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MAPPING OF RULES AND REGULATION FOR DEMAND RESPONSE AND MICRO-PRODUCTION

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AGENDA

- Demand response
  - To spot electricity prices
  - To grid tariffs
  - In the provision of system services
- Micro-production
  - Segmentation and metering
  - Access to the grid
  - Access to the market

DISCLAIMER

- The following presentation contains preliminary results from THEMA's study on behalf of NordREG on mapping of regulation on demand response and micro production (prosumers), and is based on the Draft Report submitted 23 March 2015. The report have not been subject to final quality control.

- The aim of the report is to map regulation, and not to describe current barriers for demand response and micro production nor to provide recommendations on regulation and market design within theese topics

DEMAND RESPONSE

DEFINITION OF DEMAND RESPONSE

Changes in electric usage by end use customers/micro generators from their current consumption/injection patterns in response to changes:

- In the price of electricity over time.
- To incentive payments designed to adjust electricity usage at times of high wholesale market prices or when system reliability is jeopardized.

THE ROLE OF DEMAND RESPONSE IN THE POWER SYSTEM

- *Demand response to price signals in the wholesale power market*.
- *Demand response to price signals in grid tariffs*.
- Demand response through *participation in the TSO reserve markets for balancing or in capacity mechanisms*

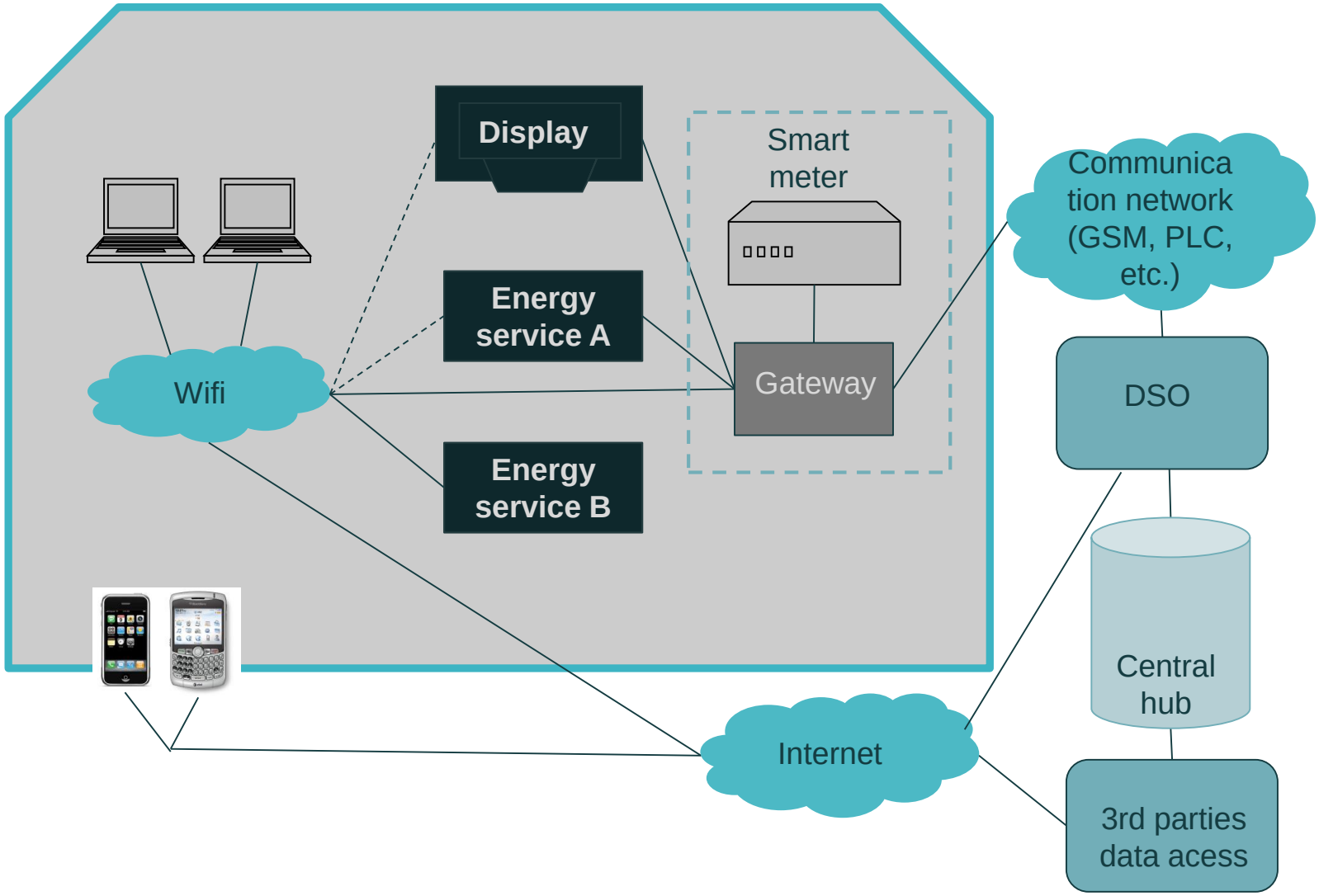
- *Improved price formation*
- *Reduced investments in the regional or local grid*
- *Provision of system services: increase the demand side participation to meet the increasing demand for system services*

RELEVANT REGULATION FOR DEMAND RESPONSE IN REACTION TO SPOT PRICES

- The roll-out and functionalities of smart meters

- The role of third parties, i.e:
  - Energy service providers (included the supplier)
  - Technology providers
  - Aggregators

SMART METERS AND SMART HOMES



REGULATION ON SMART METERING IN THE NORDICS

	Iceland	Norway	Sweden	Finland	Denmark
Roll-out status	No regulation or plan	2019	Completed	Completed	2020
Regulated technical measuring resolution	No regulation	15 minutes	No deviation from actual	15 minutes	15 minutes
Regulated actual measuring resolution	No regulation	Hourly	>63 A or on request: hourly, Other: monthly	Hourly	East DK: 15 minutes West DK: Hourly
Data collection frequency	No regulation	Daily	>63 A: Daily Other: Monthly	Daily	Daily
Local access to data	No regulation	Mandatory	No regulation	Mandatory	Mandatory
Technical possibility to reduce loads	No regulation	Required (general)	No regulation	Required (specific load)	No regulation

REGULATION OF THIRD PARTIES RELEVANT FOR DR

	Iceland	Norway	Sweden	Finland	Denmark
Restrictions on who may provide ES	None	None	None	None	DSO is prohibited from offering services on EE
Restrictions on services provided	None	Bids in spot market requires balancing responsibility	Bids in spot market requires balancing responsibility	Bids in spot market requires balancing responsibility	Bids in spot market requires balancing responsibility
Restrictions on energy services	None	None	None	None	DSO is the obliged party on energy efficiency
Restrictions on 3rd parties access to measure data	None	Power of attorney by cunsumer	Power of attorney by cunsumer	Power of attorney by cunsumer	Power of attorney by cunsumer
Regulation on pricing in electricity contracts	None	None	None	None	None

RELEVANT REGULATION FOR DEMAND RESPONSE IN REACTION TO PRICE SIGNALS FROM THE DSO AND TSO

- Regulation of the structure and price signals in the tariff structure

- Regulation on DS in system services:
  - Regulation of demand side participation
  - Capacity mechanisms and demand side participation

REGULATION ON STRUCTURE OF GRID TARIFFS AS INCENTIVE FOR DR IN THE NORDICS

	Iceland	Norway	Sweden	Finland	Denmark
Small customers	No regulation	Some obligations and restrictions, but not regulated in detail	No regulation	No regulation	No regulation
Large consumers	No regulation	Some obligations and restrictions, but not regulated in detail	No regulation	No regulation	No regulation
Low tariff for interruptible loads	Possible for large consumers, but no obligation	Yes, subjected to restraints on how and when	No regulation	No regulation	No regulation

TYPICAL FEATURES IN THE NORDIC RESERVE MARKETS

	Primary reserves (FCR-N/FCR-D)	Secondary reserves (FRR-A/LFC)	Tertiary reserves (FRR-M)
DS participation	No regulation	No regulation	No regulation
Marked design	Capacity auction, symmetric for upward and downward ramping. Hourly, weekly and/or yearly resolution	Capacity auction, separate or symmetric for upward and downward ramping.	Volume auction, separate for upward and downward ramping. Hourly resolution
Activation	Automatic activation based on frequency	Remote activation by TSO	Manual activation by provider
Response time	< 1 minute	2-15 minutes	< 15 minutes
Minimum volume	0.1-1 MW	0.3-5 MW	10 MWh/h (lower in critical situations)
Duration	< 15 minutes	Depends on circumstances	15 minutes – 1 hour per bid (duration depends on circumstances)

TYPE OF CAPACITY MECHANISMS AND REGULATION ON DS PARTICIPATION

	Iceland	Norway	Sweden	Finland	Denmark
Type of mechanism	No regulation	Contracts on cutting consumption in critical situations (ENOP)	Strategic reserve	Strategic reserve	Currently no regulation, but a strategic reserve is planned from 2016
Demand side participation	No regulation	Restricted to demand side. TSO may oblige participation.	Demand is required to cover 25 %	No restrictions or obligations	Is planned to include both demand and generation.

MICRO-PRODUCTION

THE REGULATION OF MICRO-PRODUCTION (PROSUMERS)

- Segmentation criteria; volume and other
- Measurement; is separate metering and meter device for production required?
- Grid access; Connection steps and grid costs
- Market access; payment for surplus generation

For Norway, the mapping is based on the suggested regulation, and not on current regulating. Current regulation will be added in the final report.

SEGMENTATION FOR MICRO-PRODUCTION

	Iceland	Norway	Sweden	Finland	Denmark
Volume	100 kW	100 kW (to the grid)	43,5 kW (to the grid) and fuse < 63 A (tax regulation < 100 A)	16 A is the highest current fed (occasionally) to the grid	Max capacity: PV: 50 kW Wind: 25 kW CHP: 11 kW
Site	No regulation	Generation mainly for own consumption	Net consumer of electricity over the year	Generation mainly for own consumption	Generation mainly for own consumption and 100 % owned by the consumer

REGULATION ON METERING OF MICRO-PRODUCTION

	Iceland	Norway	Sweden	Finland	Denmark
Metering	No regulation	Separate measuring from one device	Generation and consumption must be measures separately for tax deduction	Separate measuring	Separate measuring from one device
New meter needed?	No	Not after smart meter is installed	If installed meters cannot measure generation and consumption separatly	No, installed meters can measure both generation and consumption	Not after smart meter is installed

REGULATION ON GRID CONNECTION

	Iceland	Norway	Sweden	Finland	Denmark
Steps	DSO responsible for defining technical specification for micro-producers	No defined connection steps	No particular regulation for micro-producers	Technical information to the network operator The system operator grant permission	Technical information to the network operator Registration on the TSOs website
Costs	All producers pay the same connection fee, set by the DSO	Suggested: Exempt from generation feed-in tariffs. Tariffs and levies are based on net consumption	<43,5 kW/63 A exempt from all tariffs	<2MA: no investment contribution Consumption > production: normal consumption fees apply Service fee max: 0,07 cents/ kWh	Certain producers are exempt from grid access charges Tariffs and levies are based on net consumption

REGULATION ON MARKET ACCESS

	Iceland	Norway	Sweden	Finland	Denmark
Price	No regulation	Suggested: No regulation	No regulation	No regulation	No regulation
Rules	Supplier is the contact point for selling power	Suggested: Supplier is the contact point for selling power	Supplier is the contact point for selling power	May sell to marked or not via the supplier	No regulation (but agreement on power sales to the supplier is a prerequisite for subsidies)

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