DSM and norwegian energy efficiency programs

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Electricity is the main energy carrier
Market Based demand Response Results from Norwegian Research Projects

IAE/DSM workshop, Trondheim

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Outline

• Introduction

• Marked Based Demand Response – Value of demand side price elasticity

• Examples from Norwegian pilot tests – lessons learned
  – Load shifting – remote control
  – Innovative Power contract: "Fixed Price with return option"

• EcoGrid EU (FP7) Large scale smartgrid demonstration of an advanced market concept
Electricity consumption in Norway

- Total 127 TWh (07)
  - Heating: ca 35 TWh
  - Large industrials: ca 40 TWh

- Peak load: 23,994 MW

- A large (theoretical) DR potential
  - Industry ~3,000 MW
  - Residential and commercial: ~1,700 MW

- Production (99 % Hydro): average 130 TWh/Year 50 TWh variation between wettest and driest year
Monopoly - competition

- **Monopoly**
  - Authorities (NVE)
  - TSO (Statnett)
  - DSO
  - Revenue cap regulation

- **Market**
  - Market operator (NordPool)
  - Power supplier
  - Elspot
  - RPM
  - Agreements

- **Network tariff**
- **Energy price**

**Customers**
Market based Demand Response Project
(2005-2008)

Pilots

1. "Remotely controlled Load shifting" – peak load reduction
2. "Fixed Price with Return option" - reduction of energy in shortage periods
3. Automatic Demand Response (ADR)
4. "Smart house – ToD tariff" – housing cooperative
Pilot I “Remotely controlled Load shifting – ToD tariff”

- Test group: 41 household customers

- Network tariff: Time of Day tariff with high price in periods with expected shortage (+ 0,10 €, Mon-Fri, hour 9-11 and 17-19)

- Energy price
  - Hourly spot price (free choice of supplier)

- Remote control of water heaters (2-14 kW) via AMR in the defined periods

- "El-button" reminder
Pilot I
Results

Positive response from all customers. No cold water complaints.

Automatic load reduction in peak load periods gives a stable demand response.

Accumulated 600 -1000 MWh/h load reduction in peak hour indicated.
Pilot II
Fixed price with return option (FWR)

- Fixed Volume - financial contract combined with spot price settlement

- Objective /characteristics
  - Give incentives to load reduction in periods with shortage
  - Retaining the advantages of fixed price contracts with regard to predictable costs
  - Reduce the risk for the supplier.

- 2500 household customers
Demand response from FWR customers compared to alternative contracts
EcoGrid EU (FP7 Energy – 2010-2)
2011-15, 20, 6 M€

- Main objectives:
  - To demonstrate operation of a power system with more than 50% renewable sources
  - To implement ICT systems and innovative market solutions - offering TSOs additional and more efficient balancing services
  - To enhance small consumer and local producers to participate in the power market through real-time operation, energy storage and savings

EcoGrid EU Partners

* Third party