



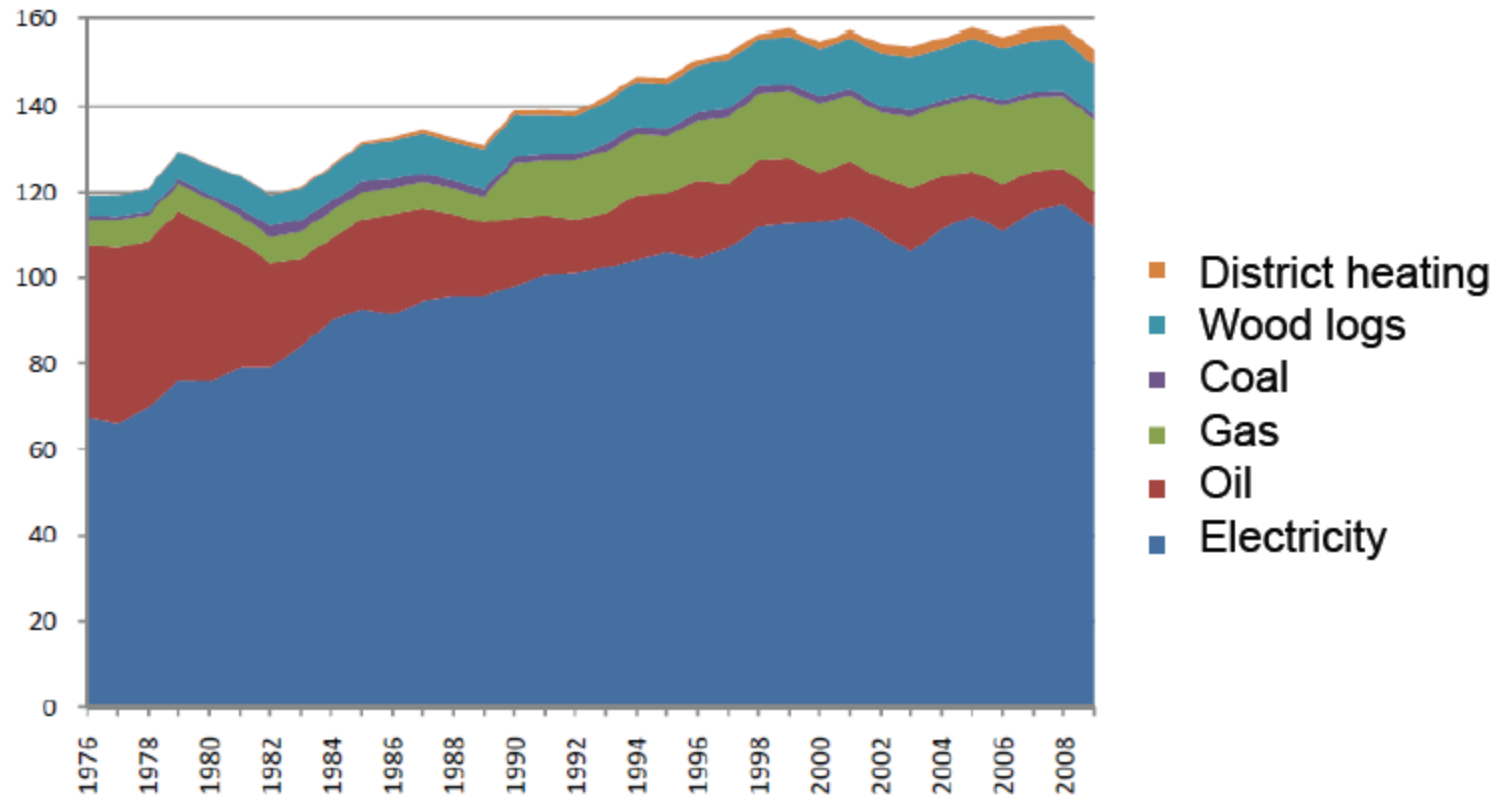
# DSM and norwegian energy efficiency programs

18. April, 2012

*Audhild Kvam*

*Director Energy Efficiency*

# Electricity is the main energy carrier



*Stationary energy use in mainland Norway, TWh , Source: NVE*

# Market Based demand Response

## Results from Norwegian Research Projects

IAE/DSM workshop, Trondheim  
18 April, 2012

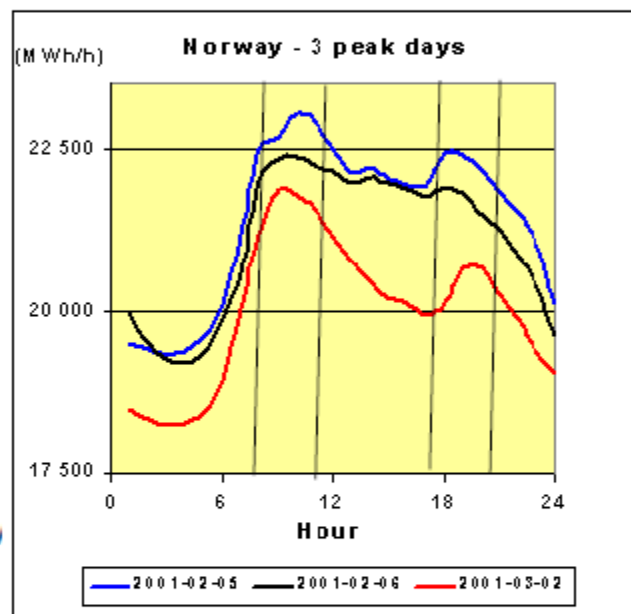
Senior Research Scientist  
SINTEF Energy Research

# Outline

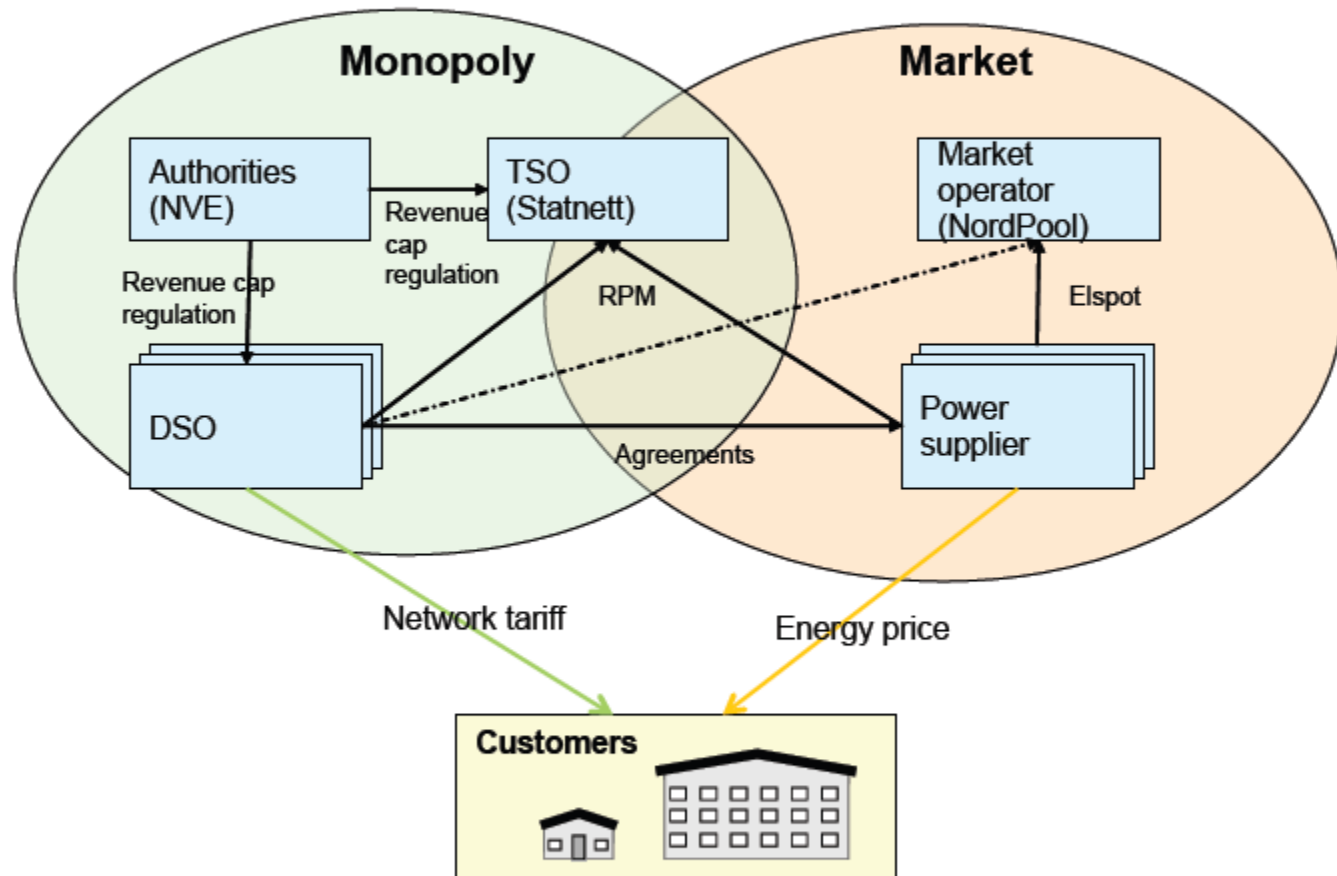
- Introduction
- Market Based Demand Response – Value of demand side price elasticity
- Examples from Norwegian pilot tests – lessons learned
  - Load shifting – remote control
  - Innovative Power contract: "Fixed Price with return option"
- EcoGrid EU (FP7) Large scale smartgrid demonstration of an 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



# Market based Demand Response Project

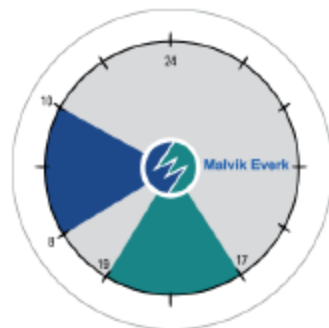
(2005-2008)

## 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



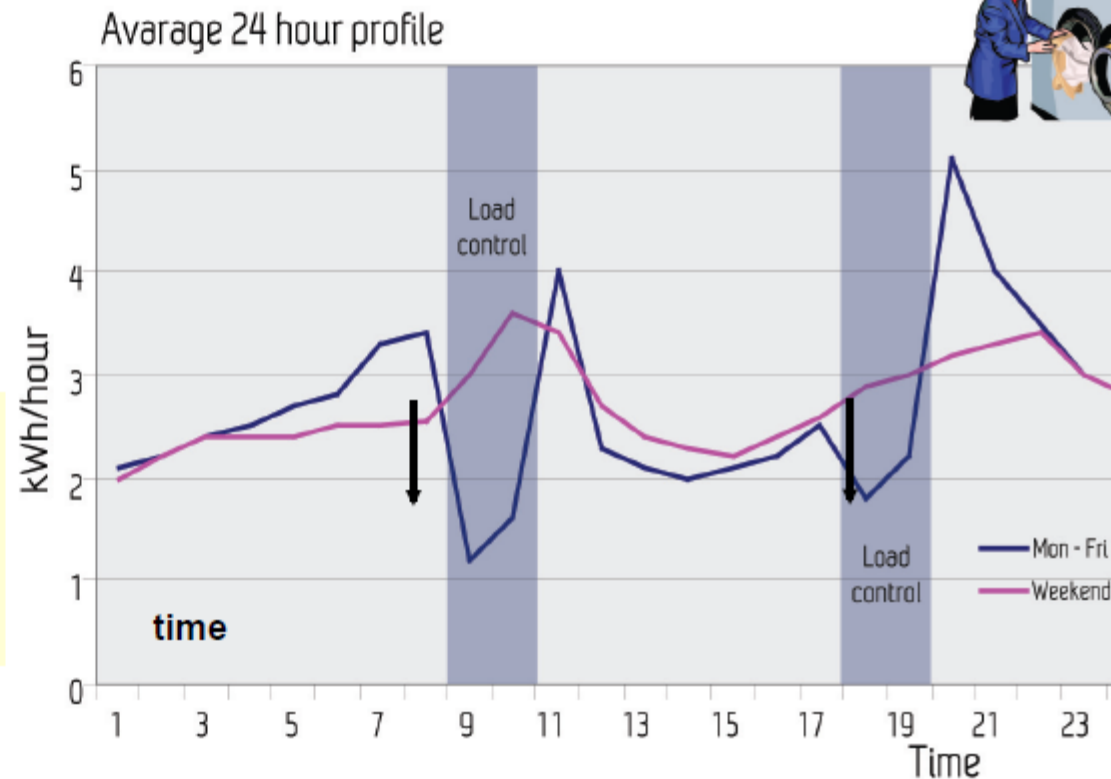


# Pilot I Results

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.



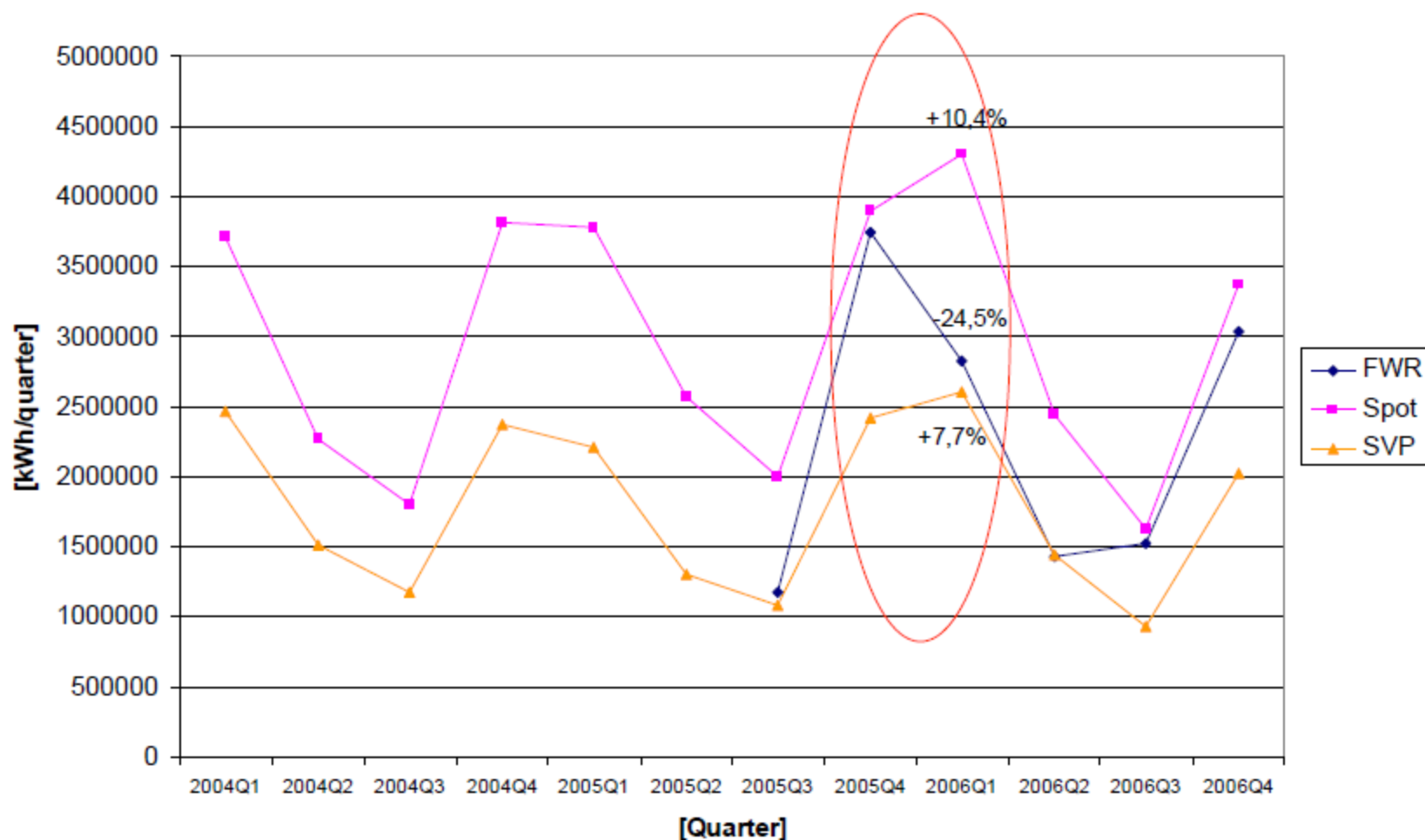
## Pilot II

### 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

