



IEA DSM
Task 23 project meeting
4. – 5. July 2013

Norwegian case studies

Even Bjørnstad



1. Background

The electricity market in Norway

- hydropower resources
- high dependence on electric energy (households, industry)
- electric space and water heating
- weather dependent supply (seasonal precipitation)
- weather dependent peak demand (winter temperature)
- green certificates in place from 2012



2. Why DSM/smart metering?

Main motivators:

- peak load control (avoided investment costs)
- automated meter data collection, efficient billing routines
- energy savings for end users
- integration of renewables
- regulation



3. Case Malvik

Demand Response in households

- smart metering
- remote load control (electric water heater, space heater 2 – 15 kW)
- hourly spot price contracts
- time of use network tariff (peak hours addition, 08 – 10, 17 -19)
- graphical "motivator" (sticker)



3. Case Malvik

Network tariff

- fixed element: 187.5 Euros/year
- standard variable part: 0.875 Eurocents per kWh
- peak hour addition: 7.88 Eurocents per kWh



3. Case Malvik

Program information

- carried out from 2007
- 40 households
- voluntary participation
- load units controlled by network operator



3. Case Malvik

Results – average DR – peak hour load reduction

- 1 kWh per hour for customers with standard water heaters
- 2.5 kWh per hour for customers with electric boilers for space heating
- A similar DR in all Norwegian households would sum up to a 4.2 % reduction in the national peak load demand

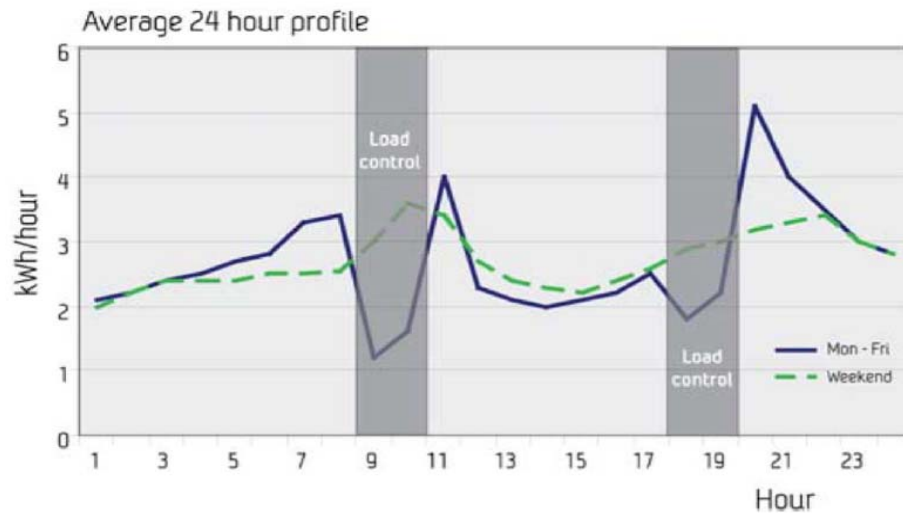


Fig. 8. Load profile for a household customer with hot water space heating system and RLC [13].



3. Case Malvik

Significant load shifting is possible, given:

- motivated customers (here: small pilot group)
- suitable economic incentives (tariff and spot price)
- good information and "behavioural trigger"



4. Case eWave

Pilot on Demand Response in households:

- development of dedicated in-home display unit
- aim: to test the effect of improved feedback to customers on energy behavior and energy consumption.

Participation:

- two power suppliers (Follo Energi and Askøy Energi)
- 44 + 47 household participants
- voluntary participation



4. Case eWave

Available display options

- graphs and "speedometer"
- current power and accumulated energy consumption
- monetary (cost) variables

eWave resembles a "smart grid-type" display, but a smart meter is not required (pulse reader)

Gets real time price information from power retailer via internet



4. Case eWave





4. Case eWave

Recorded results

Participants in the pilot tended to report behavioural changes such as:

- turning off appliances when not in use
- turning off lights when no one present
- reducing indoor temperature when no one is at home
- reducing indoor temperature during the night.

End uses affected by eWave: heating, appliances and lighting.

Quantitative results:

Energy savings in the order of 6 – 8 %.



5. Case DemoSteinkjer

Which we will visit tomorrow afternoon