

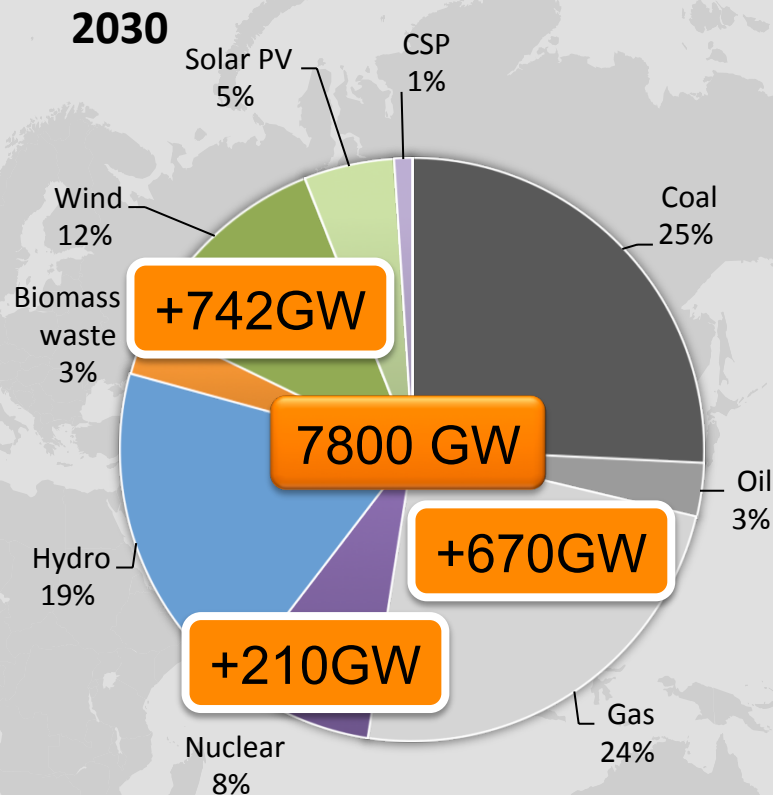
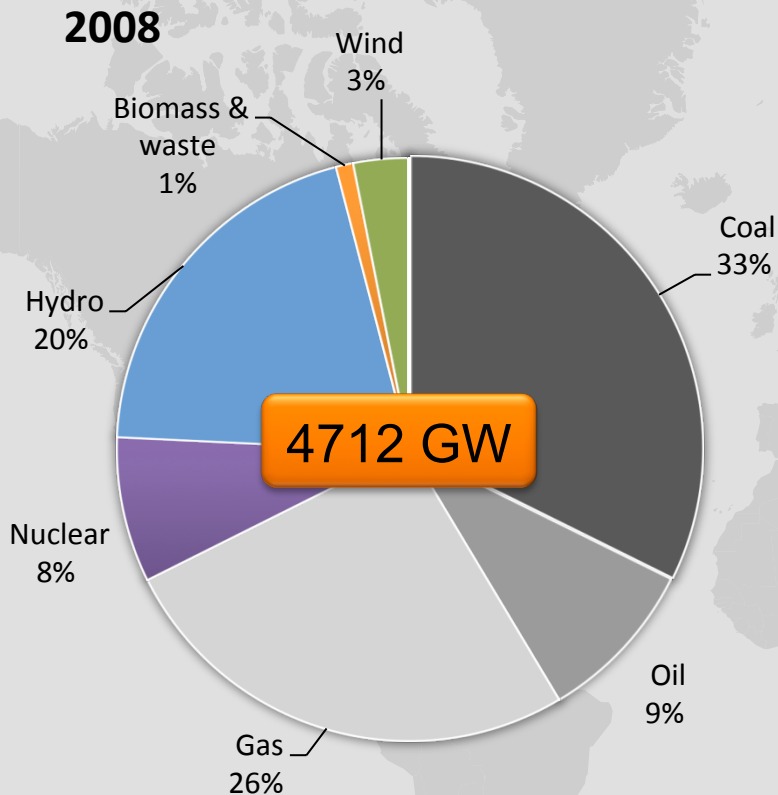
GROWING WITH GAS

VESA RIIHIMÄKI

Group Vice President, Power Plants

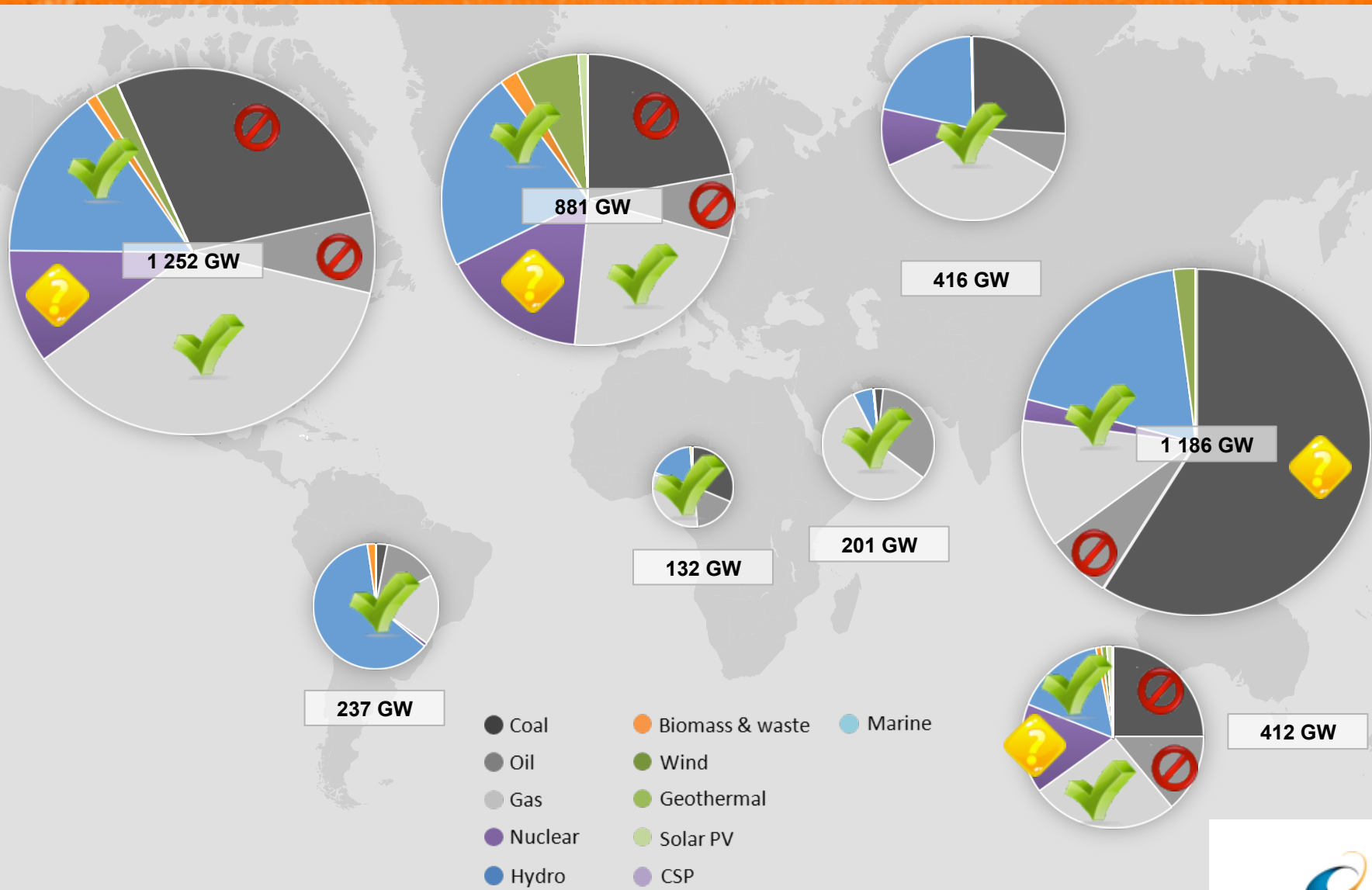


Long term outlook: Coal and oil losing share



- 1) In the next 20 years we will build as many new power plants as we have built in the past 100 years
- 2) Growth in absolute terms in all forms of energy – except oil
- 3) Biggest growth in share of capacity is in renewables

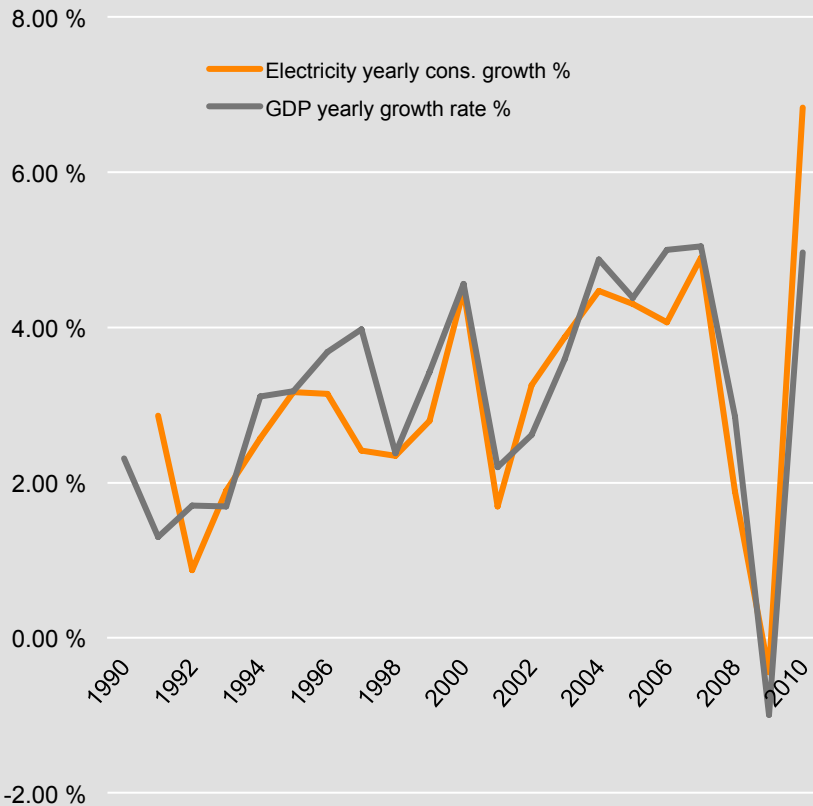
Energy policy: Renewables and gas are widely supported



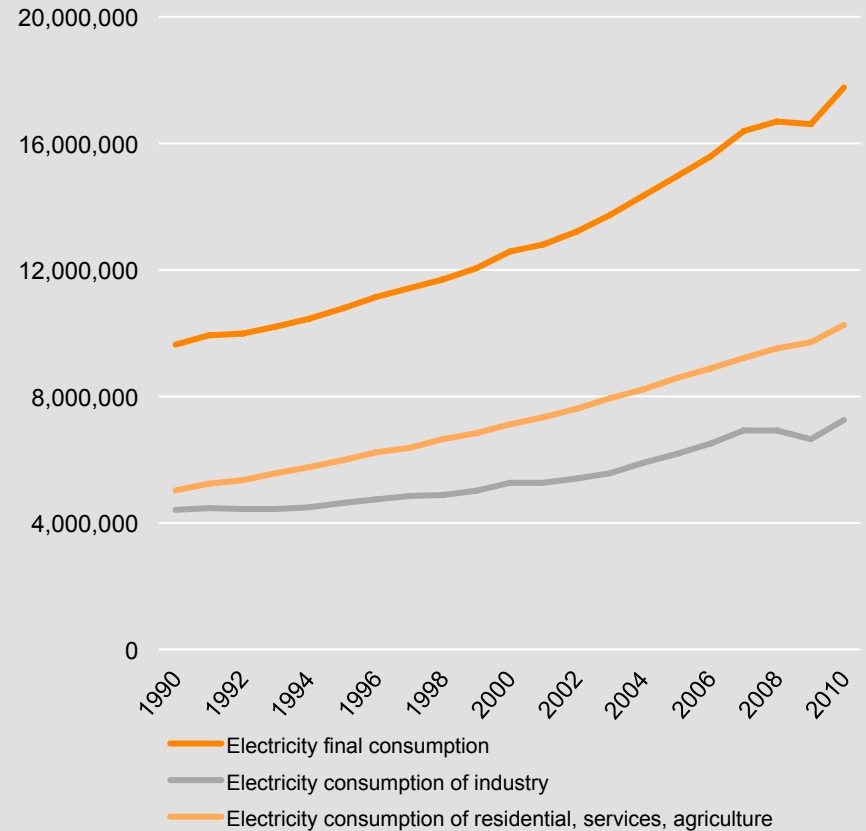
- Coal
- Oil
- Gas
- Nuclear
- Hydro
- Biomass & waste
- Wind
- Geothermal
- Solar PV
- CSP
- Marine

Electricity consumption returns to growth

Electricity consumption growth vs. GDP growth 1990-2010

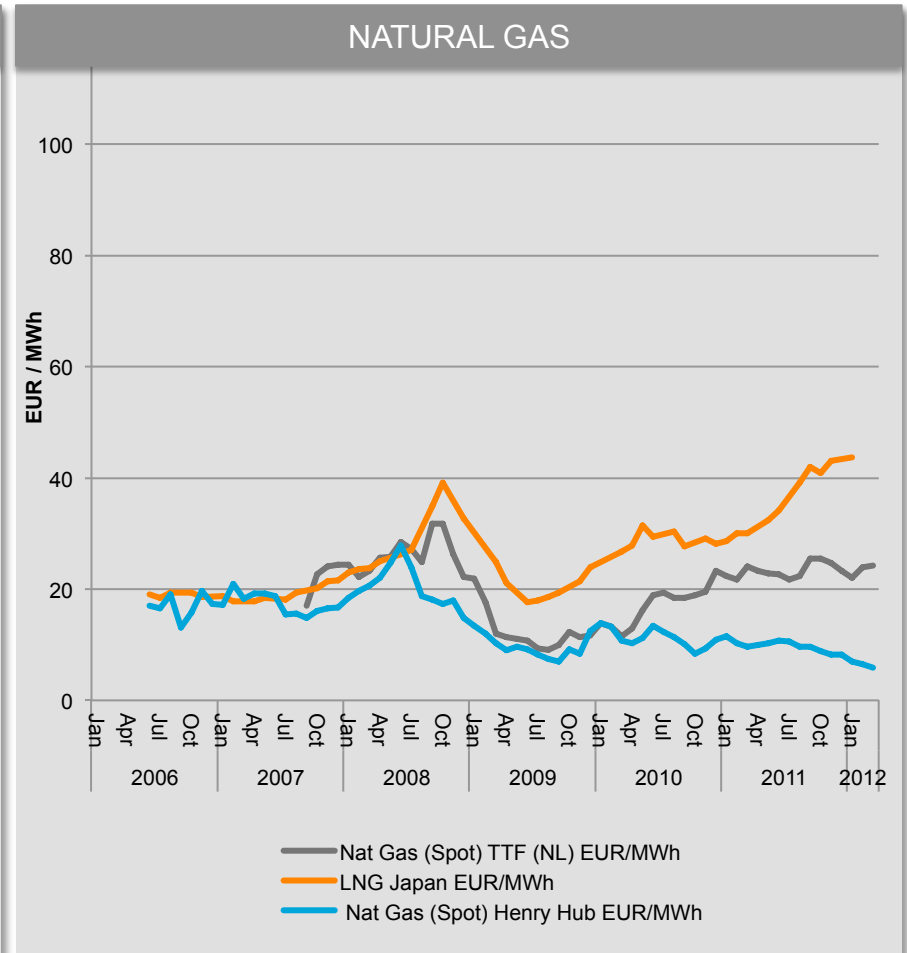
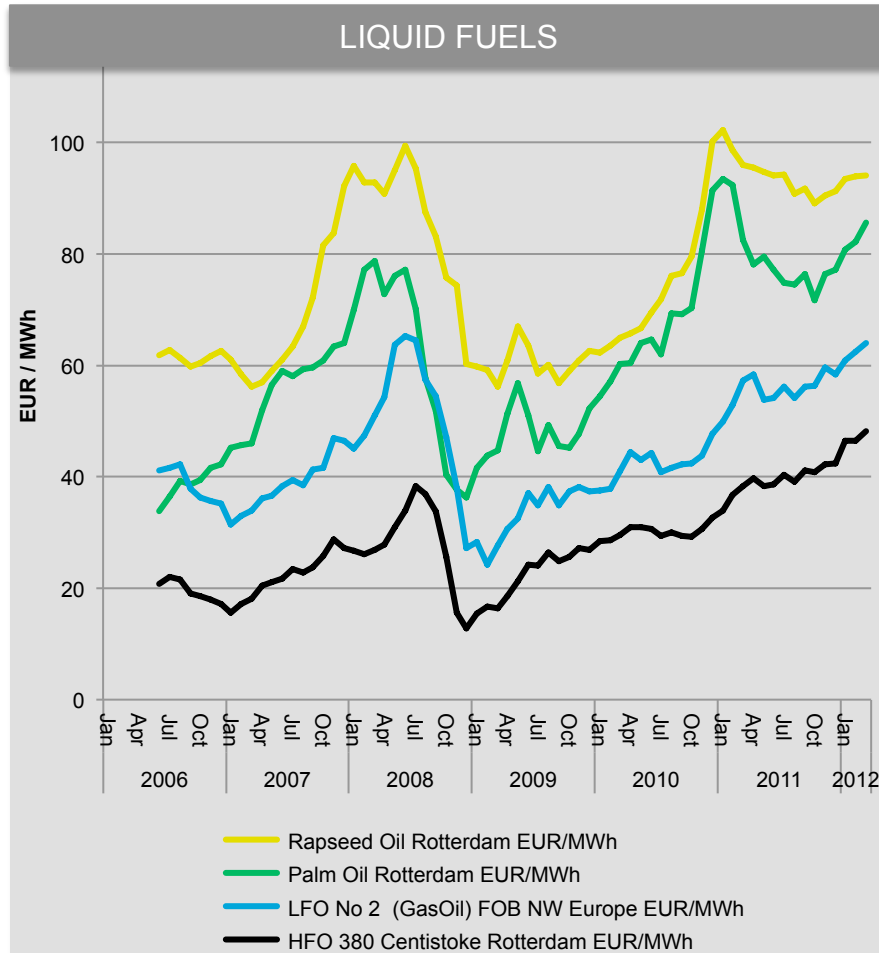


GWh World electricity consumption 1990-2010



Source: Enerdata

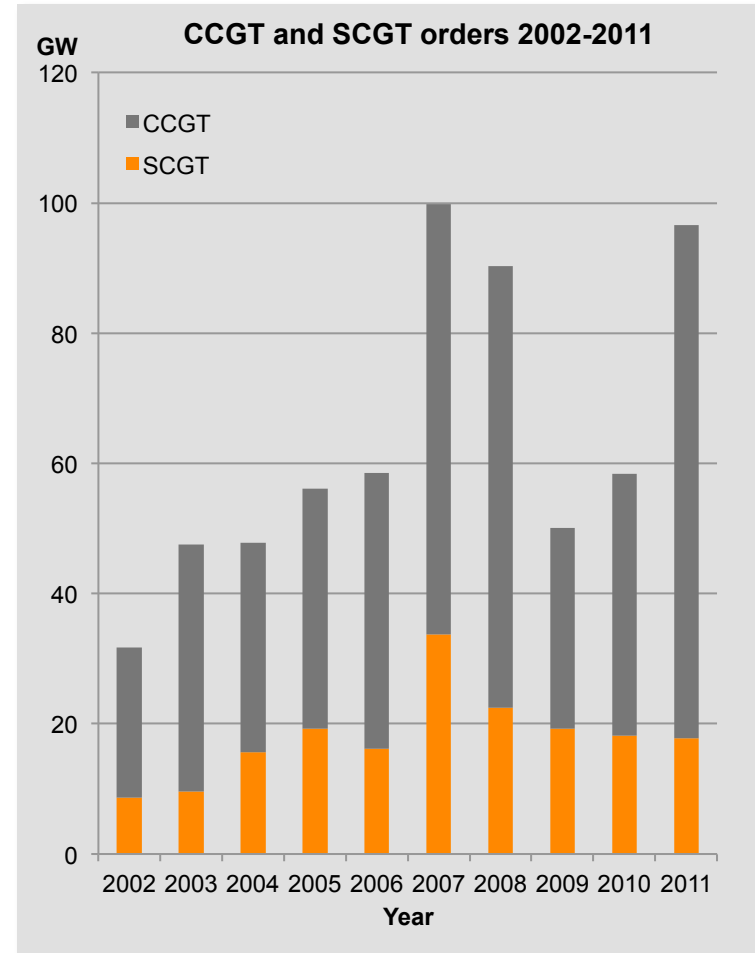
Liquid fuel prices continue to increase



Natural gas prices have wide spreads and continue to be decoupled from oil

Footnote: Heat content for liquid and gaseous fuels according to HHV, prices converted in currency and from quoted units. Prices are monthly average prices. Source: Bloomberg, Wärtsilä calculations

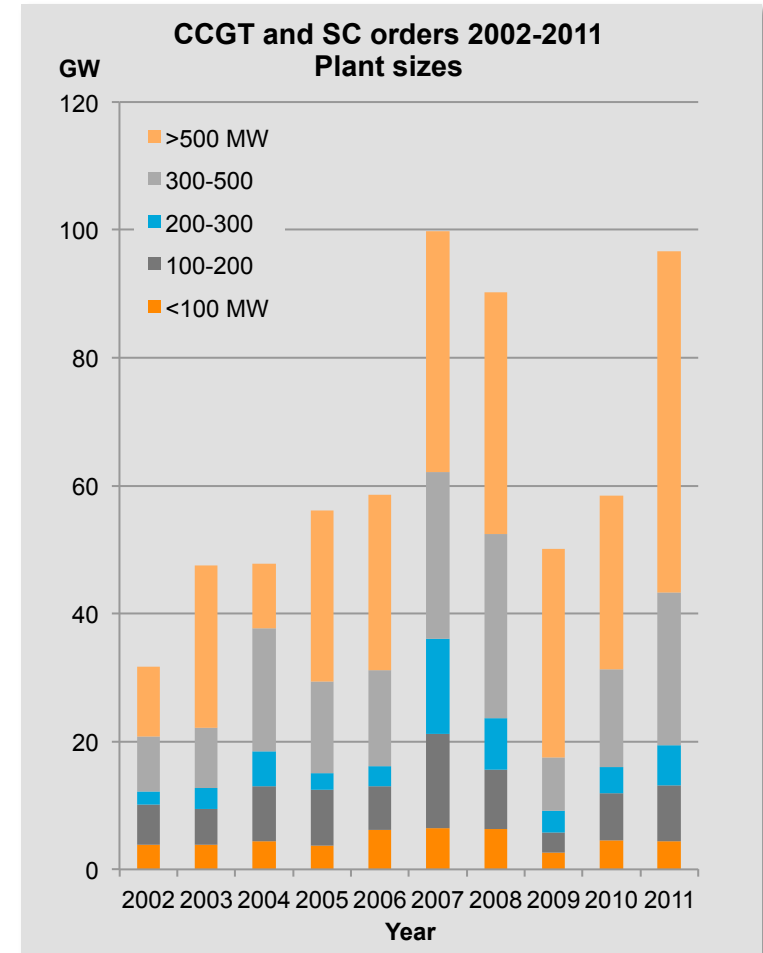
- 2011 was a significant step up in new gas plant orders
- Q4/2011 represented more than 35% of the annual orders
- Top 5 countries ordering gas
 - China 18.6GW (98% CCGT's, 2010 5GW)
 - Saudi Arabia 9.8GW (70% CCGT's)
 - Russia 7.6GW (90% CCGT's)
 - USA 7.3GW (70% CCGT's)
 - Japan 5.3GW (73% CCGT's)
- Main regions: NE Asia and Middle-East
- CC is clearly increasing the market share



Gas plant market size has been volatile, but growing over long term, China impacts the trend in 2011

Source: McCoy GT market database

- Plants >500MW represent more than 50% of the market
 - Typical projects
 - China CCGT 0.4-2.5GW size
 - Saudi-Arabia IWPP (Integrated Water and Power Project) 1GW size range, rigid baseload solutions
 - Associated with large grid systems
- Plants in 100–500MW size class represent more than 40% of the overall market
 - Typical projects
 - Intermediate operation, typical load factors for gas generation are below 50% level
 - Tailored to meet the application
 - Both SC and CC solution
- Plants <100MW are typical SC applications, market size static
- Wärtsilä's focus area is 5–500MW plant size

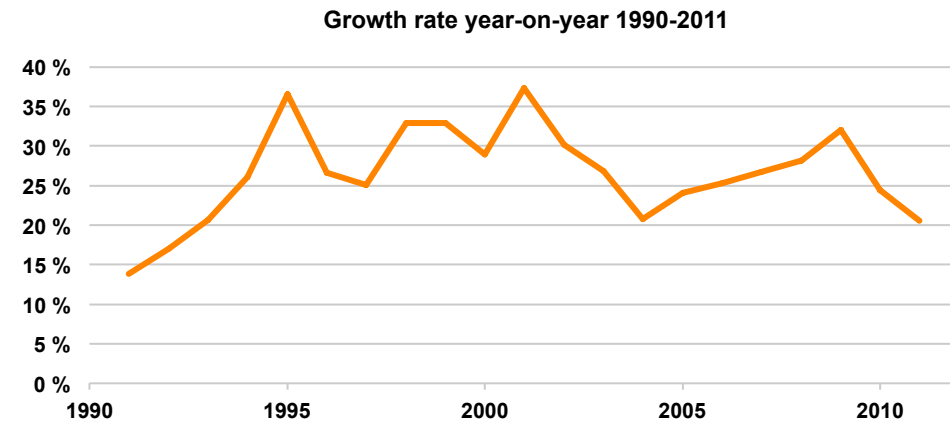
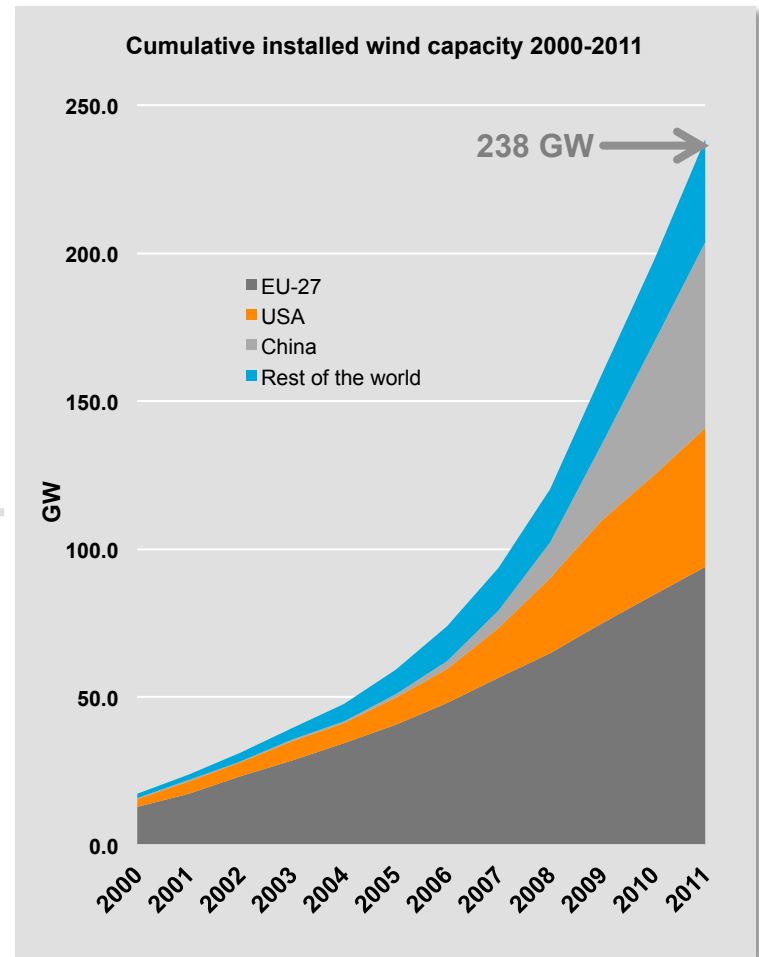


Gas plant sizes have been growing over long term, but country specific preferences impact the trends

Source: McCoy GT market database

Steep growth in installed wind power capacity

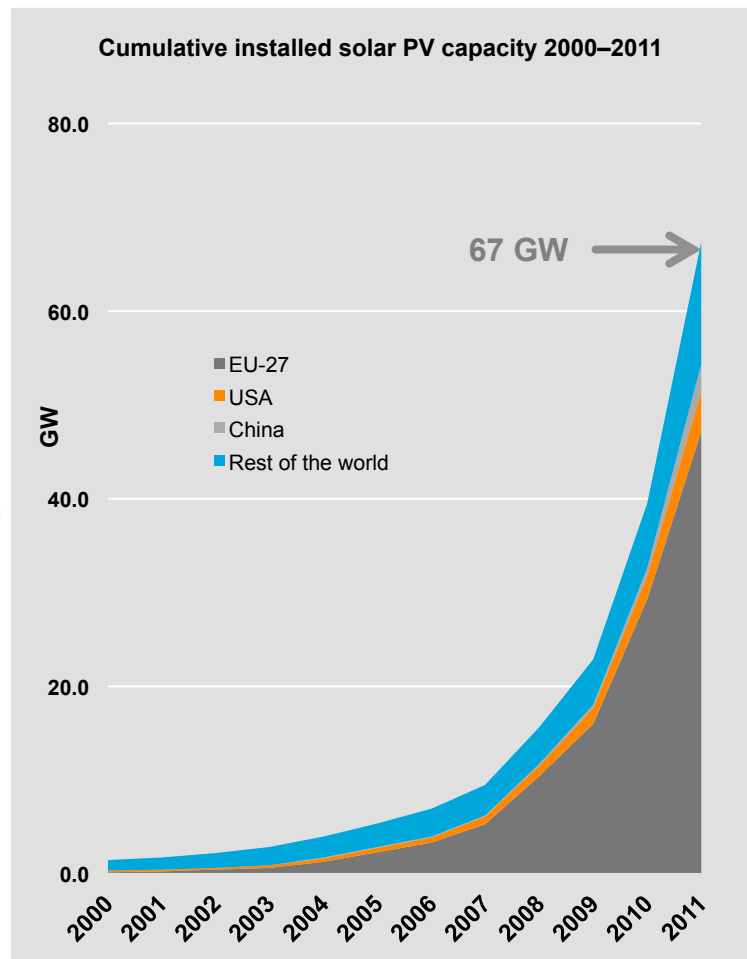
- 40.7 GW of wind capacity added during 2011
- Capacity added 2011:
 - EU-27: 9.3 GW
 - USA: 6.6 GW
 - China: 18 GW
 - Rest of the world: 6.8GW
- World total wind capacity growing by approximately 20-30% annually
- Growth rates 2010-2011:
 - EU-27: 11%
 - USA: 16%
 - China: 40%
 - Rest of the world: 24%



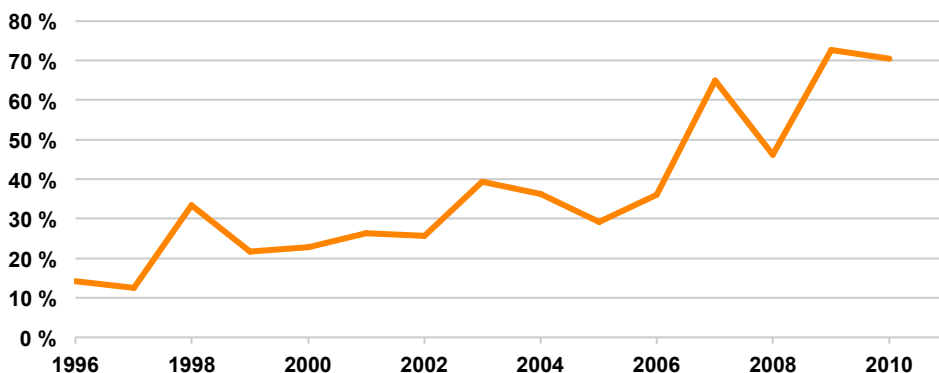
The deployment of wind power continues to be on a high level in “traditional” wind markets

Dramatic increase in installed solar power capacity

- 28 GW of Solar PV capacity added during 2011
- Capacity added 2011:
 - EU-27: 17.9 GW
 - USA: 1.7 GW
 - China: 2.0 GW
 - Rest of the world: 6.2 GW
- World total PV capacity currently growing by approximately 70% annually
- Growth rates 2010-2011:
 - EU-27: 61%
 - USA: 66%
 - China: 225%
 - Rest of the world: 90%



Growth rate year-on-year 1996-2011



Solar deployment continues to be on a high level, Europe centric

- **Utilities**

- Utilities in emerging countries continue to pursue power generation projects
- Political pressure continues to push for investments in renewable energy
- The renewable integration issues have been recognised but market mechanisms are still largely missing
 - Semi functioning markets exist in the US)
 - EU in 2050 roadmap recognises the need for balancing market

- **Industrial customers**

- Power generation investments in mining sector are on a high level
- Cement industry investments especially in the Middle East are on a good level

- **IPP's**

- There is continuing interest for private sector investments into the power sector. In a world of slow growth, power sector yields appear attractive.

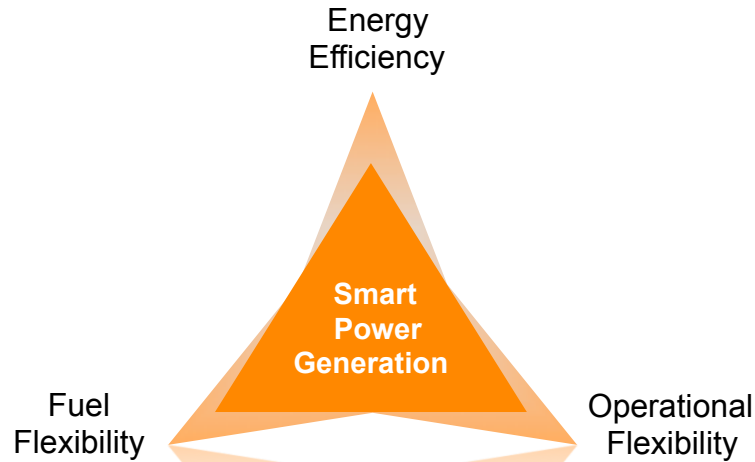
- **Nuclear**

- Post Fukushima landscape indicates strong need for investment in emergency back up units – retrofit market looks strong
- Number of potential projects has returned to higher than pre Fukushima levels

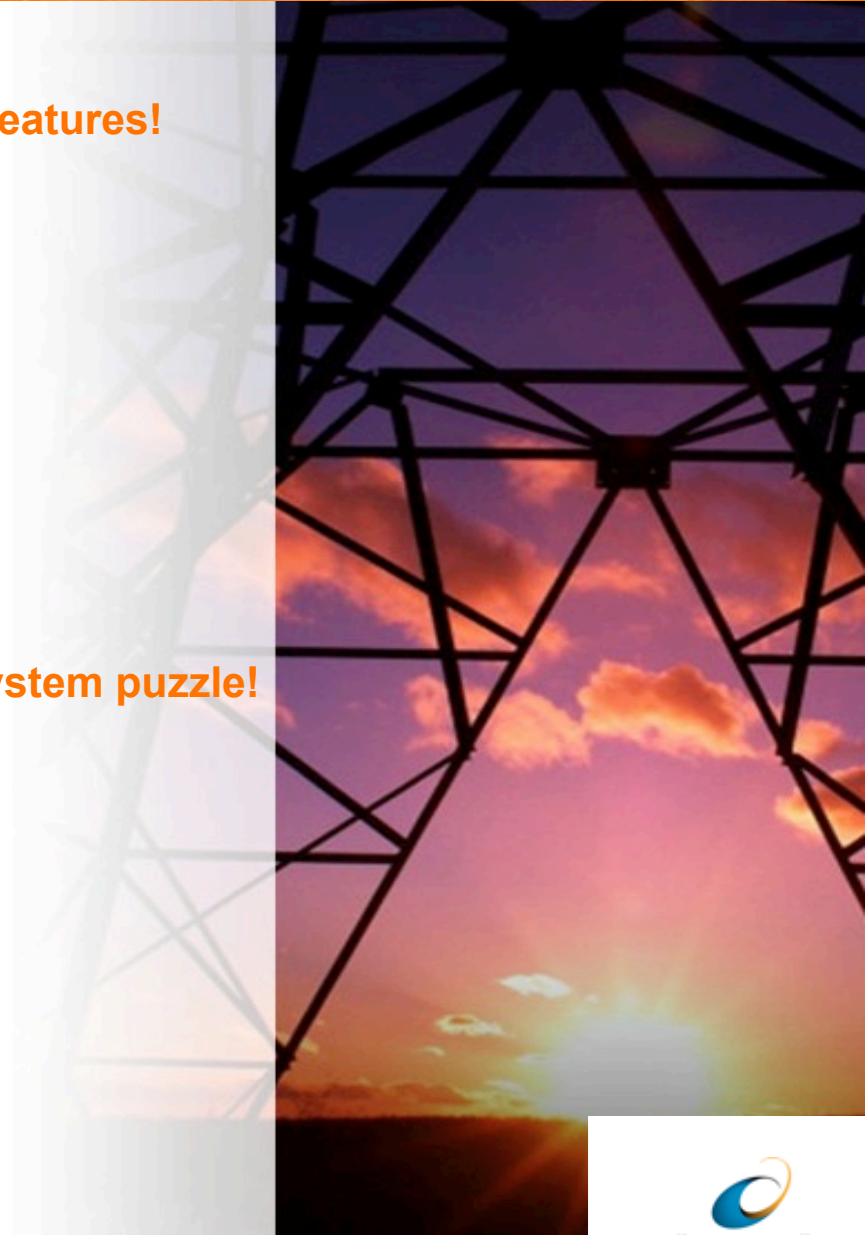
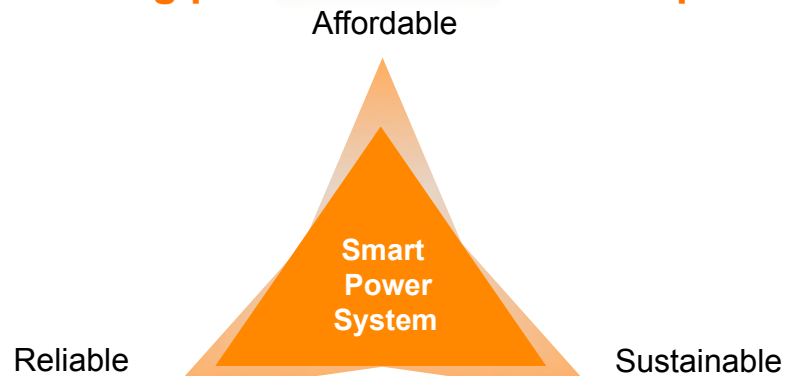
- **Oil & gas industry**

- Continued investments in developing new fields – on shore activity highest in the Middle East and Africa
- LNG is clearly in the focus in OGI sector

1) All in One! A unique combination of valuable features!



2) The missing piece of the low carbon power system puzzle!



ENERGY

- Baseload energy
 - Long-term supply agreement (ppa)
 - Maximum turnover is reached at maximum running hours
 - Maximum profit is reached by minimising cost while still reaching maximum running hours
 - Cost & running hour focus

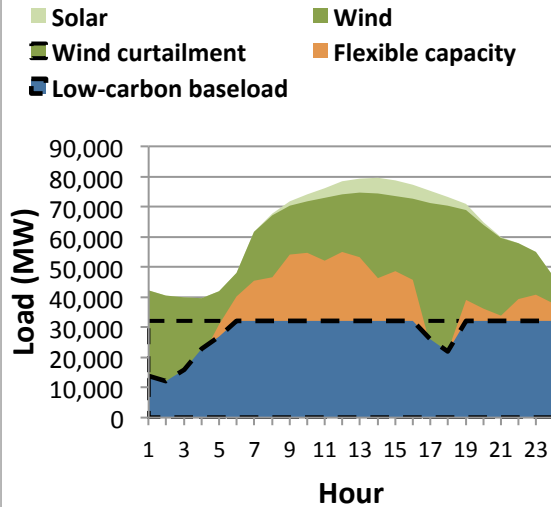
CAPACITY • DYNAMIC CAPACITY • ENERGY

- Reliability services
 - Operation in connection with electricity exchange (market)
 - Revenue is maximised by choosing the best markets to operate
 - Peaking capacity
 - Ancillary – sell capability, plant on stand by or spinning
 - Merchant – bid on high prices
 - Combination of above
 - Customer business model adapts to market situation

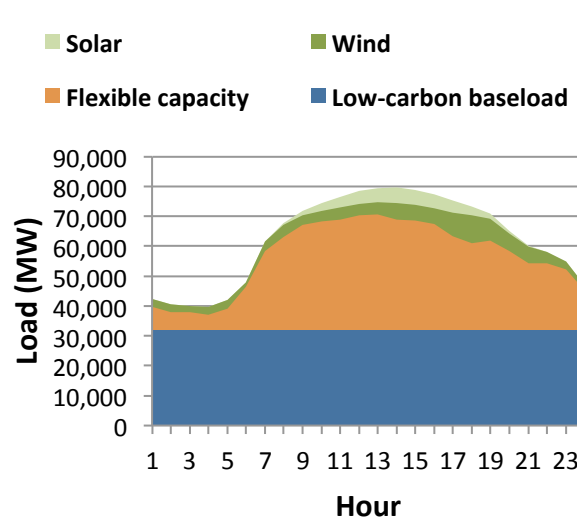
Wärtsilä's view on the power generation markets supports investment in flexible assets. Feedback from customers and operational experience shows that most thermal power generation assets serve intermediate loads.

Decisions for the market participation are made on daily basis

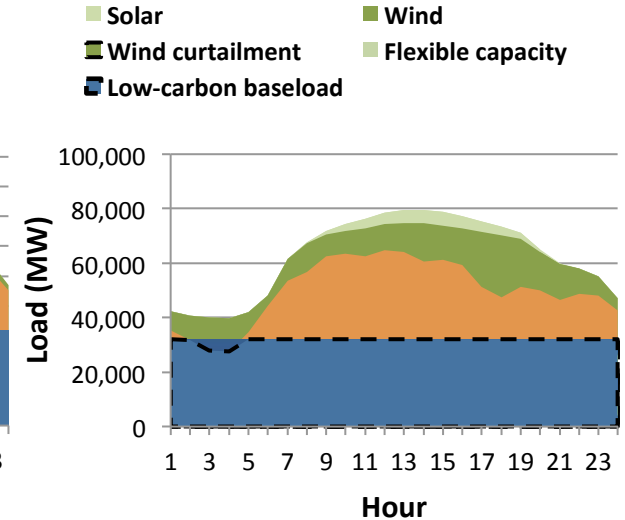
Load curve, future - high wind



Load curve, future - low wind



Load curve, future - average wind





Day ahead market

Competitive auction bidding of next day's supply against next day's buyers' estimated demand. Bidding €/MWh.

Intraday market bidding

Competitive continuous bidding in 1 hour intervals for the unbalance between real demand and available supply. Bidding €/MWh.

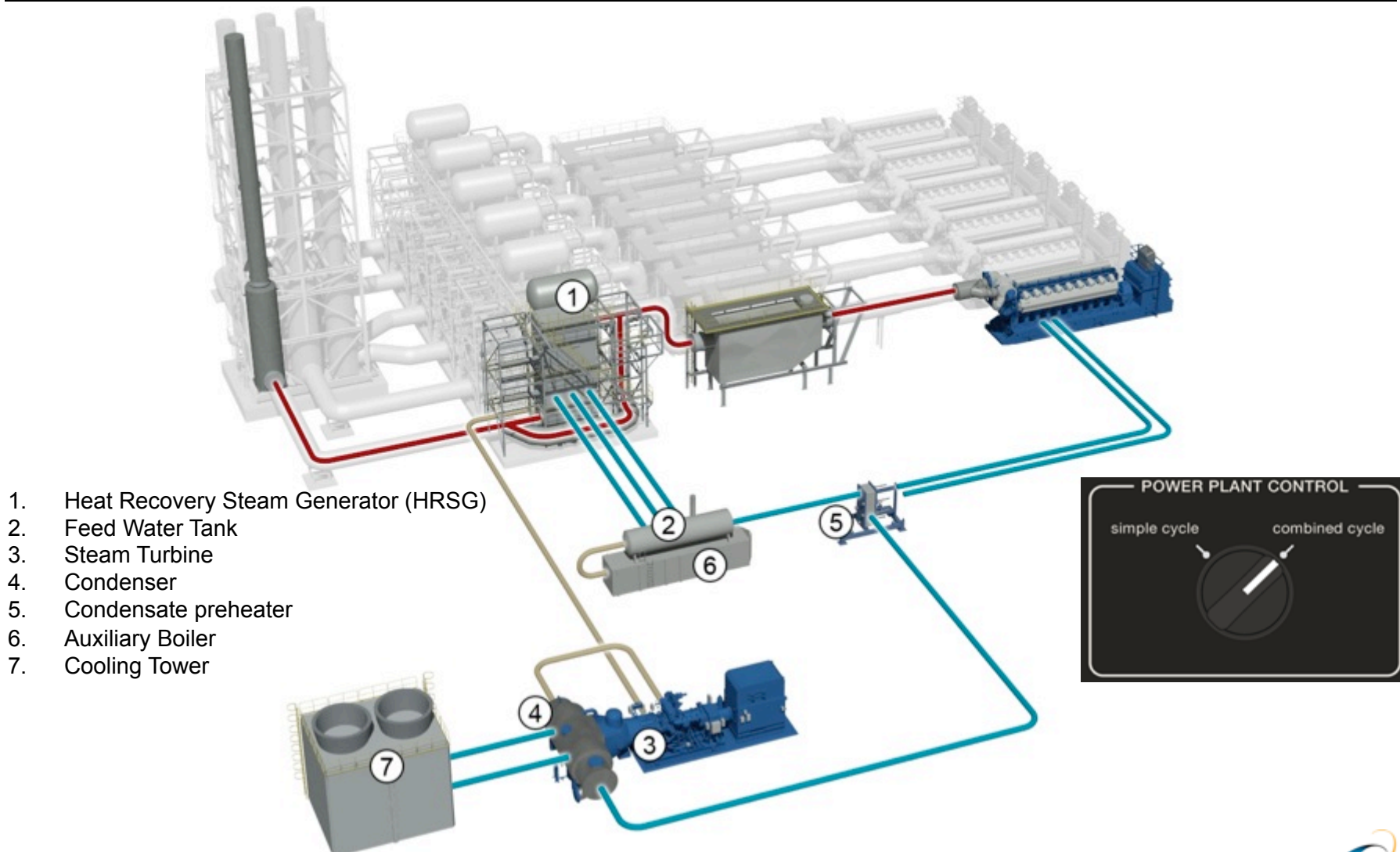
Balancing (regulating) market

Agreed and committed capacity reserves for managing unexpected situations in the systems. Bidding capacity and capabilities.

Plant operator's choice: Which of the 3 markets to participate in?

All in one solution: Wärtsilä Flexicycle™

Wärtsilä Flexicycle plants combine energy efficiency, operational flexibility and fuel flexibility



Case: Haina & Barrick, 430MW Flexicycle™



- Maintain our leading position in HFO power plants
- Grow strongly in large gas power plants
- Grow in power plants based on renewables
- Grow in oil and gas and emergency power applications





WÄRTSILÄ