



SEESGEN-ICT

4° GENERAL WORKSHOP

Paris - SAP Office, April 14th – 15th 2011

Ove S. Grande
Sintef ER, Norway

Aggregator services, ICT requirements and solutions



PARIS 15/04/2011



Aggregator services

- Balance intermittent production
- Flexible Micro CHP
- DER production – "Grid storage"/ exchange
- Demand respons in real time balancing
- CPH broker



Market and operational products – time resolution

Service \ time horizon	< one minute	15 minutes	1 hour	1 day	1 year
Trading energy on organized markets			DR, DG, DS	DR, DG, DS	
Frequency control (primary, secondary, tertiary)	local automated DG, local automated DR	Centralized signals to and DR	DR, DG, DS		
Meeting system peak load					EE, DR, DG
Portfolio balancing		DR, , DS	DR,, DS		
Relief of network congestion		DR, , DS	DR, , DS	DR, , DS	



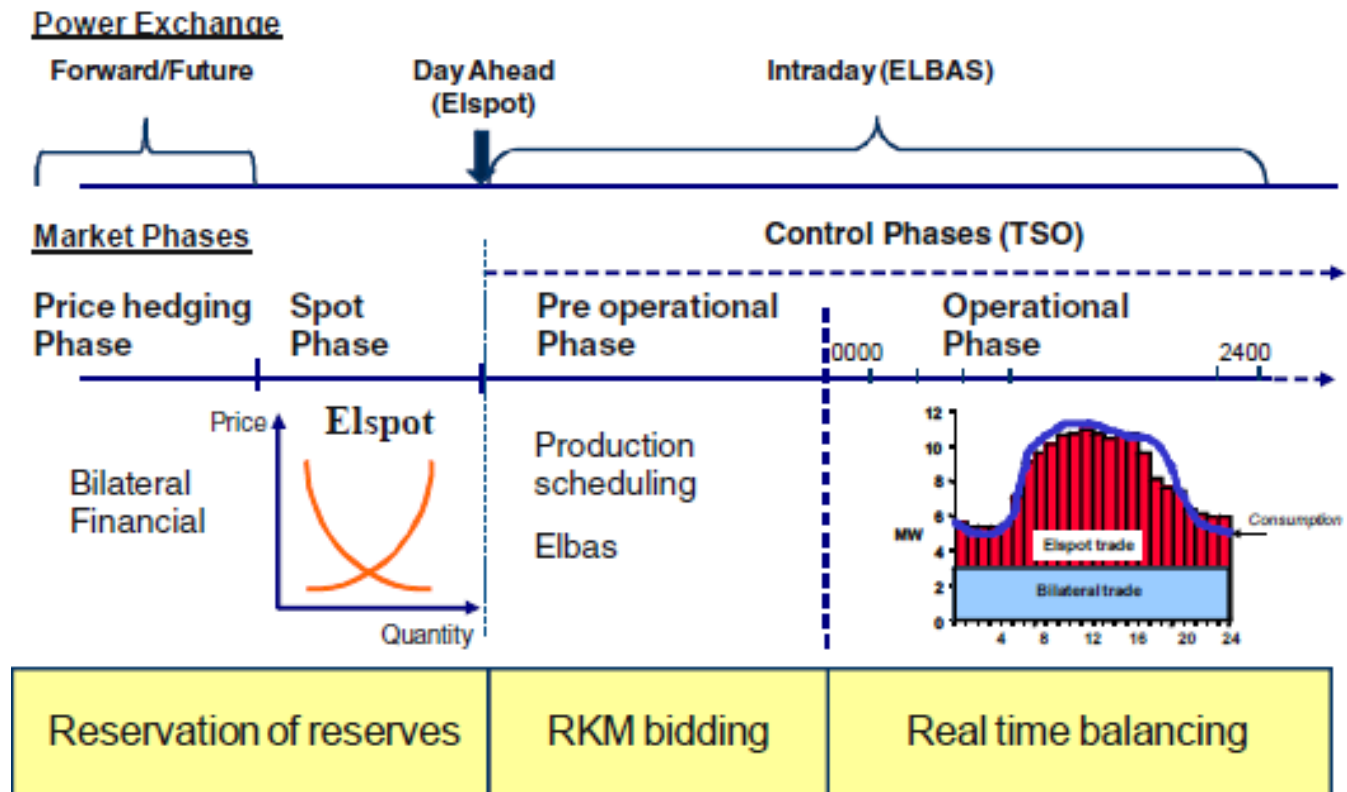
Example

Norwegian business case

- ***Demand Response (DR) access to the Balancing Market through a commercial aggregator***
 - Aggregator: Norwegian retailer
 - Trade on the Norwegian Balancing Option Market (capacity reservation) and the realtime Regulation Power Market
 - Aggregation of DR resources (boilers, ventilation, stone crushers, factory production lines) from medium sized customers
 - Activation of DR through DSO control centre (phone, scada and AMR system)

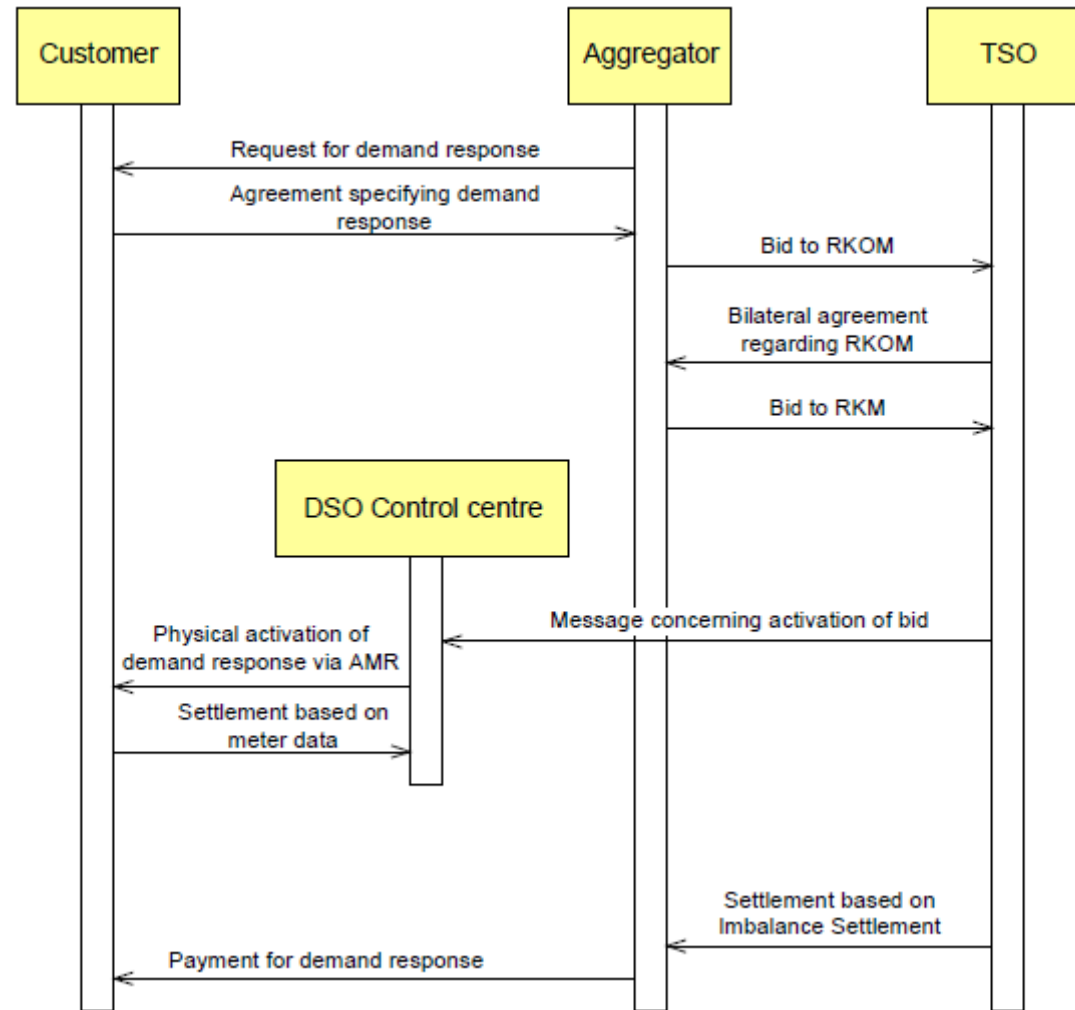


Transition from market to physical operation Nordic system



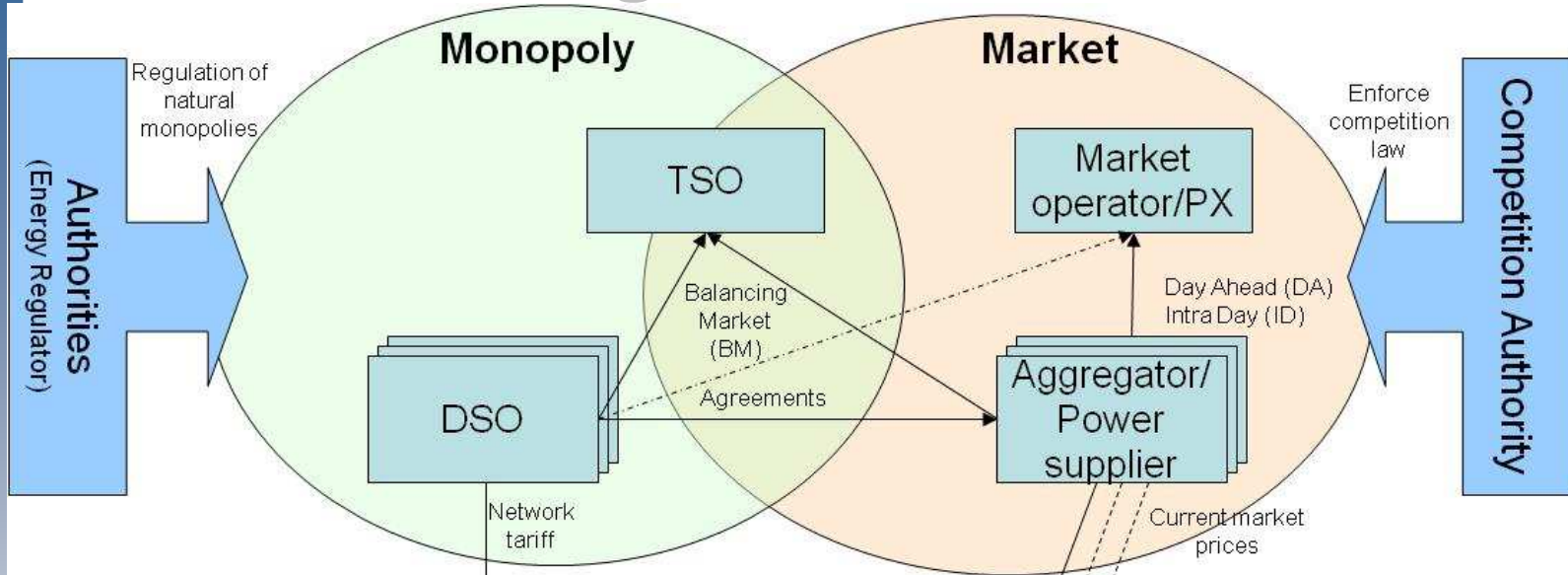




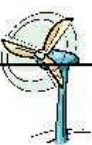
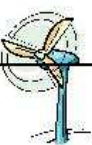


Exchange of information between actors involved





Price signals and ICT



Technology	Price signals		ICT requirements (local load control)
	Monopoly	Market	
Solar 	Infeed(?)	DA – hour	<ul style="list-style-type: none"> •Meter •Interface with controller
CHP  	Infeed(?)	DA/ID/BM – 15 min	<ul style="list-style-type: none"> •Meter) •Interface with controller
Wind 	Infeed(?)	DA/BM – 15 min	<ul style="list-style-type: none"> •Meter •Interface with controller
Household 	Time-of-Day	DA – hour	<ul style="list-style-type: none"> •Meter •Market interface
Commercial 	Time-of-Day	DA/ID/BM – 15 min	<ul style="list-style-type: none"> •Meter •Market interface



DR aggregator tools

- Web services (Nord Pool, TSOs etc)
- Tools related to end user contracts and actions
- Price forecasting
- Load forecasting



Customer-level simulations tools

- Load forecasting
 - Several tools available
 - Estimation of ΔMW is a challenge

- Price forecasting
 - Important to estimate in relation to C/B on contracts
 - List of tools provided

- DER scheduling and trading optimization



DER management tools (EU-DEEP)

Tool	Offpeak	Flexprof	DEMS	CleanPower
Field of analysis	sensitivity analysis of business cases	support investment decisions and customer selection	support investment decisions; live usage in online mode	support investment decisions
Degree of industrialization	internal tool	intenal tool	commercial tool	internal tool
Model type	deterministic	stochastic	deterministic	deterministic
Planning horizon	½ hours	normally 24 – 48 hours	typically max 7 days ahead	specifiend number of periods (1, 6, 24 etc.)
Time resolution	½ h	user-defined	¼ h, ½ h or 1 h	user-defined
Support for energy storages	no	yes	yes	yes
Computation time for one year simulation	10 s (5 customer types, ½ hour resolution)	15 min (5 customer types, ½ hour resolution)	45 min (with 5 contracts and 10 generator units)	1 h 20 min (50 end-uses, 10 generation units and 5 exchange contracts)



ICT tools maturity level

Category	Topic	Maturity level
Aggregator's ICT tools	Variable-output production (e.g. wind, μ -CHP) forecasting	young/existing
	Load forecasting	mature
	Consumer's response forecasting	young
	Market price forecasting	mature
	DER operation and trading optimization	existing
	Customer portfolio optimization	Young
	Tools interoperability	Young
Aggregator business	Incentives and subsidies	young/existing
	Good, real data	young
	Customer exposure to smart rates	young