

WP 3.4

System integration

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- 3.4.1 Integration of centralised and decentralised generation; influence on the grid
 - KULeuven, Electa
- 3.4.2 Greenhouse-gas emissions due to interaction centralised and decentralised generation (because of operation-time effects and investment consequences)
 - KULeuven, TME

- No common agreement on exact definition DG
 - “Electric power generator connected directly to distribution network or on customer side of meter”
- Benefits
 - Improved market development
 - **Flexibility**
 - Allows response to changing market conditions
 - Allows hedging against price fluctuations
 - Ecological benefits
 - **Allows exploitation of cheap fuel opportunities**
 - Small-scale and dispersed among the grid

- Additional quality of supply and reliability
 - Voltage support and power factor corrections

- Difficulties
 - Large-scale introduction may cause instability of voltage profile
 - Bi-directional power flows
 - Complex reactive power management
 - Increase capital cost per kW
 - DG is quite expensive

- Simulation tool (e.g. Promix)
 - Detailed simulation of electricity generation
- Precise quantification of impact \Rightarrow simulations
 - For complicated scenarios a-priori statements are difficult or even impossible to make
- Simulation of electricity generation for all relevant scenarios is essential
 - Study impact of demand/supply-side options, or both at same time

- Promoted / prohibited application leads to instantaneous change in fuel mix
 - Change in demand does not result in same relative change for all active power plants
 - **Only most expensive plants are shut down, activated or modulated**
- Properties of *average* system not relevant
 - Incremental changes in demand only affect activation of this limited number of plants
 - **Characterized by their own emissions, efficiency and fuel costs**

- Larger variations possible if measure causes changes in evolution of power system investments
 - Especially when action on demand side triggers technology with high load factor
 - **Base load or semi base load**
- New base load plant built to respond to additional demand peak
 - Plant not only activated during period of additional demand
 - **(almost) continuously**