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Flexibility in power systems – the role of smart grids, coordination and regulation

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Overview

- Setting the frame – the current situation
- Challenges for electricity networks
- Smart Grid Roadmap of Switzerland
- Functionalities of Smart Grids and the role of flexibility
- Flexibility for markets or networks – a contradiction?
- Questions to be worked upon

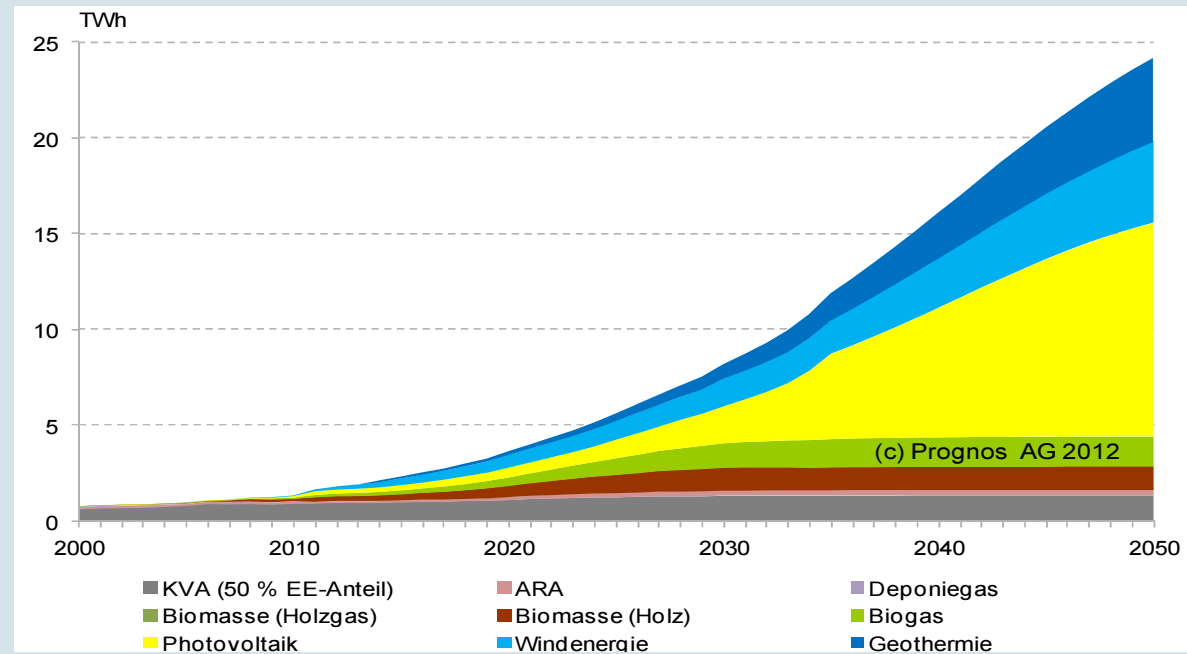


The current situation in Switzerland - Setting the frame -

- Production:
56.4% water, 37.9% nuclear, 2.2% new renewables, 3.5% rest
- 1 TSO (swissgrid), around 700 DSOs and 1 Regulator (ElCom)
- Unbundling: information/accounting separated for market / network
- Electricity market only open for large consumers (>100MWh)
- Cost+ regulation for networks
- Currently «Energy Strategy 2050» being discussed in parliament



The current situation in Switzerland - The «Energy Strategy 2050» -



- Decentralized infeed in distribution networks
- Fluctuating infeed
- Increase in energy efficiency



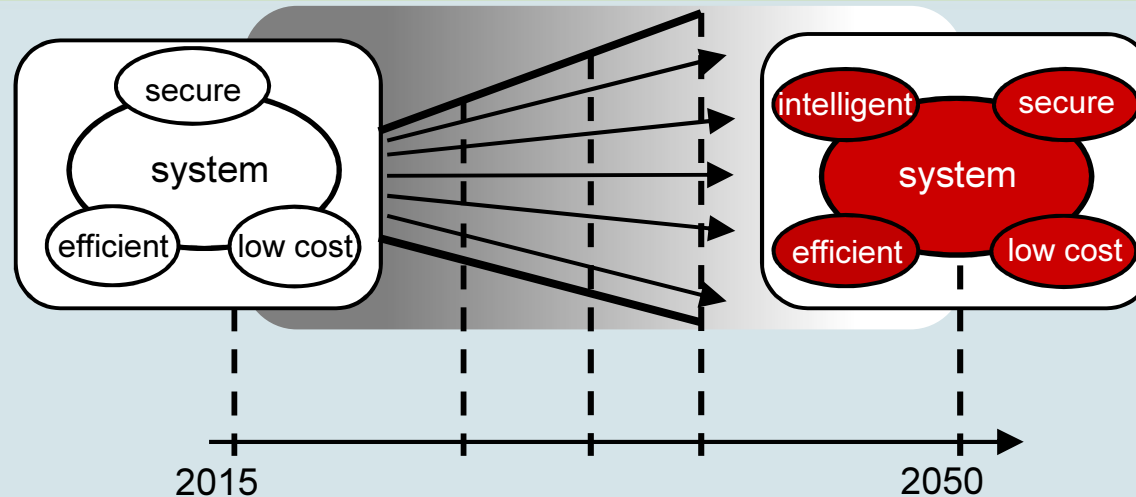
Future challenges for electricity networks - Are smart grids a solution? -

- Grid capacity and other circuit impacts
- Grid stability - equilibrium of production and consumption
- Network faults and protection concepts
- Data security and data management
- Increase in energy efficiency





Smart Grid Roadmap of Switzerland - Goals of the national roadmap -



Goals:

- Brings together technical knowledge
- Creates common, basic understanding and a «Vision Smart Grids»
- Provides guidelines / identifies need for action
- Initiates coordinated approach to implement vision



Basic functionalities

- What are the features of Smart Grids? -

Information

- on passive elements in the grid (lines, transformers)
- on active elements in the grid (e.g. on-load tap changer, storage)
- on production and consumption for the DSO (time resolution x)
- on production and consumption for prosumers (time resolution y)

Grid security and resilience

- management of production, storage and consumption ensuring grid security
- ancillary services by consumption, production of renewable energies
- cyber-security and fallback solutions for ICT

Market and consumers

- consumers and producers of renewable energy operate in markets
- influencing consumption (interface Smart Home / self consumption)
- simple customer change processes



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Relevant for
Flexibility

Grid security and resilience

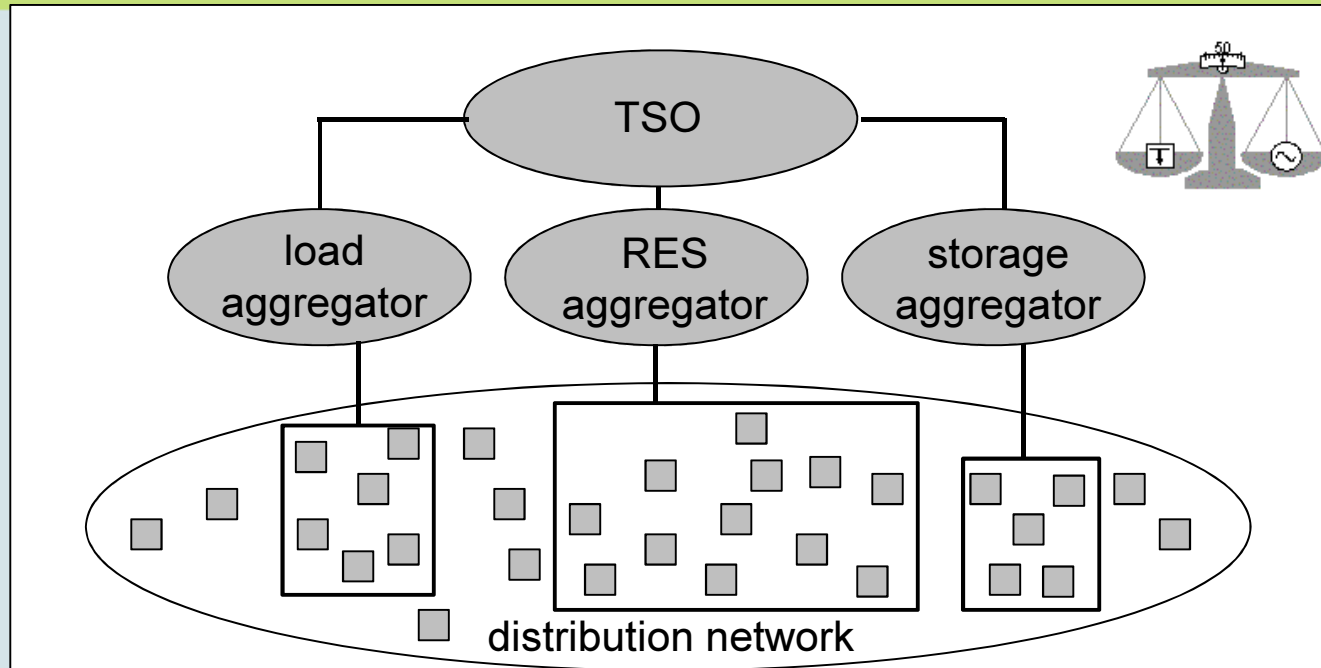
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Smart Grids example - focus on the system: - Flexibility to stabilize the grid – aggregators -



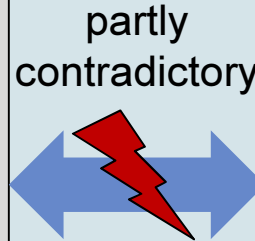
- Future (markets): aggregators control flexibility for market / network premises
- Current (no markets): DSO/utility controls flexibility for its own premises



Use Cases of flexibility - DSM for markets and / or networks -

Market use cases

- M1: ancillary services: primary, secondary and tertiary control
- M2: load control for portfolio optimization
- M3: reduce balancing energy costs
- M4: consumers maximizing self consumption / generate savings

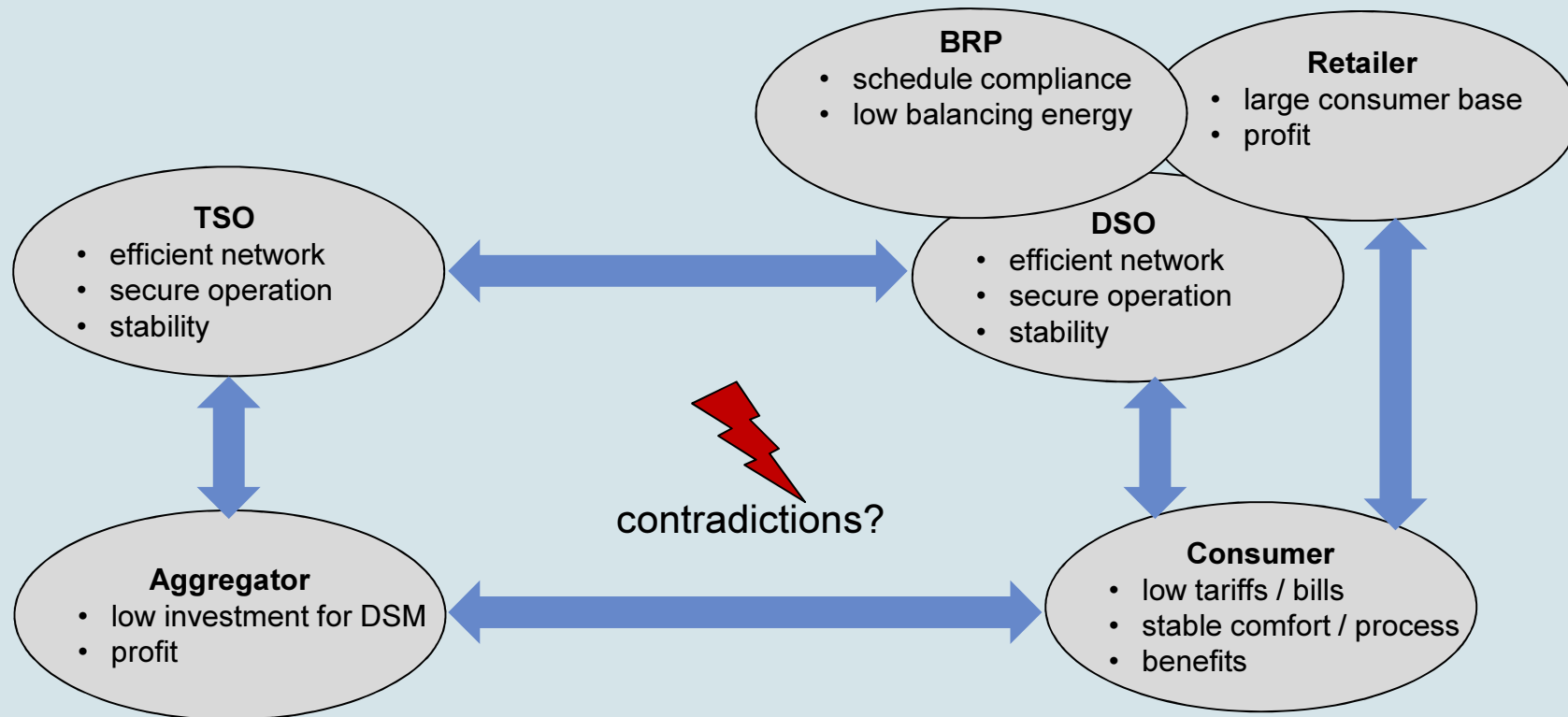


Network use cases

- N1: avoiding load peaks and high tariffs
- N2: optimize network utilization
- N3: defer investment
- N4: avoid congestions
- N5: integrate PV



Coordination for DSM - or dealing with contradictory goals -





Future questions - The role of regulation -

- Framework for flexibility utilization necessary
- Discrimination needs to be avoided, barriers to be removed
- Information provision guidelines
- Clear guidelines for DSOs when to intervene
- OPEX vs. CAPEX incentives – «smart» vs. conventional
- Costs need to be distributed to the ones who cause them (dynamic tariffs based on energy / power / grid state)



**Thank you for your attention,
questions, please**

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