Experiences with Demand Response and Back-Up Generation as regulation power

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The “energy web” – a long term scenario

- Communication is abundant and free
- Price signals “everywhere”

- No minimum size
- Many markets
- Individual security of supply
- All nodes can negotiate with all other nodes

- Equal possibilities for all technologies
- Demand response
- Back-up generation
- ... and much more
Activating Back-Up Generation: Synergy

- New capacity to the market: Activating existing generation capacity
- Local security can be maintained or even improved
- Companies get an income

- Typical operation periods: 10-30 hours per year (~ before)
- Environmental problems limited
Demonstration project in few words

- 10 MW regulating power from BUG and demand
  - End of year 2005: 25 MW
- 15 units online, 7 to come online soon
- Typical start up time: 1 minute
- Typical size: 0.5 MW per unit
- 200.000 DKK/MW per year in reservation cost (US $ 30.000)
- 1 DKK/kWh produced (US $ 0.15)
Three types

• **BUG in island operation**
  – High degree of safety (important reason to participate)
  – Reduced and varying effect (depending on actual demand)
  – No extra meters

• **BUG in synchronous operation**
  – Security obtained with relays
  – Extra meters needed

• **Demand**
  – Measurement of reduced demand has been difficult (only total demand metered)
  – Effect varying with time
  – Demand will return at a later time
Typical owners of BUG

- Hospitals: 2
- Airport: 1
- Computer centre: 1
- Medical factory: 2
- Waste management: 2
- Tele communication and media: 2
- Electric utility (owner of BUG): 2
  - Including 5 mobile units and 8 stationary units
Demand as regulating power

- Malting company (brewery): Cooling by ventilators
- Industrial cold store: Refrigeration compressors
- Ice skating ring: Refrigeration compressors
- Supermarkets: Ventilation and refrigeration
- Water supply: Pumping
NOIS

Power

Flex

Minimum 10 MW (via balance responsible)

Individual units or groups of units (any size)

Power+Flex:
One click system to activate BUG and demand as regulating power
Plus communication with balance responsible
Results

• High interest to participate with BUG

• New application for aggregating bids and communication to each unit is working
  – GPRS-relay
  – Voice mail

• Many delays (mainly administrative problems)
  – Contracts with balance responsible
  – New meters (utility not used to this type of metering)
  – Allowance to deliver to grid
  – Tax questions
To be documented... (BUG)

- Fast resource (1 minute)
- Secure (many independent units)
- Reservation cost can be lowered

- Realistic with 75 MW regulating power from BUG in 2010
  - 50% of maximum need for regulating power in East Denmark