

Will renewables turn the energy market (and gas) into a "weather derivative" in Europe?

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Venue: Kuala Lumpur



Patron



Host



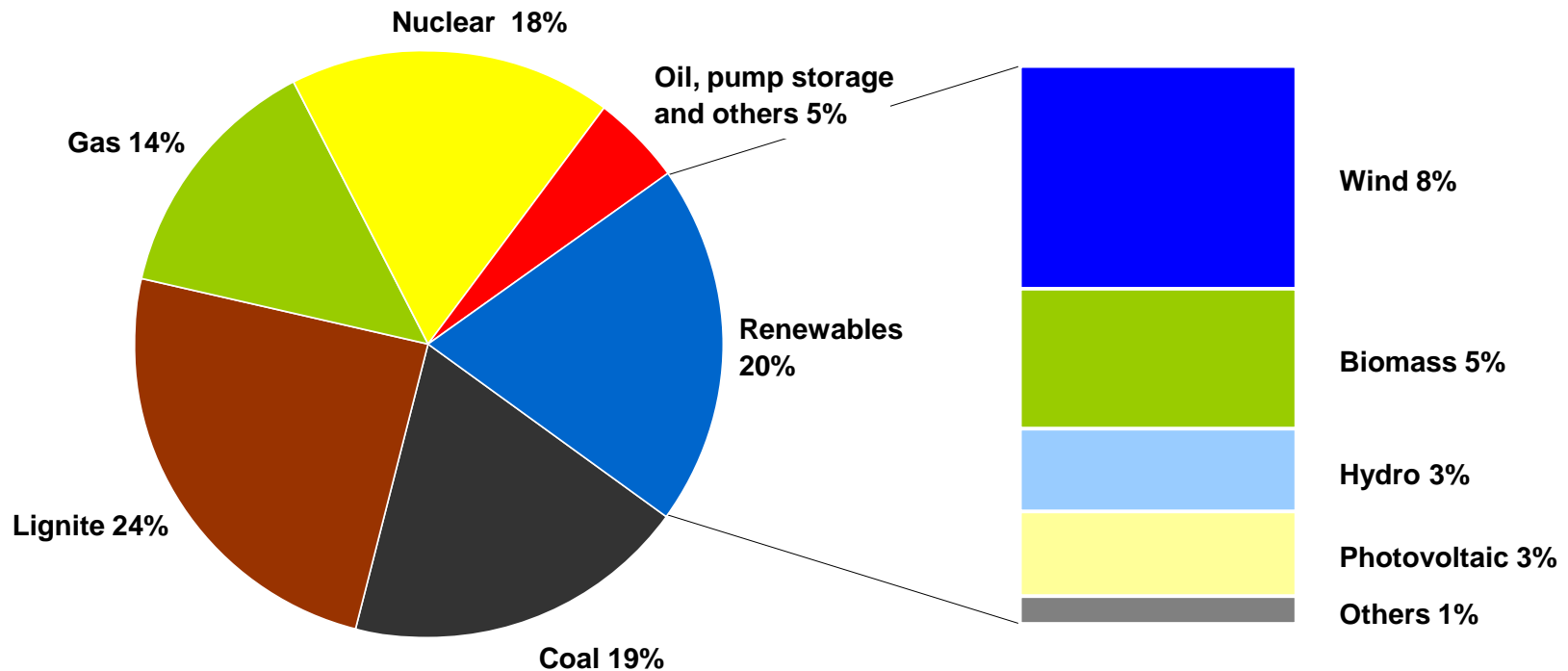
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With generous subsidies renewables are gaining market share

All of (northern) Europe is boosting its wind and photovoltaic (PV) capacity as a result of ambitious EU climate targets (e.g. the “20-20-20” target)

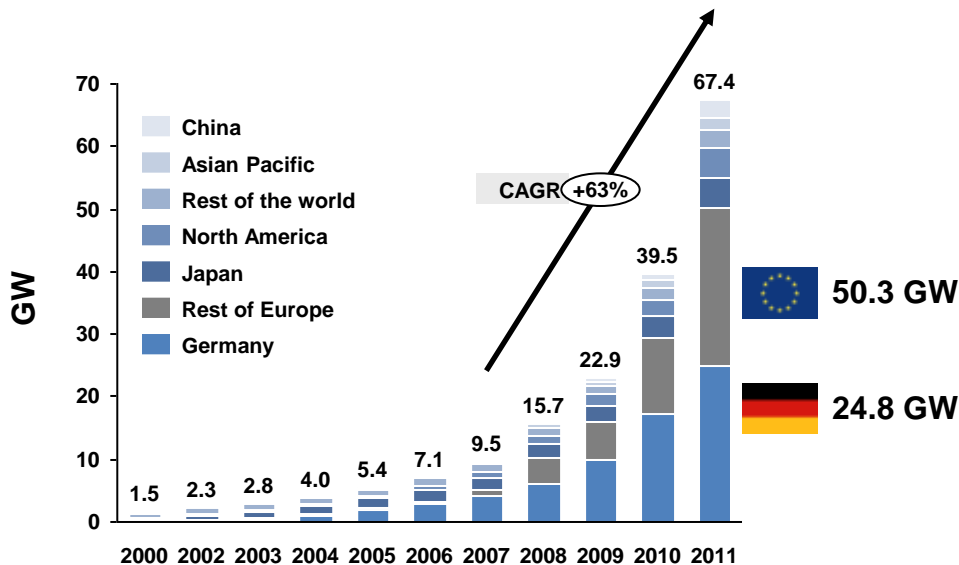
Gross power generation by fuel categories in 2011 (Germany)



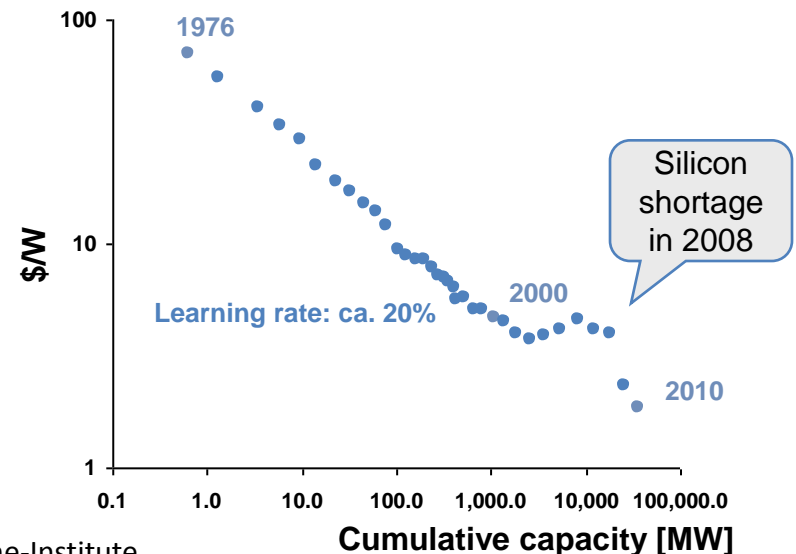
Example: The growth story of PV in Europe

- European feed-in tariffs provided reliable framework for ramp-up of PV module production
- So far, PV growth has been focused on Europe, making up for approx. 75% of global installed capacity
- PV industry achieved learning rate of approx. 20%, i.e. with each doubling of produced cumulated volume, prices decreased by 20%

Total PV capacity

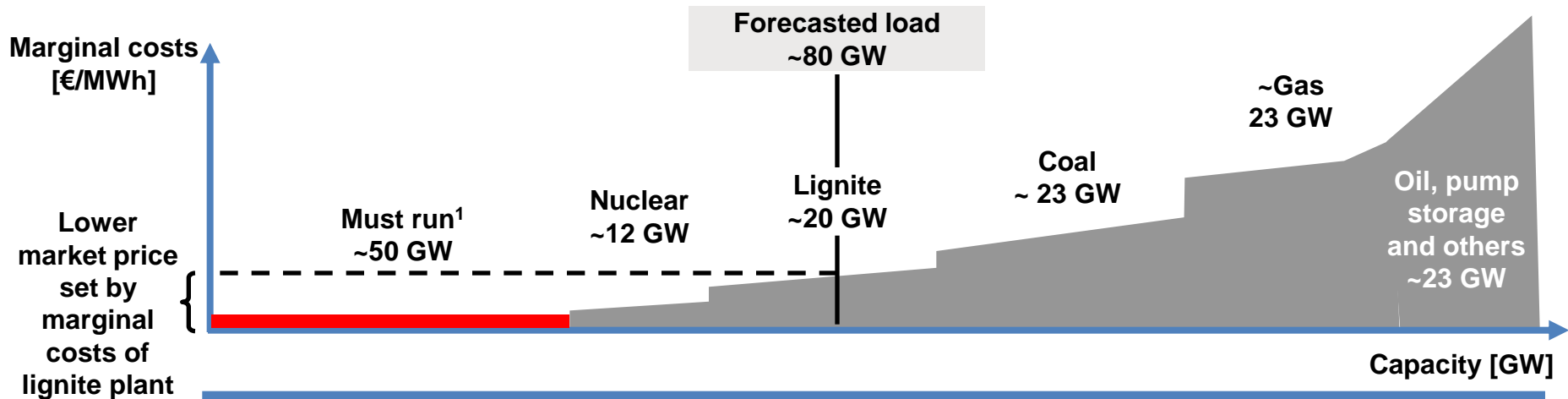


PV module price

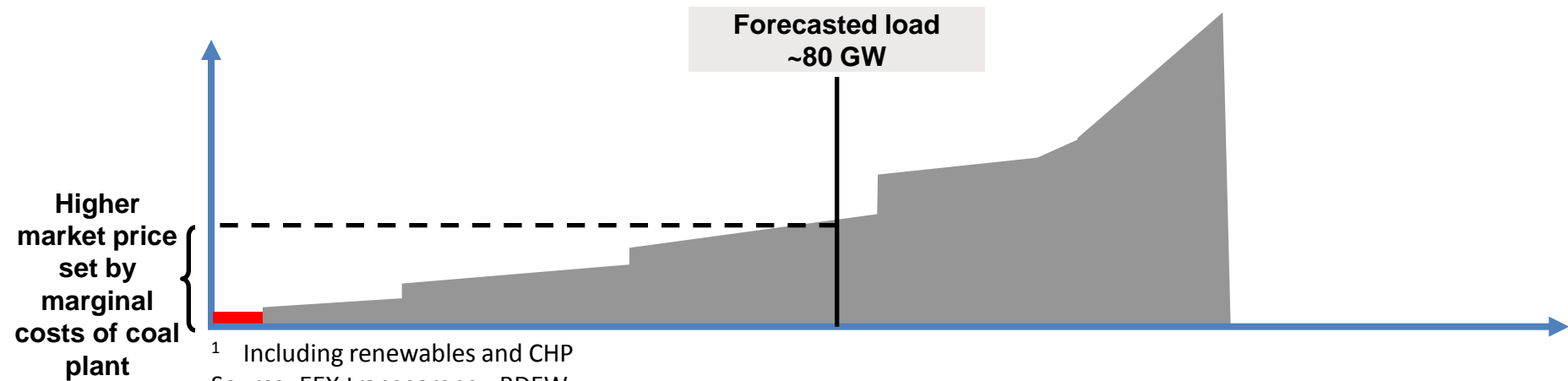


Renewables are pushing “traditional” fuels out of the market due to their first priority in the grid

Scenario 1: Total installed capacity in Germany (~150 GW)



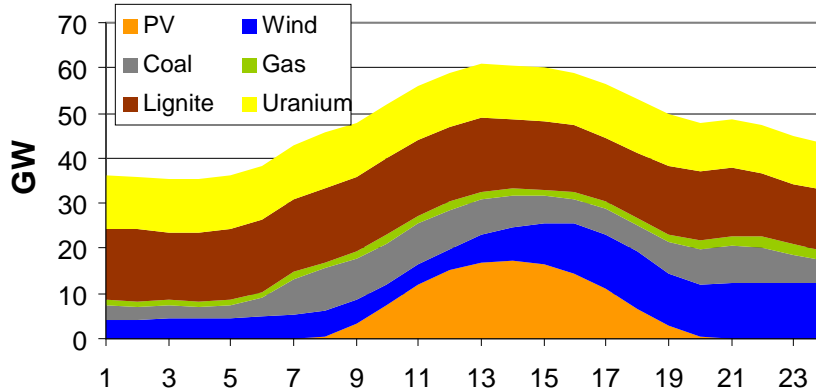
Scenario 2: Only a small portion of renewable capacity is producing power



¹ Including renewables and CHP
Source: EEX transparency, BDEW

Impact of shift in merit order on power prices...

Power generation on a sunny day



- On a sunny day, PV power generation pushes other conventional power plants out of the market
- A comparison of daily settlement prices shows an overall decreasing level of power prices and a shrinking difference between base and power prices

16.05.2012 (Tuesday)

Base: 40.87 €/MWh

Peak: 43.74 €/MWh

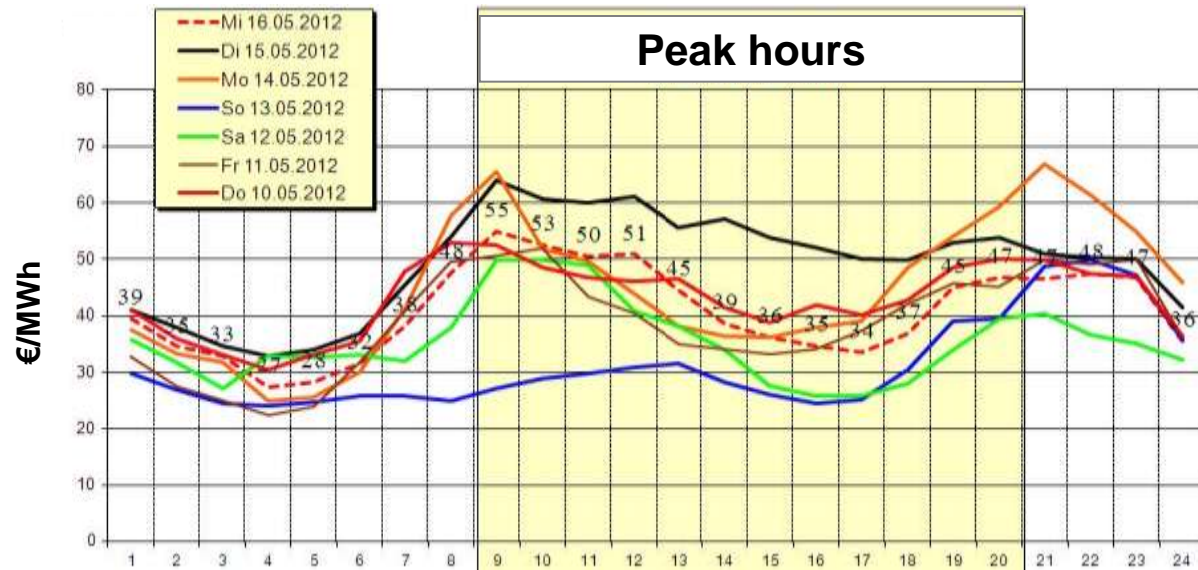


13.05.2008 (Tuesday)

Base: 56.63 €/MWh

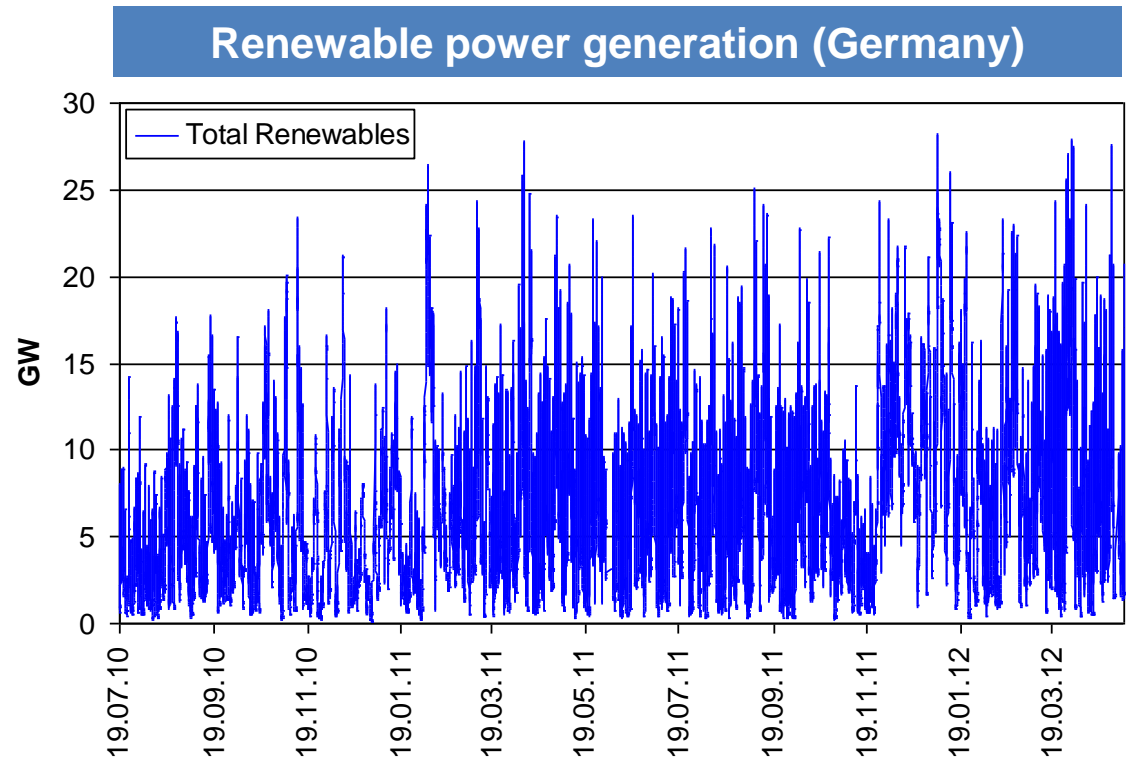
Peak: 71.31 €/MWh

EEX hourly settlement prices (Germany)



...and on operating profiles of existing conventional power plants

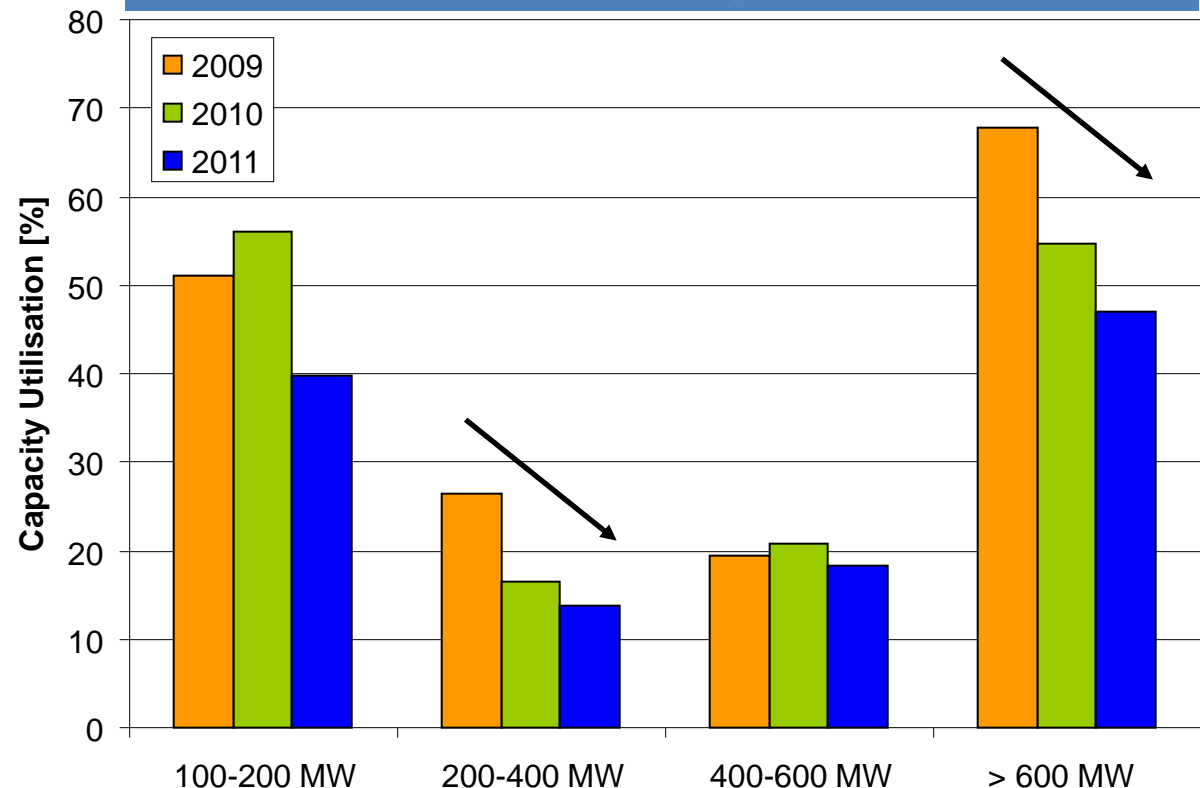
- The inherent (daily, weekly and seasonal) volatility and uncertainty of renewables lead to a variable non-dispatchable generation with huge spikes and drops
- **Wind and PV power production could range daily from 0 to 50 GW** (to put this into perspective: the largest German lignite power plant has a capacity of 3,8 GW - with a reliable output)
- Wind power generation is highest in winter during periods of low pressure weather systems when the temperature is also relatively mild while solar power generation is highest during summer
- **Gas-fired power plants have to respond to the (fast) changing levels of generation from wind and PV**



Conventional power plants as back-up capacity to balance intermittency of renewables

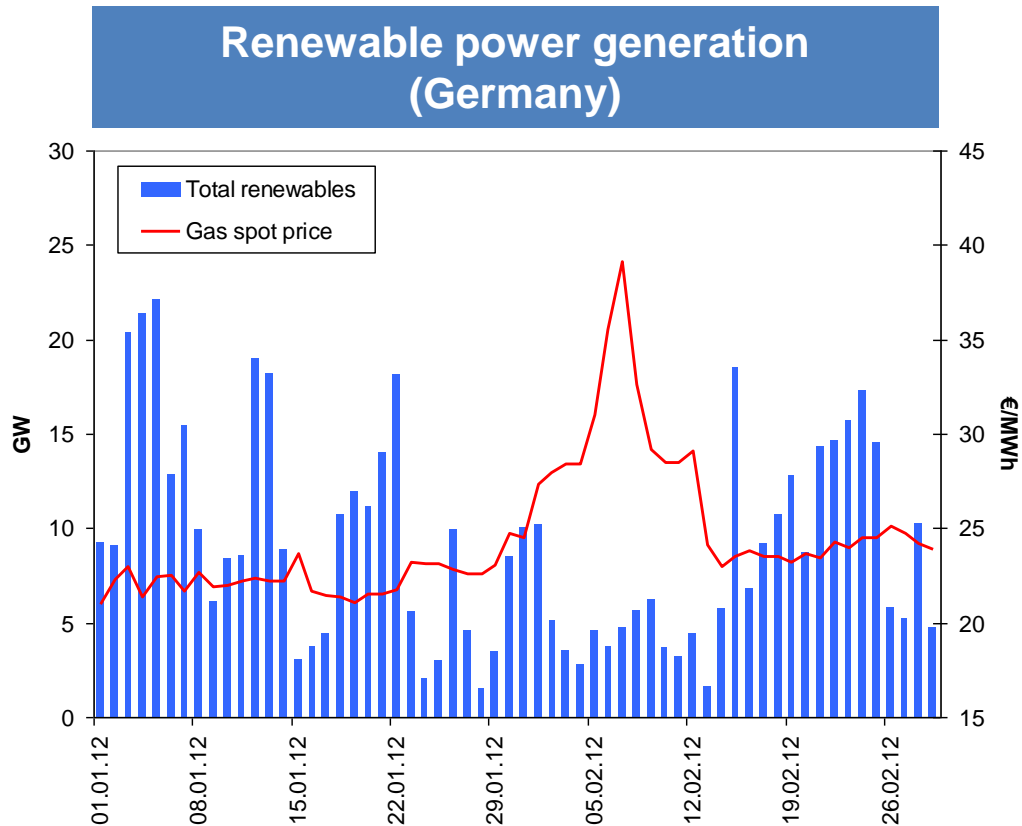
- Conventional power plants as back-up capacity already implies a low utilisation of conventional power plants and consequently a low gas demand
- A study of BDEW assumes a 40% reduced utilisation rate for conventional power plants within the next eight years

Reduced running hours of gas-fired power plants (Germany)



- **Conclusion: Gas for power is less and less a factor of economic decision and more and more a factor of renewable availability**

Gas demand becomes less predictable due to intermittency of renewables



Low wind power generation and low temperatures caused an increase in gas prices during the cold snap in January and February 2012

- With high wind penetration, gas-fired power plants will run when the wind is not blowing, and so the intermittency of wind will be passed on through to gas demand
- Gas demand from the power sector will be much more volatile and driven by the wind
- The increased volatility of the gas demand means that daily gas prices become more volatile
- While temperature has been the main driver for gas demand historically, wind may become the major determinant of prices and demand in the future

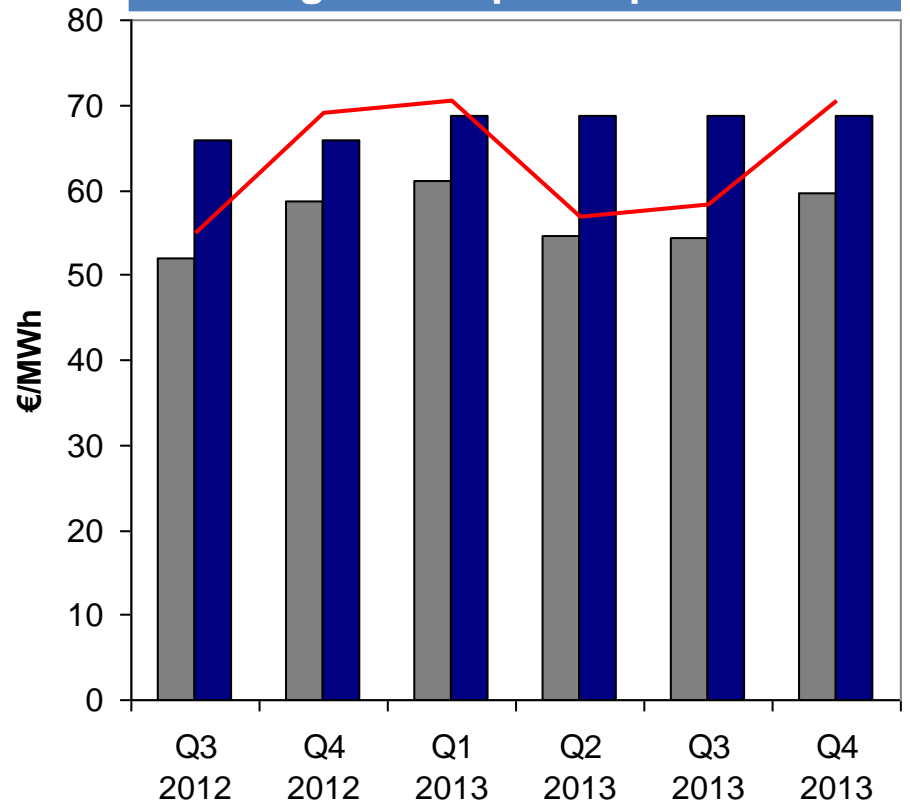
Gas plants have become an unprofitable business

- As our example shows a highly efficient gas-fired power plant (efficiency of 57%) will be “in the money” in 2012 only 2,200 hours
- At the time when the plant was built, running hours of approximately 6,000 hours were expected

“E.ON, Germany’s largest utility, has approached network regulator Bundesnetzagentur about plans to shut down gas-fired power plants. [...] E.ON planned to mothball at least three plants with a combined capacity of more than 1 GW.”

Source: Reuters, 14th May 2012

An efficient but “out of the money” gas-fired power plant

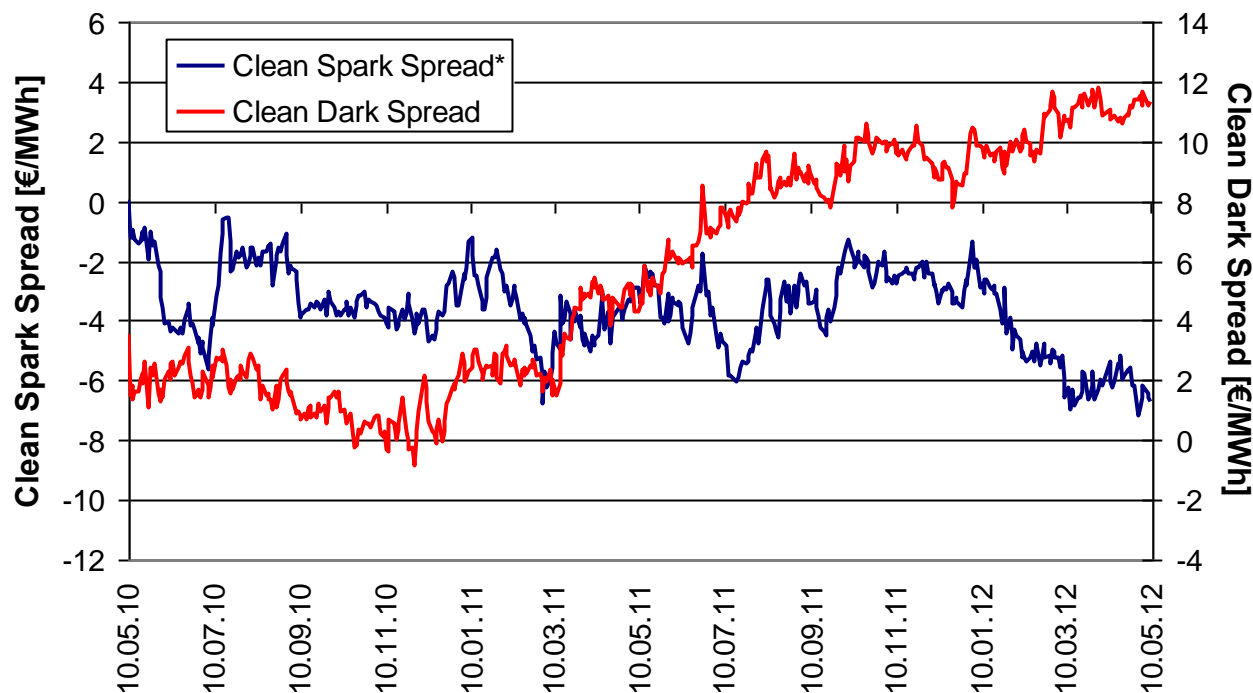


■ Marginal costs
■ Specific generation costs incl. operating and start-up costs
— Power price

New builds – “gone with the wind”

Investment signals for new gas-fired power plants are missing

Gas is not the fuel of choice



Reasons

- Low power prices because renewable energy has priority grid access and near-zero marginal cost
- Low carbon prices due to an over-allocated ineffective Emission Trading System
- High gas prices relative to coal prices

Notes: Efficiency Coal = 37%

Energetic Transformation Factor = 6.98

CO₂ Intensity Coal = 91.9%

Efficiency Gas = 50%

CO₂ Intensity Coal = 40.4%

* Clean Dark Spread calculated with base 2013

The future is not what it used to be

YES, renewables will turn gas and other fuels into a weather derivative

- Weather and pricing patterns are correlated across North West Europe
- More volatile and unpredictable gas prices will be driven by intermittent renewables
- Significant build of renewable capacities does not offset the requirement for reliable conventional capacity, but returns on existing and new plants become squeezed
- With weak investment signals for new builds, gas storage and LNG can provide a high level of flexibility contributing to renewables integration