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CEEC 2013

Nuclear Energy in Central Europe

26 November 2013

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Westinghouse Electric Company

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Westinghouse in Europe Today

- Westinghouse technology is the basis for over one-half of Europe's operating nuclear plants.
- Westinghouse has more than 4,000 employees in the EMEA Region.
- Two nuclear fuel facilities (Springfields & Västeras).
- EMEA operations in:
  - **Belgium:** Brussels*, Nivelles
  - **Bulgaria:** Sofia
  - **Czech Republic:** Prague, Temelín
  - **France:** Orsay, Marseille
  - **Germany:** Mannheim
  - **Spain:** Madrid, Tarragona
  - **Sweden:** Västeras, Täby
  - **Ukraine:** Kiev, Kharkov
  - **United Kingdom:** Chorley, Springfields
  - **South Africa:** Capetown, Johanesburg

**** Westinghouse EMEA Headquarters***

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EU Energy Policy

"three pillars"

Sustainability **Competitiveness** **Security of Supply**

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Sustainability

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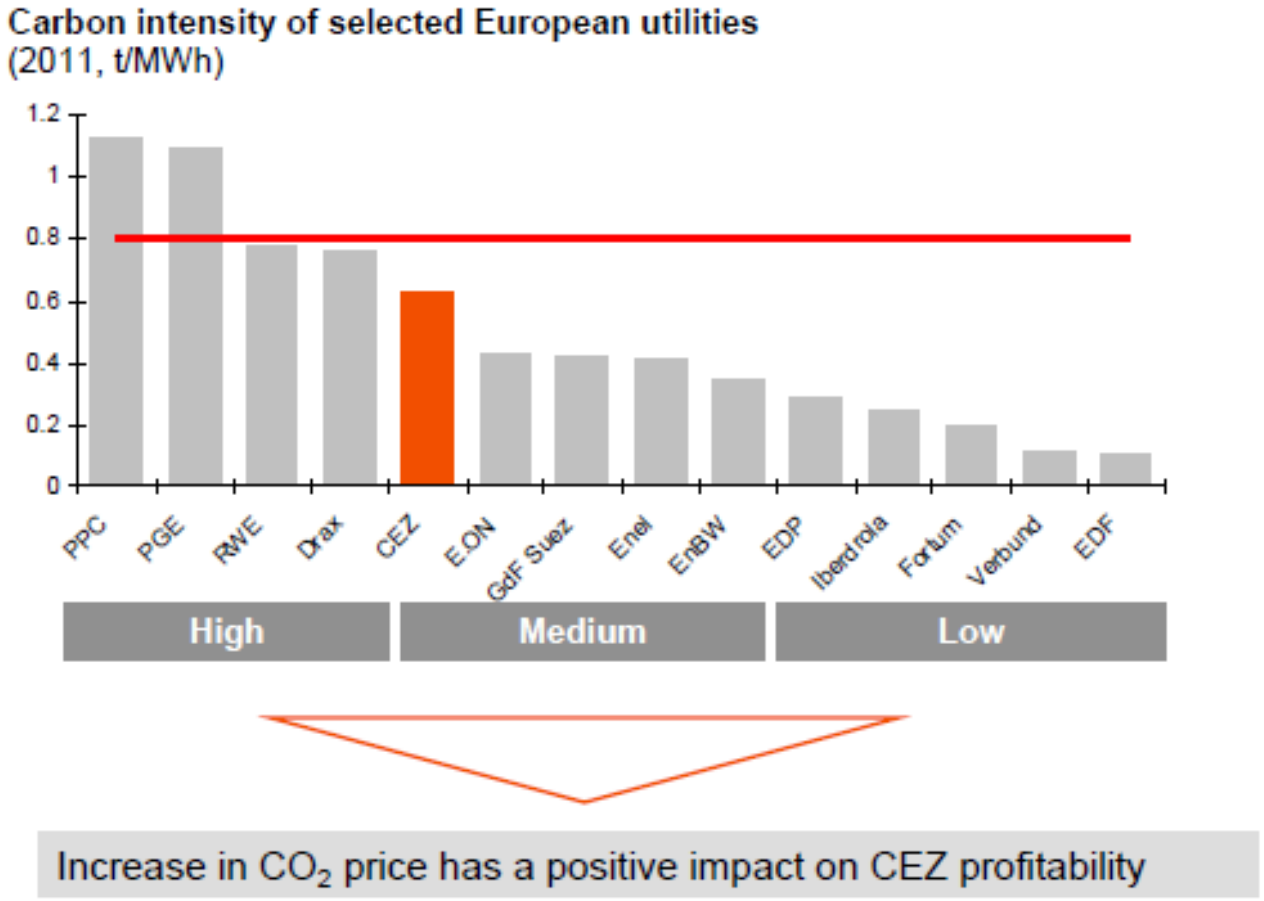
Utilities Carbon Intensity (Example: CEZ)



Increase in CO_2 price has a positive impact on CEZ profitability

Source: CEZ

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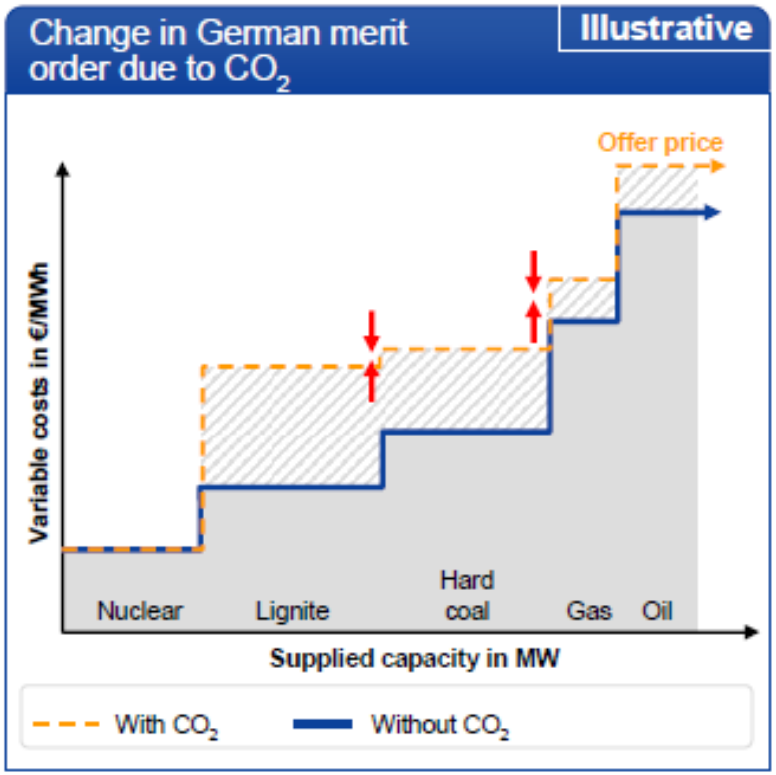
CO_2 Cap and Trade System



- Marginal costs for old lignite-fired power stations increased more than marginal costs for efficient hard coal plants
- Marginal costs for old hard coal-fired power stations rose more compared to those of efficient gas-fired power stations
- As this is a dynamic system with changing fuel price relations (e.g. gas vs. hard coal), it is difficult nevertheless to predict at which CO_2 price levels a switch between the fuel types in the merit order would happen

Source: RWE

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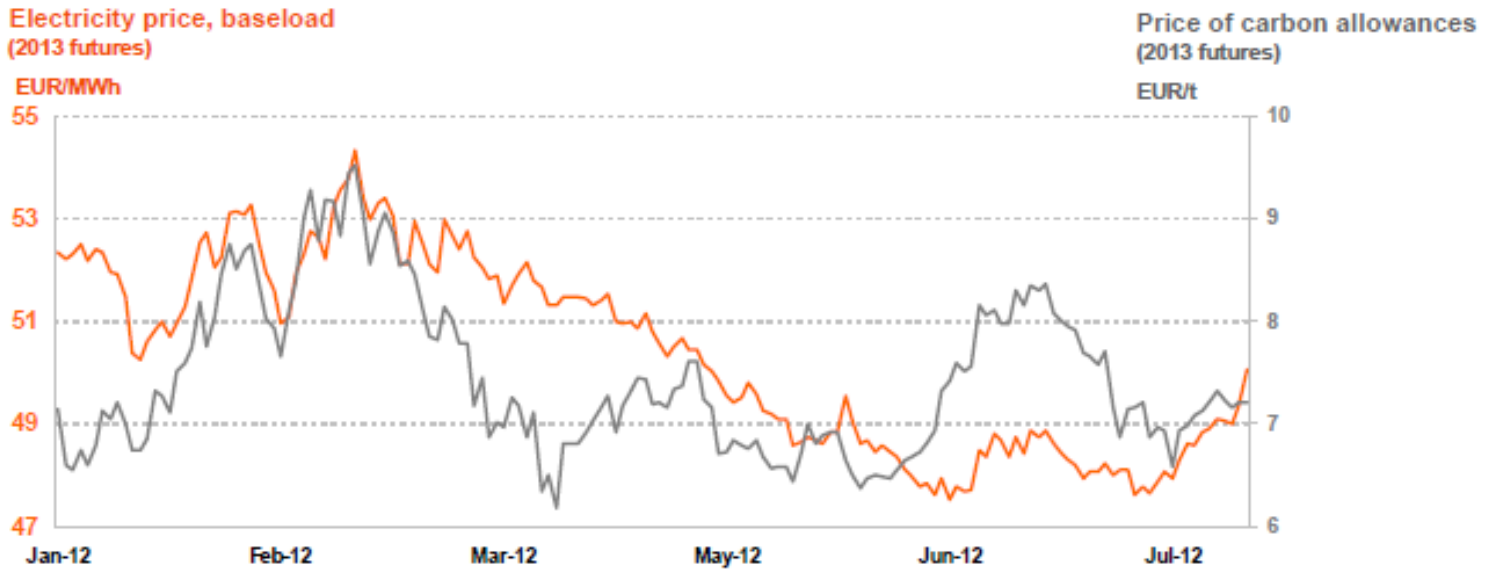
Price of Electricity / Carbon Allowances



prices of EUA allowances are at low levels, average price reached 7 EUR/t in 2Q 2012

- the gradual fall of emission allowance prices had a significant impact on forward and spot electricity prices
- at these price levels, the EU ETS system fails to fulfil its function of an incentive for reduction of CO_2 emissions during electricity production
- the European Commission aims to reduce volume of emission allowances planned for auctions in the first three years of NAP 3 and bringing them back later. The examined options of such „set aside" are 0.4, 0,8 and1.2 bn allowances.

Source: CEZ

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Competitiveness

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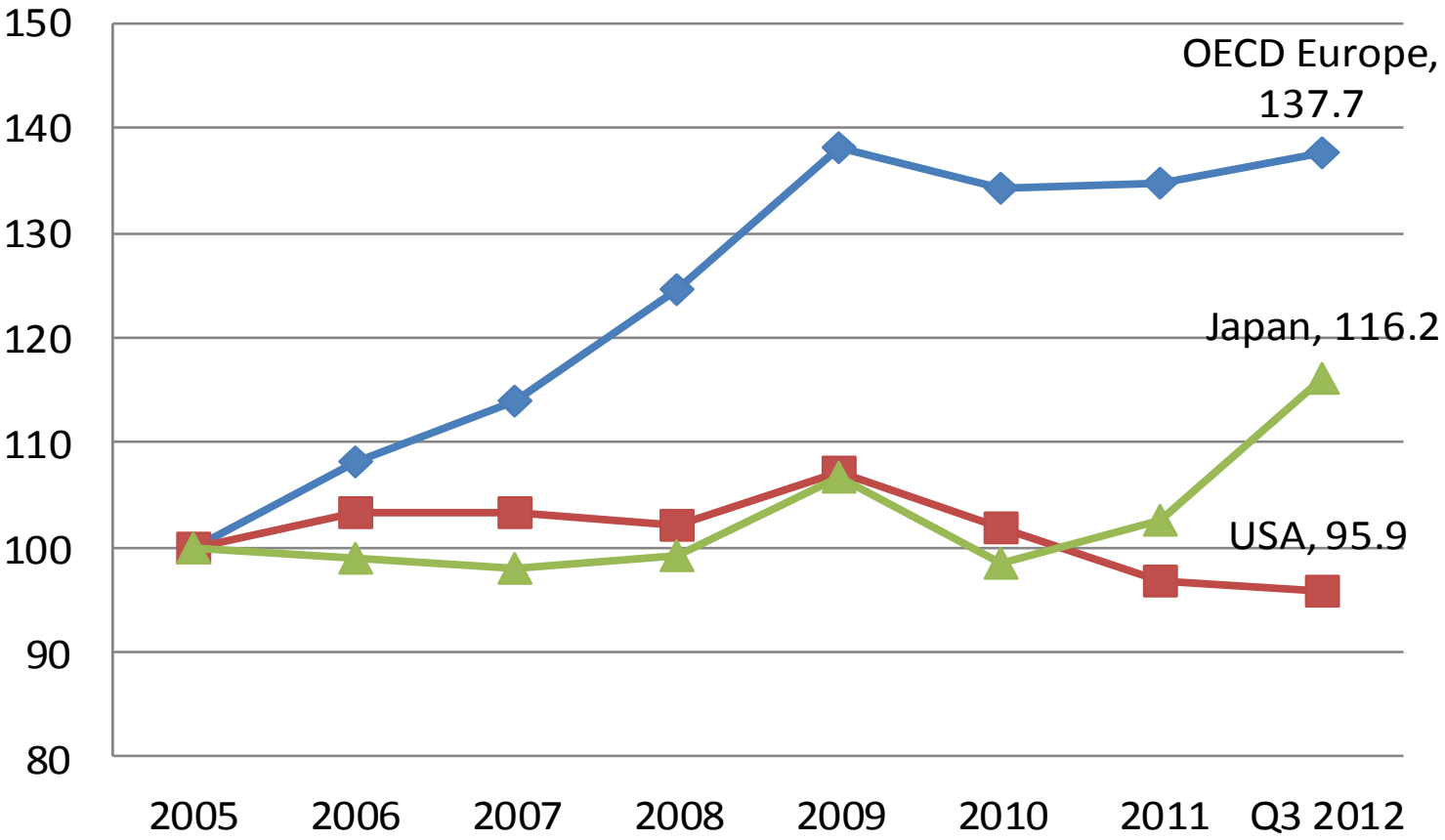
Electricity Prices – the U.S. is increasing its advantage…

Evolution of end-user electricity prices for industry (2005 = Index 100)



Source: IEA, Energy Prices and Taxes, 4th quarter 2012

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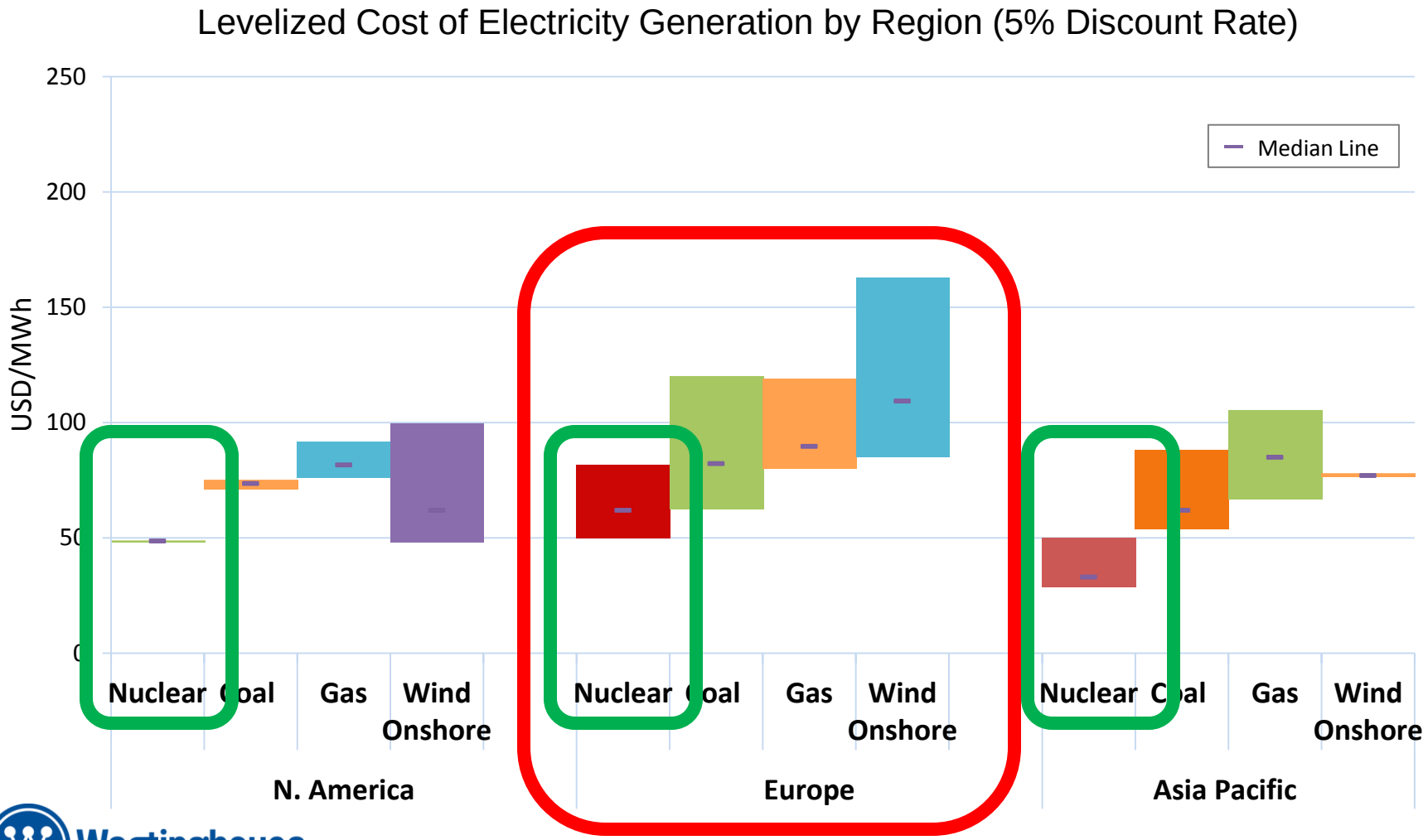
Nuclear is Already a Cost Competitive Technology



Source: Projected Costs of Generating Electricity, IEA/NEA 2010

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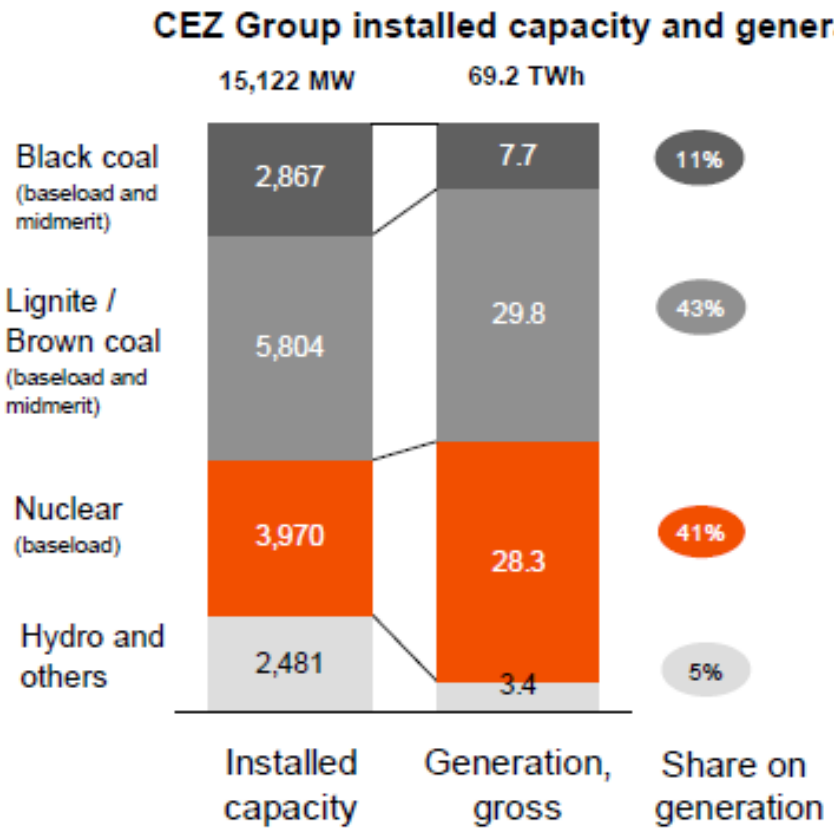
Example: CEZ Group Benefiting from Low Cost Generation Fleet



- Coal power plants are using mostly lignite from CEZ's own mine (63% of lignite needs sourced internally, remaining volume through medium-term supply contracts)
- Nuclear plants have very low operational costs

CEZ has a long-term competitive advantage of low and relatively stable generation costs

Source: CEZ

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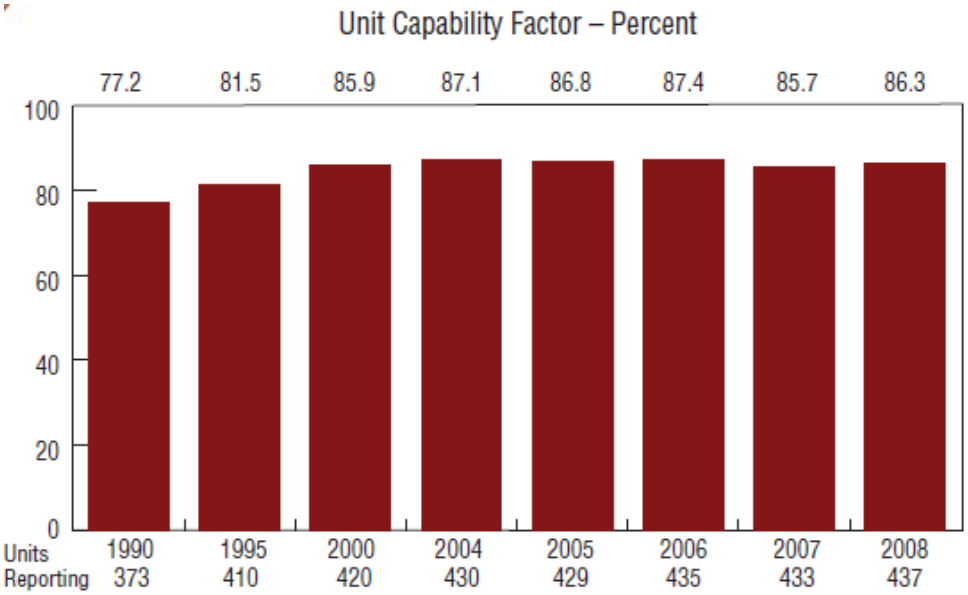
Efficiency by Generation Sources

Fuel Type	Average Capacity Factors (%)
Nuclear	89.8
Coal (steam turbine)	71.1
Wind	30.3
Solar	18.8

Global Nuclear Statistics



Source: World Association of Nuclear Operators

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Security of Supply

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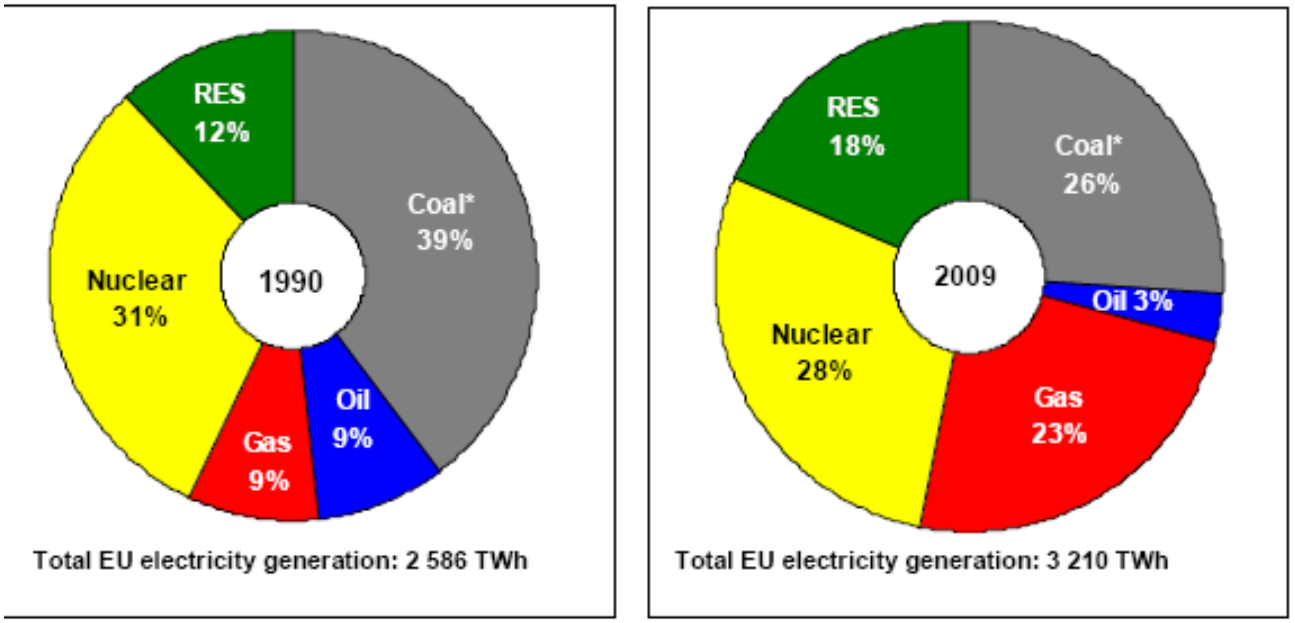
EU Electricity Generation

Gas and RES are more and more contributing to the electricity generation in the EU, just after nuclear and coal….

Electricity Generation in the EU by type of fuel in 1990 and 2009



Eurostat May 2011 - * Coal and other solid fuels - RES: Renewable Energy Sources

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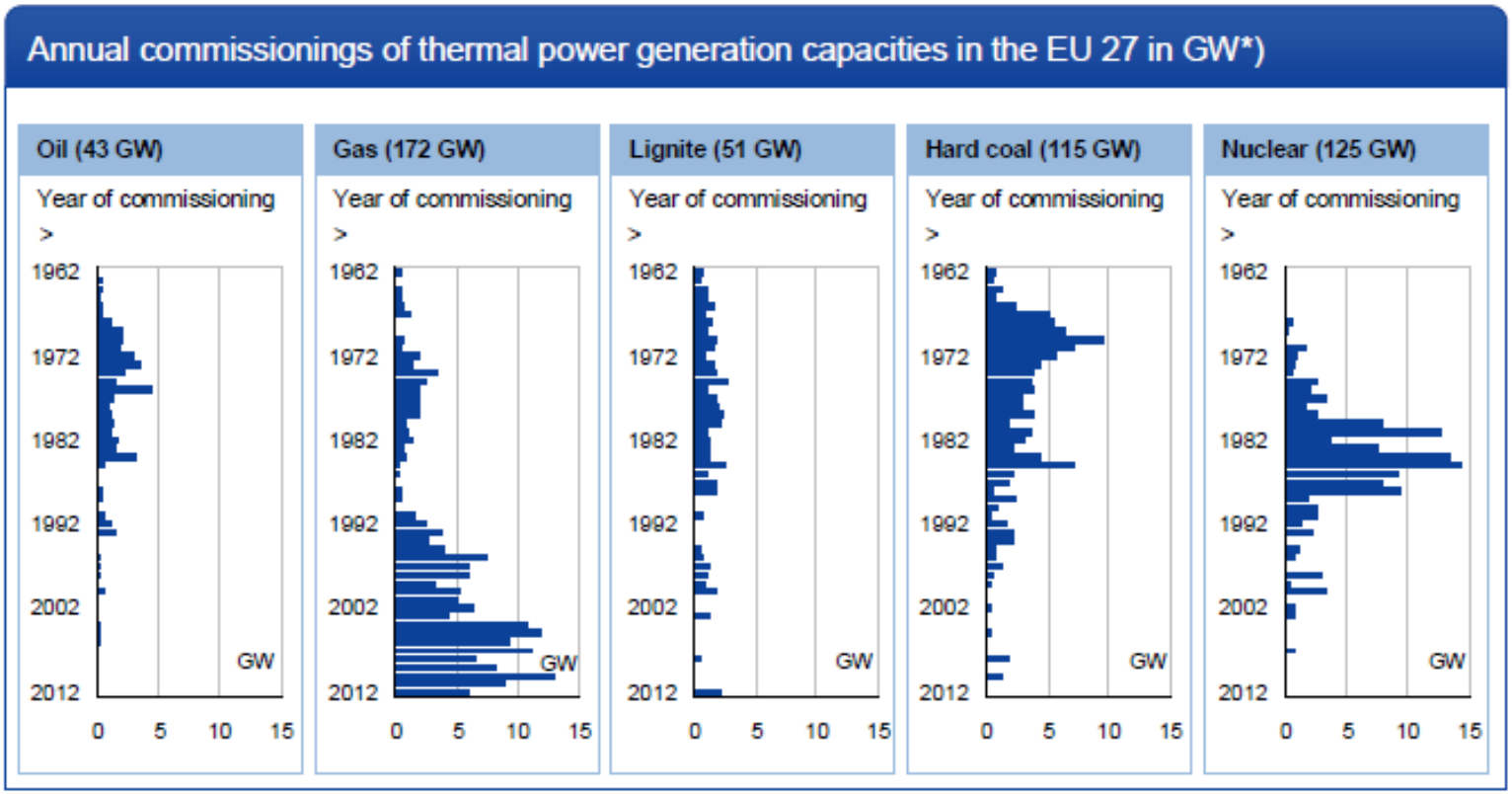
Capacity Trends (50 years outlook)



1 Adjusted net generation capacity.

Sources: Platts Database, Worldwatch Institute, RWE, 2012.

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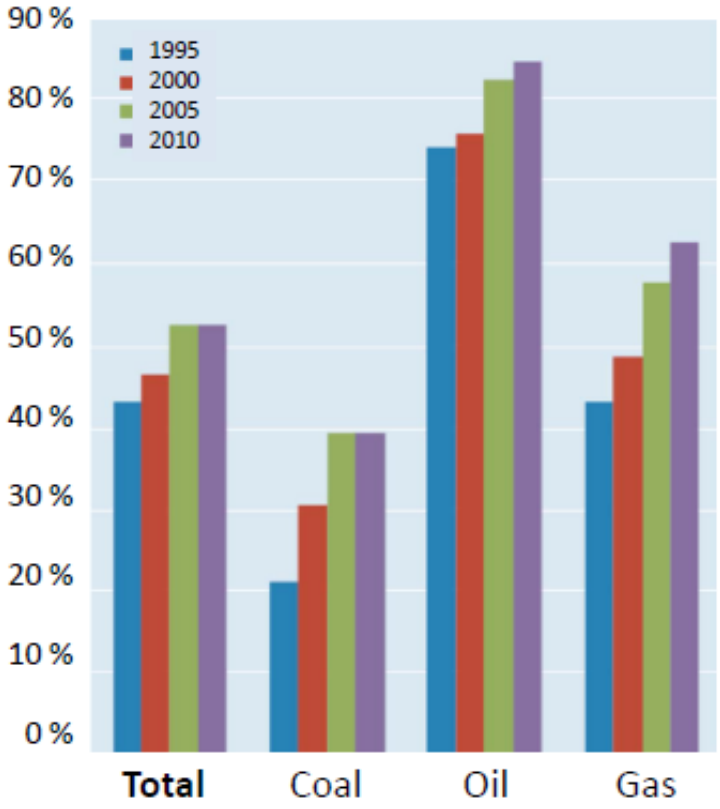
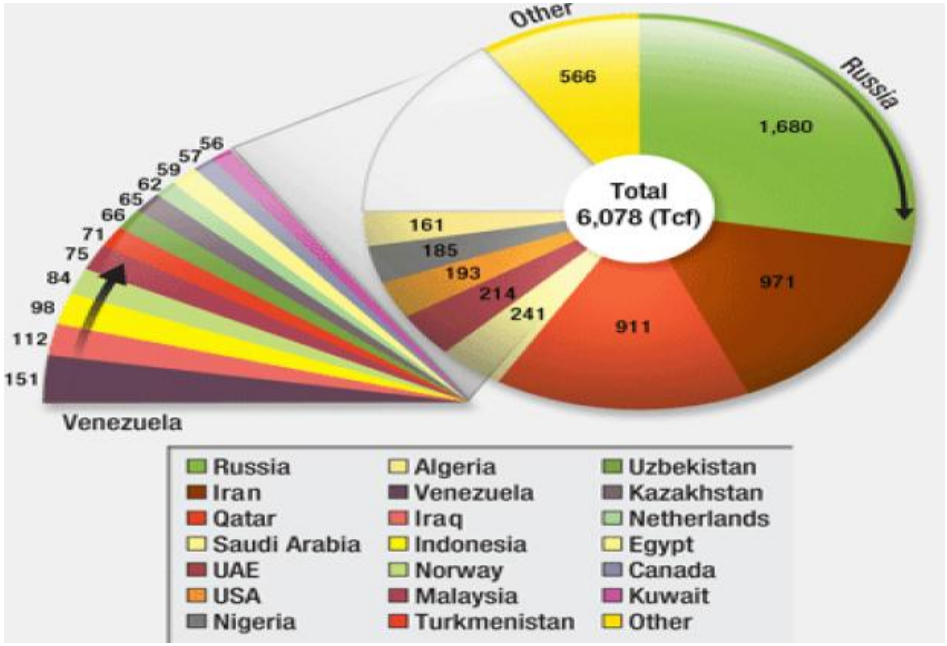
EU Import Dependence





Worldwide Gas reserve

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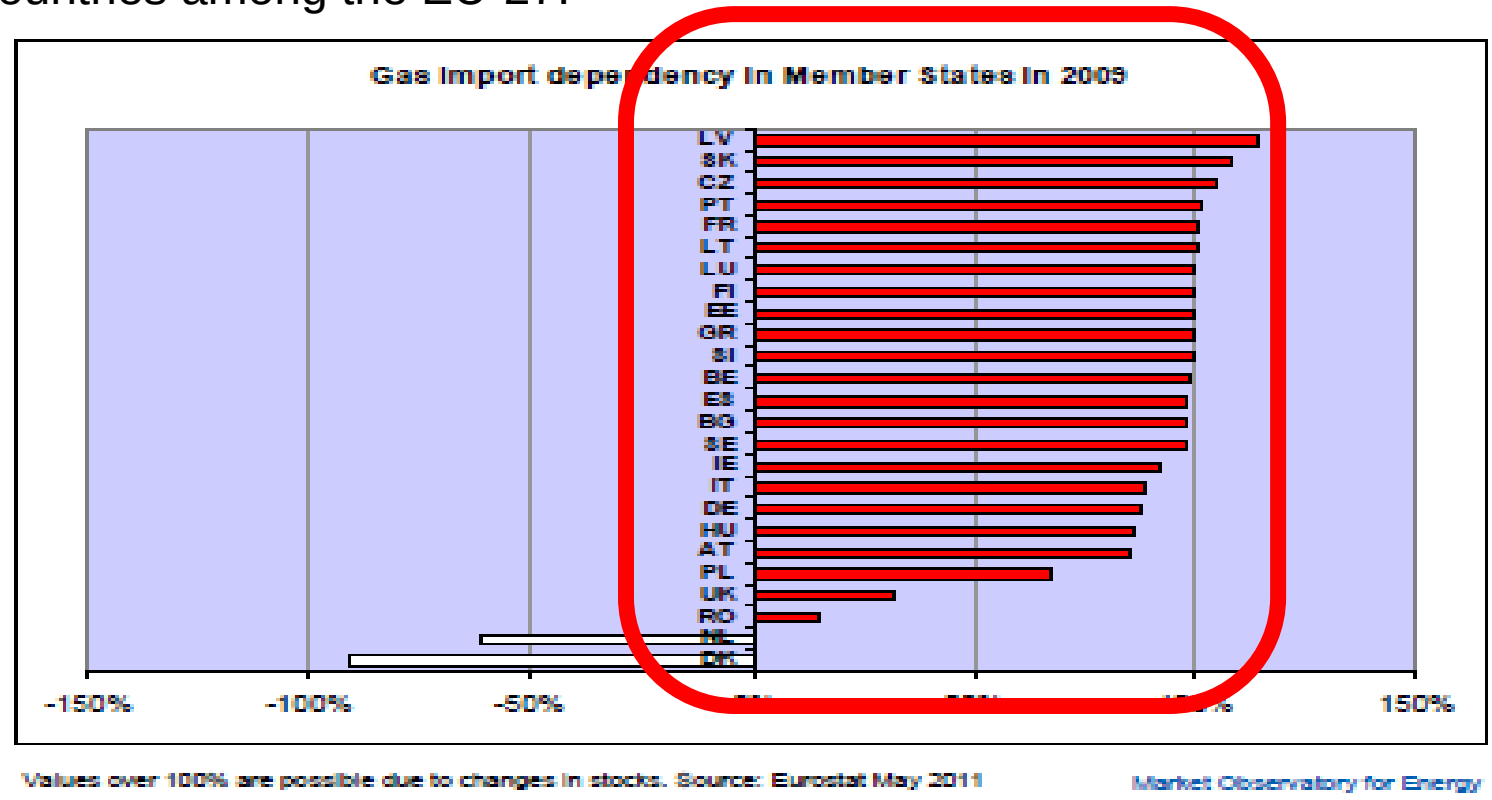
EU Energy Dependency

In 2009, Denmark and the Netherlands were the only gas exporting countries among the EU-27.



Values over 100% are possible due to changes in stocks. Source: Eurostat May 2011

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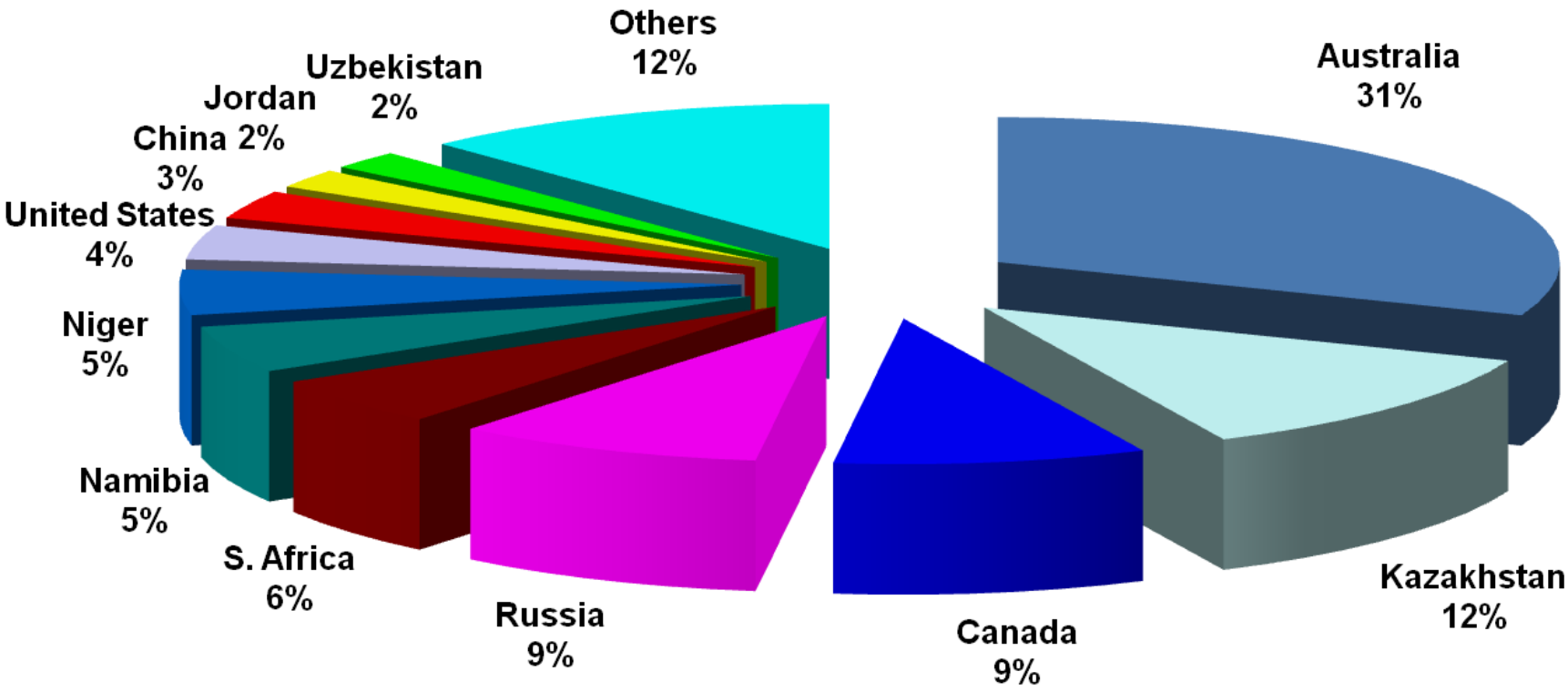
Identified Resources of Uranium



Source: NEA & IAEA 2010

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EU Energy Policy to the Rescue?

- European energy policies are generally driven by three considerations:

  - **combating climate change**

  - **competitiveness** (affordable energy for domestic and industrial consumers); and

  - **security of energy supply**

- Most Member States try to find a balance.
- **BUT**, the EU weighs tackling climate change ahead of other priorities:

  - "20-20-20" (GHG, RES and energy efficiency) targets by 2020.

- Conflicting policies *(ETS vs RES vs liberalization etc):*

  - unstable and unpredictable policy framework; and

  - 27 political interventions has cost utilities ***€200bn in shareholder value*** [Citibank Report].

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Lack of Clarity/Stability of European Energy Policies and Effects on Low-Carbon Projects

- EU policies are moving toward **"re-regulation":**
  - picking winners and losers (RES/EE)

- In parallel, Member States are ***incentivizing some sources*** (RES, EE etc) and ***penalizing others*** (coal, nuclear etc)

- At the same time, nuclear and RES face similar issues as EU and Member State policies are ***inconsistent*** - promote or detract from its development (RES incentives - then withdrawn, nuclear taxes (steadily increasing) etc.)

- **Nuclear** not clearly recognized as a viable EU **low-carbon** policy option.

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Nuclear is Part of the Solution

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Nuclear Energy in Europe: Facts and Data

15 countries use nuclear power technology in Europe

137 nuclear reactors in operation in Europe(*)

27.8% nuclear share of power generation

500 million tons of CO_2/year avoided due to nuclear generation

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(*) Excluding Ukraine and Russia.

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Value of Nuclear Power

- Nuclear power provides safe, clean, reliable and affordable energy and ***support economic growth***:
  - Not subject volatility of fuel prices
  - High capacity factors
  - Competitive cost of electric generation
  - Nuclear power is very safe
- Nuclear power ***creates high paying jobs***:
  - Nuclear power drives training and education
- Nuclear power creates ***economic value for the surrounding community***:
  - Taxes
  - Local businesses
- Nuclear power plants are very safe places to work
- Nuclear power creates domestic and export opportunities for industry

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Recommendations [1/2]

- Clear recognition by EU policy makers that **nuclear energy** is being developed by some Member States and a **permanent part of the energy mix**
- Consistent and **fair treatment** of all **low-carbon** power generation
- **Coherent, predictable and long-term energy/environment** policy framework
- Expansion/introduction of innovative financial instruments to **support capital intensive projects which meet EU 2020 goals** (‘20-20-20’) and 2050 aspirations (80-95% GHG reduction)

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Recommendations [2/2]

- More **harmonization in nuclear licensing** requirements across the EU whilst also ensuring high-levels of safety
- Fully functioning and **stable ETS regime** which provides investors with long-term clarity in decision-making
- Support for **research and innovation** – leadership /knowledge

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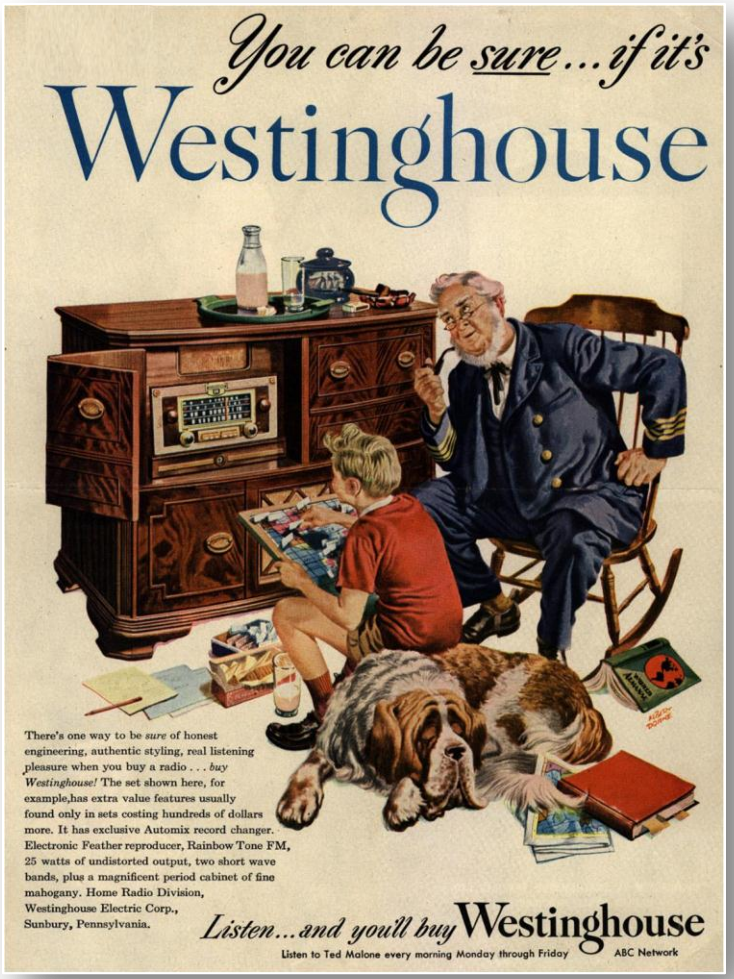
One thing that has not changed…

1954 → **2013**



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if it's Westinghouse

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Questions?