Unlocking Demand Response for Germany & Europe

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Entelios is Germany’s first Demand Response Aggregator

- **Service:** Entelios sheds, curtails, or eliminates energy usage through technologies, solutions, & programs that manage customer demand for electricity and gas in response to price signals, incentives, & directions from utilities and grid operators.
- **Focus:** Commercial and industrial sector; German speaking countries
- **Locations:** Munich and Berlin
The ambitious EU renewable energy targets will imply a significant additional burden on electricity systems, both in terms of congestion management and balancing.

**The Paradigm Shift**

- **Supply Peaks**  
  - Supply Valleys

- **Demand Peaks**  
  - Demand Valleys

**Virtual Peaking**

**Power System (Plant)**

**Wind Generation Unpredictability**

Germany 2009, Windpower generation 37 TWh

**Balancing Power**

**Demand Flexibility**
Slow market adoption of Demand Response is due to a series of interrelated factors.

The Challenge

- Cloudy information about DR benefits
- No available study about DR potential (commercial)
- Investments focused on supply side infrastructure
- Earnings tied to MWh
- None or limited customer incentives to save energy
- DR initiatives being at the bottom of the priority list
- Many other mandates (e.g. smart meter roll-out)
Realities and needs among stakeholders need to be balanced out. Is the customer still „king“?

The Balancing Act

- DR Reliability
- Learning Curve
- Deployment Costs
- Regulatory Framework

- Energy is seen as commodity
- Opportunity Costs (tariff Δ)
- Investment
- Risk
- Staff

Incentives?

Utility & System Operator Needs

Demand-Side Realities
Demand Response services and programs are evolving.

DR Evolution

Demand Response 1.0 / Smart Metering
Demand Response 2.0 (automation)
Demand Response 3.0 (eMobility)
Advanced customer analytics

NOC 1.0
NOC 2.0
NOC 3.0
By "decoupling" sales from earnings, utility regulators can write efficiency into utilities' bottom lines.

De-coupling

- The most promising and environmentally sound new "source" of energy is energy efficiency – one would believe.

A decoupled utility would make profits not in proportion to its sales but in proportion to its success in advancing efficiency.
A national - european roadmap for DR development will tremendously help to facilitate demand-side resources and to adapt market-based approaches.

**National DR Roadmap**

- July 2001, a national roadmap for Demand Response was developed by South Korea.

- The Energy Independence and Security Act of 2007 required both FERC and NIST* to have the roadmap for demand response to be defined by June 2010.

- Europe?

* Federal Energy Regulatory Commission (FERC); National Institute of Standards and Technology (NIST)
Appendix
Further challenges demand-side

**Policy Support (1/2)**

- DR to become an application within a company’s energy efficiency (EE) suite
- Wrecking bonus (analog to Germany and USA car based subsidy programs)
- Dynamic pricing programs
  - Time-of-Use (TOU)
  - Critical-Peak-Pricing (CPP)
  - Real-Time Pricing (RTP)
  - Peak time rebates
Further challenges supply-side

Policy Support (2/2)

- Clear regulatory guidance that prudent DR investments can be recovered through rates
- Allow DR-related Operating Expenses to be considered in the calculations of earnings
- Establish load balancing / capacity markets
High-Level End-to-End Market Taxonomy positioning DR aggregators among the other market players.

**Market Taxonomy**

- **Utility Layer**
  - Utility Control & Mgmt. System
  - EMS, DMS, GIS
  - DR Control System
  - AMI, MDM

- **Infrastructure Layer**
  - Application n
  - Distributed Generation
  - Entelios - Demand Response
  - Advanced Meter Integration (AMI)

- **Consumer Layer**
  - End-user data for Application n
  - Distributed Generation and Storage Data
  - B2B (commercial / industrial) Appliance Data and Control
  - Meter Data

- **Power Layer**
  - Generation
  - Transmission
  - Substation
  - Distribution

- **Communications Layer**
  - LAN (Local Area Network)

- **Smart Grid Application Layer**
  - EMS, DMS, GIS
  - DR Control System
  - AMI, MDM

- **Network Security, Network Auditing are other important aspects, not shown on this slide.**

**High-Level End-to-End Market Taxonomy**

- **Energy Trading, Carbon Credit Trading, Weather / Energy Supply Prediction**

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*EFEN 2010 European Future Energy Forum*