

EFFLOCOM Workshop 13 June 2003

Market based load flexibility

Technology, price signals and incentives

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EFFLOCOM Phase 3:

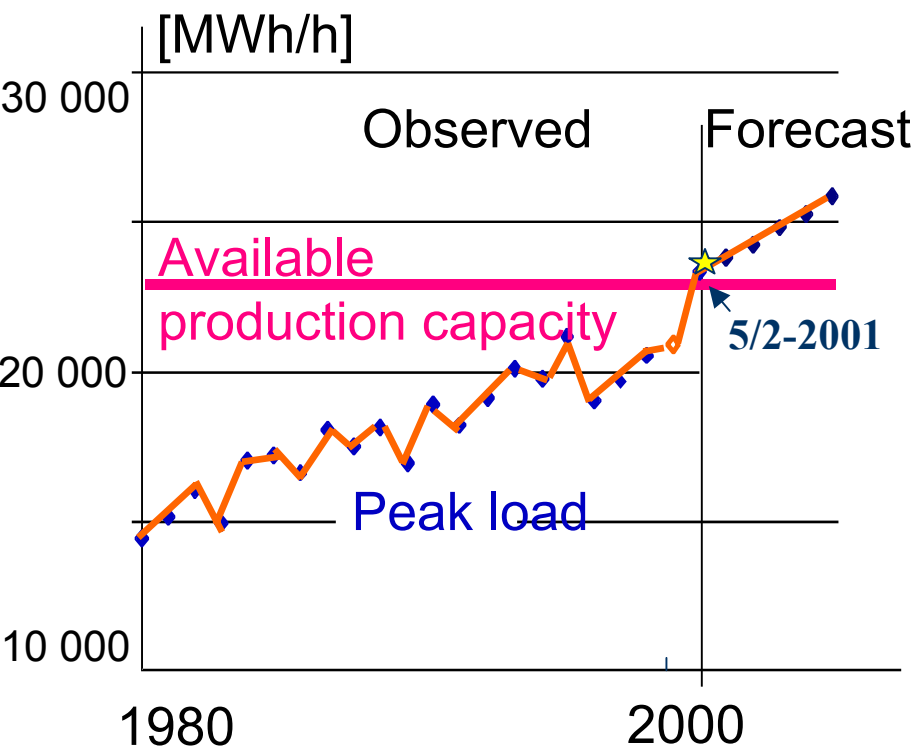
Impact of communication infrastructure

- **Direct communication**
 - Hourly metering
 - Remote load control
- **Price signals**
 - Network tariff
 - Electricity Cost
- **Potential of load reduction in peak hours**
 - Industry
 - Domestic
- **Incentives of the different actors - funding of infrastructure**

Outline

- Introduction
- Potential and incentives
- Status Direct Communication Norway
- Pilot project
- End User participation in Balancing Market

Capacity shortage Norway



Elspot 29/1-6/2 - 01



- Peak load increase: ~ 350 MW/year
- Capacity shortage is expected only in limited periods (hours)

FOCUS has turned towards the potential of market based load reduction in peak hours

Vision

To improve **Demand Side price flexibility** and to create **“Regulation objects”** from consumption as alternatives to investments in new production

Requirements:

- Price flexibility on hourly basis
- Controllability

Demand side potential in Norway

- Power intensive industry: ~3600 MW
(15 % of total load)
- Residential load and smaller industry: ~1750 MW

Improved utilization of reducible loads.

Main aspects (Norwegian case)

- Hourly metering
 - Remote and/or local load control
 - Improvement in data management procedures
 - Improvement in End User markets
- } **Direct Communication**
- MVS/CIS**
- Market Design**

Benefits of Direct Communication

■ Network Owner

■ Supplier

- Rationalised management of meter information

- Improved metering accuracy

■ End User

- Potential for new products based on

■ Authorities

- Detailed information about own energy consumption

- Potential for increase price flexibility in consumption with improved power balance as a consequence

Direct Communication Norway

■ Norway:

Presently hourly metering is available from all consumers with yearly consumption **> 400 000 kWh** and from 2005: All **> 100 000 kWh**

80 000 customers
~60-70 % of the load

Direct Communication Sweden

- Authority requirements :
 - **Monthly** meter reading of all customers from 2009

*Consequences of different authority requirements
in the Nordic power system???*

Large scale development Italia

- ENEL Distribuzione establishes Direct Communication to 30 mill. customers 2004
- Hourly metering
- Main motivation: More precise and automatic metering

Direct Communication costs

- Investments in
 - Electronic meters with pulse output
 - Terminals for the end-use customers
- Installations of the electronic meters and terminals
- Establishment of the communication between the end-use customers and the network operator
- Appropriate program system at the site of the network operator
- Operational costs (mainly maintenance and communication)

Cost example Norway

- ~280 Euro per end-use customer
- The costs is divided in three different parts:

Terminals	:	50%
New meters	:	25%
Installation	:	25%

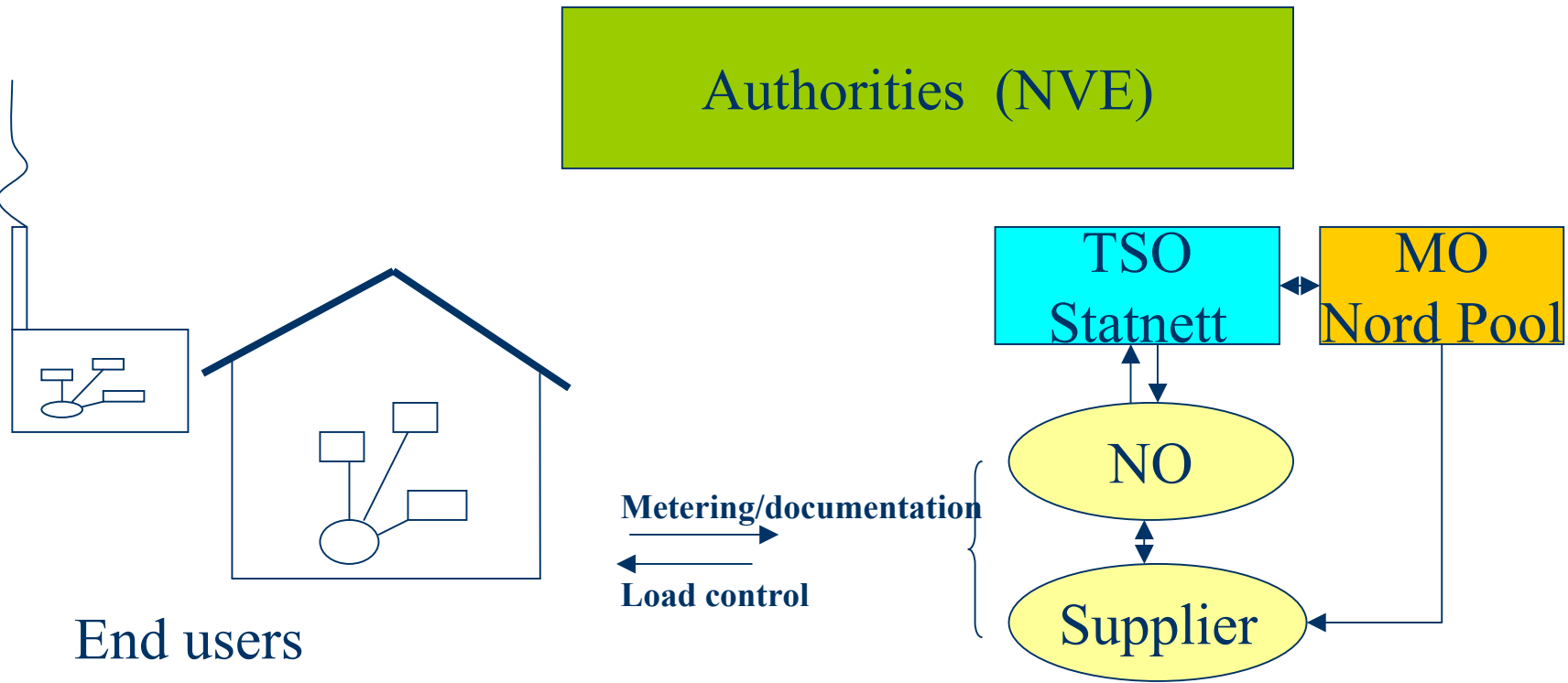


EFFLOCOM Pilot

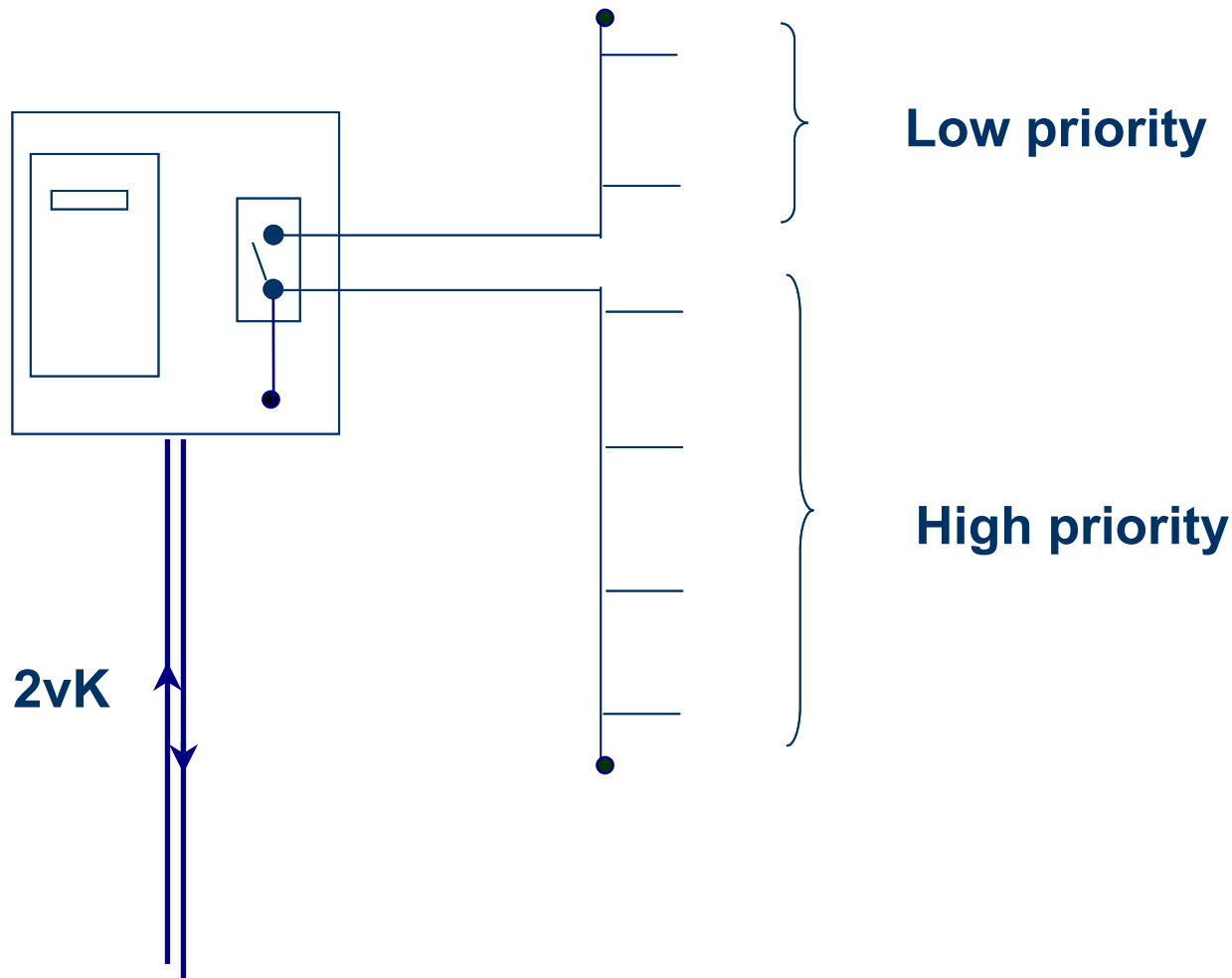
”End User flexibility by efficient use of ICT”

- R&D project 2001-2004
- 2 Network Owners participate with “laboratories in field”:
 - Direct Communication for hourly metering and a separate channel for remote control to **10 000 End Users**
 - Financed on exemption through network tariff
- Testing activities to provide:
 - Response on price (network tariff + energy cost)
 - Remote controlled load reduction

Market based load flexibility



Disconnection of low prioritized load (limited duration)



“Price signals” used in the project

■ Network tariff

- Time of use tariff with high price in periods with shortage (Shortage defined by temperature and/or time: Mon-Fri, hour 7-11 and 16-19)

■ Energy price

- Spot price products
- Firm price products provided automatic load reduction in case capacity shortage
- Combined product: Firm price (base load) + spot price

Main principle network tariff

- Tariff calculated from "Normal Tariff"
- Skagerak: Power part in peak load: ~7 €/kW (Jan/Feb)
Buskerud: Energy part in peak load: 0,13 €/kWh

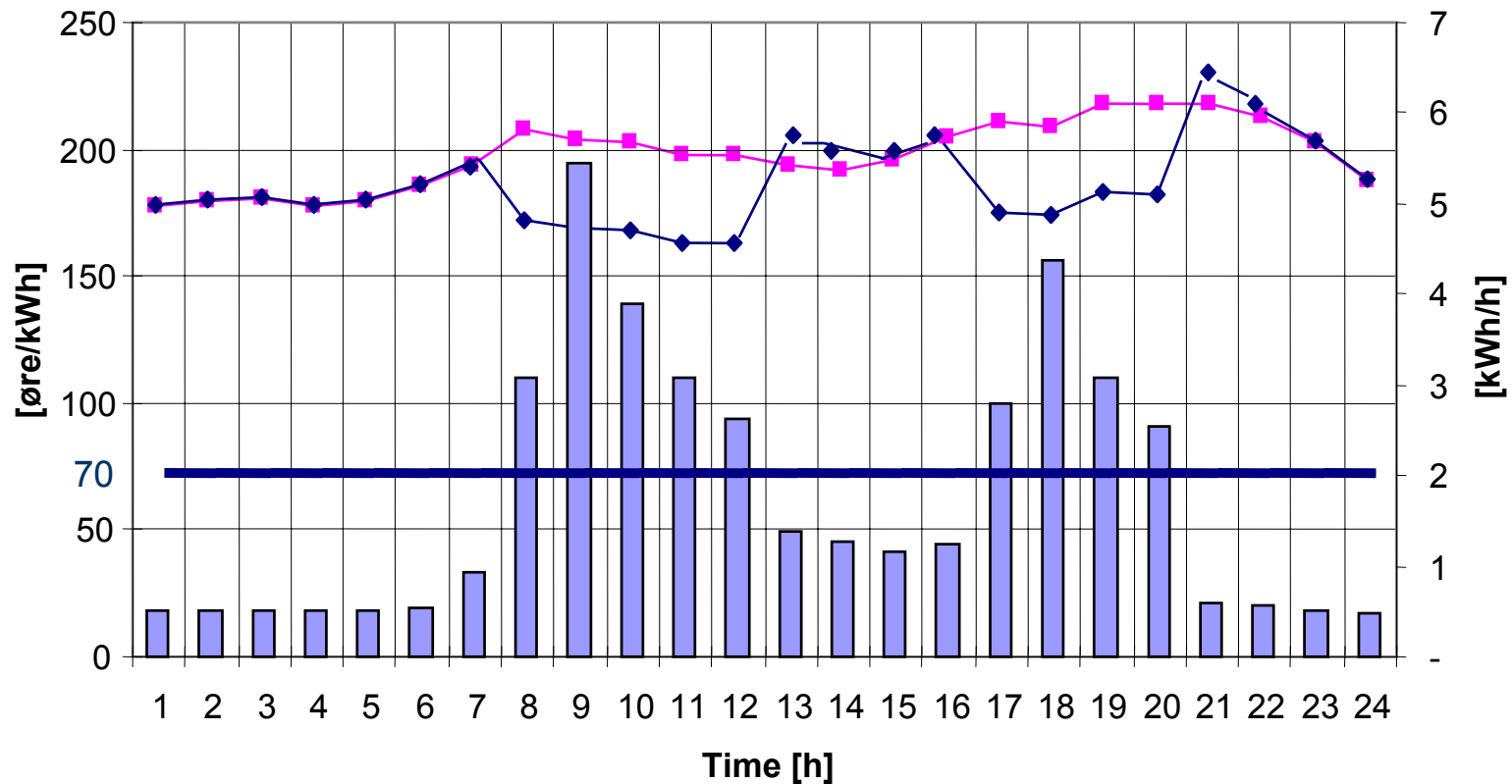


**Customers who are reducing their consumption
in peak load periods will reduce their bills!**

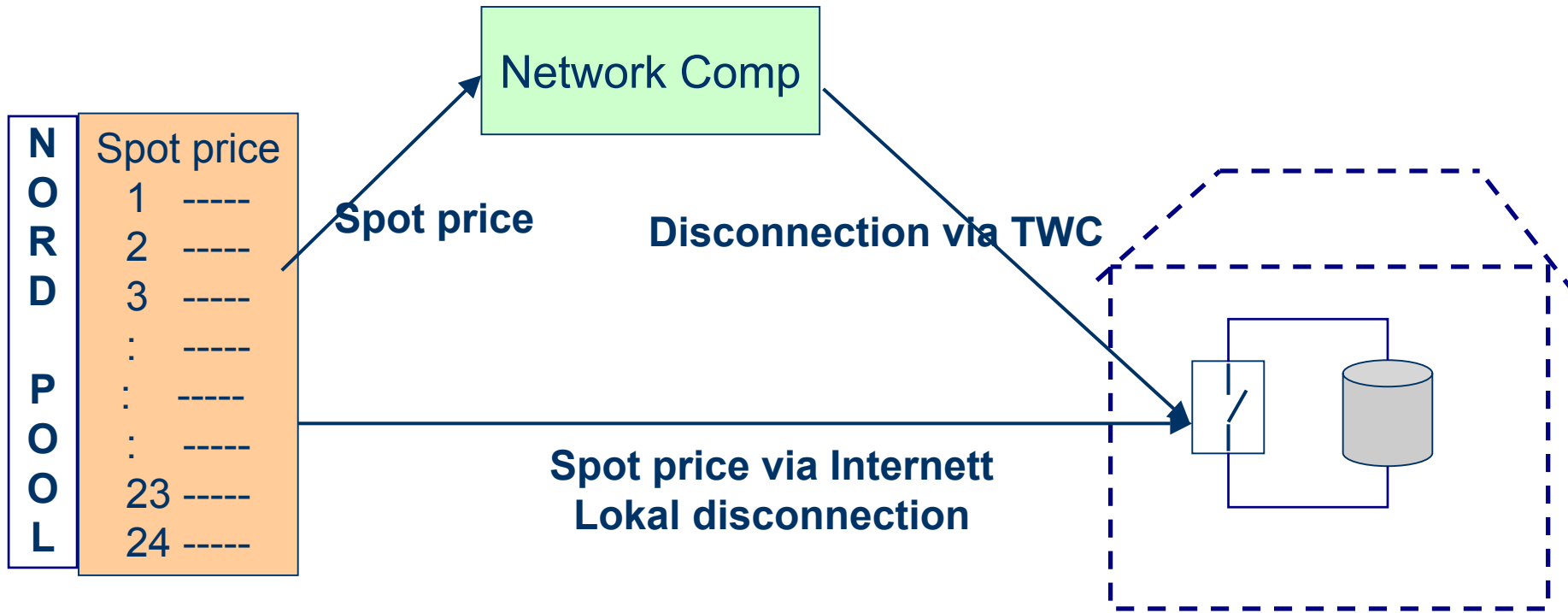
Criteria for load reduction

- "Spot price criterion"
 - Spot price reference defined by end user
- "Peak load criterion"
 - Referred to peak load limit defined by the end user
- "Reserves criterion"
 - Need of reserves defined by TSO and/or network owner

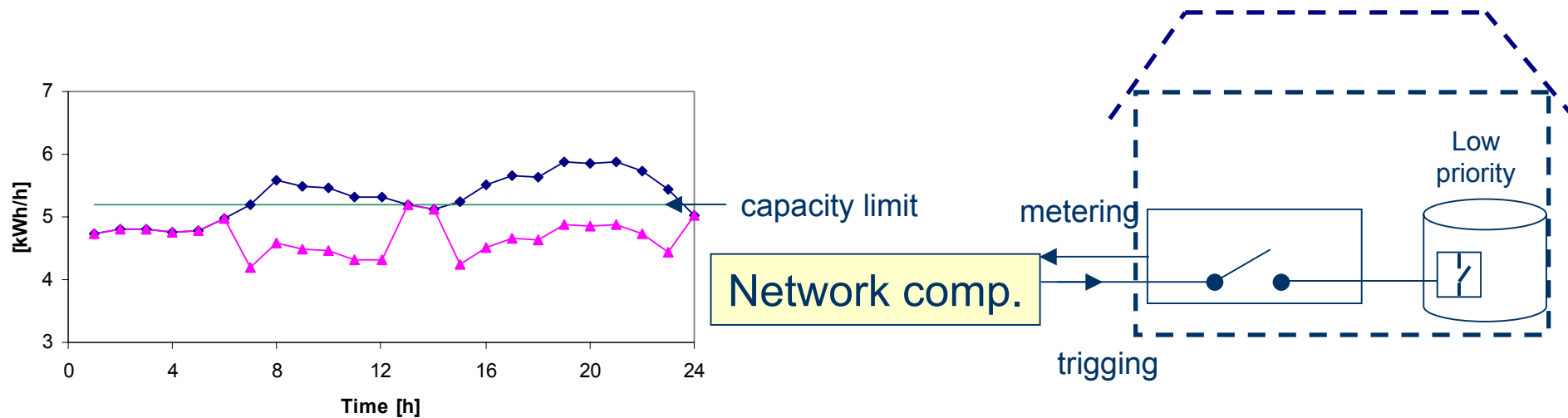
Response on spot price



Disconnection Spot Price Criterion

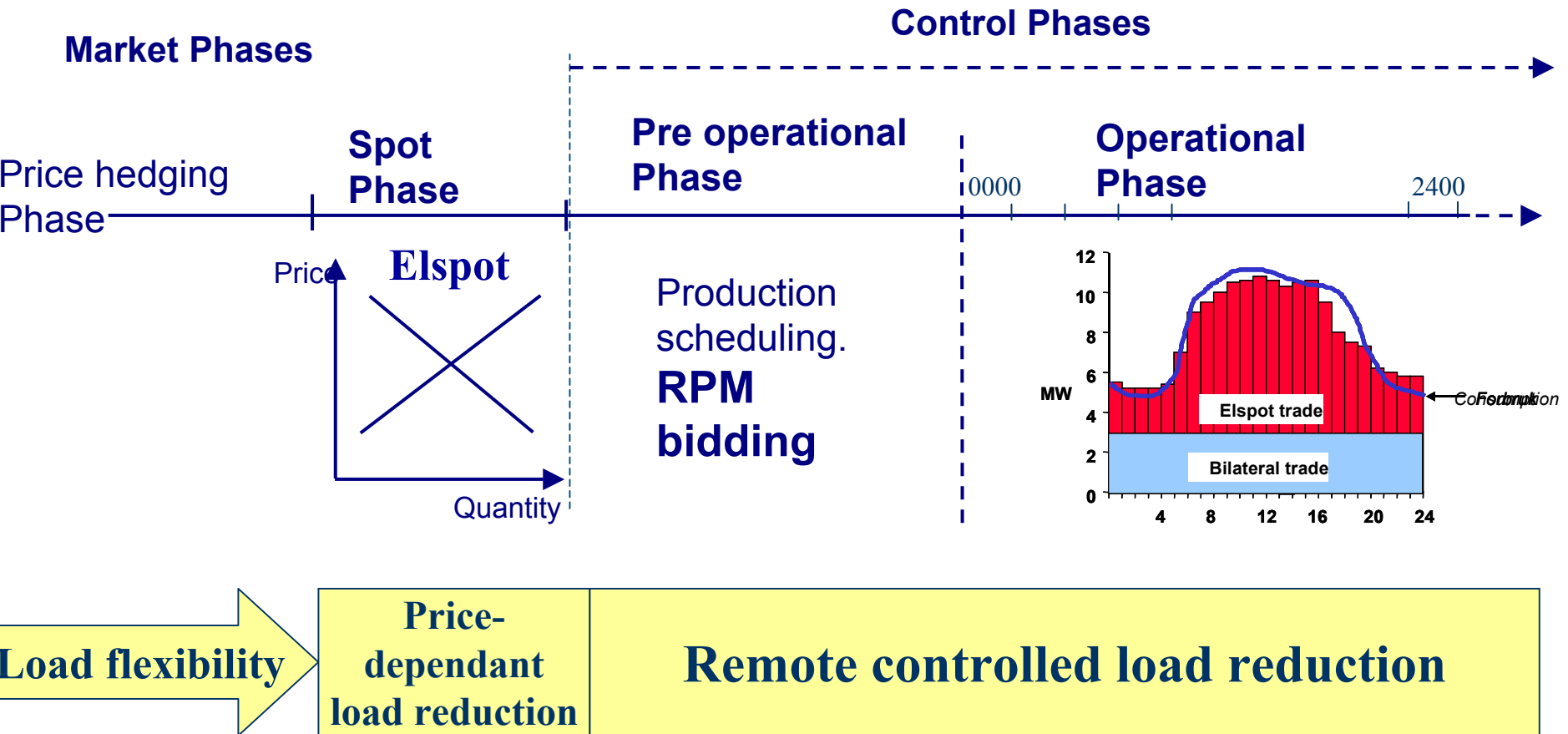


Disconnection Peak Load Criterion



- Area of use: Capacity shortage
 - National
 - Local (Distribution)

Peak load adjustment Contribution from End Users



“Option Market for reserves”

New product from the Norwegian TSO Statnett

■ “Option” Market (RPOM)

- Payment for availability which implies an obligation to bid into the RPM
- The actors are allowed to define their own minimum RPM-price

■ Contract periods:

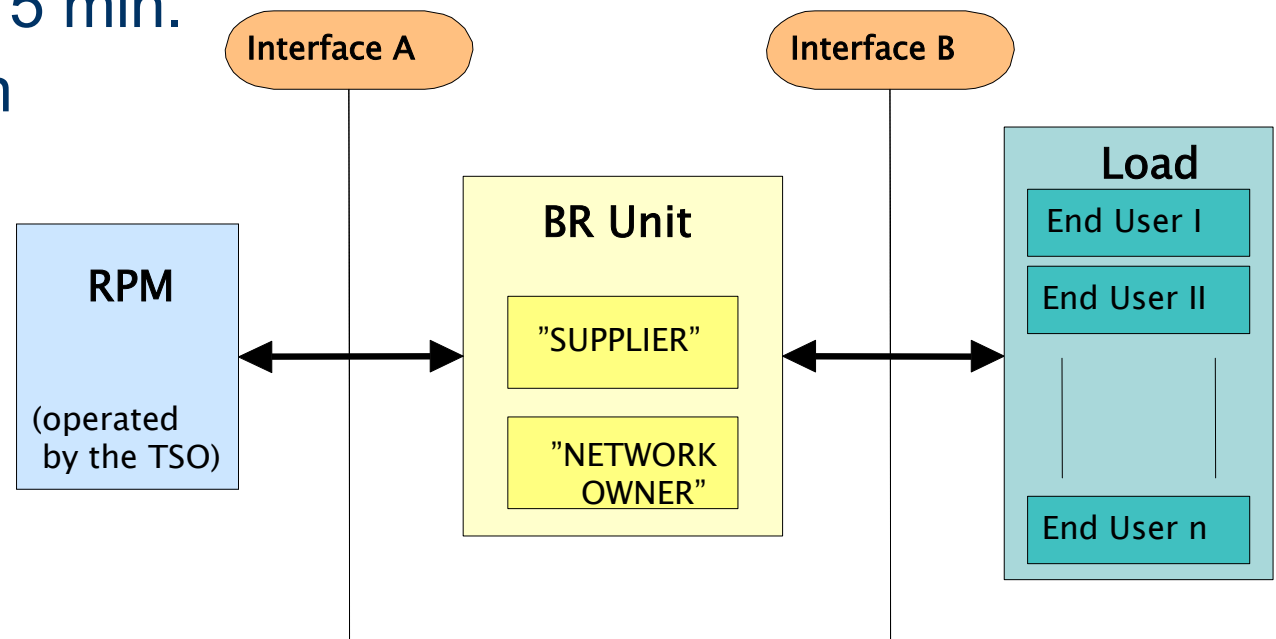
- 2 * 3 months during winter and 1 year (2000-2001)
- 1 month during winter (2001-2002)

30 - 70 % of the volume from the consumption side

How to include smaller loads in the Regulation Power Market?

Main challenges:

- Volume: >25 MW
- Response: 15 min.
- Organisation



Integrated Internet based service Future solution?

