Transition of the German utilities: increasing the emphasis on the service component of supply

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Platt's European Power Summit

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RWE

The energy to lead

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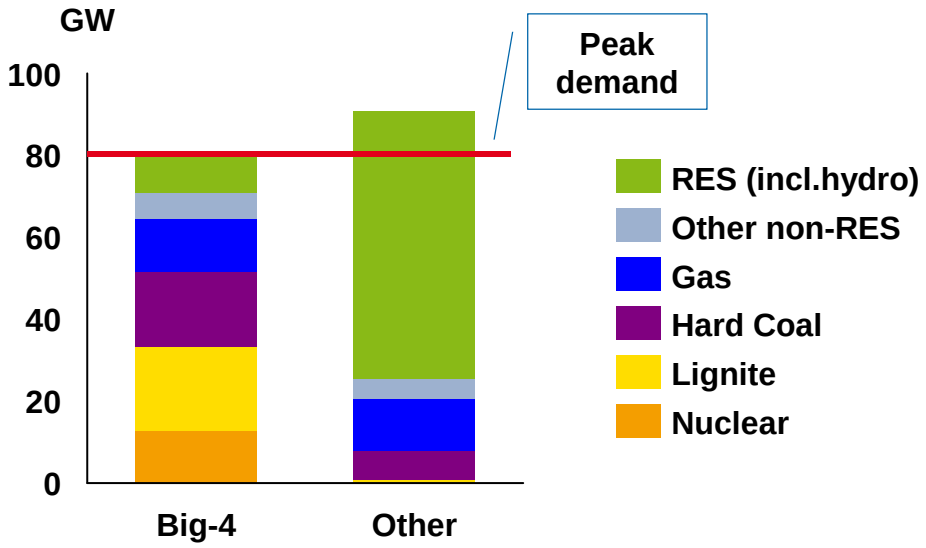
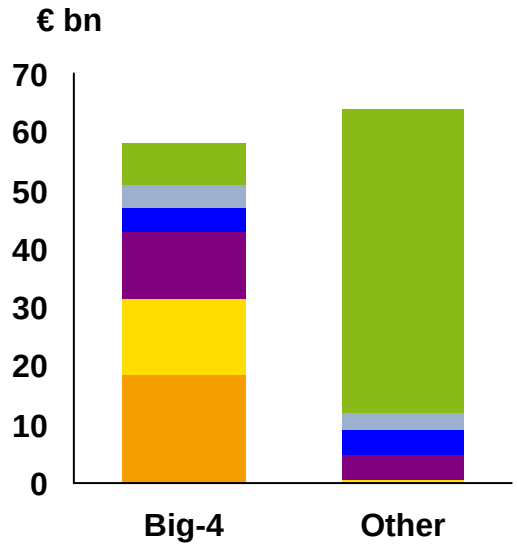
Utilities – high capital employed in conventional plants whose operation is driven increasingly by the growing renewables capacity

Net Capacity in Germany end 2012

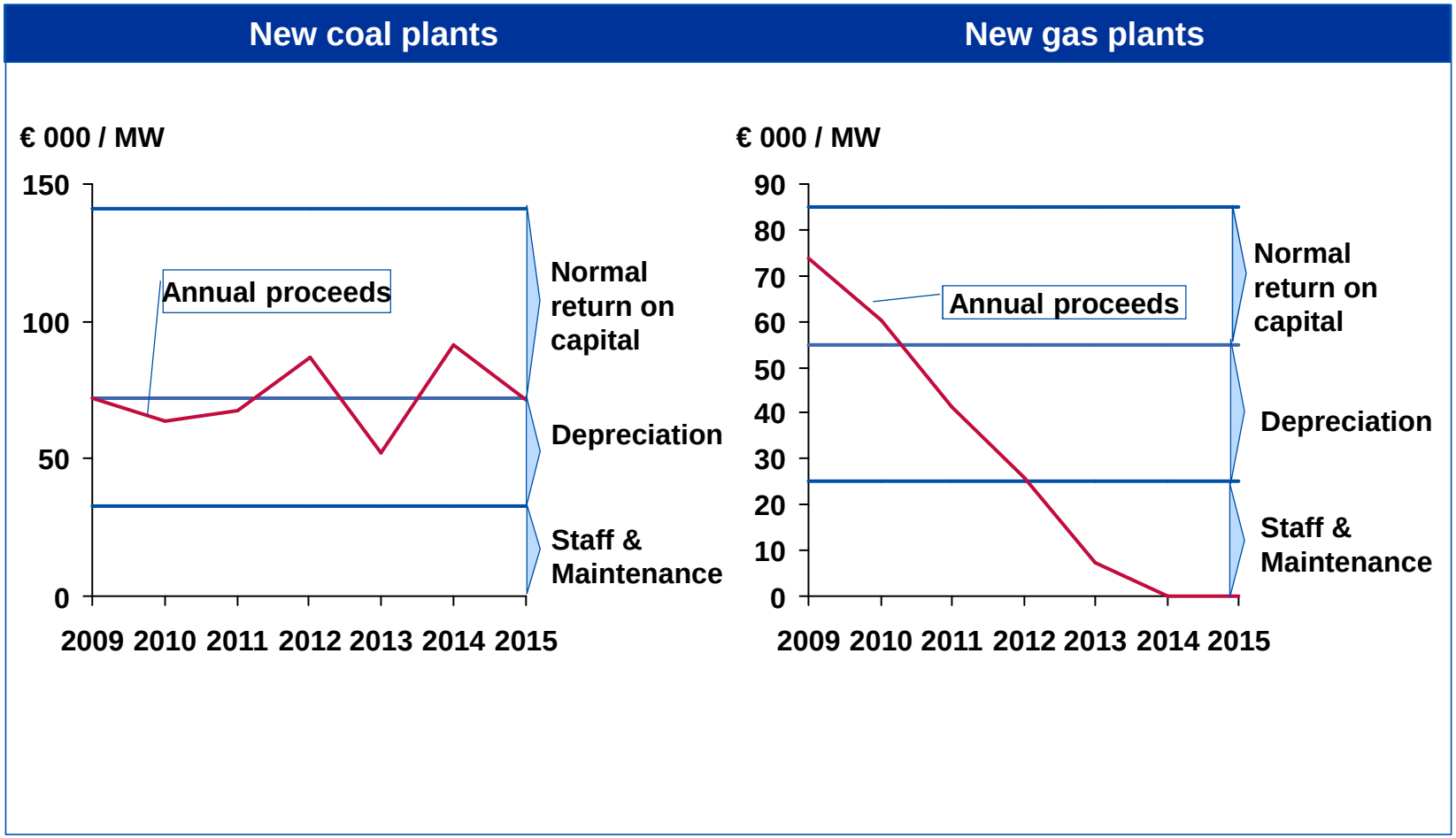


Indicative capital employed in German generating plant based on 50% new value



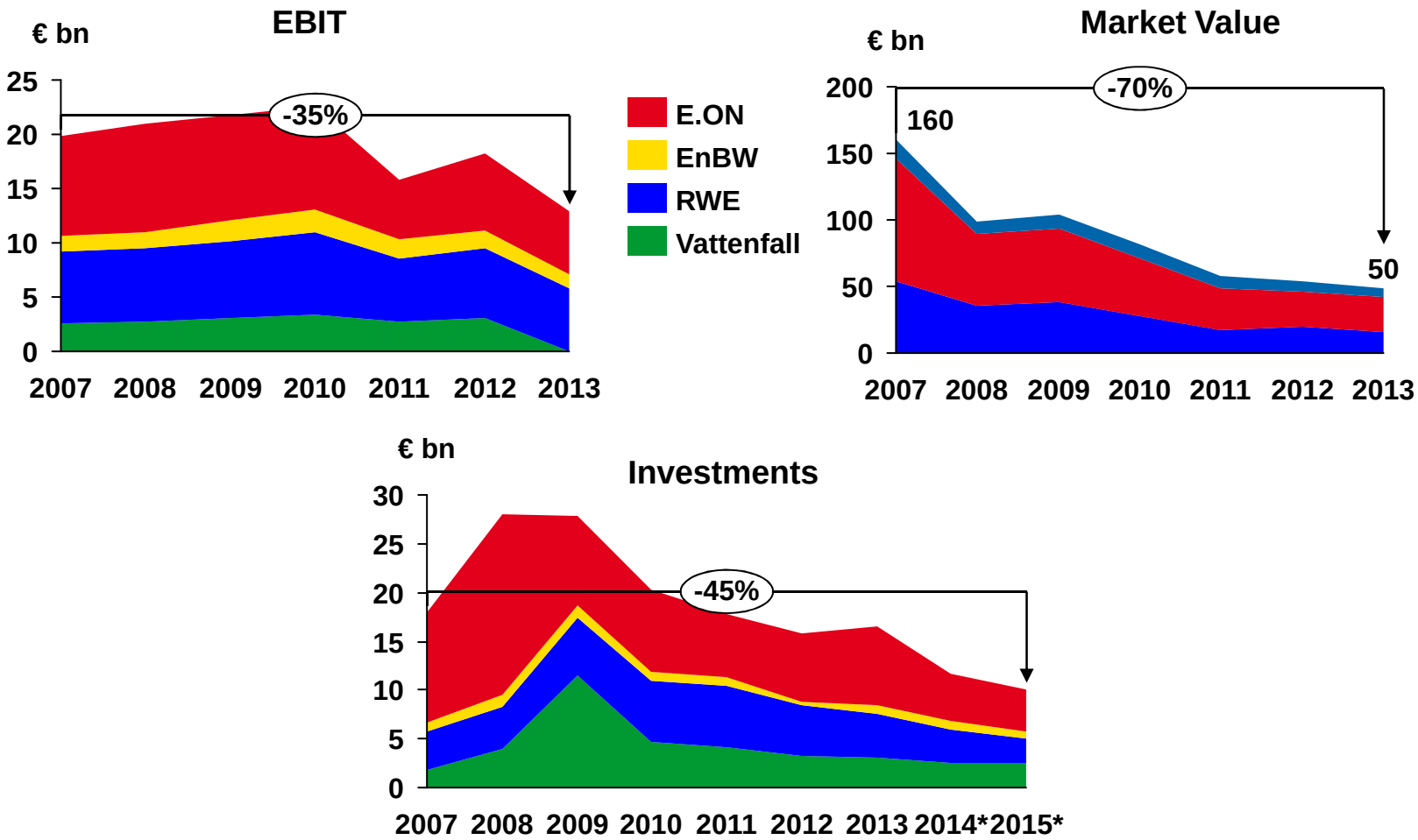
Source: BMWi and RWE estimates

New coal plants make no return on capital and new gas plants fail to cover even O & M



Source: RWE – indicative figures for typical plants

Result: a low total EBIT, declining market value and reduced investments



Source: Company annual reports. Figures cover total company operations

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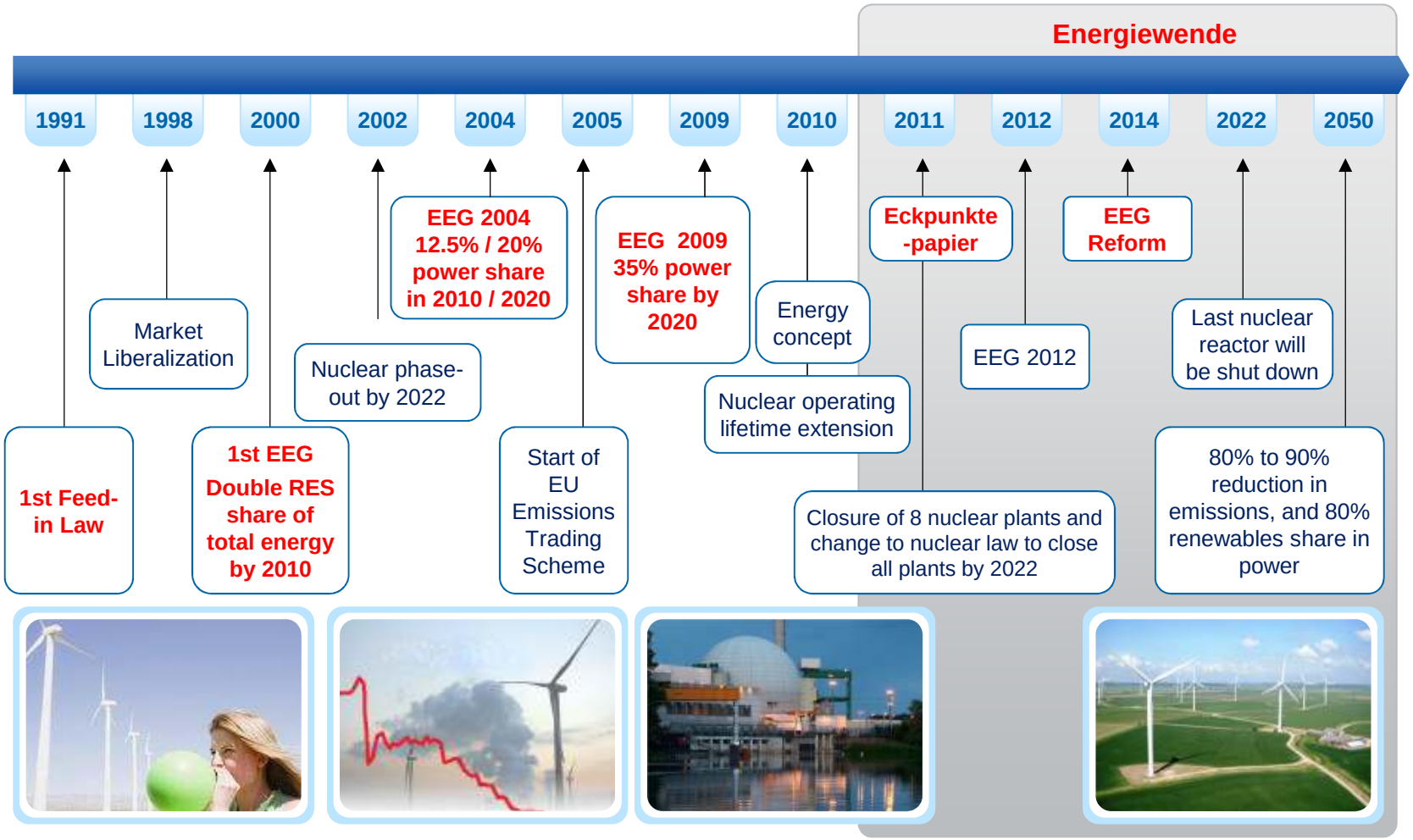
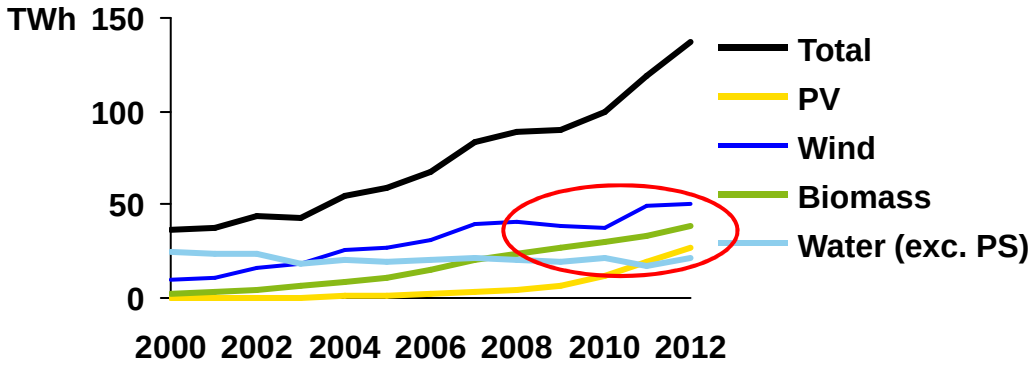
The Energiewende – a plan to move from nuclear and coal to renewables: milestones from 1991



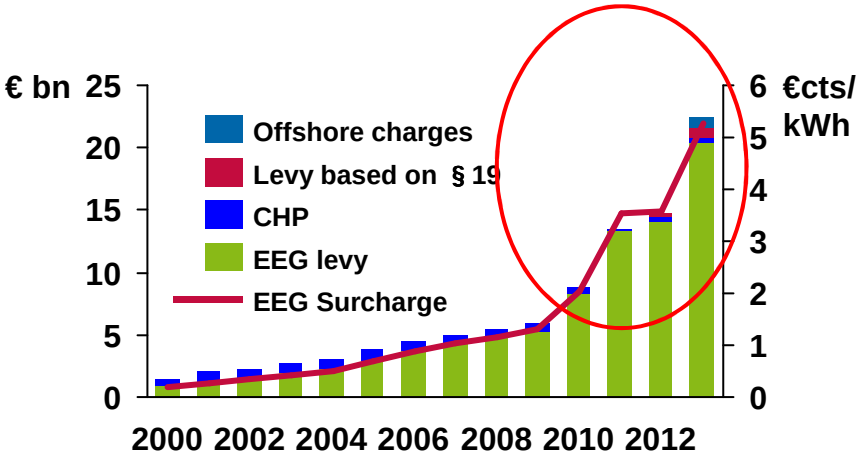
The implications of the Energiewende together with the 2007 global recession

1. **Renewables subsidy system without any cap**
   - annual support originally expected to be € 0,6 bn, not € 22 bn
   - has its origins in the 2000 EEG, rather than the 2011 "Energiewende"
   - costs (esp. PV) continually lower than subsidies = strong incentive
2. **Greatest recession since the 1930's**
   - Low CO2 prices
   - Low coal prices (also due to Shale gas in the US)
3. Over-investment in conventional plant based on trend from early 2000's

Renewables production build-up

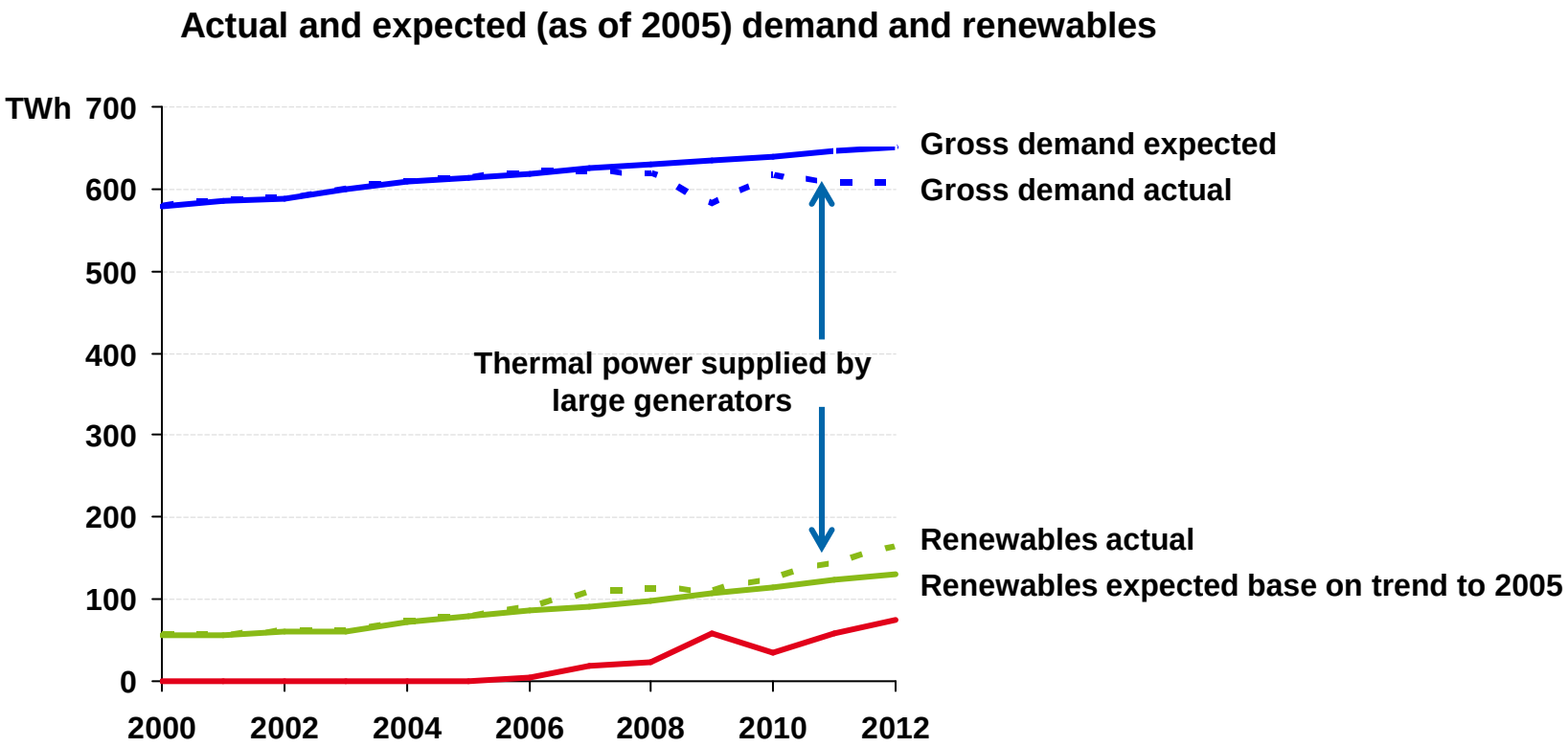


Subsidies for the Energiewende



Source: BMWi and RWE

Generators suffered from two effects cutting volume by 15% vs. expected level...

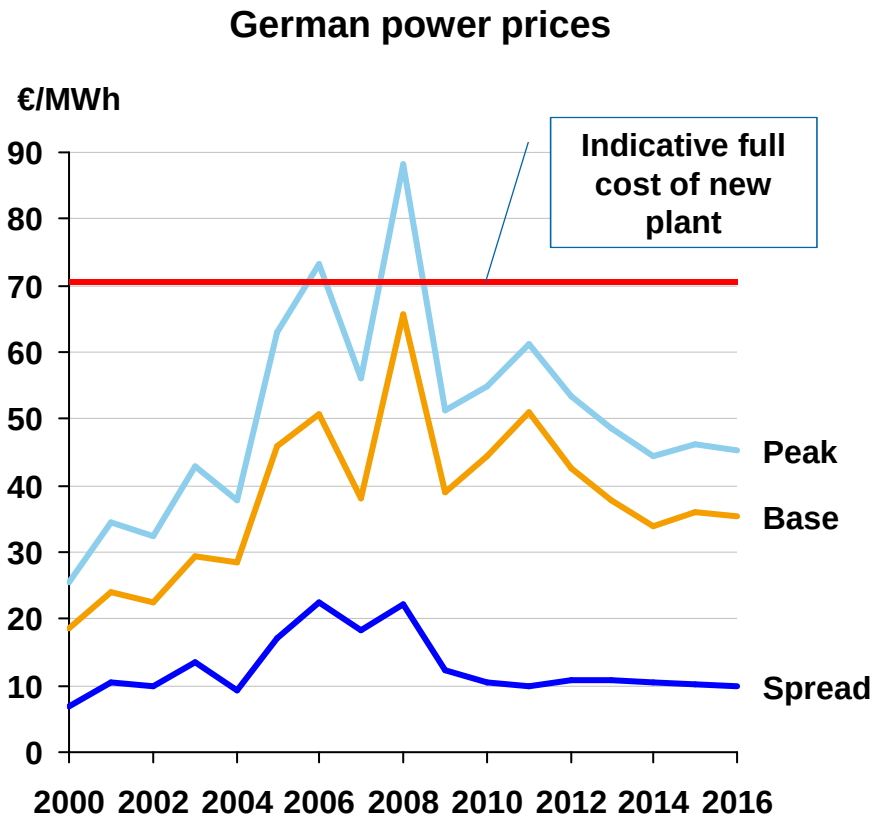


- 15% lower than expected demand due 60% to recession and 40% to renewables

Source: BMWi and RWE calculations

… and five effects cutting price by 50% vs. expected level (greater effect on margins)

1. Volume effect of higher than expected RES pushed out merit-order curve (nuclear closures had some offsetting impact)
2. Volume effect of recession also pushed out merit-order curve
3. PV had effect of flattening out daily peak price – important part of earning component
4. CO_2 price € 5/t vs. expected - € 30/t
5. Coal price also lower than expected – flattened out merit-order curve



Source: EEX

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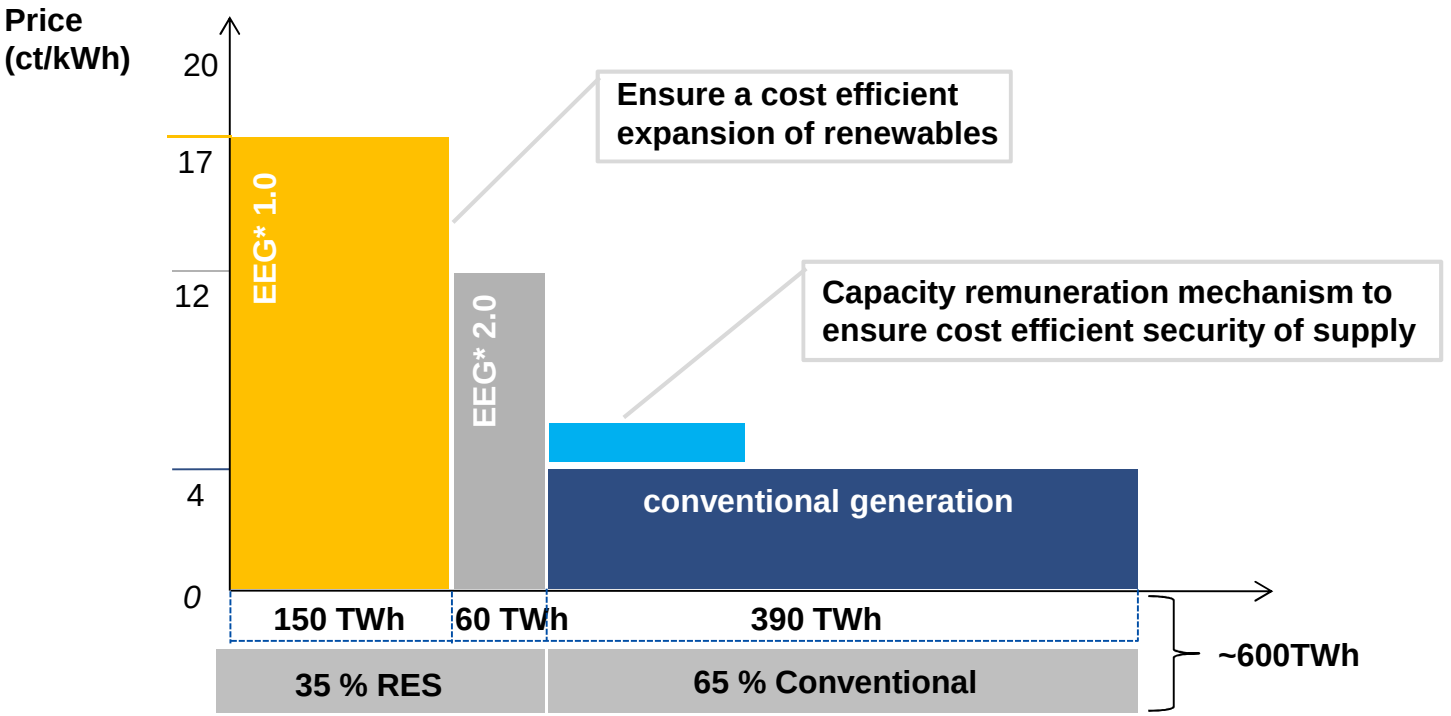
The current proposal for revision of EEG – agreed by Cabinet, awaiting Parliament approval

- **Aim to reach 40-45% by 2025 then 55-60% by 2035 renewables share of power but always ensuring affordability and supply security**
- **Reduce average RES cost level from €cts 17 / kWh to € 12 / kWh**
- **RES growth corridor will be legally fixed**, with technology-specific instruments and focus on the most cost-efficient technologies
  - Offshore wind 6.5 GW to 2020 and 15 GW to 2030 and afterwards two wind-parks p.a.
  - Onshore wind and PV each a maximum growth of 2.5 GW (exc. repowering) p.a.,
  - Biomass maximum 100 MW p.a.
- Improved market integration through a market-premium approach and direct marketing
- **New EEG (renewables law) will be fully EU-conform, including industry privileges**
- **Market design** – a capacity market is envisaged medium-term with details still to come
- **Time-plan** – Cabinet agreement on 8th April 2014 and entry into law 1st August 2014

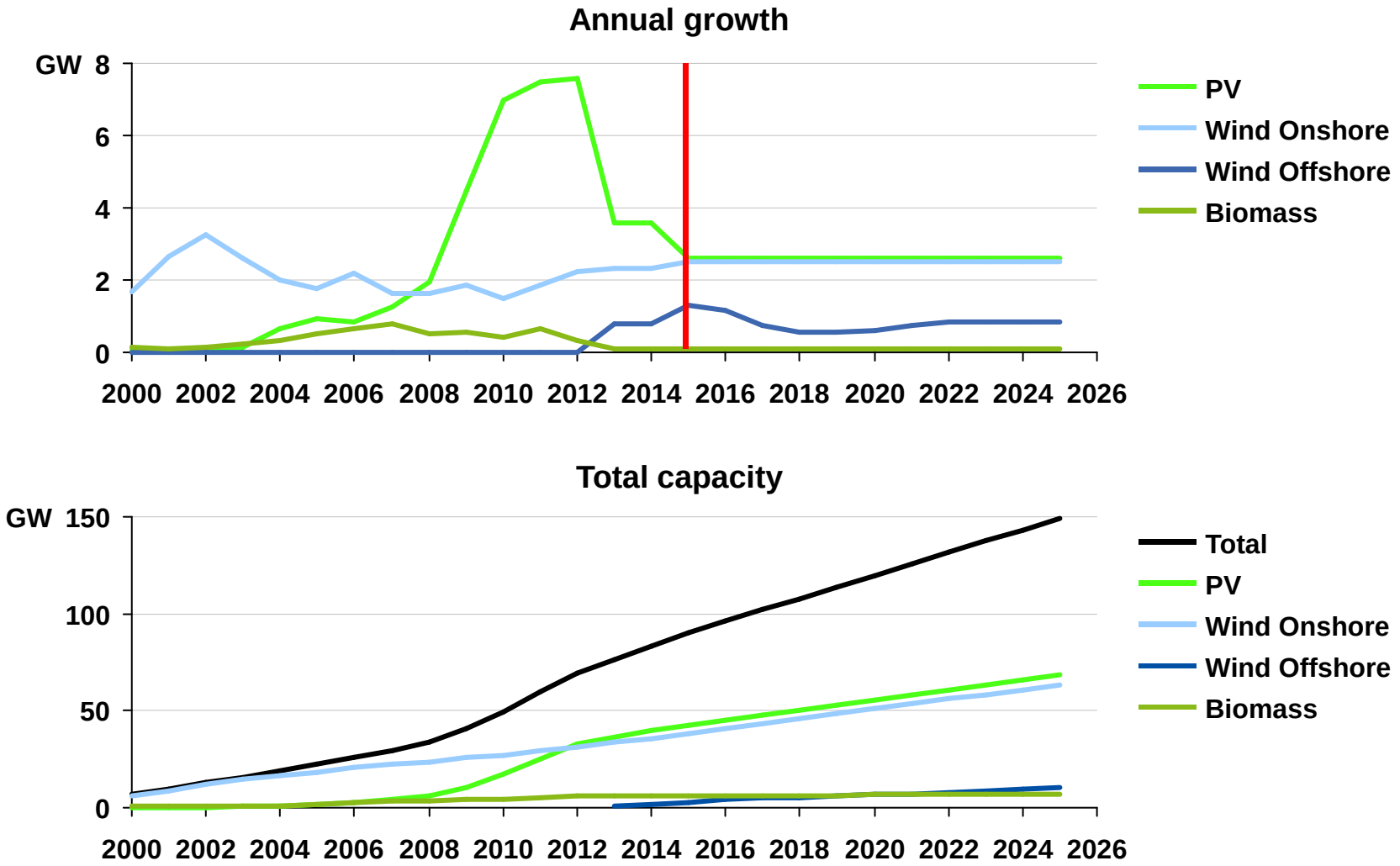
The cost for power supply with a 35% RES share (target for 2020)



* EEG = German renewable energy act

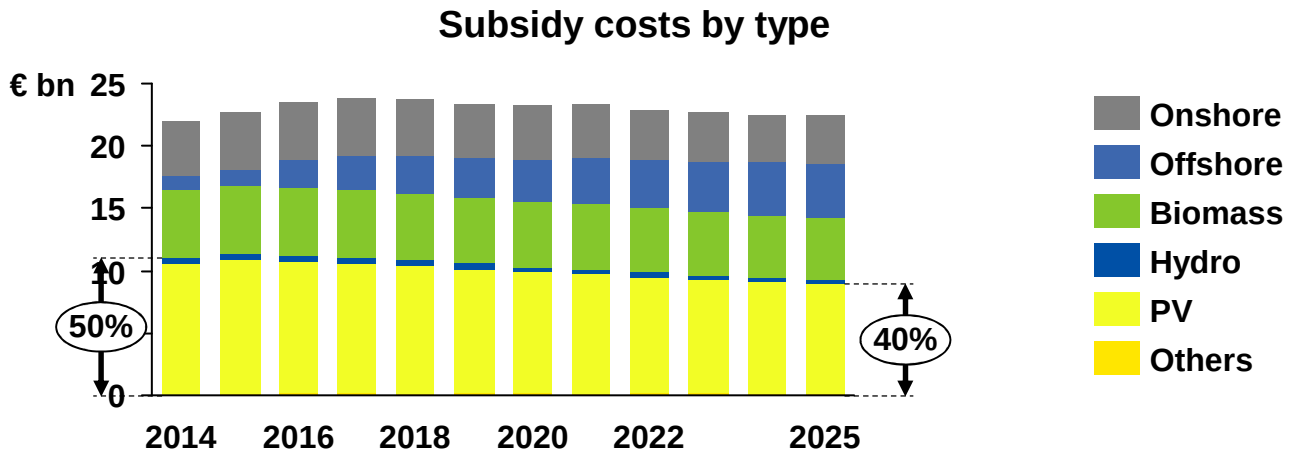
Source: BMWi

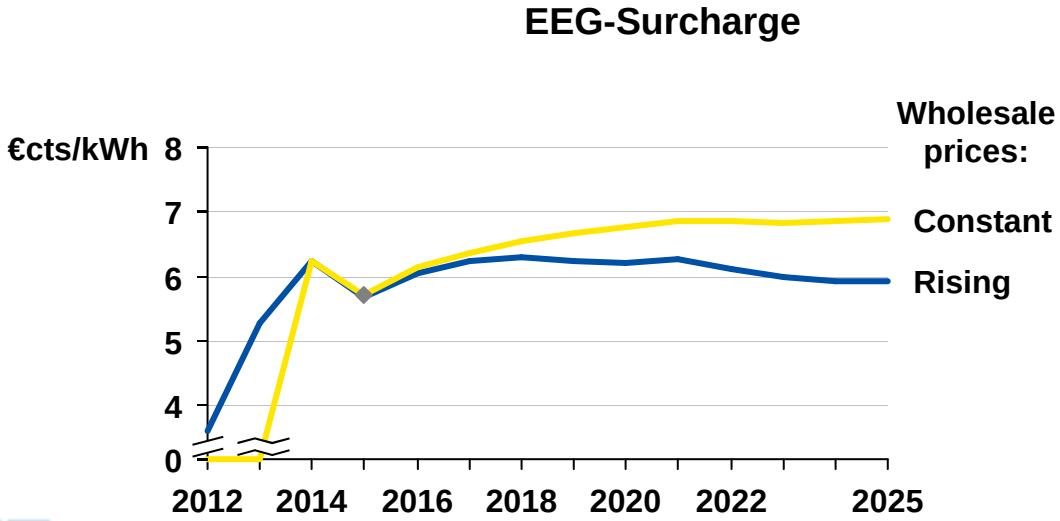
Renewables growth path proposed by new EEG compared with past…



Source: BMWi

… and putting a limit on subsidies and the EEG surcharge even in a worst case





Source: RWE estimates

Implications of the new EEG for utilities relatively limited

1. **Investment opportunities in renewables continue but with some changes**
   - Greater impact for non-utility than utility investors
   - Continued support for utility-type investments e.g. Offshore Wind, albeit with reduced volumes and support levels – tendering from 2017
2. **Impact on revenue**
   - Directionally reduces growth path of renewables as compared to previous position
   - Progress of renewables will continue, with volume effect (+ 73 TWh 2014-2022) and price effects continuing, but somewhat offset by further nuclear closures
   - Limited impact on future revenue prospects compared with previous position
3. **Ongoing need to integrate renewables**
   - Still substantial but slight relief vs. previous position

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Utilities will continue contributing to the three essential elements of supply, but in evolving ways

1. **Affordability** – **commodity** (kWh) and **service** level must be delivered at **lowest cost**

   – Use lowest cost fuels consistent with meeting EU carbon targets and most efficient plants to balance demand

   – Invest efficiently in renewables and operate reliably

   – Make use of existing thermal plants to increase service element; mothball or close those not covering fixed costs

2. **Supply-security**

   – Achieved by the round-the-clock availability of conventional plants and their increasing flexibility

   – Also by introduction of further flexibility along delivery chain – smart grids, smart meters etc

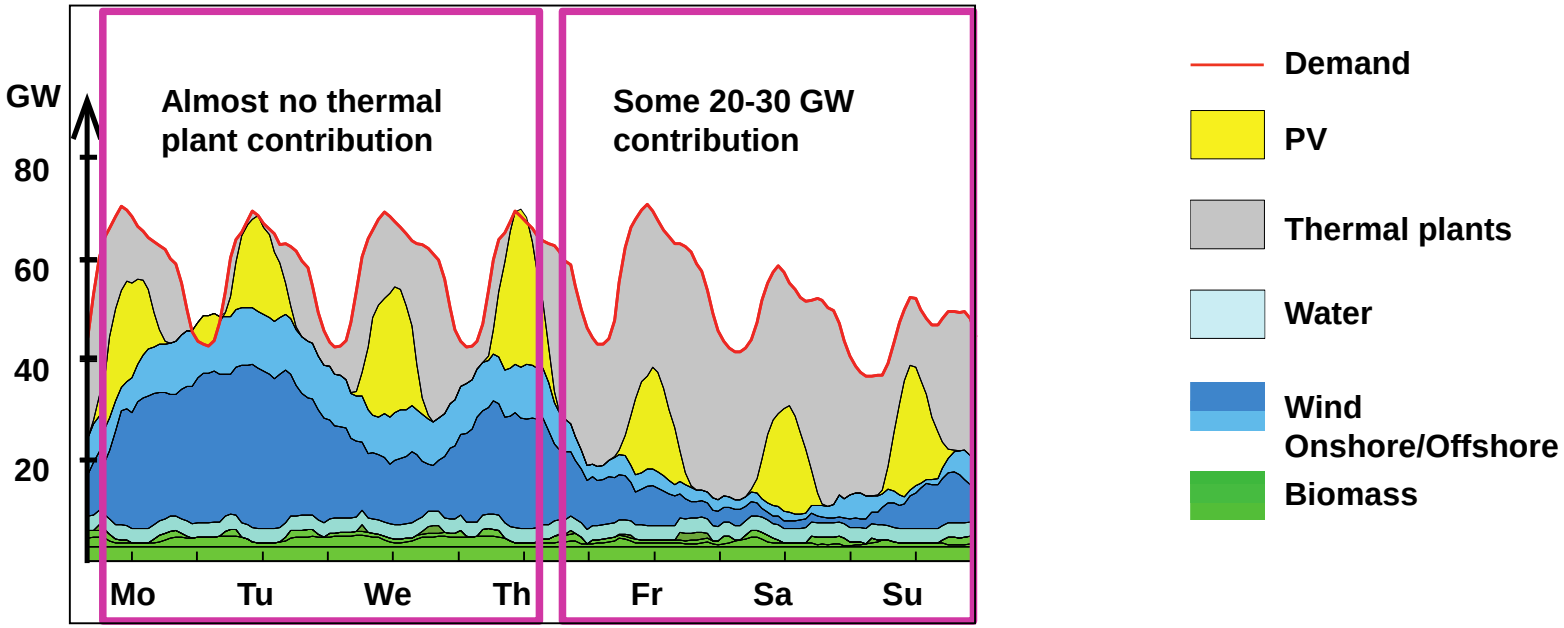
3. **Carbon reduction**

   – Controlled by Emissions Trading Scheme – meets targets

   – Achieved by combination of renewables and fuel-switching

The integration of renewables will require a much higher „service“ component in supply…

Indication of the role for thermal plants in August 2022

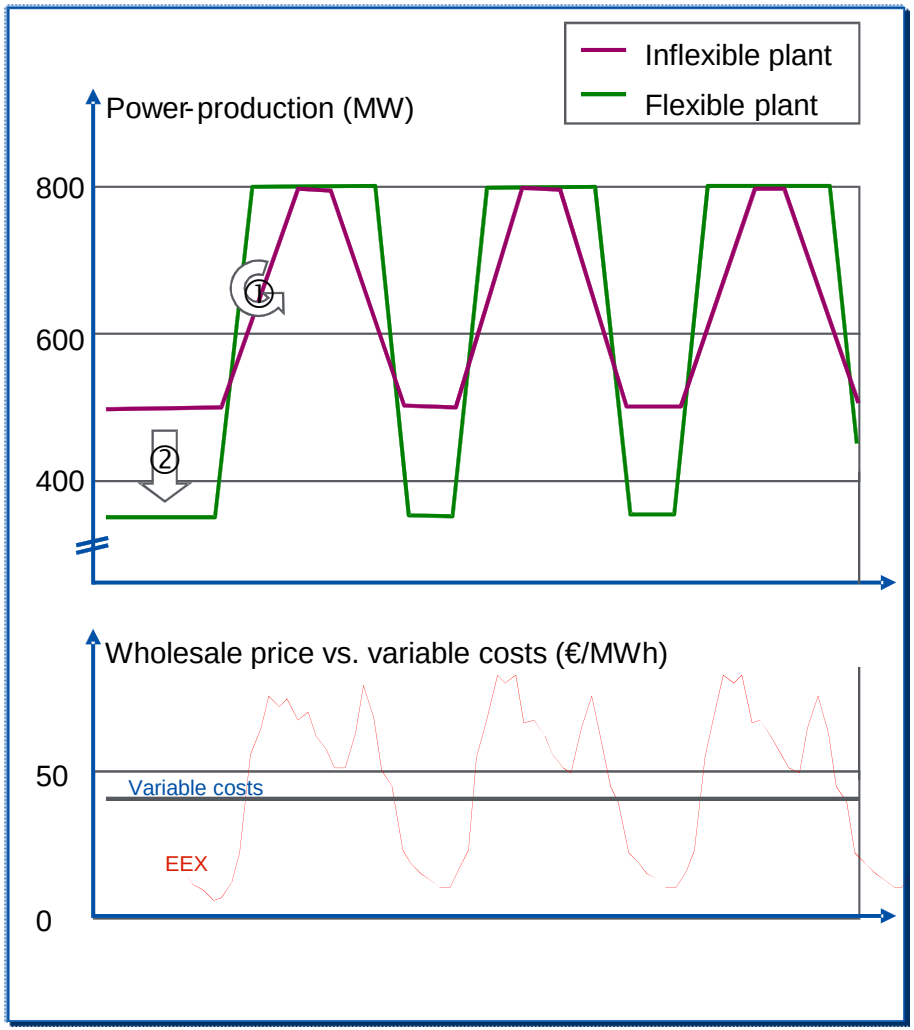


- Wind and PV become basis for power supply; remaining plants optimise themselves around this
- Most thermal plants only needed at times of low wind / sun – no longer operate as base-load

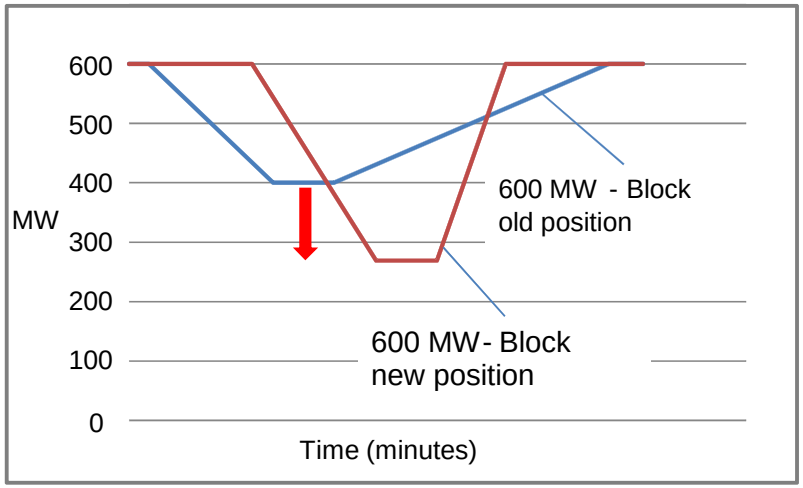
Source: Agora Energiewende (12 Thesen zur Energiewende, 2012)

… requiring more flexibility from thermal plants

- **Dynamic performance**
  - High rate of changing load output
  - Short-times for ramping up/down
- **Operational flexibility**
  - Low minimum load with high efficiency
  - High number of start p.a.
  - Low costs for ramping up/down
  - Short minimum load times
- **Organisational flexibility**
  - Flexible shift models with wide range of staff qualifications
  - Market-orientated maintenance plan
- **Additional factors**
  - Permit restrictions, fuel quality and contract flexibility



Example: RWE Weisweiler Lignite Plant renewal of Control Technology increases the load rates



- Retrofitting of all 600-MW-Blocks with modern digital control in combination with required technical adjustments to the plant
- Renewal of the control system is the requirement to improve the ramping
- Increasing the flexibility of the 600-MW Lignite blocks: ramping rate increased to 10 MW/ minute and minimum load to 170 MW.
- Contributes to life-time extension
- Allows the plant to operate in the secondary markets

Increased service emphasis in distribution and retailing. Example: RWE Smart grids

Smart Country - Smart Grid solution for rural areas has successfully passed practice test

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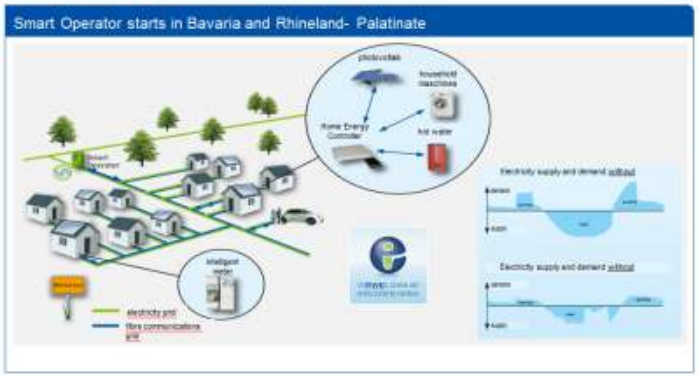
RWE implements "more intelligence" in the low voltage grid with the project "smart operator"



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Energy users become prosumers - this implies ICT and new market models

E-DeMa: Marketplace

- Creating incentives by electricity exchange (EEX), sales and service provider
- Market for energy services
- Network management with online information for medium and low voltage

Mülheim counts

- More than 100.000 smart meters
- Largest smart meter project in Germany
- Focus on data acquisition and customer acceptance.

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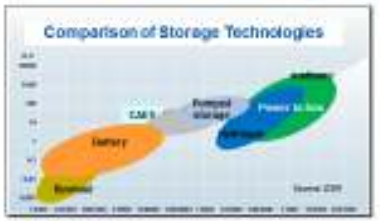
Power-to-gas demonstration plant of RWE - A look into the future of storage



- Container plant near an existing gas pressure regulating and metering system in Ibbenbüren.
- Electrolyzer with innovative proton exchange membrane technology
- 100 kW PV Electric power connected with 100 kW PV system
- Introduction of hydrogen into the regional gas network
- Reconversion in a CHP plant and supply to a local heating network.

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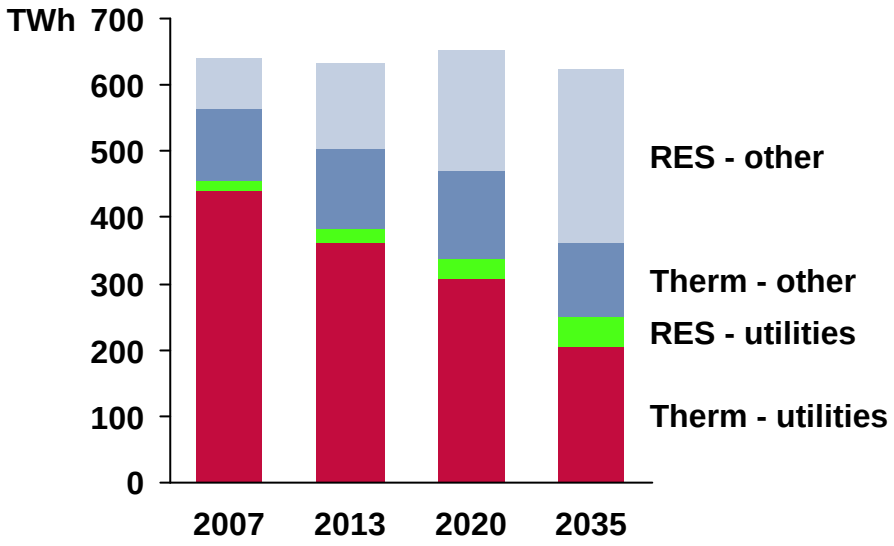
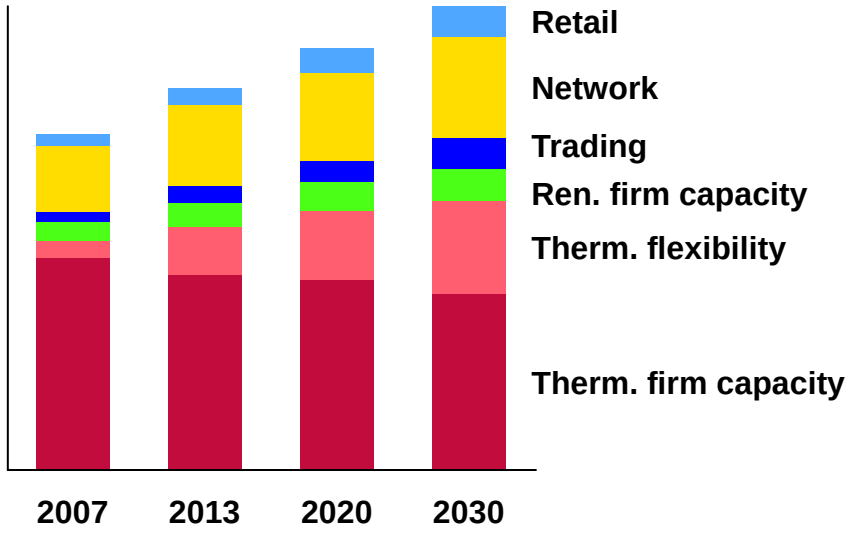
Conclusion: utilities will shift from conventional production to renewables and even higher emphasis on service…

Less conventional production (indicative figures)*



More effort on service Qualitative Index vs. 2007

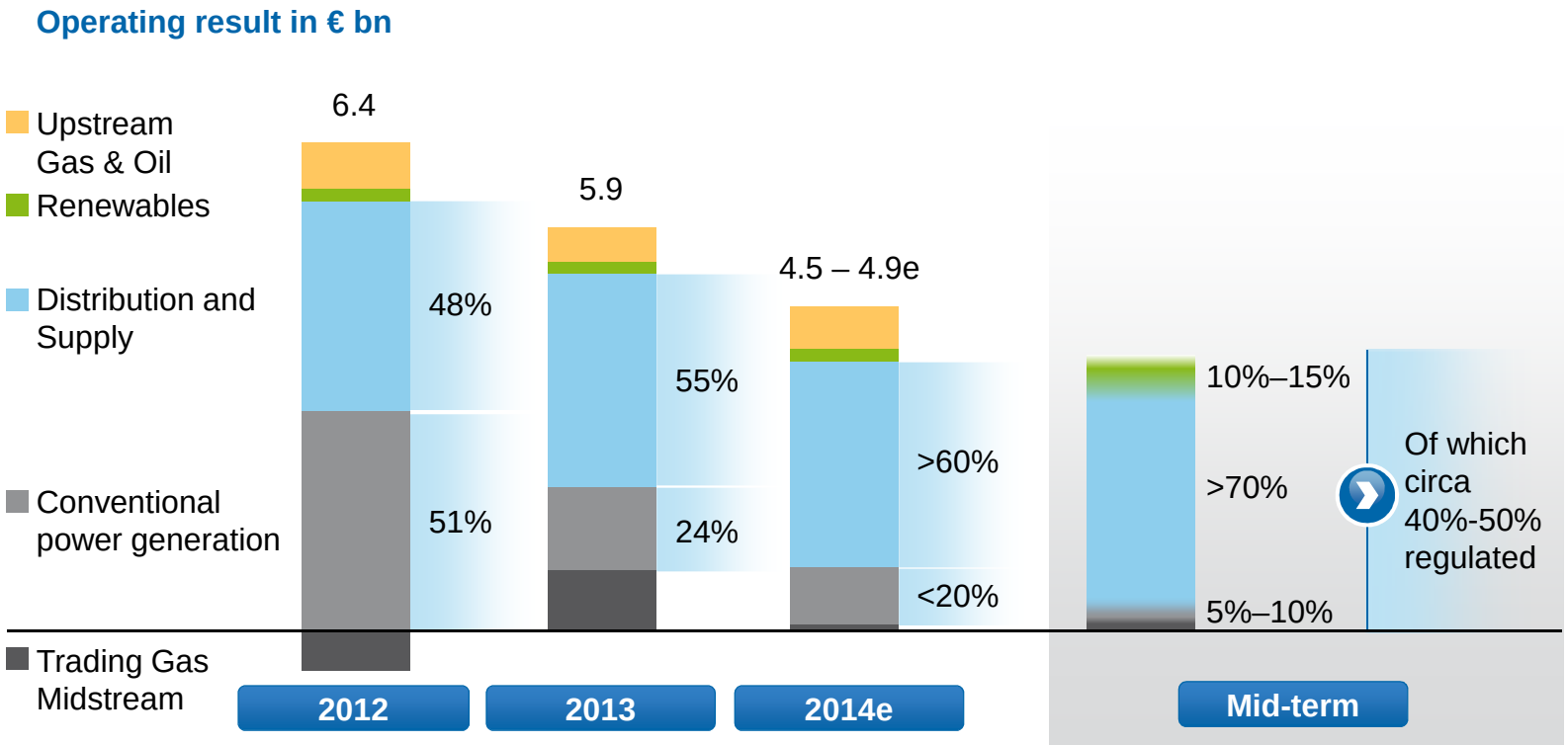


RES. = renewables,
Therm. = conventional thermal plants

*Source: 2007, 2013 AG Energiebilanzen, 2020, 2035 dena (2012) with RWE estimates

… with earnings following this pattern and being increasingly regulated: example RWE

RWE develops towards an attractive stable downstream business profile with additional focus on renewables and upside potential from conventional power generation



Source: RWE

THANK YOU VERY MUCH FOR YOUR ATTENTION.

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