EFFLOCOM Workshop 13-06-2003

How to achieve energy efficiency actions as an alternative to grid reinforcement!

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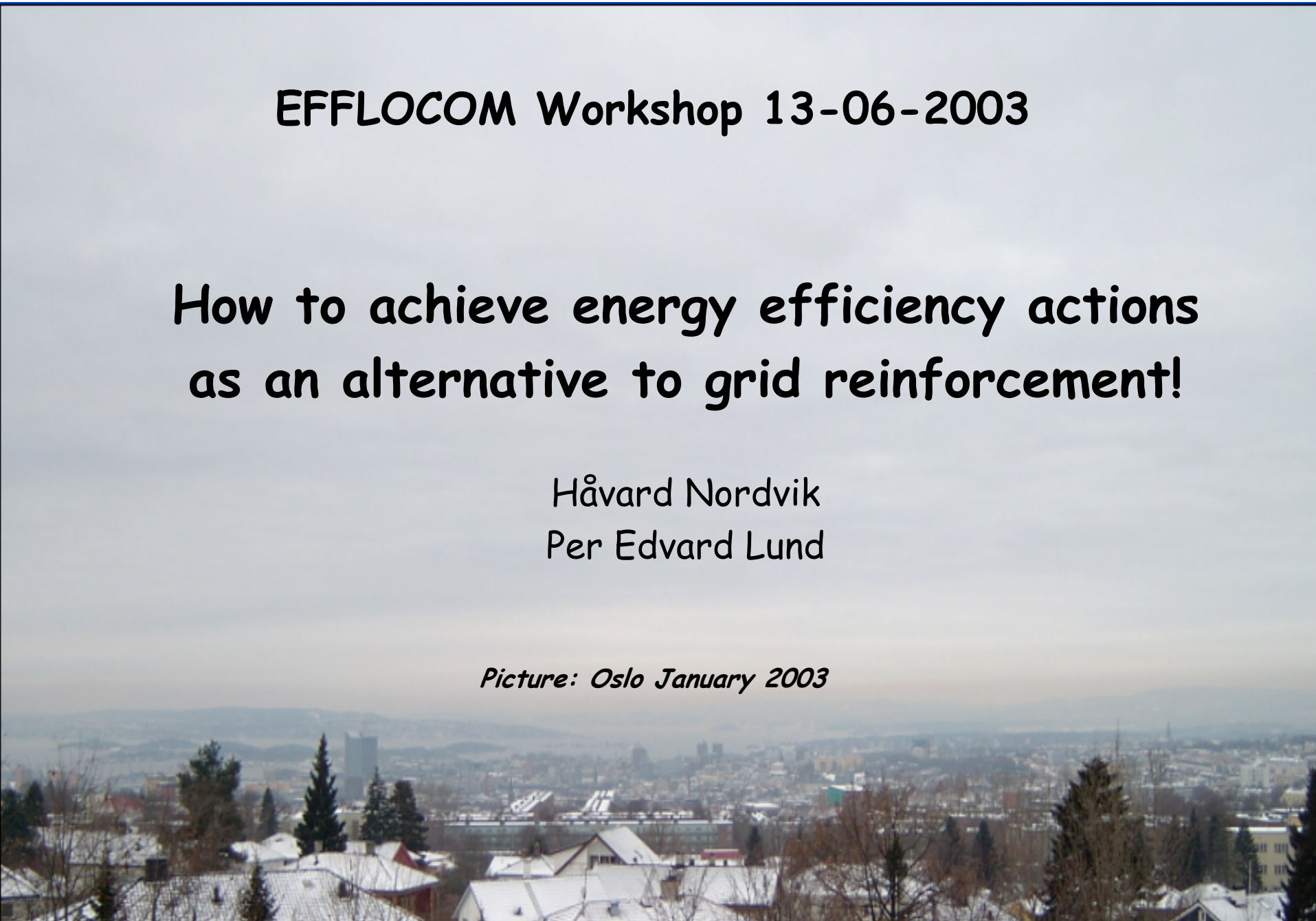
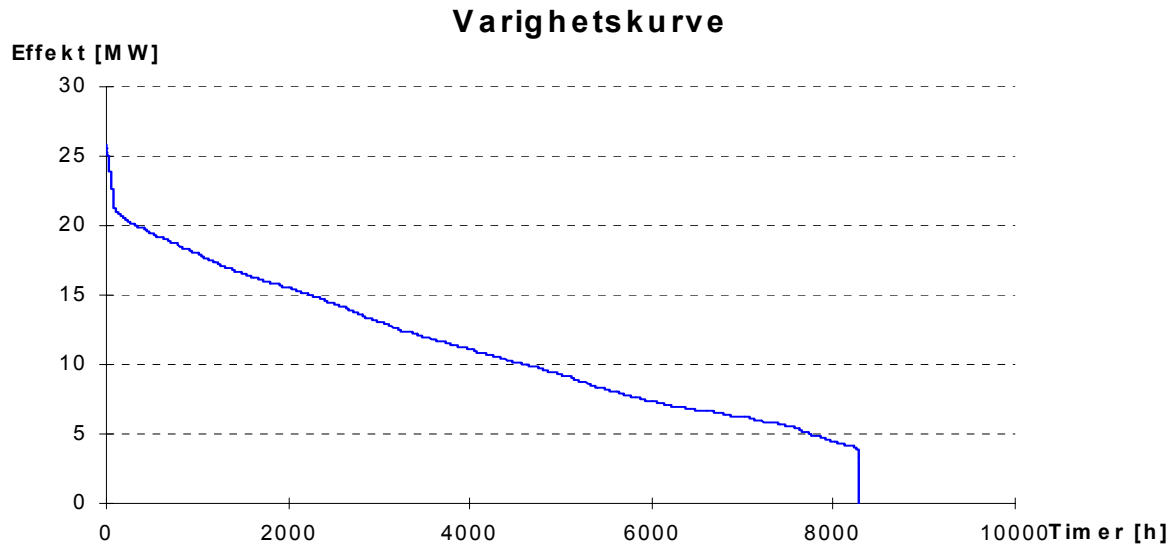


Picture: Oslo January 2003

IDO - Based on the "DSM balance principle"



Load prognosis is determined

↓

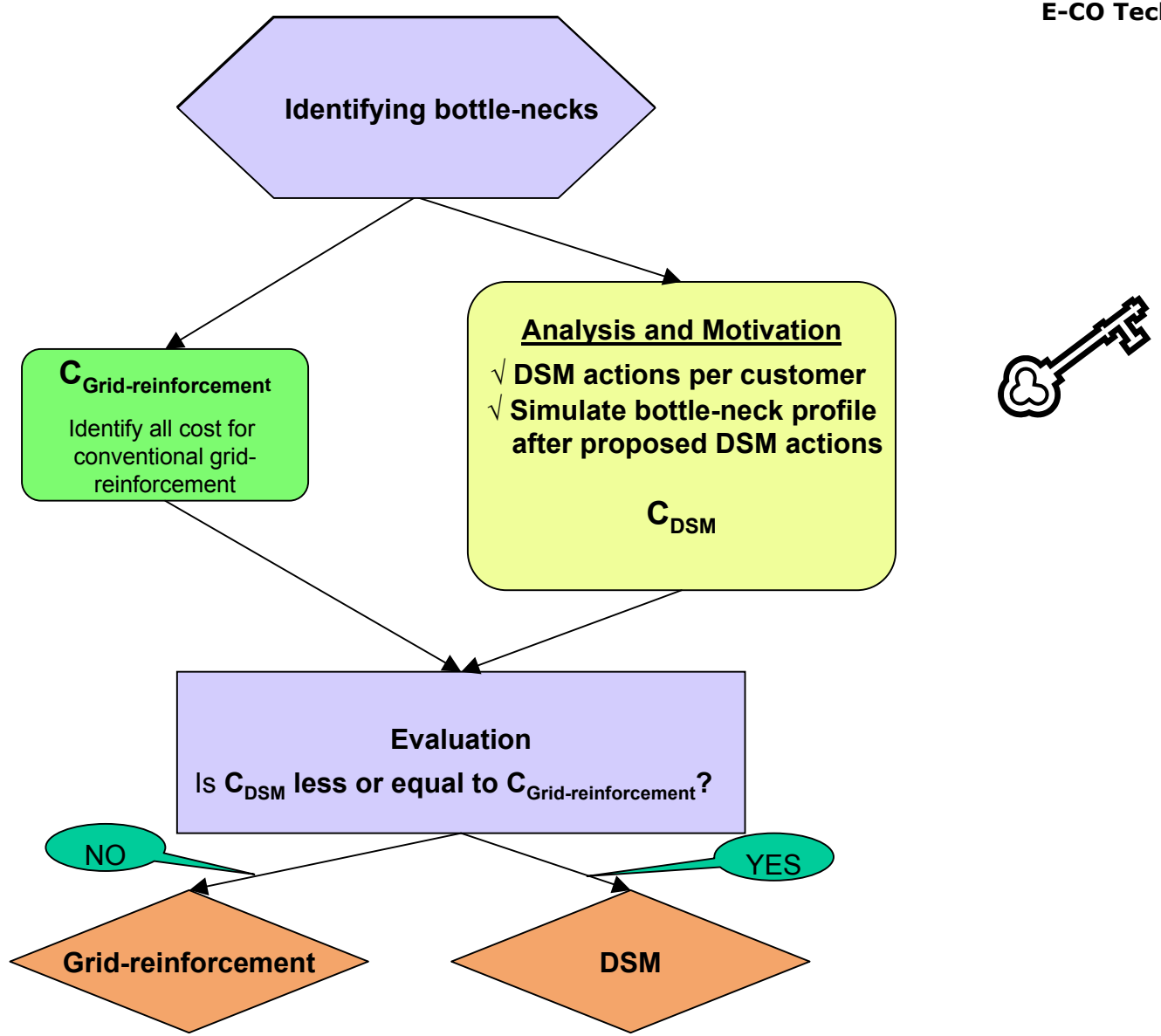
Adaptation of the grid

Alternative

The grid is determined

↓

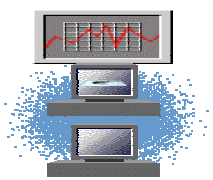
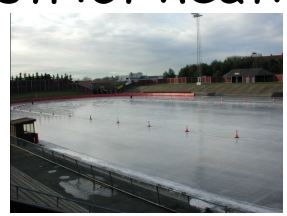
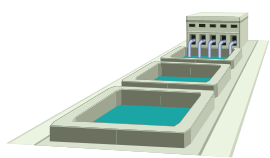
Adaptation of the end user

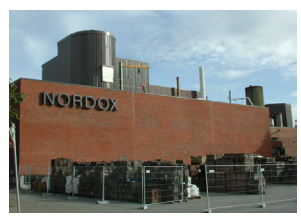

Identifying bottle-necks
$C_{Grid\text{-}reinforcement}$
Identify all cost for conventional grid-reinforcement
Analysis and Motivation
√ DSM actions per customer
√ Simulate bottle-neck profile after proposed DSM actions
C_{DSM}
Evaluation
Is C_{DSM} less or equal to $C_{Grid\text{-}reinforcement}$?
NO
YES
Grid-reinforcement
DSM

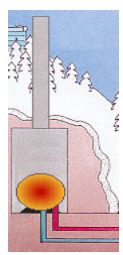
What makes it interesting for the end-user to invest in DSM?


- Switching off the water heater, electric boiler, heat pump, heater cables, outdoor electric installations
- Reducing the room temperature with 1-2 ^{0}C
- Using the emergency power aggregate in the peak period
- Rehabilitation of building such as insulation, replacing windows, heat recuperator in ventilation plant etc..
- Implementing building automation system for controlling energy consumption and peak load reduction
- Choosing another energy carrier than electricity, e.g. district heating

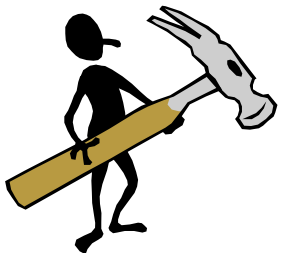


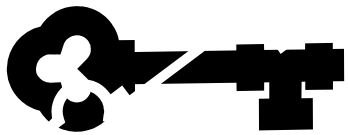




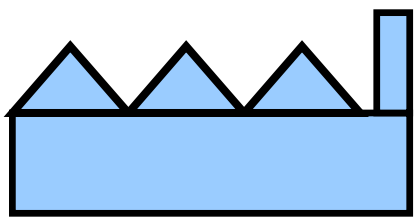



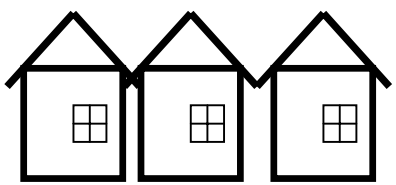


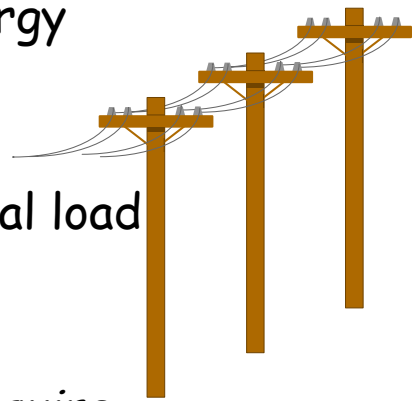
The network company wishes the end-user to invest in Demand Side Management!











Pilot 1: Long-term DSM actions (*do not require involvement by the network company*)

a) "Energy alteration" – alternative energy carrier to electricity

b) Reduction of energy consumption

c) Reduction of maximum peak load (local load control)

Pilot 2: Short-term DSM actions (*do require involvement by the network company*):

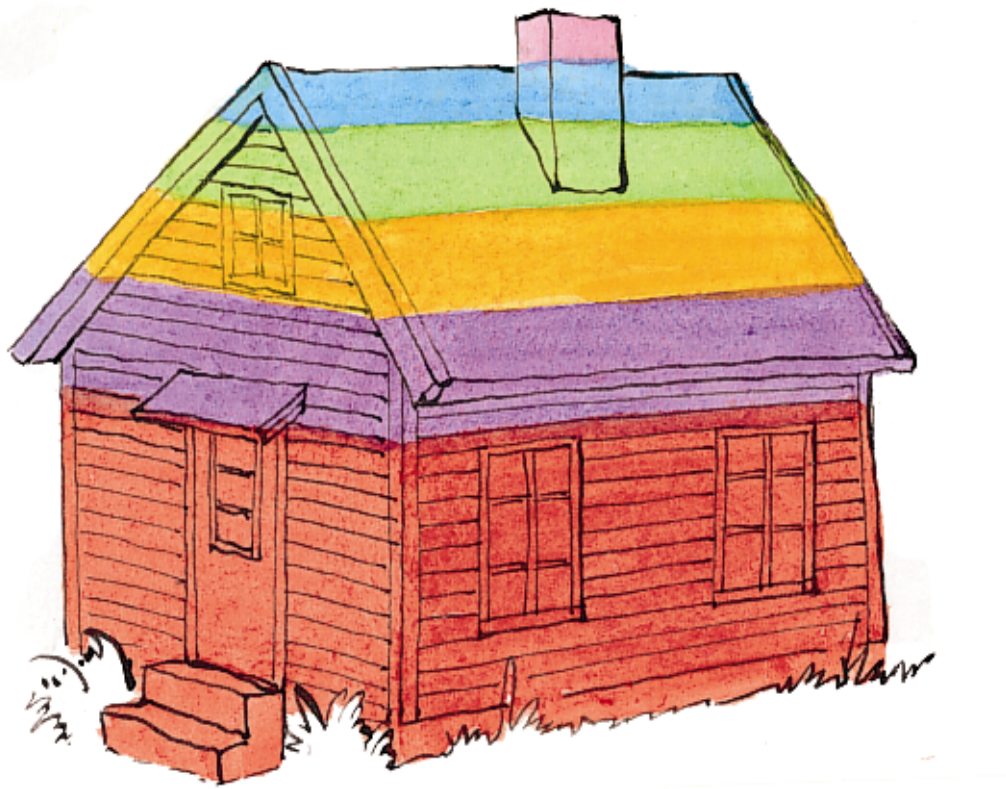
d) Remote control of the end users power load.

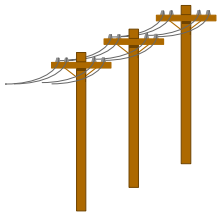
"How to understand the end-user? Everyone is so different?

Among the majority of end-users in Norway energy consumption is based on electricity!

An average resident:

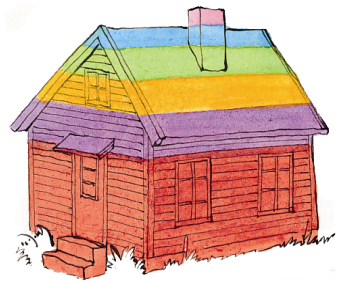
- **Heating 58 %**
- **Hot water 14 %**
- **Lighting 11 %**
- **Kitchen 11 %**
- **Bathroom 4 %**
- **Sundry 2 %**





Key Motivation factors!

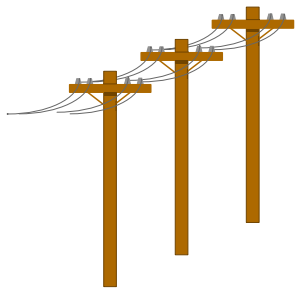
Residential end users



- Cost allocation – the end user have to pay for the potential grid reinforcement himself
  - ✓ What can I afford compared to other costs in the household?
- Electricity costs
  - ✓ Why shall I reduce the peak load when I do not pay for it?
- Contact persons and decision-making process
  - ✓ Jointly decision – if my neighbour does I will
- Human factors and knowledge
  - ✓ Confidence in the projects spokesman

Incentives and goals!

Commercial end users

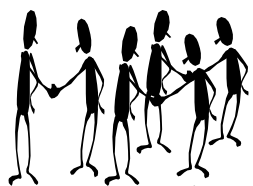


Owner of premises

- High profitability of his investments
- Strengthening of his position on the real estate market
- Low operation and maintenance costs

Network company

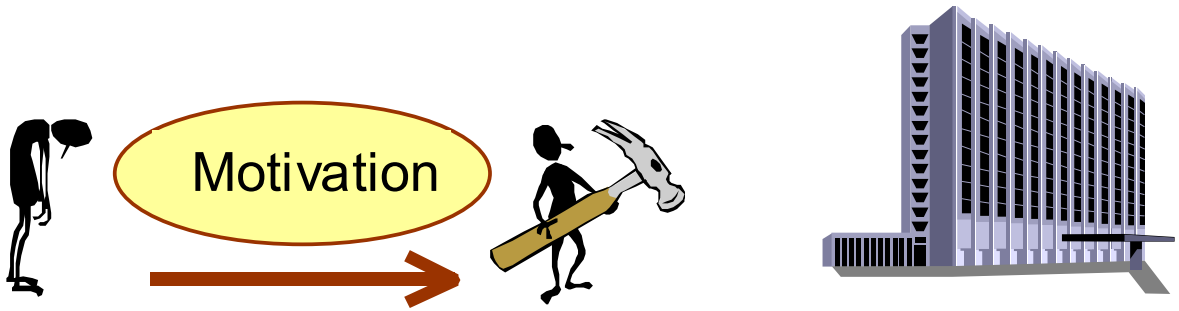
- A tariff agreement which makes the end user implement DSM actions
- Maintained or increased incomes from transmission



Leaseholders (renters)

- Low rent fees
- A secure solution for remote control
- Similar to residential (selfowner)

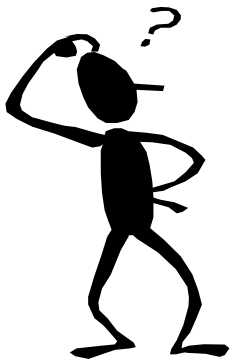
Key Motivation factors!



- Ownership versus rent of premises
  - Affects the decision-making process
- Contact persons and decision-making process
- Cost allocation
- Financing of DSM and recovering of investments
- Electricity costs
- Human factors and knowledge

Network Tariff – The Motor Oil in the Motivation Model !

My electricity costs?



- An enduser in Norway will most likely have its electricity costs as follows:

  - Power Company: 50%
  - Taxes: 20%
  - **Network company: 30%**

Commercial (Average):
60% Maximum peak load
38% Energy consumption
2% Fixed Cost

Residential (Average):
0% Maximum peak load
75% Energy consumption
25% Fixed Cost

Conclusions from pilotstudies in Oslo

- DSM actions can be proved to be profitable compared to conventional grid reinforcements
- One methodology for implementing DSM actions has been developed – a motivation model.
- Among a random group of commercial end users, 49% of peak power load can be controlled or interruptible for a limited period of time (short-term DSM)
- A general potential for energy saving and peak load reduction (long-term DSM), of 10-15%. This potential is related to a wide type of energy efficiency actions.
- We beleive this knowledge will lead the way for network owners, local authorities and district heating suppliers in Norway and other coutries.