significant producer of coal.
- For remaining geographies capital allocated to the energy sector is around 10-15%, except for **Sweden**. Sweden stands out compared to the other selected geographies with an estimated share allocated to energy related companies of c. 1%, having few energy related companies listed.

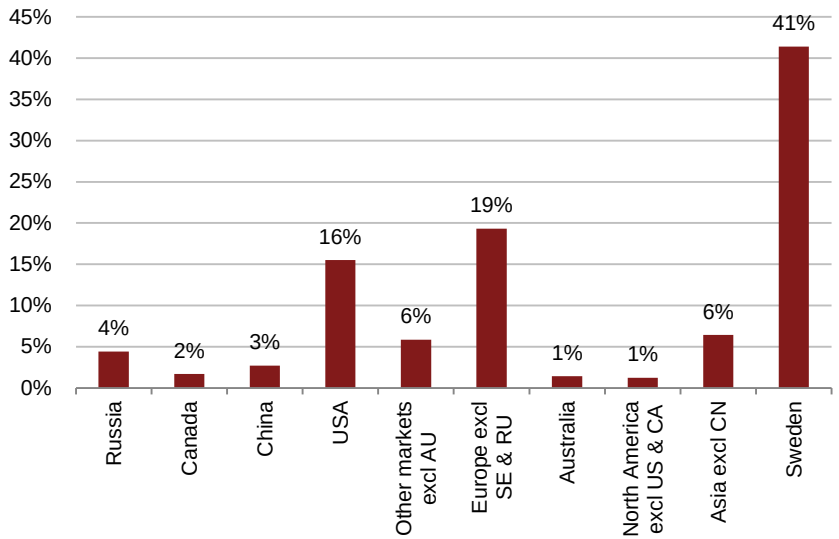
Note: Energy related companies are defined to include capital allocated to companies producing and delivering electricity, companies delivering gas, oil production, oil and gas refining, oilfield service and equipment and pipeline operators as well as estimated capital attributable to coal mining in specific among mining companies. Capital allocation by region refers to the financial markets, i.e. for example where a listed company is listed on the stock exchange, not where the company's underlying assets are located
Source: Morningstar, Industry experts, Fondbolagen, PwC analysis

Non-energy related investments represent the majority of Swedish Invested Capital with a significant portion capital invested domestically

Estimated allocation of Swedish Invested Capital by type

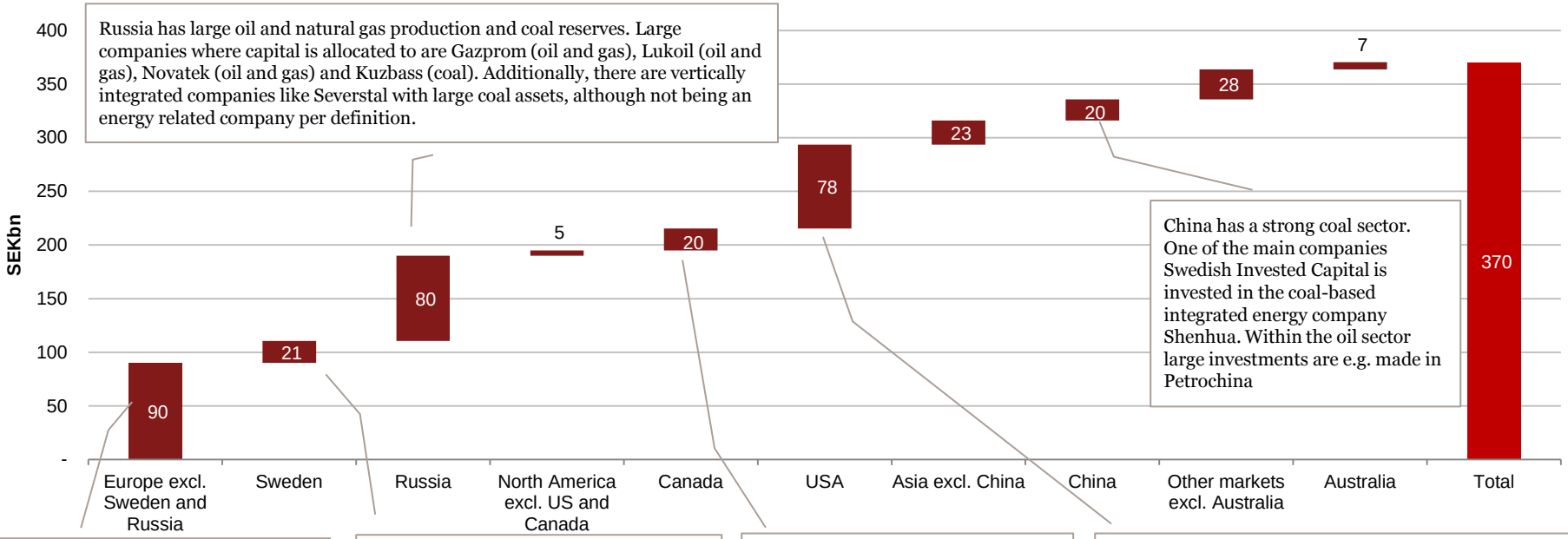


Estimated share in each region of non-energy related Swedish Invested Capital



C. SEK 370bn is allocated to energy related companies, where Russia and the US stand out, estimated at c. 40% of the investments

Estimated allocation of Swedish Invested Capital to energy related companies by region



Russia has large oil and natural gas production and coal reserves. Large companies where capital is allocated to are Gazprom (oil and gas), Lukoil (oil and gas), Novatek (oil and gas) and Kuzbass (coal). Additionally, there are vertically integrated companies like Severstal with large coal assets, although not being an energy related company per definition.

China has a strong coal sector. One of the main companies Swedish Invested Capital is invested in the coal-based integrated energy company Shenhua. Within the oil sector large investments are e.g. made in Petrochina

Europe holds several large oil companies, especially in the UK, where significant capital is allocated to e.g. BP and Royal Dutch Shell, and in France where Total is a major oil company. Additionally, e.g. Anglo American and Glencore Xstrata are large UK companies with major coal reserves.

Sweden, having few energy related companies listed, thus having a very small share of the capital allocated to the sector in relative terms. However, since a significant share of the Swedish Invested Capital is allocated to Sweden, energy related investments still account for a rather significant sum.

Although Canada has significant exposure to the energy sector, primarily via oil, limited capital allocated to the country reduces the capital invested in Canada's energy sector. Large oil companies invested in includes e.g. Suncor Energy, Imperial Oil and Canadian Oil Sands.

US has a capital share allocated to energy related companies inline with several of the other geographies. However, being a large economy with a significant capital allocation to the country as a whole, the estimated amount allocated to energy related companies is significant compared to the other regions. Large investments are e.g. made in the oil companies ConocoPhillips, Exxon Mobil and Chevron.

Amount of capital allocated to the region and the region's exposure to the energy sector are main factors impacting the amount invested in energy related companies in the different regions

Note: It is common for large companies to be listed at multiple stock exchanges. E.g. some of the major non-US energy related companies are also listed in the US. Capital allocation by region refers to the financial markets, i.e. for example where a listed company is listed on the stock exchange, not where the company's underlying assets are located

Source: Fondbolagen, AP-fonderna, Svensk Försäkring, Morningstar, Industry experts, PwC analysis

Carbon emissions as well as carbon reserves differ between the regions that the Swedish Invested Capital is invested in

Carbon reserves by region

- The world's top emitters of CO2 are China, US and Russia. All the countries have a high reliance on fossil fuel in its electricity generation.
- Russia holds the largest carbon reserve, but both the US and China have a significant share of the carbon reserve listed on the world's stock exchanges.
- Australia has the highest carbon intensity of the countries, both in terms of CO2 emissions per capita and CO2 emissions from its electricity generation.
- Canada has a low-emitting electricity generation, but relatively high levels of total GHG emissions mainly due to its energy sector.
- Sweden is one of the world's lowest-carbon economies. In relation to other countries, investments in Sweden are positive from a low carbon intensity perspective.

Region /country	CO2 emissions per region in 2012 (mn tCO2)	CO2 emissions per capita in 2012 (tCO2/person)	CO2 emissions from electricity generation** (t CO2/MWh)	Carbon reserves for companies listed on stock exchange (total CO2 reserves (GtCO2))
China	9,860	7.1	0.790	67.46
US	5,190	16.4	0.528	156.49
Russia	1,770	12.4	0.684	252.98
Canada	560	16.0	0.183	27.88
Australia	430	18.8	0.847	21.97
Sweden	58	5.6*	0.022	0.47
Asia excl. China & Japan	n.a.	n.a.	0.757	n.a.
North America	6.24	n.a.	0.457	n.a.
EU27	3.74	7.4	0.442	n.a.

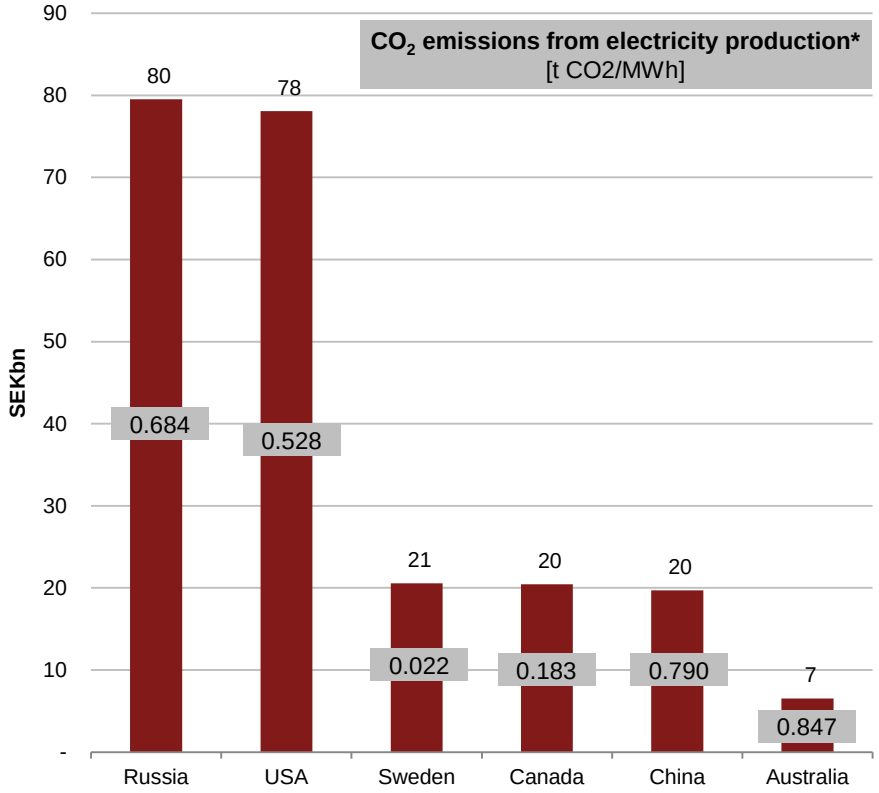
*CO2 emissions per capita in 2010. **CO2 emissions from electricity genertation represents the average of 2008-2010
Note: Carbon reserves are estimated by Carbon Tracker

In countries with high carbon intensity, such as Russia, China and Australia, the challenges facing investors are different from low emitting countries

Source: PwC analysis, EDGAR Trends in global CO_2 emissions 2013 report, IEA, Naturvårdsverket, World bank CO2 emission list, Carbon Tracker Initiative,

Russia and the US with significant carbon reserves are also the two largest regions in terms of invested Swedish capital in energy

Estimated distribution of Swedish Invested Capital in energy related companies for selected countries and its CO2 emissions in electricity production*



*CO_2 emissions represent the average of 2008-2010

Source: PwC analysis, IMF, EIA, IEA, Naturvårdsverket

The three largest regions in terms of invested Swedish capital in energy related companies are Russia, US and Sweden

Russia

- Of the Swedish Invested Capital in energy related companies, 22% is invested in Russia. In Russia, fossil fuels accounts for two-thirds of the electricity generation of which 49%-units from oil, followed by hydropower (17%) and nuclear (16%).
- Russia holds the world's largest natural gas reserves, the second-largest coal reserves, and the ninth-largest crude oil reserves.

US

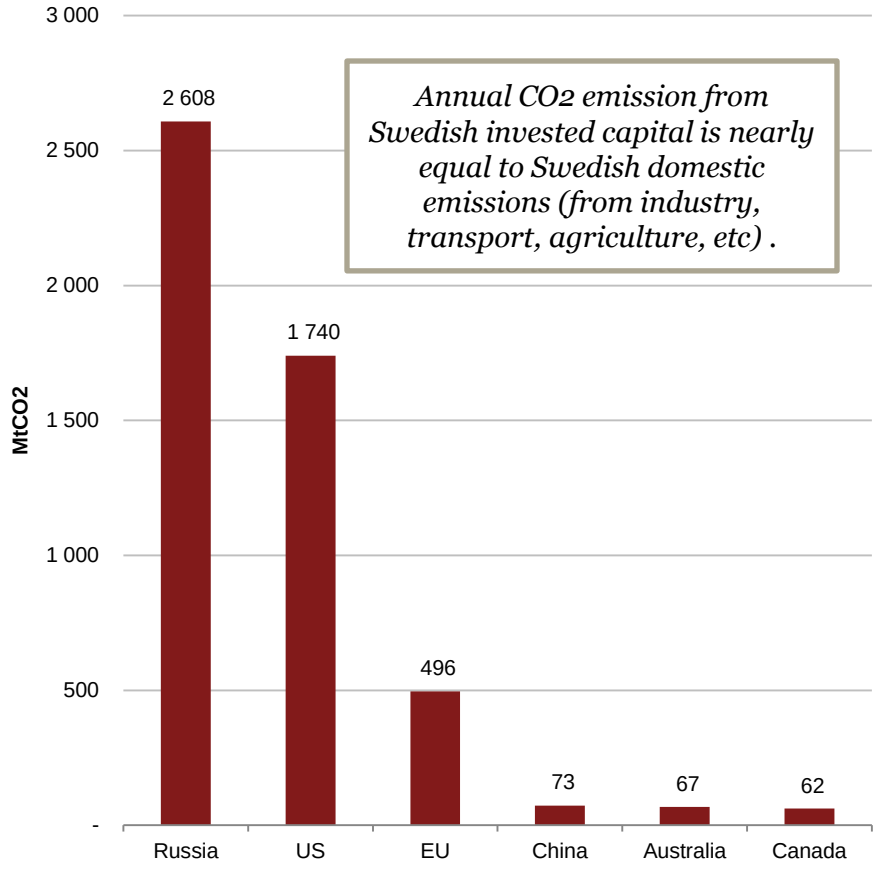
- Energy related investments in the US corresponds to 21%. 68% of the electricity generation is from fossil fuels, a fifth from nuclear and 12% from renewables.
- However, in 2012 the US decreased its carbon intensity by c. 6%, as the shale gas boom helped to cut energy-related carbon emissions. The proportion of natural gas in electricity generation increased from 25% to 30%, matched by a fall in coal-fired electricity generation.

Sweden

- Of the Swedish Invested Capital in energy related companies, 6% is invested in Sweden.
- CO_2 emissions in Sweden have decreased by 40% since 1970 and its decarbonisation is characterised by a high level of nuclear power consumption and large share of hydro power.
- Renewables and nuclear account for about 97% while fossil fuels only represents 3% of the Swedish electricity generation.

Total fossil fuel reserves of the Swedish invested capital is estimated to 5.0 Gt CO2

Estimated reserve intensity of Swedish invested capital per region



Estimated Swedish Invested capital CO2-reserves

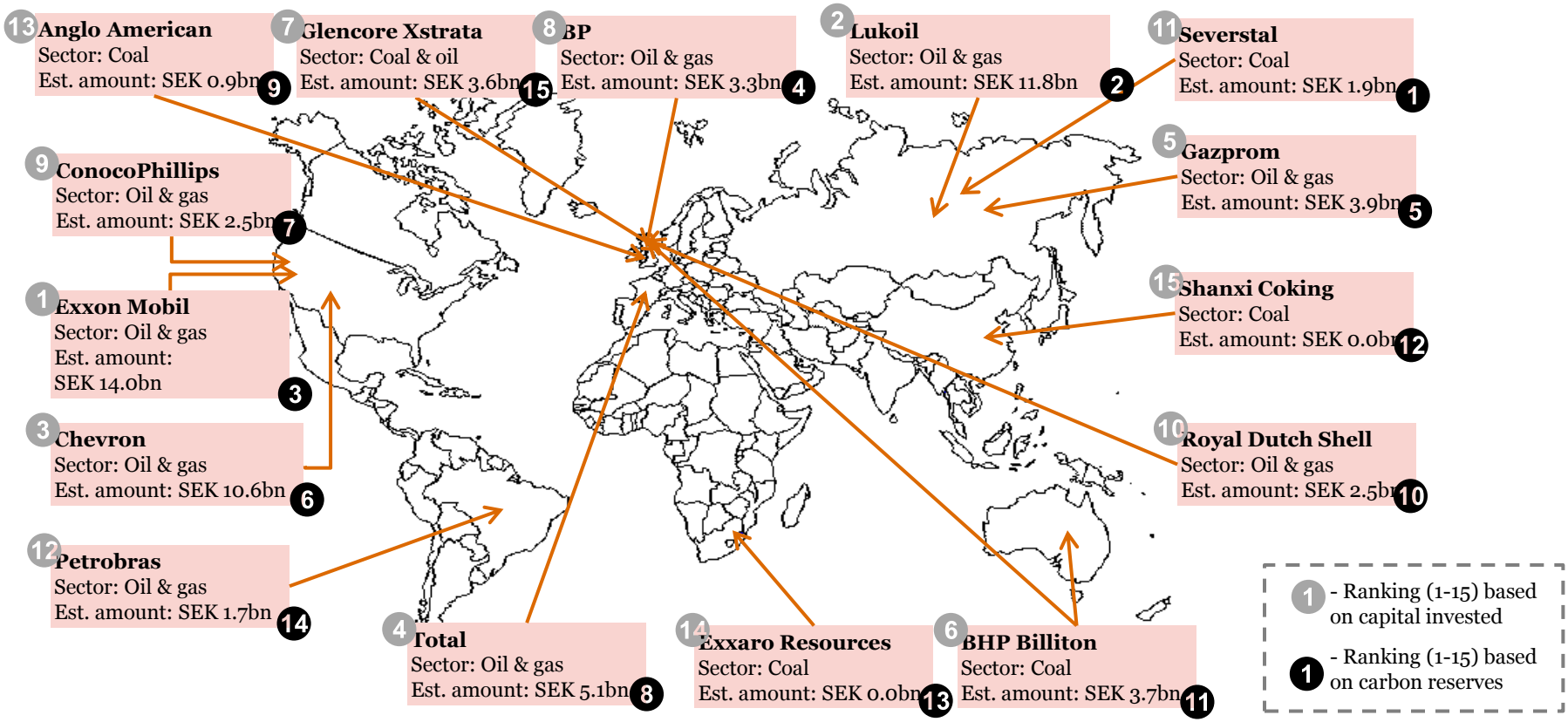
- Total fossil fuel reserves of the Swedish Invested Capital is estimated to c. 5.047 Mt CO2.
- Estimated annual CO2 emissions from Swedish invested capital in major exchanges emit approximately 53 MtCO2. Which is roughly equal to Sweden's annual CO2-emissions (58 MtCO2 in 2012). This is estimated based on Swedish Invested Capital and holdings in each of the major stock exchanges and their respective carbon intensity.
- Of the Swedish invested capital's fossil fuel reserve, the vast majority or c. 2,400 Mt CO2 relates to CO2-reserves in companies listed on the Moscow's stock exchange, corresponding to approximately 1% of total listed Russian carbon reserves.
- The reserve intensity of companies listed on the London Stock Exchange represent the CO2-reserve of Swedish invested capital in Europe* and amounts to c. 500 Mt CO2.

Indices	Current reserves intensity of index (GtCO2 / USD trn mkt cap)
MICEX Index (Moscow)	213.39
NYSE (New York)	145.00
FTSE 100 (London)	35.86
Hong Kong Hang Seng Index	24.16
S&P/TSX Composite Index (Canada)	19.59
S&P/ASX 200 (Australia)***	67.14

Current reserves: greater than 90% probability of economic extraction and geological certainty. Coal, oil and gas reserves based on data from RMG Intierra and Evaluate Energy

*The CO2-reserve of has been calculated by multiplying current reserves intensity of index (see table above) by the Swedish invested capital by region **Europe excl Russia and Sweden ***For calculating the Australian CO2-reserve of Swedish invested capital, potential reserve intensity of index is used because of the absence of current reserves intensity of index
Source: Carbon Tracker Initiative, Unburnable Carbon 2013: Wasted capital and stranded assets, SLU Kolinnehåll i skog och mark i Sverige

C. SEK 65bn is estimated to be allocated to the top 15 listed companies with the largest carbon reserves in the world



The top 15 listed companies with the highest carbon reserves represent the sectors oil, gas and mining (due to coal reserves). The oil and gas sector is largest, both in terms of number of companies and in terms of investment size

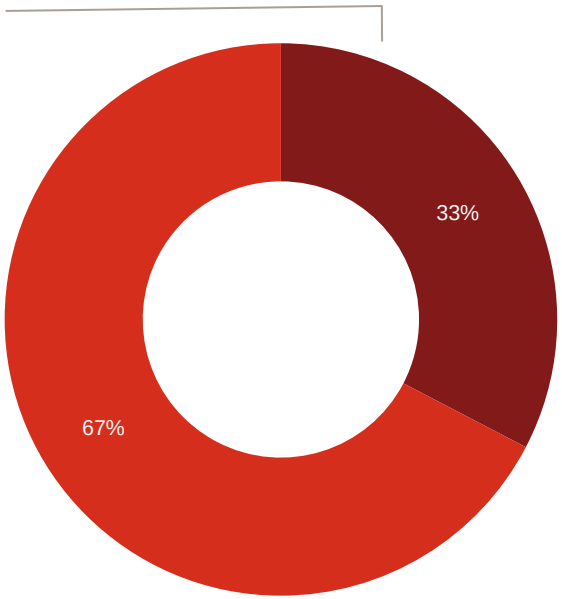
Note: Carbon reserves are estimated by Carbon Tracker. It is common for large companies to be listed at multiple stock exchanges. Mining companies are included due to coal mining operations, as coal being one of the main fossil fuels. Note that this differs from how "energy related companies" are defined in the report where capital attributable to coal mining in specific among mining companies is included

Source: Fondbolagen, AP-fonderna, Svensk Försäkring, Morningstar, Finansinspektionen, Carbon Tracker, PwC analysis

Swedish mutual funds have invested c. SEK 21bn in the top 15 listed companies with the largest carbon reserves

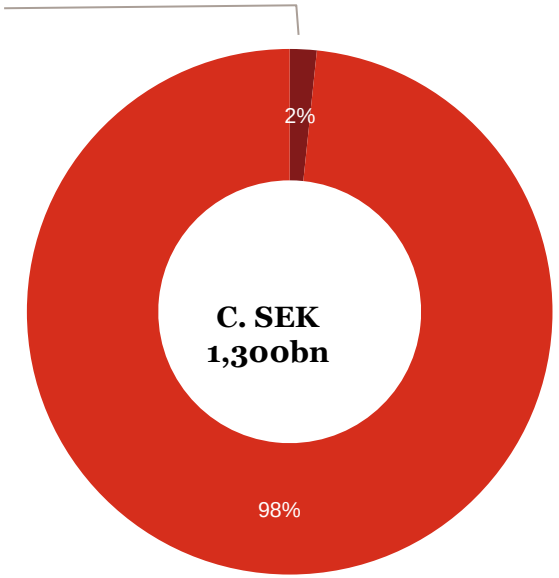
Share of Swedish mutual funds that have holdings in the top 15 listed companies with the largest carbon reserves

159 of 487 Swedish mutual funds have holdings in the top 15 listed companies with the largest estimated carbon reserves



Estimated share of capital invested by Swedish mutual funds in the top 15 listed companies with the estimated largest carbon reserves

Holdings in the top 15 listed companies with the largest estimated carbon reserves amount to c. SEK 21bn in Swedish mutual funds



Note: Capital refers to estimated investments in equity and corporate bonds

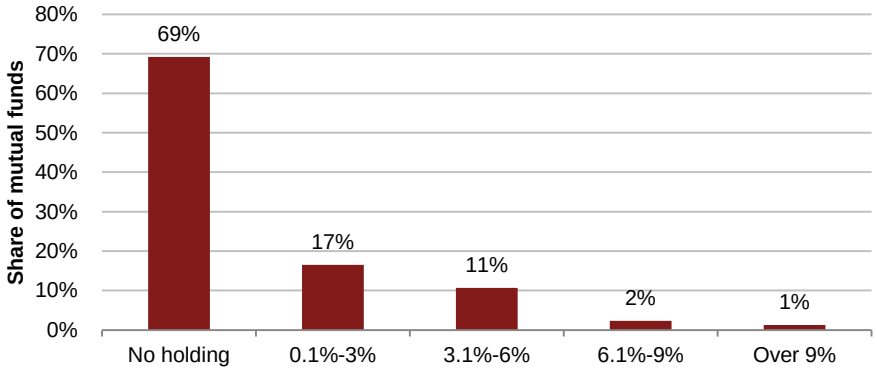
- ***33% of the Swedish mutual funds have invested c. SEK 21bn in the top 15 listed companies with the largest carbon reserves***
- ***The invested capital corresponds to c. 2% of the estimated capital (equity and corporate bonds) in the Swedish mutual funds, hence the impact is limited. For comparison, this can be related to the share of Swedish Invested Capital allocated to energy related companies, estimated at c. 9%***

Note: Listed companies with the highest carbon reserves are estimated by Carbon Tracker. Mining companies are included due to coal mining operations, as coal is one of the main fossil fuels. Funds includes Swedish mutual funds, besides hedge funds, registered at Finansinspektionen

Source: PwC analysis, Carbon Tracker, Finansinspektionen

Funds focusing on Russia show strong exposure towards top 15 listed companies with highest carbon reserves

Distribution based on held share in the top 15 listed companies with the largest carbon reserves as % of fund capital among Swedish mutual funds



- Approximately 1/3 of the Swedish mutual funds have holdings in the top 15 listed companies with the largest carbon reserves.
- Among the mutual funds with a large share of their holdings in these companies are funds focusing on Russia and Eastern Europe heavily represented, mainly explained by large holdings in Gazprom and Lukoil.

Top 5 funds in terms of share of total investments

Fund	% of total fund capital in top 15 companies	Total assets under management SEKmn
Swedbank Robur Råvarufond	18%	548
Alfred Berg Ryssland	18%	880
Swedbank Robur Östeuropafond	16%	6 013
Swedbank Robur Rysslandsfond	16%	6 351
Handelsbankens Östeuropafond	16%	1 571

Top 5 funds in terms of holdings in the top 15 companies

Fund	Total capital invested in top 15 companies (SEKmn, % of total fund)	Total assets under management SEKmn
AP7 Aktiefond	4,591 (3%)	140 177
Swedbank Robur Rysslandsfond	1,005 (16%)	6 351
Swedbank Robur Östeuropafond	956 (16%)	6 013
East Capital Rysslandsfonden	912 (12%)	7 532
Folksam LO Världen	592 (3%)	17 420

Note: Listed companies with the highest carbon reserves are estimated by Carbon Tracker. Mining companies are included due to coal mining operations, as coal is one of the main fossil fuels. Funds includes Swedish mutual funds, besides hedge funds, registered at Finansinspektionen

Source: PwC analysis, Finansinspektionen, Carbon Tracker

The largest oil and gas companies have minor investments in renewable energy relative to their core business

Case study: BP Alternative Energy

	BP Alternative Energy is a BP company investing in renewable energy and carbon neutral technologies including wind, biofuel and carbon capture and storage. BP shall invest USD 8 bn in alternative energy between 2005-2015.
Portfolio	Since 2005, BP has invested USD 7.6 bn in renewable energy, whereof USD 1 bn in 2012.
Wind Power	BP wind power division have a combined generating capacity of approximately 2.6GW located in the US.
Solar	Historically BP has been active in the solar industry through its former subsidiary BP Solar. In 2011, BP made an exit in the solar business after 40 years.
Biofuels	In 2011, BP acquired the Brazilian sugar and ethanol producer Companhia Nacional de Açúcar e Álcool and increased its share in the Brazilian biofuels company, Tropical BioEnergia S.A., to 100%. The three sugar cane ethanol mills had a capacity of 7.2 Mt of sugar cane in 2012.
CCS	BP is developing and applying CCS technologies for BP and the energy sector. BP is also involved in full-scale projects such as In Salah, Algeria. The project is one of the few operating industrial-scale C02 storage facilities in the world.
Carbon reserve	34.6 Gt CO2

Other oil and gas players also investing in alternatives

Carbon reserve
16.20 Gt CO2

Royal Dutch Shell spends USD 400mn a year on alternative energy. The company has invested billions of USD in a Brazilian biofuels venture, buying up sugar cane mills, plantations, and refineries to make ethanol

Total S.A. greatly increased its solar operations in 2011 by acquiring a controlling stake in SunPower Corp for USD 1.37bn

Carbon reserve
18.02 Gt CO2

ExxonMobil is spending USD 60mn a year effort to produce liquid transportation fuel from algae

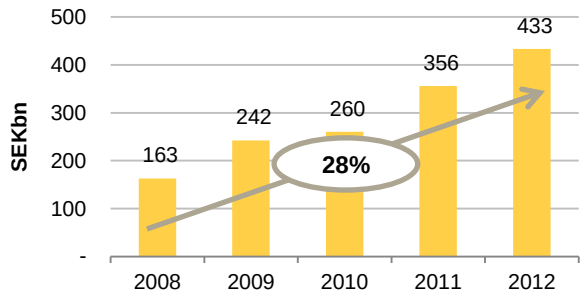
Carbon reserve
41.03 Gt CO2

Large oil and gas companies offer exposure towards the renewable energy sectors. In 2012, the largest companies' investments in green energy amounted to between less than 0.5% to approximately 4% of total capital expenditures, with BP holding the oil industry record for the highest percentage of expenditures committed to alternative energy

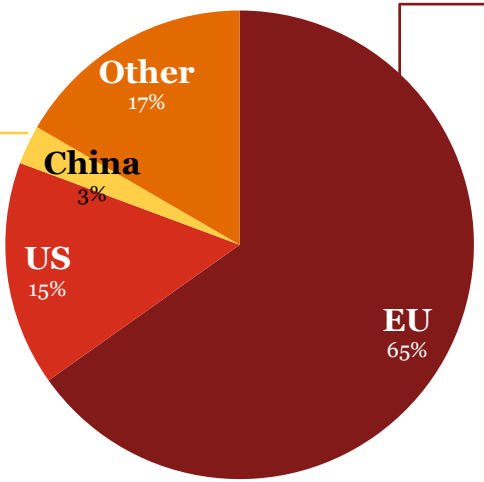
Source: BP, BP Alternative Energy, BloombergBusiness week, Rolling Stone Politics, Wall street journal

Growth in renewable energy investments are increasing most rapidly in China where approximately 2.7% of Swedish invested capital is allocated

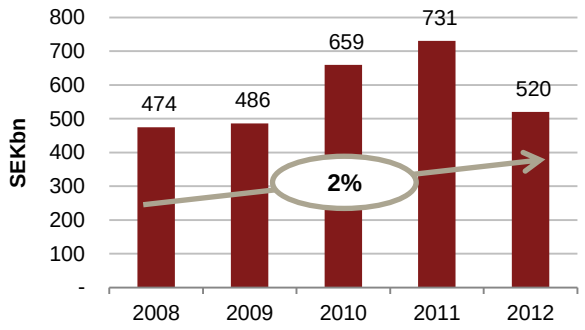
Renewable energy investments in China



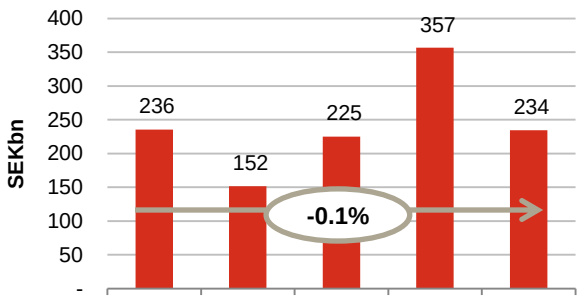
Share of total Swedish invested capital by region



Renewable energy investments in EU



Renewable energy investments in US



- ***Investments in renewable energy are just as other energy investments typically financed on companies balance sheet or asset financing.***
- ***Europe as a region invested the most in renewable energy in 2012.***
- ***China may soon surpass total EU renewable energy investments. Compound annual growth rate for the period 2008-12 corresponds to 28%.***
- ***US investments in renewables peaked in 2011, but declined back to more (historically) normal levels in 2012.***

Source: Trends in global CO_2 emissions 2013 report

Section 3.2
Standards for investing in energy among main Swedish investors

The main investor groups of Swedish capital are…

Swedish banks

Swedbank

Nordea

Handelsbanken

SEB

Swedish insurance and pension/life insurance companies

if…

Folksam

skandia

TRYGG HANSA

Länsförsäkringar

alecta

spp

AMF

KPA PENSION

The Swedish state-owned pension funds

FÖRSTA AP-FONDEN

Andra AP-fonden
Second Swedish National Pension Fund - AP2

AP3

FJÄRDE AP-FONDEN

Sjätte AP-fonden

AP7

Multilateral organisations*

European Bank
for Reconstruction and Development

European Investment Bank

NIB

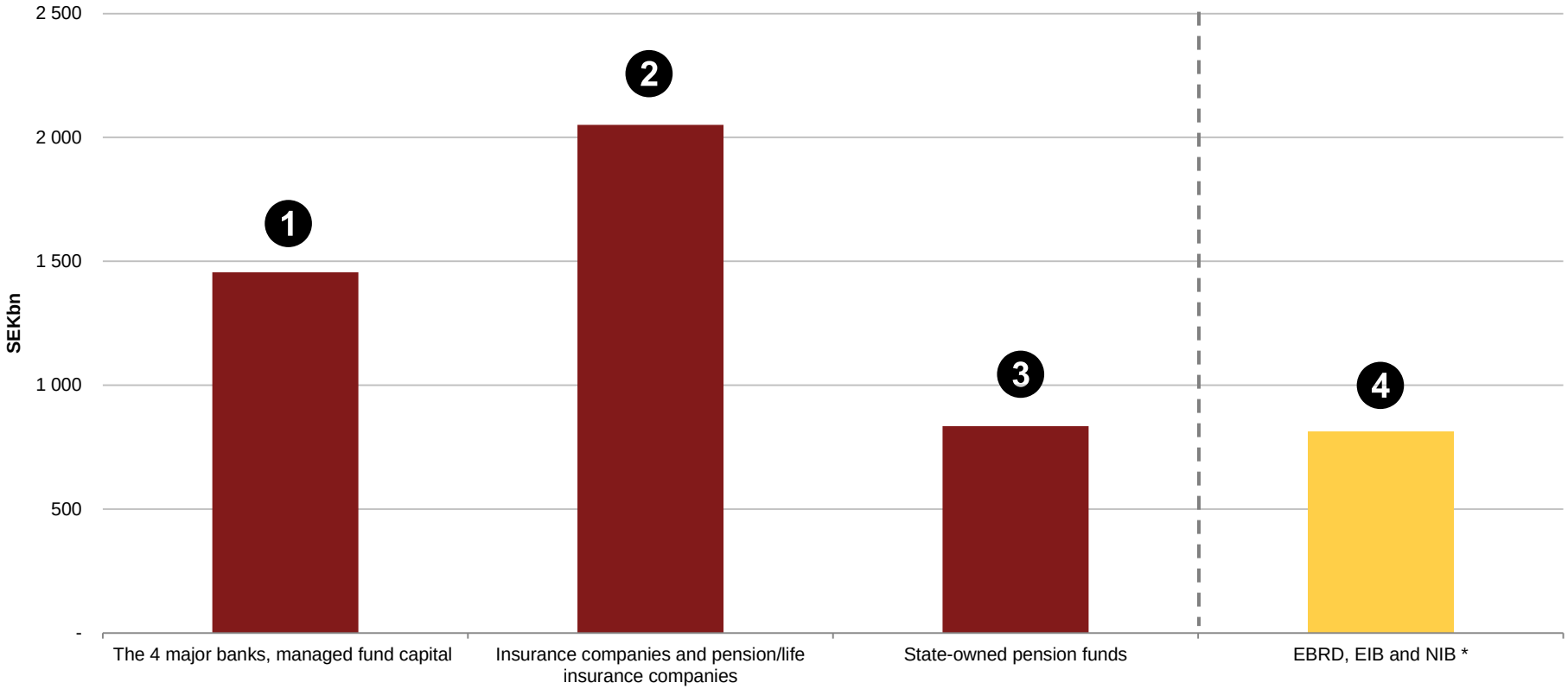
***Large investors, with contribution of Swedish capital**

Note: The companies are examples within the different investor groups, which are focused on in the following slides

Source: PwC analysis, company webpages

In addition to banks, insurance companies and state owned funds significant amounts of capital is invested through multilaterals (4)

Estimated capital invested in stocks and corporate bonds by main investor groups



*Refers to total funds available for EBRD (European Bank for Reconstruction and Development), EIB (European Investment Bank) and NIB (Nordic Investment Bank) and is capital influenced by Sweden rather than Swedish Capital.
Note: Capital attributed to the four major banks e.g. includes foreign capital invested in the mutual funds and mutual funds registered outside Sweden. Investor groups' capital overlap, e.g. capital invested by insurance companies are also found among the capital for the 4 major banks

Source: Morningstar, Svensk Försäkring, companies' webpages, PwC analysis

Portfolio Management is governed by capital allocation and ownership policy

Insurance and pension / life insurance companies

Company board or fund management sets principles	Capital allocation principles	Portfolio management strategies
• Every insurance is tied to an investment policy consisting of assets such as bonds, stocks and real estate. • The investment policies have different degrees of risk-bearing assets, mainly shares • Insurance and pension funds offer money back guarantee	Investment policies vary (examples): Folksam Liv: 1. Pension with warranty: 85% interest bearing (+/-5%) 2. Pension without warranty: 60%interest bearing (+/-10%) KPA pension: **60%** interest bearing investment Alecta: predetermined investment strategies with 60% shares, 50%, 40% or 10% shares	• Asset and portfolio managers are responsible for execution in line with capital allocation principles. • Different strategies exist. • Liability Matching attempts to time future assets sales and income streams to match against expected future expenses. • The strategy is widely embraced among pension fund managers, who attempt to minimize a portfolio's liquidation risk by ensuring asset sales, interest and dividend payments correspond with expected payments to pension recipients. • Both active and passive portfolio management*

AP-funds

• The Government has decided to have limited influence over the AP-funds and capital allocation • No explicit incentive for limiting investment in stranded assets • Only exercises influence by appointing boards, determining remuneration to board members, appointing auditors, approving the income statement and balance sheet of the funds and evaluating the management of funds on the close of each year	**AP funds allocation principles** • Min.30% in fixed income instruments • Restrictions on direct investments • Max. 5% invested in unlisted securities • Not allowed to invest in commodities • Max40% to be exposed to exchange rate risk • Min 10% of capital to be managed by external fund manager	

Asset and portfolio managers are governed by fund risk allocation policy – insurance and AP-funds have a generally low risk exposure implying a bias towards local markets and index linked investing. Renewables typically have a higher risk reducing exposure to energy sector even in active management.

*__Active management__ involves the manager actively buying and selling investments on behalf of the pension fund, with a view to getting a better return than the competition. __Passive management__ involves investing as closely as possible in line with a given market index with the objective to match the index return.

The risk profile of funds with energy focus is typically higher than the average mutual funds

Funds with energy focus

- There are 16,623 available mutual funds on the Swedish market*, whereof 106 have energy focus (corresponding to approx. 0.5% of total funds)
  - 16% (17 of 106) of the energy funds have a stated clean energy focus
- Common examples of clean energy focus are funds that "*only invest in companies that develop or use technologies/methods to limit global warming*" or "*shall invest at least two thirds of the capital issued by companies which reduce CO2 by encourage production and use of clean energy*"
- Average standard deviation** of the energy funds is 15.8% which can be compared to the average standard deviation of all mutual funds 10.8%
- Energy funds have in general high regulatory risks compared to other industries.

Investment criteria's

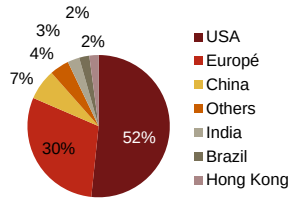
- Asset quality and its expected present value is the basis for whether a company is seen as interesting from an investment perspective
- Investors primary focus is economic factors. Other risks (such as carbon exposure) are typically more difficult to quantify due to limited samples or case studies. Environmental risks are mainly included as pure legal risks for example lack or loss of environmental permits
- There is a limited number of renewables investments on the Swedish stock market, where the companies mainly been in the early investment phases and been focusing on bringing capital to expand capacity.

Case study: DNB Renewable Energy (DNB Asset Management)

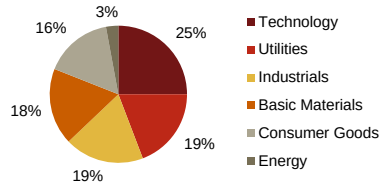
Fund objective	To achieve long-term capital growth by investing in companies worldwide that profit from new technologies in the field of generating and using cleaner energy, increasing energy effectiveness and/or promoting the growth in renewable energy sources.
Risk	6 of 7 (i.e. high risk)
Fund size	EUR 26.56m as at 31-Jan-2014
Launch Date	16-Aug-2007
Investment strategy	Bottom-up stock selection***. The portfolio consists of about 40 companies and has succeeded in creating significant excess returns over time.
Regional breakdown	More than half of the capital (51,4%) is invested in USA, followed by nearly 30% in Europe.
Sector breakdown	About a quarter of the capital is invested in the technology sector followed by investments in utilities sector (19%) and industrials sector (19%).

Energy or renewable energy investments typically have higher risk than average – ratings are based on standardised financial measures of volatility and correlation with market returns.

Regional sectors



Technology sectors



* Morningstar.
**Standard deviation is a statistical measurement of dispersion about an average, depicts how widely a mutual fund's returns varied over a certain period of time. Standard deviation is most appropriate for measuring the risk a fund that is an investor's only holding.
***Bottom-up investment strategies choose stocks based on the strength of an individual company.

❶ *There are a few fossil-free saving options in the Swedish banking sector*

Swedish bank sector

- The group consists of the four main Swedish banks, in the positions as fund managers, including Handelsbanken, Nordea, SEB and Swedbank (including the mutual fund manager Swedbank Robur).
- The banks act as investors via own mutual funds investing in debt and equity globally, but with strong focus on Sweden.
- Additionally, the banks e.g. offer mutual funds managed by external parties, where customers' capital are allocated to. In such funds, the investment activities is not carried out by the banks.
- Capital invested e.g. includes pension capital as well households' savings and other capital from corporates.
- None of the banks have an explicit strategy for reallocation of their energy investments to make their portfolio 2°C compliant.

Banks	Examples of fossil-free saving options
Swedbank + Swedbank Robur	• 2 of 10 sustainable funds (Ethica Humanfond, Ethica Sverige) are fossil-free, corresponding to 42% of total fund wealth in its sustainable funds • Swedbank states that "We want the energy companies we invest in to refrain from prospecting and extracting oil from oil sand". • No investments in oil sand related companies are allowed in Swedbank's Ethics funds. Approximately 34 companies have failed so far due to connection to tar sands extraction. However, the allocation principle does not apply to all of Swedbank's portfolios.
SEB	• The green bond concept was developed by SEB and the World Bank in 2008 as a response to increased investor demand for engagement in climate-related opportunities. • SEB have issued green bonds totalling c. SEK 15bn by funding c. 40 environmental projects in 17 countries. • No available fossil-free fund or funds with a green focus for individuals and no plans to launch a new fund free from carbon.
Handelsbanken	• New Energy Fund invests in companies that develop or use technologies that limit the effects of global warming including companies whose assets can positively contribute to energy efficiency.
Nordea	• No available fund with less than 3% fossil-fuel holding • Will likely launch funds with a focus on energy companies operating in renewable energy and limitations on fossil fuels. • Nordea strategy is to reduce the exposure towards fossil-fuel producing companies in Emerging Stars (Ethical Funds).

Source: PwC analysis, WWF, Company websites, Swedbank Robur's Position on Production of Fossil Oil and Gas

❷ *Insurance and life insurance companies have limited focus on shifting capital away from fossil fuel companies to the green sector*

Insurance and life science companies

- The group consists of the Swedish insurance companies including Folksam, If, Länsförsäkringar, Skandia and Trygg-Hansa, and the main Swedish pension/life insurance companies, including Alecta, AMF, KPA and SPP.
- Of the capital for Swedish insurance and life insurance companies, approximately 85% of the invested capital is pension capital, and the remaining share is paid in premiums for insurances.
- The capital is primarily invested in stocks, bonds and mutual funds.
- The insurance and life insurance/pension companies have not earmarked capital to investments in green companies.
- International conventions such as e.g. UN declaration for human rights are used as a filter to screen investments and in active ownership.

Examples of insurance and pension companies	Examples of fossil-free saving options
Skandia Insurance company	• One (Skandia Världsnaturfonden) out of 18 equity funds is fossil-free. Skandia Världsnaturfondens fund wealth amounts to c. SEK 400mn
Folksam Insurance company	• All 11 funds include investments in fossil-fuel (oil companies) • The main strategy is to influence the energy companies as owner, rather than excluding the fossil fuel industry
Alecta Pension company	• In Alecta's ethics policy for investment operations the UN, EU and ILO treaties and conventions are listed to be relevant to Alecta's investment operations • Climate change is not an investment criteria in Alecta's policy
KPA Pension Pension company	• All of KPA's ethical funds include holdings in fossil-fuel companies • The major oil companies that KPA is investing in have activities related to oil sands. The main strategy is to influence the oil companies as owner by voting at general meetings and organizing seminars • KPA is not investing in companies only active in prospecting and extraction of oil sand • KPA is introducing a project aimed at energy companies reporting its investments in alternative (fossil-free) energy sources
Kåpan Manage defined contribution pensions for public sector employees	• Kåpan's investment policy: 45% - 65% fixed-income assets (bonds and other debt securities) 25% - 35% equity assets, 10% - 20% other assets (eg real estate) • Many fossil corporate ownership in its holding No transfer rights for individuals, i.e. no possibilities to move the pension saving to another company that offers active management • Climate change is not an investment criteria in Kåpan's investment policy

Source: PwC analysis, WWF, company websites

❸ *The state-owned funds are governed by strict fund allocation rules to a certain extent preventing investments in energy assets*

AP-funds and capital allocation criteria

- The investor group comprises state-owned pension funds as part of the Swedish national income pension system; Första AP-fonden, Andra AP-fonden, Tredje AP-fonden, Fjärde AP-fonden and Sjätte AP-fonden. Sjunde AP-fonden is a state-owned alternative to the private pension.
- Capital allocation is governed by Swedish law (2000:192) on state-owned pension fund investment strategy which is briefly summarised in the table.

Impact on capital allocated to energy sector and investments

- Current capital allocation rules is driving fund allocation towards fixed income interest-bearing assets, listed companies and real estate.
- This implies that the AP-funds have limited opportunity to invest in illiquid assets* with higher potential returns.
- Illiquid assets with high return potential can be found in the energy sector and particularly within renewables.
- As the funds invest significantly in large cap on major regulated exchanges they have holdings in 133 of the 200 most CO_2 intensive listed companies globally - through these companies AP fonderna own reserves equivalent to 625 $MtCO_2$, corresponding to 11 times of Sweden's annual emissions in 2012.

Increasing investments in the energy efficiency and renewable energy sector by the AP-funds could be achieved by granting the funds higher independence and more long-term investment perspective through allowing investments in energy and infrastructure asset classes.

Capital allocation rules	Impact on investments in energy assets
Minimum 30% of total assets under management has to be placed in **fixed income instruments** with low credit and liquidity risk	• Significant amount of capital in Swedish pension funds is restricted to secure government issued bonds. • Allocation rule could drive investments in green bonds given that there exists sufficient instruments with low credit and liquidity risk.
Restrictions on direct investments – can typically only invest in listed companies on regulated exchanges	• Energy assets with a focus on renewable energy are often companies active in the renewable energy industry, and infrastructure projects in renewable energy, are seldom listed on regulated exchanges. • Listed companies on regulated exchanges imply a high exposure to major corporations that constitute major indices such as (FTSE100, S&P500 etc.) • As noted previously several of these companies are energy companies with significant carbon reserves
Maximum of 5 % of assets may be invested in unlisted securities and **only in private equity funds**	• Sets a limit on capital allocation to private equity funds which are better placed to invest in private equity funds which are designed to invest in unlisted companies or infrastructure projects, and hence have the ability to access many of the investment opportunities in renewable energy. • Allocation rule restricts the AP-funds from making investments directly into energy infrastructure assets with long investment horizons and stable cash-flows
The funds are not allowed to invest in commodities nor financial instruments with commodities as underlying security	• Restricts investments in energy commodities – from an environmental perspective also reduces possibility to invest in renewable energy based securities such as green certificates and emission rights.
Maximum 40% of total assets under management to be exposed to exchange rate risk and maximum 10% to be exposed to single issuer (except Swedish state)	• Limited specific impact on energy investments.
Voting shares in a single company may **not exceed 10%** (30% in unlisted private equity run).	• Limits AP-funds ability to actively demand changes in companies with investments in energy sector – AP-funds are not able to take majority shareholding in order to divert investments away from stranded assets.
Minimum 10% of capital to be managed by external fund manager.	• Limited specific impact on energy investments.

None of the current capital allocation rules specify specific targets for energy investments, carbon exposure reduction, nor state explicit requirements on reporting of carbon intensity of assets.

*Illiquid assets are assets which cannot be readily converted into cash, in contrast with liquid assets. Therefore, illiquid assets carry higher risks and have a higher expected return than liquid ones.
Source: PwC analysis, WWF, AP-funds, SOU2012 Buffertkapitalutredningen

❹ *Development banks have in 2013 strengthened their focus to contribute to a sustainable development via their financing*

Multilateral agencies

- **European Bank for Reconstruction and Development (EBRD)** provide project financing for banks, industries and businesses, both new ventures and investments in existing companies, in Europe and Asia. The bank only invests in projects that could not otherwise attract financing on similar terms. EBRD is owned by 64 countries and the EU and the EIB.
  - From 2006 to August 2013, the EBRD funded 172 operations and invested over EUR 8.6bn in the energy sector
- **The European Investment Bank (EIB)** is the EU's bank, providing financing to sound and sustainable investment projects which contribute to furthering EU policy objectives.
  - In 2012, 16% of the EIB's financing was for energy sector projects whereof EUR 7.2bn within the EU and EUR 1.2bn outside.
  - Financing of fossil fuel generation has dropped from 21% of EIB energy lending in 2007 to 6% in 2012.
- **The Nordic Investment Bank (NIB)** finances projects that improve competitiveness and the environment of the Nordic and Baltic countries by offering long-term loans and guarantees to the private and public sectors. NIB is owned by Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden.
  - In 2012, 22% of the loans agreed was in the energy and environmental industry.

Policy/Strategy	Overall performance
EBRD Energy Sector Strategy	• The Energy Sector Strategy outline the EBRD's plan and role in the energy sector from 2014 to the end of 2018. • EBRD will focus primarily on improving the energy efficiency through its financing and increase its investments in renewable energy • According to EBRD's coal screening criteria, the investments must: - Represent the least carbon-intensive of the realistically available options - Use best available techniques (BAT) in order to ensure that it achieves the lowest feasible carbon intensity - Comply with the IED requirements in relation to carbon capture and storage readiness
EIB Energy Lending Criteria	• EIB focuses on the economic justification of RES projects and aims to increase its investments in energy efficiency • According to the screening criteria for fossil fuels generation all fossil fuel power plants financed by EIB: - Must be economically justified based on a cost benefit analysis - Have CO_2 emissions of less than the Emission Performance Standard* • EIB will consider investments in hydrocarbons • In addition to normal screening criteria for large thermal power plants, EIB uses additional nuclear appraisal guidelines to address specific issues related to nuclear projects.
NIB Investment policy	• NIB has an explicit environmental mandate from the Bank's owners to promote projects that enhance the environment • All projects considered for financing undergo assessment of potential environmental impact. The review includes the environmental risks and opportunities of the project concerned; the commitment and capacity of the customer concerned to manage these potential impacts; and the costs resulting from the ecological and social aspects of the project

*Is set at a level designed to ensure that the Bank finances fossil projects whose carbon emissions are consistent with the EU's climate and energy policies

Source: PwC analysis, company websites, EIB Energy Lending Criteria 2013, EBRD Energy Sector Strategy

There have been significant developments within particularly structured products to provide fund managers with more investment options

Private Equity and Venture Capital	Infrastructure funds	Structured fixed income products	Angel investing and peer-to-peer lending
Alternative equity investments such as private equity and venture capital is an option for investing pension capital. Governments and international financial institutions can take actions to improve deal flow for PE/VC by providing initial seed and start-up capital as well as promoting R&D. For example via investment vehicles specializing in early-stage projects.	Infrastructure funds is a rapidly growing asset class as investors are seeking to match long term liabilities and generate stable returns at lower risk. There is a trend towards an increasing focus on renewable infrastructure and green energy opportunities among these funds.	Fund managers are often required to seek low risk investments with steady returns and are often required to allocate a certain share of the total portfolio to bonds. Structured green products (such as green bonds) are now readily available as an alternative asset class without needing fund managers to change risk/return levels of their duration of existing bond portfolios.	Is critical to provide a basis for growth of particularly renewable energy which has to be developed and commercialised. This sector can be assisted by government grants, subsidies and promoting R&D.

There are several options for fund managers to re-evaluate current investments and identify alternative investment opportunities to reduce carbon intensity of their existing portfolios.

Cleantech related investments is a rather popular segment among state-owned investment vehicles albeit at small volumes*

Company	Amount of capital available	Focused investments in green energy	Explicitly stated that environmental factors are taken into account in investments	Example of investments
Swedish Energy Agency	Soft loans: SEK 90m per year	Yes	Only grants companies in the stages of commercialisation within the clean-tech energy sector. The innovations shall reduce energy consumption or find new ways of producing renewable energy.	The agency's portfolio consists of 44 holdings in the clean-tech energy sector.
ALMI INVEST	C. SEK 1,000m	No	Nothing is stated	8 of 82 holdings are within clean-tech, e.g. More Biogas (production of biogas) and SolarWave (production of solar driven water purification systems and desalination systems)
Fouriertransform	SEK 3,000m	No	Sustainability in terms of focus on the environment is considered a key factor in the investment strategy and the work with portfolio companies in order to achieve the mission to strengthen the Swedish manufacturing industry, where development of sustainable vehicles is a focus area	7 of 16 holdings are within development of sustainable vehicles. E.g. El-forest (electric hybrid technology forestry machines) and Powercell (fuel cell systems for the transport industry)
Industrifonden	C. SEK 3,600m of which SEK 1,500m is invested in companies	No	Investments shall contribute to a more sustainable society. Consequently, environmental matters are evaluated when investing, regardless of industry, and are on the agenda as active owners	11 of 83 holdings are clean-tech companies, e.g. Climatewell (solar based heating pumps) and SEEC (energy systems for heating and cooling of larger buildings)

*Clean-tech is by definition **not** the same as energy or renewable energy and covers other technologies and services although there may be some overlap. Given the low amount of capital invested compared to total Swedish Invested Capital this has not been further split into clean-tech vs renewable energy investments. Note: AP 6 is a significant player offering state-financed venture capital. AP 6 is covered together with the other AP funds

Source: Companies' webpages

(cont'd) Environmental focus, e.g. being part of the investment process, is from a wider perspective regardless of sector, rather than specifically allocating capital to green investments

Company	Amount of capital	Focused investments in green energy	Explicitly stated that environmental factors are taken into account in investments	Example of investments
inlands innovation	C. SEK 2,000m	No	The sustainability policy is based on the state ownership policy. An active dialogue regarding environmental matters is carried out with the portfolio companies. The company supports the FN Global Compact principles	5 of 19 investments are related to the clean-tech sector. For example Inlandsinnovation has invested in the investment company Ekonord Invest focusing on investments with a positive impact on the environment
Swedfund	C. SEK 3,100m	No	E.g. aiming at contributing to an environmentally sustainable development. Evaluation of environmental aspects is a part of the investment process, as well as the work during the holding period and is based on own policy based on guidelines from ILO, UN, the World Bank, EDFI and OECD	6 of 75 holdings are related to clean-tech. (A number of holdings are funds with holdings in several sectors). Investments include e.g. Vireo, producer of renewable energy

- Overall, focus on environmental matters is seen among the state-owned investment vehicles, both in the investment process as and as active owners. Clean-tech is seen as a popular sector to invest in, both due to positive environmental factors but also having significant growth opportunities. However, the investors have in general a wider focus on sustainability, where environment is one factor, rather looking at the specific conditions relating to sustainability for e.g. specific companies. Consequently, capital is not earmarked to green energy.
- Consequently, there is an opportunity for the state to use state-owned investment vehicles to allocate capital more specifically to the green energy sector in order to enable pension capital to be invested in the sector today as well as being a part of establishing a more mature sector and provide future private equity investors with potential investment opportunities.

*Clean-tech is by definition **not** the same as energy or renewable energy and covers other technologies and services although there may be some overlap. Given the low amount of capital invested compared to total Swedish Invested Capital this has not been further split into clean-tech vs renewable energy investments. Note: AP 6 is a significant player offering state-financed venture capital. AP 6 is covered together with the other AP funds

Source: Companies' webpages, OECD, PwC analysis

Green bonds constitute a major opportunity to allocate e.g. pension capital to the green sector

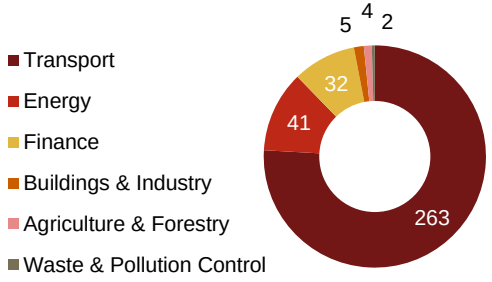
Green bonds

Green bonds can be defined as fixed income debt securities issued by governments, municipalities, multi-national banks or corporations to finance a project contributing to a low carbon and climate resilient economy. The term green bonds includes a wide range of different types of green bonds.

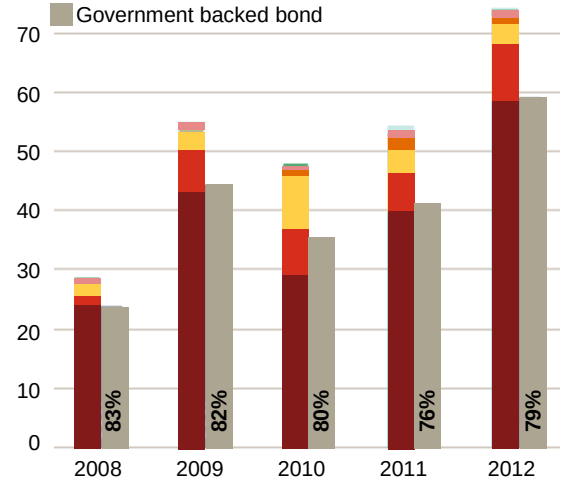
The global green bond market is still rather small and illiquid but is growing rapidly, estimated at c. USD 346 bn in 2012. **The market for green bonds is increasing**, e.g. driven by that green bonds are issued with the same interest rates as other bonds and with the same credit rating, thus providing a green investment opportunity equal to other investment opportunities.

- Pension capital, representing a significant share of the Swedish Invested Capital, seeks investments characterised by lower risk with steady, inflation adjusted income streams.
- A significant share of the capital is invested in bonds, due to these characteristics. Consequently, green bonds could be used to attract significant investments in the green sector.
- To continue to drive capital allocation it is e.g. viewed as important to communicate to investors that green bonds, being related to the financing of green assets, are separated from factors such as selling output, subsidies, and tax incentives, which relate to creating real assets. As debt holders the risk is smaller compared to equity holders.

Total green bonds per type USDbn (total USD 346 bn)



Year of issuance of climate-themed bonds outstanding in 2013 (USDbn)



Note: E.g. bonds issued to finance operations within e.g. renewable energy, which is carried out without being labelled as a "green bond", although relating to the green sector is not covered on this slide

Source: EBRD, SEB, WWF, OECD, PwC analysis

The market for Green Bond is small but is developing rapidly as seen in the three examples below

World Bank

The World Bank's green bonds

The World Bank has issued green bonds worth c. USD 7.5bn (of which USD 2.5bn was issued in 2012 and USD 2bn in 2011) in order to raise capital focusing on developing countries. Capital is used to fund projects within alternative energy installations, new technologies that reduce greenhouse gas emissions, reforestation, watershed management and flood protection.
World Bank issued the bonds to a large extent at similar yield levels as their conventional bonds, but the bonds may still be considered as less attractive to some parties due to lack of liquidity in the market .
SEB has worked as lead underwriter (responsible to raise capital from investors) for bonds in SEK as a part of the USD 7.5bn issues. Investors e.g. include the Swedish National Pension Funds such as AP 2 and AP 3 and Länsförsäkringar.

EBRD

EBRD green bonds

EBRD has issued green bonds since 2010, recently issuing another SEK 1.6bn in green bonds targeting institutional investors seeking to invest in environmentally sustainable projects .

SEB

SEB as underwriter

The Swedish bank SEB has a strong track record as underwriter of green bonds (i.e. buying the issue of bonds from the issuer and re-selling them to investors), e.g. working with issuers as the World Bank, EBRD and EIB. SEB recently also facilitated a green bond for Gothenburg City of SEK 500m (part of a potential issuance of SEK 2bn) to help fund environmental projects. In November 2013SEB also facilitated the first green corporate bond for Vasakronan.

Note: E.g. bonds issued to finance operations within e.g. renewable energy, which is carried out without being labelled as a "green bond", although relating to the green sector is not covered on this slide
Source: EBRD, SEB, WWF, OECD, PwC analysis

Structured green products and green infrastructure funds are instruments and vehicles with potential to attract e.g. pension capital to the green sector. Current offering is viewed as too small

Structured green products

- Structured green products are alternatives to green bonds, but with similar features which attracts pension capital, e.g. in terms of risk level.
- A structured product is a financial engineered product consisting of e.g. shares and options, in order to perform in a certain way, given development of the market.
- A green structured product can e.g. give the investor exposure to the environment sector while protecting all of the invested capital through the use bonds in the construction of the product. Consequently, it can be an attractive investment from a risk and reward perspective to investors, such as managers of pension capital seeking low risk investments, thus driving capital to the green sector.
  - An example is Société Générale's synthetic green bond, being linked to the performance of the Lyxor Dynamic Environment Fund, which offered exposure to the SGI Global Environment Index (index aiming to reflect the global environment sector comprising 30 companies which have their biggest share of revenues from clean water, alternative energy and/or waste management)
- Growth in the structured green products segment is considered to be needed going forward in order for the possibility to attract significant capital to the sector.

Infrastructure funds

- Green infrastructure funds are a possible way of importance for pension capital to be allocated to green energy.
- Funds as investment vehicle offers the opportunity to share scale, knowledge and gain diversification, which is beneficial to investors not wanting to invest directly in infrastructure projects, e.g. due to previously stated reasons. Thus, by using funds a broad mass of investors can gain access to the green sector.
- E.g. the EIB has set up a number of funds together with other institutions and the private sector to invest in renewable energy. An example is the Green for Growth Fund, where EIB was one of the initiators, which provides financing (loans and equity) and technical assistance to sustainable energy projects in the Western Balkans and Turkey.
- Additionally, there are infrastructure funds without any governmental involvement such as the Swedish EQT's infrastructure fund. However, EQT carry out infrastructure investments regardless of sector, i.e. not specifically allocating capital to green infrastructure related assets.
- There are also infrastructure funds, focusing only on green energy infrastructure investments. For example, HG Capital's renewable energy infrastructure fund and Macquaire European Infrastructure Fund renewables.
- The current possibility to invest in green infrastructure funds on a global basis is considered too low. Additional alternatives are considered to be needed in order to allocate additional capital to the green sector.

Source: EIB, OECD, PwC analysis

Angel investing and peer-to-peer lending are examples of investment vehicles, instead enabling private individuals to finance investments in the renewable energy sector

Angel investing

- Angel investing refers to high net worth individuals investing in companies, and similarly to early stage venture capitalists take the role as active owners and work closely to the companies they invest in.
- Angel investors in Sweden is estimated to invest c. SEK 3bn per year.
- Angel investors often invest in an early stage, often during the R&D phase, prior to the company seeking debt financing for developing the business or seed capital as the company may be too small to attract venture capital investors.
- One investment area for angel investors is, similar to venture capitalists, early-stage, high-potential growth start-up companies making e.g. cleantech companies suitable companies to invest in.
- Based on the above, angel investing is often associated with high risk, why angel investors often invest together through angel networks or online platforms, e.g. such as the European network "Put Your Money Where Your Mouth Is Community" focusing on companies e.g. within climate-change mitigation and CONNECT Green, a network focusing on cleantech companies.

Peer-to-peer lending

- Peer-to-peer lending are loans which are given directly to the entrepreneur, typically by private individuals, high net worth individuals or institutions.
- Just as in equity crowd funding (like peer-to-peer lending but with equity investments instead of debt financing) as well as sometimes for angel investing, online platforms are used to facilitate loans.
- Peer-to-peer lending is an alternative to traditional finance routes such as e.g. venture capital or bank debt, which may be difficult to access.
- Additionally, peer-to-peer lending can be a faster alternative compared to bank financing or venture capital, which can be key for developers operating within renewable energy, e.g. such as solar energy.
- Moreover, peer-to-peer lending is characterised by low entry barriers for lenders, due to low minimum amounts.
- Since peer-to-peer lending is a way of financing via debt, investments are not restricted to companies, but is also used to finance direct investments in renewable energy e.g. made by farmers and land-owners investing in solar energy or wind power.

Source: WWF, CONNECT Green, Tillväxtverket, Energimyndigheten, Renewable Energy News

Considerable fundamental factors such as an unclear climate policy environment act as barriers to invest in green energy

Barrier to increase investment in green energy	Comment
Unclear climate policy environment	• Failure of international climate negotiations to commit to climate related targets creates uncertainty among investors regarding green energy related investments. Thus, lack of commitments by specific regions may hinder increased investments in environmentally sustainable companies.
Climate change risk is not included in traditional strategic asset allocation	• Strategic asset allocation, focusing to a large extent on historical quantitative analysis, is a central part in investment decisions. • Unclear climate policy environment and uncertainty around the full economic consequences of climate change makes analysis of historical information ineffective in order to project future development. A foundation enabling investors to carry out qualitative forward looking analyses would be needed. • Consequently, currently allocation towards more sustainable holdings is not in focus.
Mismatch of needed capital and available capital	• Large need of capital is expected going forward, driven by emerging markets and the energy transition driven by e.g. the 2°C target. • However, global savings are not expected to match the development, why a gap between needed and available capital is expected. Additionally, it is observed increased focus on short term investments among asset managers. • As a consequence, a shortage of capital for long-term risky investments (or investments considered to have a higher risk level), characteristics applicable on e.g. investments in green energy, is expected.
Lack of incentives among portfolio managers	• Lack of incentive among portfolio managers to reallocate from fossil fuel holdings to investments in the green sector with the same risk/reward profile. Additionally, a reallocation is also held back by e.g. transaction costs

Source: PwC analysis, OECD, Mercer, industry experts, media search

Additionally, strong index focus and lack of suitable financial instruments also serve as barriers for allocating capital to the green sector

Barrier to increase investment in green energy	Comment
Capital allocation based on index	• There is strong focus on capital allocation based on relevant indices for funds. There are several reasons for that, e.g. the use of index funds replicating an index, it can be hard for large funds to deviate from index in their holdings, funds are evaluated based on performance compared to index implying an increased risk by deviating from index, as well as requirements of high returns at low risk. Previously stated reasons strengthens incentives to have holdings aligned with relevant indices. • As a consequence capital is allocated to the fossil fuel sector automatically, and smaller companies within green energy is only allocated a smaller share of capital.
A narrow sector focus as such - when the is perceived as less attractive from a risk/reward perspective	• The broader implications of lack investments in green energy is overlooked, i.e. stranded assets, flooding's, potential water shortages etc. due to lack of carbon and climate assessments of the whole portfolio. • Investments in e.g. cleantech are considered, especially from a private equity point of view, as less attractive from a risk/reward perspective as returns do not in general tend to be higher compared to other segments, but the risk is greater. • There is e.g. a political risk (e.g. related to carbon dioxide tax level), the sector is capital intensive and may require recurring capital injections due to high development costs often associated with the sector and the investment period can often be long as it takes time to reach a large scale and profitable operations.
Lack of suitable financial instruments	• Pension capital accounts for a significant share of the capital on the financial market. Investors of pension capital are interested in lower risk investments providing a steady, inflation adjusted income stream. • Lack of suitable alternatives for such investments limits investments in green energy. Additionally, it is important with liquidity in the instruments in order to attract capital.

Source: PwC analysis, Tillväxtanalys, McKinsey, Mercer, media search

Main drivers to increase investments in low carbon energy…

Main drivers to increase investments in low carbon energy

- **Improved risk return**, low carbon intensity has to prove its more profitable than high carbon intensity within the energy sector. When proven, investments will follow. Any signs of decreased growth and lower profitability among fossil fuel related companies will benefit arguments supporting investments in low carbon energy.

- **Increased regulations supporting low carbon energy** is effective and there are a number of different kinds available. Notably certificate systems, energy-tax, CO_2 -tax and Emission Trading Schemes.

- **Long-term investors** such as managers of pension capital **need to adopt a long-term strategy for their investments** . Climate change is a global risk factor for investors with long-term focus, thus needing to be addressed. E.g. through reallocating capital.

- Investments that are based on the value and returns from fossil sources must adhere to that all carbon in the reserve included in the investment is unlikely to be released. **The pricing for energy from fossil sources will be more about economic instruments than production costs, investors needs to weigh this into their calculations.**

- **Increased visibility of carbon exposure,** policies or schemes that enforce funds to publish carbon exposure will probably benefit a shift towards investments in low carbon energy.

- **Incentives to switching,** mechanisms to lower the switching cost from reallocation of capital or lower the threshold of investment in green energy.

..are today lower than the main barriers to increase investments in green energy…

Main barriers to increase investments in green energy

- The renewable energy sector is considered as **less attractive from a risk/reward perspective.** Lack of incentives among portfolio managers to reallocate from fossil fuel holdings to investments in the green sector with the same risk/reward profile.
- **Unclear climate policy environment, long term investments need long term politics**. Long term politics are seldom seen on current agendas.
- **Climate change risk is not included in traditional strategic asset allocation**. Consequently, allocation towards more sustainable holdings are not in focus.
- **Mismatch of needed capital and available capital**. As a consequence, a shortage of capital for investments in e.g. green energy, is expected.
- There is **little incentive for fund managers** to re-evaluate their energy investments and include CO2 intensity and leave the established investments, this "inactive capital" could very well be reallocated to investments with the same return- and risk profile but with focus on CO2 intensity.
- **Capital allocation based on index,** limiting allocation to the green sector**, favoring traditional investments.**
- **Lack of suitable financial instruments**, for e.g. pension capital, hinders allocation to the sector.

...though actionable measures to increase investments in green energy are plenty (1 of 2)

PwC recommendation in order to increase investments in green energy

- **Work aggressively to revalue portfolios.** Weigh in carbon intensity as a factor in understanding the risk and return of the investments. Redefining risk in investment. Use NPV of carbon assets to cater for future risks.
- **Control and influence in current holdings** so that investee see and understand the development and evolution of risk in decisions with high carbon intensity and scope of decisions with low carbon intensity.
- **Work with regulations such as tax solutions**. Lower taxes if investment switches from high to low CO2 intensity.
- **Extend the mandate of investments for funds**, for example it is difficult to find alternatives to investments in traditional large energy companies in a particular energy company with lower CO2 intensity but it would be quite possible to get similar risk and return profile if allowing investments in green energy bonds.
- Swedish capital asset managers need **clear rules and incentive structures that actively encourages fund managers to seek out alternative securities with similar risk/return as current assets but with lower, or no, carbon intensity**. For example an existing portfolio of corporate bonds issued by companies with large carbon reserves could be rebalanced with green bonds of similar credit rating and duration.
- **Implement reporting requirements on carbon intensity** for institutional investors who want to follow PRI or global compact.
- **Calculate how much "inactive capital" there is in funds** (e.g. AP Funds) and how much this implies in carbon reserves and/or carbon emissions.

...though actionable measures to increase investments in green energy are plenty (2 of 2)

PwC recommendation in order to increase investments in green energy

- **Mandate an action-oriented dialogue between financial institutions and policy makers** about the FIs abilities, available financial instruments and conditions required for enabling investments aligned with a two degree compatible infrastructure and roadmap
- **Explore and activate the market transformation opportunity held by Swedish Insurance and Pension Funds** with very large low cost capital (long tern assets) to develop more mutual funds, sustainable corporate bonds and green bonds in the field of energy efficiency and renewable energy.
- Total **Swedish invested capital** in the entire energy sector **represent more than a quarter required in global renewable energy investments for a path to stay below two degrees. Use that significant power to shift the financial sector from the problems to the solutions to climate change**.
- **Improve finance professional understanding about the negative implications of continued investments in the fossil fuel industry** including (i) this is not long-term compliant with staying below two degrees global warming, and (ii) increasing investments in unconventional fossil fuel resources are increasingly harmful for the environment and people.
- **Be particularly cautious towards investments on the Moscow Stock exchange** where the vast majority of Swedish invested capital in fossil fuel reserves exist
- **Minimise capital allocation based on index** since this means capital is allocated to the fossil fuel sector automatically. Automatically steering investment decisions towards fossil fuel interests is counterproductive to combating climate change. Use your influence to address the institutions that have powers to address this vicious circle for climate change.
- Mutual fund managers should **make it easy for climate change aware customers to choose investments that are free from unburnable fossil fuel reserves**. All fund managers should give transfer rights for individuals, i.e. possibilities to move the pension saving to another company that offers more active management.
- Better align investments with current practice and requirements of large institutional investors to overcome barriers and **meet the capital need of companies in green sectors**.