Demand Side Management in Hungary

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February 21-22, 2011.
Budapest Technical Exchange Program

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Agenda

– About the system

– Demand Side Management
  • Direct DSM
  • Indirect DSM
  • Energy-efficiency DSM

– Ancillary Services

– Emergency Restrictions
System has to be balanced...

consumption

frequency, Hz

production

Δf

consumers

“on”

(control)

consumers

“off”

control reserves

generation outage
Daily gross system load

Téli csúcs: 2009, január 13., 17:00, 4380 MW Winter peak load: 13 January, 2009 17:00, 4380 MW

Nyúj csúcs: 2009, július 16-án, 13:00, 5894 MW Summer peak load on 16 July, 2009 13:00, 5894 MW

- Import szaldó
  Total import
- Szabályozott erőművek
  Regulated power plants
- Nem szabályozott erőművek
  Not regulated power plants
- Kiserőművek
  Small PP
- Atom
  Nuclear
Consumer’s daily characteristics

Households’ consumption

Three-shift production facility

Industrial consumption
Planned and real system loads
**Demand Side Management**

**DSM**

**Load balancing:**
Decrease in the peak load, increase in the off-peak load

The amount of the generation capacity is scheduled for the peak load → smaller peak load: less power plants, less cost, bigger utilization

**Emergency restrictions:**
Load-shedding in case of lack of power to prevent severe emergency situation
Demand Side Management

DSM

**Direct:**
Consumers are directly ordered to change their consumption
Required: reliable one- or two-way communication connection

**Indirect:**
Consumers change their behaviour because of the condition
Example: tariff system
Direct DSM

Audio frequency ripple control

- Storage heaters, electric water heaters

- Water heater is one of the biggest consumers in a household with a flat load

- Water heaters are switched on during off-peak periods

- These consumers have separate metering
Audio frequency ripple control model

1. Central Unit
2. Signal transmission
3. Local control
4. Transmitter
5. Filter, binder
6. Distribution system
7. Receiver
8. Consumer
9. Manual control
10. Process control computer
11. Signals, metered data

Direct DSM
Radio frequency ripple control model

- Control station
- Transmission route
- Central computer
- Modulator
- Receiver
- Filter
- Antenna
- Receiver
- Receiver
- Receiver
- Receiver
Direct DSM

EFR – Radio frequency ripple control system

Package oriented data transfer, e.g. X.25, ISDN X.31
Direct DSM

Transmission sites and reception areas
Ripple control summary

One-way communication only

• Controlled load about 1500 MW

• DSOs divide them into 10-15 groups
  - Load jumps cannot exceed 90 MW (on system level) in 5 min
  - Total service time at least 8 hours per day
  - Minimum duration of activation of a group at least 30 min
  - At least 2 hours service time during peak time
Ripple control effects

System load
Indirect DSM

Concept: create a condition to make consumers change their behaviour, advantageous both for consumers and TSOs (typically: tariffs)

Depending on the time of use of the power

Time-of-Use pricing

- Real Time TOU: Price depends on the amount of the generated power, Automatic control
- Dynamic TOU: Depends on the amount of the generated power, but fix prices, Controlled by the consumer
- Tariff TOU: Fix prices, Automatic control
Energy-efficiency DSM

Regulated processes, generally initiated by local regulators

DSOs use DSM as a marketing tool

Mostly regional initiatives adjusted to local conditions

General methods:

- Support of heating refurbishment and insulation
- Upgrade of lighting (energy saving light bulbs, EU: phase-out of conventional light bulbs until 2012)
- Energy efficient appliances (refrigerators, freezers etc.)
- Energy consulting services
- Consumer information
- Communication, communication, communication…
Different DSM methods

Effects of different DSM methods

[Diagram showing the effects of different DSM methods on load over time.]
Ancillary services

- Primary control reserve
- Secondary control reserve
- Tertiary control reserve
- Black start service
- U/Q control service
Demand side ancillary service

Conditions:

Accreditation

Minimum: 5 MW, 5 MW/15 min.

Availability of metering

Bid submission to the tender
Lessons learned

Year 2010:
2 industrial consumers get market maker contract
±25 MW & −12MW

Year 2011:
1 consumer gets market maker contract
(only a few hours/year)
+25 MW

Consumers:
not able to provide services
not interested in services
Emergency load shedding schemes

Load limiting systems

Predictable
- Rotary load-shedding order

Emergency
- Automatic under-frequency load-shedding
- Frequency independent load-shedding
Rotary load-shedding order

In case of the lack of power is foreseeable
  In a scheduled way

MAVIR has a free hand for 6 hours
  Authorized by a ministerial decree
  Can be used also in emergency situation

Ordered by phone to the direction of DSOs
  DSOs make the order by
    - remote control (low voltage lines)
    - phone (individual consumers – high load)
Automatic under-frequency load-shedding

UCTE Operation Handbook

Starting point: 49 Hz

Three steps (49 – 48.7 – 48.4 Hz)

Sum approximately 50 %

Differences allowed
Some quick conclusion

Demand side has the capability to efficiently balance load and generation

A limited but well selected cluster of end users may contribute to the success
Thank you!

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