Big and profitable CHP power plant in a turbulent electric market

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Market trends and challenges

• Electricity consumption
• The growing importance of renewables
  • Impact of wind and solar power
• Green house gas emission targets and challenges
• Typical present capacity mix
• Cyclic operation impact on the power system
  • How to manage the increasing variability
  • Cyclic operation impacts on steam power plants
• The role of gas and coal.
DISTRICT HEATING FUTURE?

Example from Germany

1. FULLFILL the HEATING DEMAND
2. BALANCE with HEAT STORAGE
DISTRICT HEATING FUTURE?

1. OPERATE on PROFITABLE HOURS
2. MAXIMISE HEAT STORAGE UTILISATION
3. OPERATE ON ”ELECTRICITY ONLY”-mode

Example from Germany
HOW TO OPTIMISE GENERATION?

- Maximizing PORTFOLIO profit
  - Minimizing generation cost
  - Exploring market opportunities
INTRA DAY MARKET GROWTH

INTRA DAILY market in GERMANY

GWh

2009  2010  2011  2013  2013

15-min Volumes

correlation to solar production

EPEXSPOT: Workshop on grids and renewable energy
Oslo, 24.9.2013, Audrey Mahuet
300MWth DEMAND, OPERATING REGIME
CHP-power plant configurations

SIMPLIFIED FLOW DIAGRAM

CCGT-CHP

ENGINE-CHP

1. District heating network
2. CHP Module
3. Engine, Wärtsilä 26V34SG
4. Exhaust gas boiler
5. Exhaust gas stack
6. Generator
7. Electricity
8. Natural gas
9. Radiator
10. Thermal storage
11. Municipality
CAPITAL COSTS for 300MWth

295 M€ - 33 % - 200 M€

CCGT-CHP
60 min start time
30 min shut down time
Construction time 3.5 years

ENGINE-CHP
3 min start time
1 min shut down time
Construction time 16 months
**Elspot & Elbas markets**

- CHP must work profitable with challenging market situation.
- Price fluctuation generate opportunity to for CHP power plant which can utilize short high price peek.
- Wärtsilä CHP has competitive advantage against gas turbines.
  - Full power in few minutes.
  - High efficiency at partial power.
  - Shut down in one minute, ready to start immediately.
  - **Plant can run profitable even difficult market situation.**
Elering Kiisa I & II, Estonia
Output: 250 MW
Fuel: Natural gas & LFO
Prime movers: 27 x Wärtsilä 20V34DF
Operating mode: Grid stability
Year of completion: 2013 & 2014
Scope: EPC
THANK YOU!

Smart Power Generation