ETG

VDE

- Regional Flexibility Markets -

Using market based flexibility for integration of power from renewables in distribution grids

Results of the VDE/ETG “Regioflex“ Task Force

Paris, 14, January 2015

Agenda

1. Development path of electrical energy supply

- What are the aspects characterizing the change process?
- What are the resulting challenges?

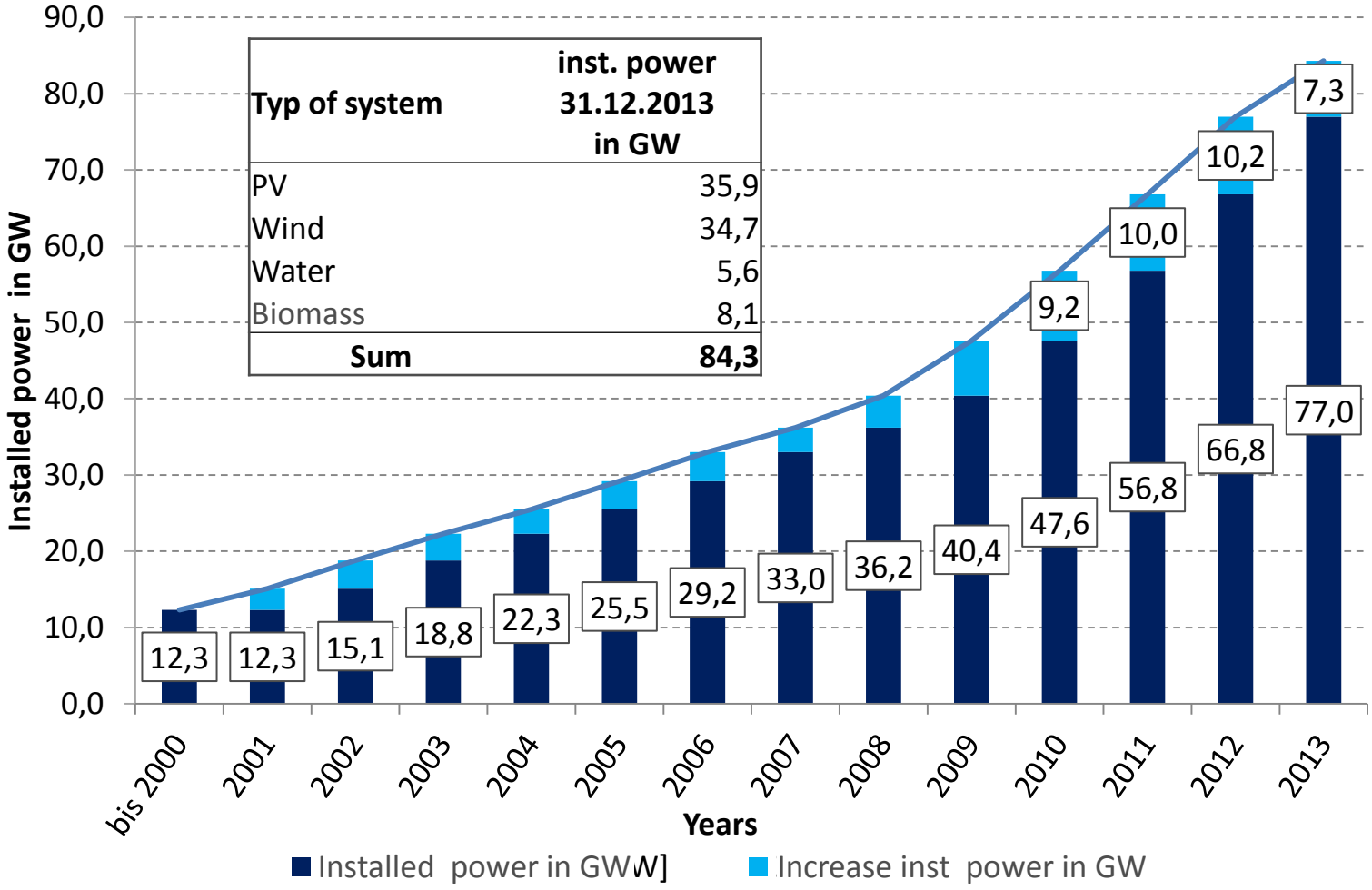
2. Flexibility markets as a key factor of future energy supply

- What are the conditions?
- Who are the actors involved?
- Regional flexibility markets (”RegioFlex” markets) as an option?

3. Summary and outlook

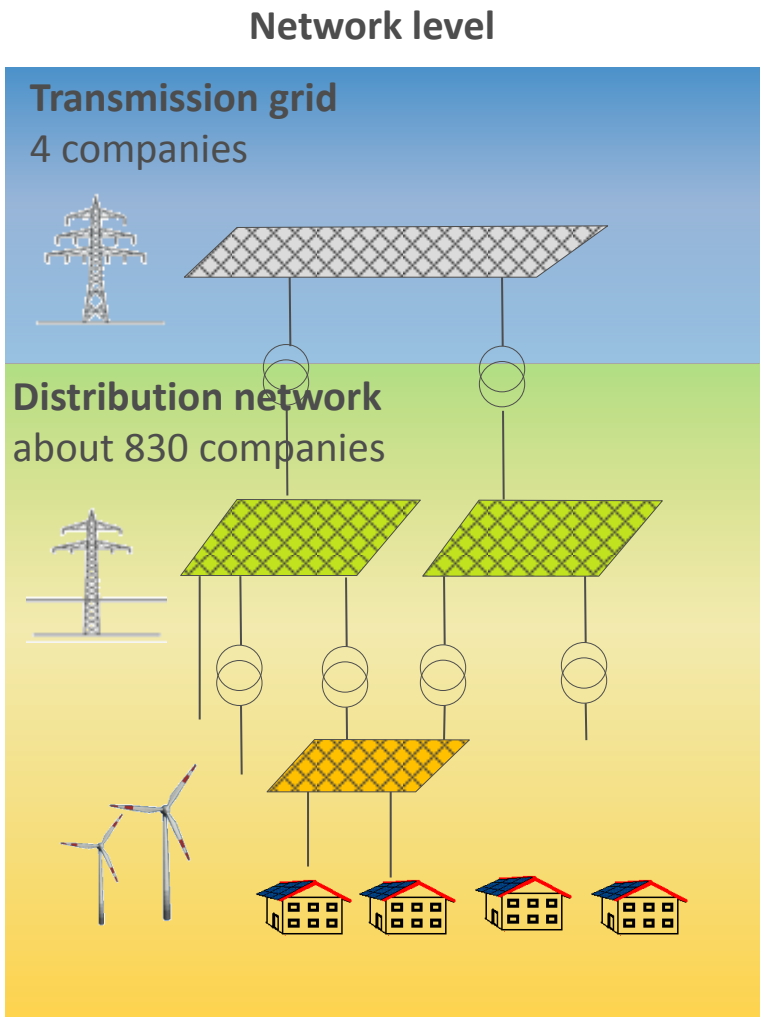
- What are the conclusions to be drawn?
- Where is further action needed?

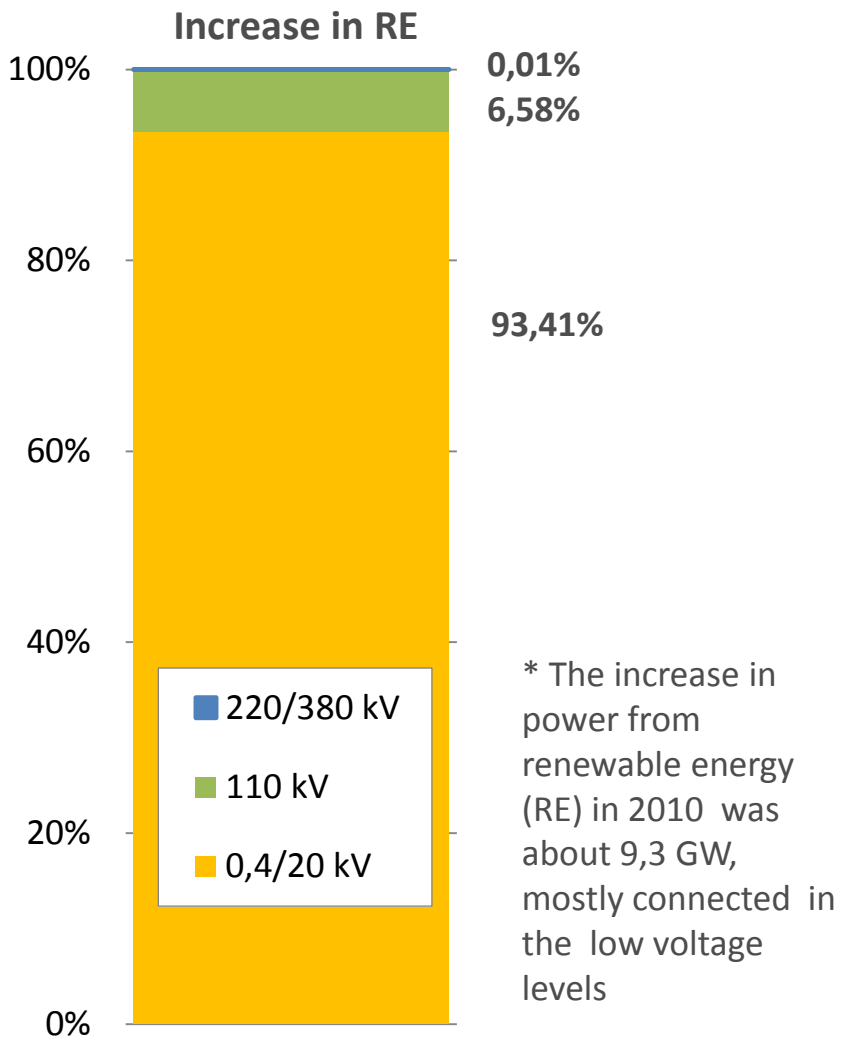
Development of renewable energies in Germany



Quelle: BMWi – Bundesministerium für Wirtschaft und Energie (www.erneuerbare-energien.de)

Increase in renewable energy (RE) in the voltage levels





* The increase in power from renewable energy (RE) in 2010 was about 9,3 GW, mostly connected in the low voltage levels

For the distribution network level, this means that

- 95 % of the increase in decentralized power from renewable energy is connected to the distribution network (high, medium and low voltage level)
- ”One way Roads” of the distribution network as designed until now are only suitable for bi-directional loading to a limited extent
- Due to decentralized production and of the resulting dynamic load the technical requirements concerning grid control and stability level will increase
- High investments in the distribution network are needed to adapt to the changing tasks and new challenges
- The distribution network is an elementary component of the entire changing process

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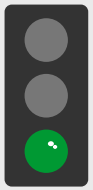
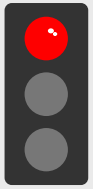
The traffic light system as a network indicator

- Green light
  - No bottlenecks in case of cross-border trading
  - No local bottlenecks or critical network conditions
  - Market and secure network operation comply



- Yellow light
  - No bottlenecks in the case of cross-border trading
  - Regional bottlenecks and/or regional voltage stability endangered
  - **Use of regional flexibility options by distribution system operators (market-based)**

- Red light
  - Bottlenecks at the cross-border interconnections and/or
  - Regional bottlenecks without sufficient flexibility options
  - Transition to central network control (EnWG §13 II und EnWG §14a)



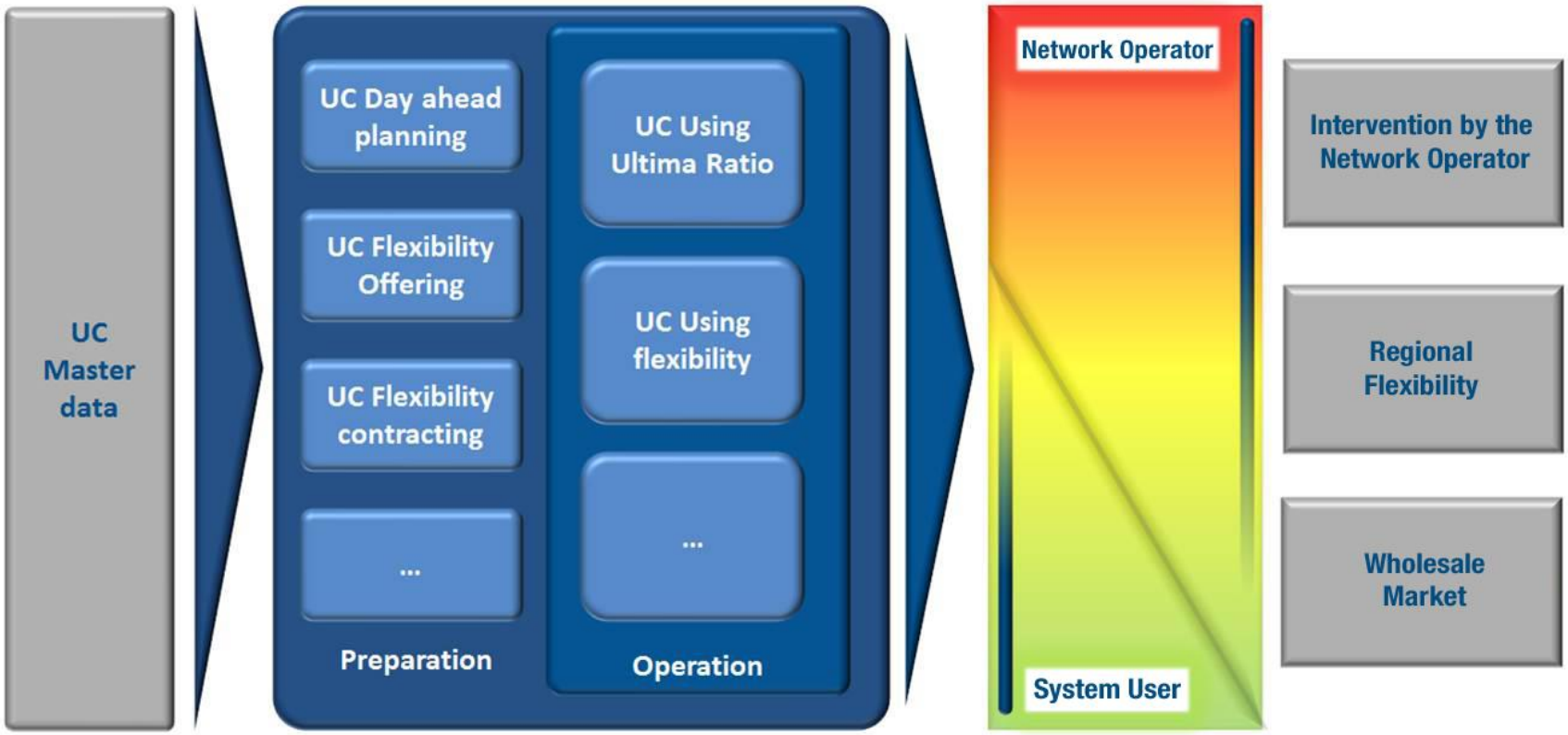
The traffic light system in the grid aggregation area

- The network area of the distribution system operator (DSO) is characterized by different network topologies
  - Radial network and/or ring network (open/closed)
  - Degree of meshing (rural or urban network structure)
- Necessary for using “RegioFlex”
  - The DSO defines technical units (“grid aggregation areas”) for his network thus setting a clear allocation of the connection for the network user (“locality information”)
  - The number and size of grid aggregation areas depend on the technical requirements and the secure integration of decentralized power generation
  - The DSO continuously monitors the status of the respective network segment
  - The DSO gives continuous and prompt status notification in the necessary granularity
- Notification of the technical conditions per grid aggregation area by using the “traffic light system” is cessity of recording

Proposal for the design of the "RegioFlex" concept (1/3)

- Use of market-based mechanisms to avoid critical regional network situations as an alternative to the network expansion
  - Physical conditions of the network operation are the basis
  - Regional markets for system services /flexibility designed along the lines of the design on the transmission grid level
- Concept study for a market based organizational approach
  - Testing plausibility by the application of the use case systematics
- Use case-description
  - Application of IEC 65559-2
- Analysis of requirements of DSOs and design of standardized flexibility products for the yellow traffic light phase
  - Prequalification procedure (including "locality information" -> securing grid supporting functions of the flexibility options)
  - Standardization and comparability of products in order to secure liquidity

The use case structure of the “ RegioFlex“ Concept



Actors in the “RegioFlex “ -Concept

Prosumer

- Description of (available) flexibility options
- Covering the entire value chain
- All groups (household, tertiary sector, industry)

AGG/BRP*)

- Bundling of the flexibility options by the contract-prosumers
- In close cooperation with BRP or in a common function

DSO

- Germany : approx. 900 DSOs
- Main task: to secure the regional system stability
- Modernization and expansion of the network

DAM**)

- DAM is a new function
- Supply of master data
- Improvement of the existing market structures

SMGW-A***)

- Metering operator: Responsible for the measuring point
- Reliable and secure data communication
- Interface: prosumer

RegioFlex – trading platform

- Trading platform
- Need for discussion: Number, Expansion, delimitation and operators
- In the long term: one market place

*) BRP:Balancing Responsible Party; **) DAM: Data Access Point Manager;
***) SMGW-A: Smart Meter Gateway Administrator

Proposal for the design of the "RegioFlex" concept (2/3)

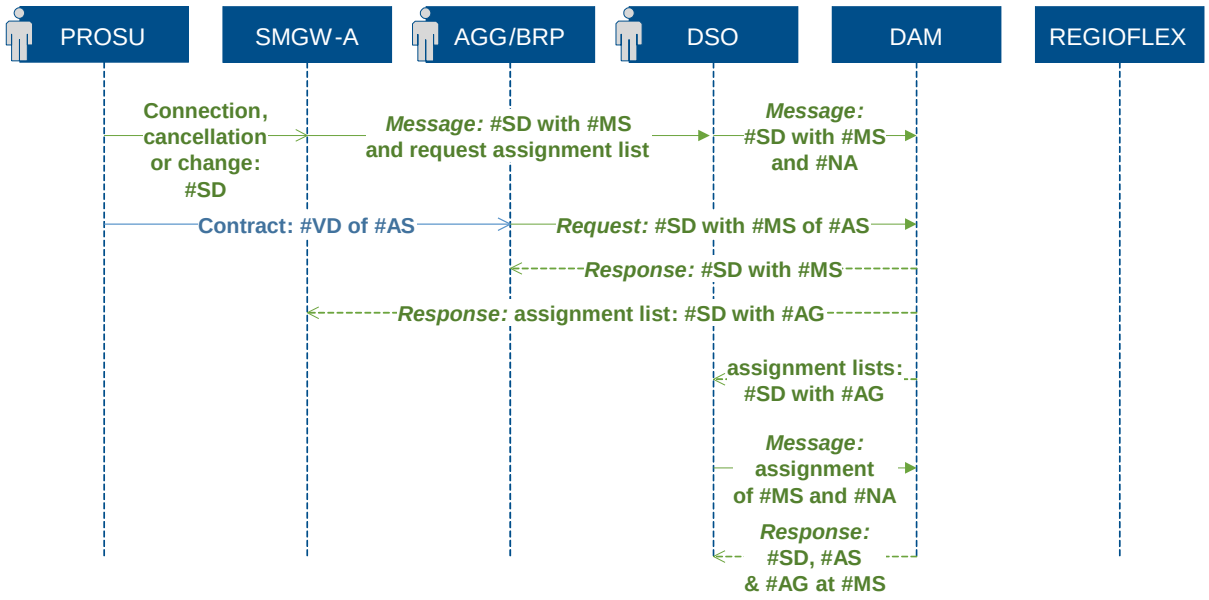
- Call for delivery of flexibility products and compensation by the DSO
  - Allocation of the full costs on the grid tariffs ("flexibility versus network expansion")
- Use of "RegioFlex" in two directions

  To transfer the status of the grid aggregation with market based flexibility
  - from a yellow traffic light back to the condition of a green traffic light or
  - to avoid the condition of a red traffic light
- "RegioFlex " as a regional market place
  - Prosumers as well as aggregators are able to offer flexibility options from their portfolio
  - DSOs are able to publish and contract the need in flexibility
- Data sets at "RegioFlex "
  - Place, time, duration and scope as well as the type of the flexibility option

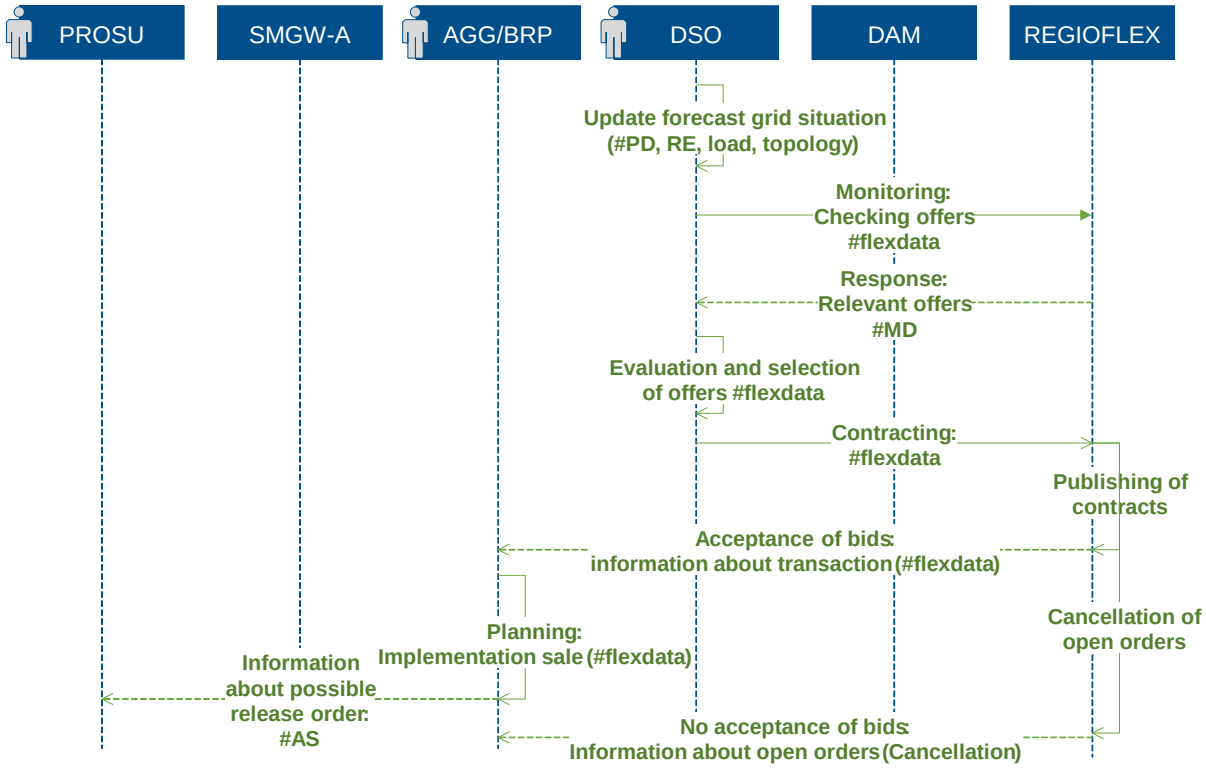
Proposal for the design of the “RegioFlex“ concept (3/3)

- “RegioFlex“ concept in detail
  - Electronical measuring data recording for each network aggregation area
  - To define: Organization, number, size and operators of the “RegioFlex“ – platform
  - Open time window between the individual items of information of the actors
  - Definition of the tradable products
  - Consideration of technical aspects

Use case diagram: Master data exchange



Use case diagram: Flexibility contracting



The screen mask of the “RegioFlex “ concept

Flexibility - option (#FO)	Net - aggrega - tions- area (#NA)	Provider of Flexibility– Customer for Flexibility (#AG / #MS / #NB)	Time (#t) dd:mm:jj hh:mm:ss	Duration (#d) mmm:ss	Product (#FM) (#RS)	Performance (#P) kW	Price: - energy (#AP) €/kWh	Price: - capacity (#LP) €/kW
		Offer						
1	64285 001	DE000134 64285 M4AR7QH2I9A2SE3G4KW9	21.11.14 15:00:00	120:00	...	-45,0	25,00	10,00
...	...	...	...	...	...	...	...	...
23	51063 005	DE000721 51063 4AR77QH2I9B2SE3G4K0W	15.08.14 12:00:00	60:00	...	12,0	15,00	5,00
...	...	...	...	...	...	...	...	...
35	85428 011	DE000534 85428 Q6AT7PH7I3A2TE3K4GF9	13.03.14 20:00:00	45:00	...	19,0	19,80	15,70
		Demand						
36	75689 025	DE000335 75689 6GAT7PH7I3A2ZE3K400G	28.09.14 15:00:00	60:00	...	-35,0	...	...
	...	...	...	...	...	...	...	...

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Summary and outlook

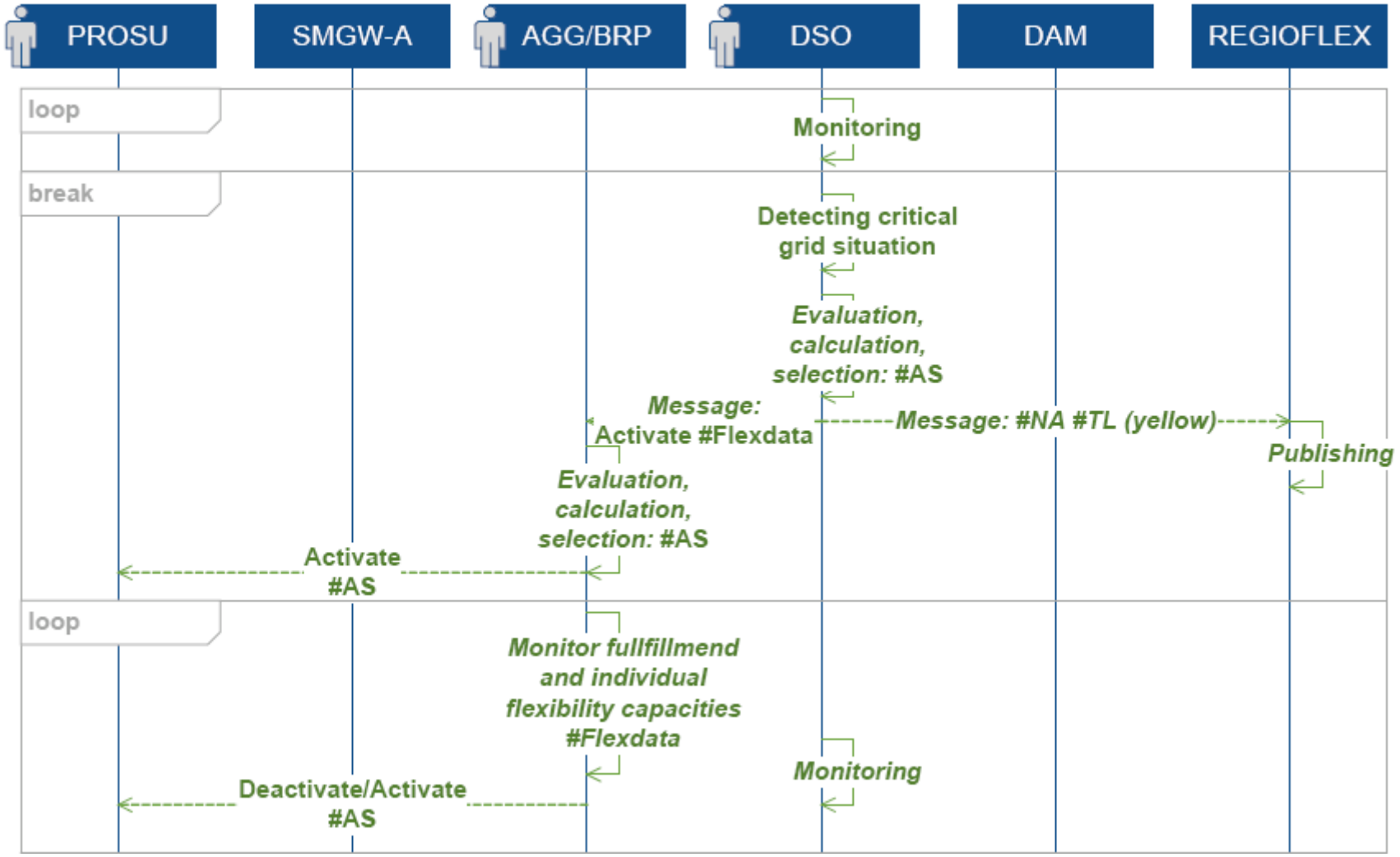
- **Increasing decentralized generation requires new possibilities for actions for the distribution system operator**
  - Distribution system operators can use flexibilties from the prosumer via **"**RegioFlex**"** for the operation of the grid
- **Using flexibilities requires an adequate ICT-infrastructure**
  - For using flexibilities the knowledge of the network condition is essential
- **"RegioFlex " is a valuable complement to the present energy market design**
  - **"RegioFlex "** enables a technologically neutral competition of possible flexibilities
- **Flexibilities for the network operation are linked to the local network area**
  - Critical network situations in the distribution network are regional (emergence and mitigation)
- **Using flexibilities by the distribution system operator requires the adaptation of regulation and market rules as well as a corresponding standardization**
  - At the moment the use of flexibilities is not intended by law/ regulatory framework

Thank you for your attention

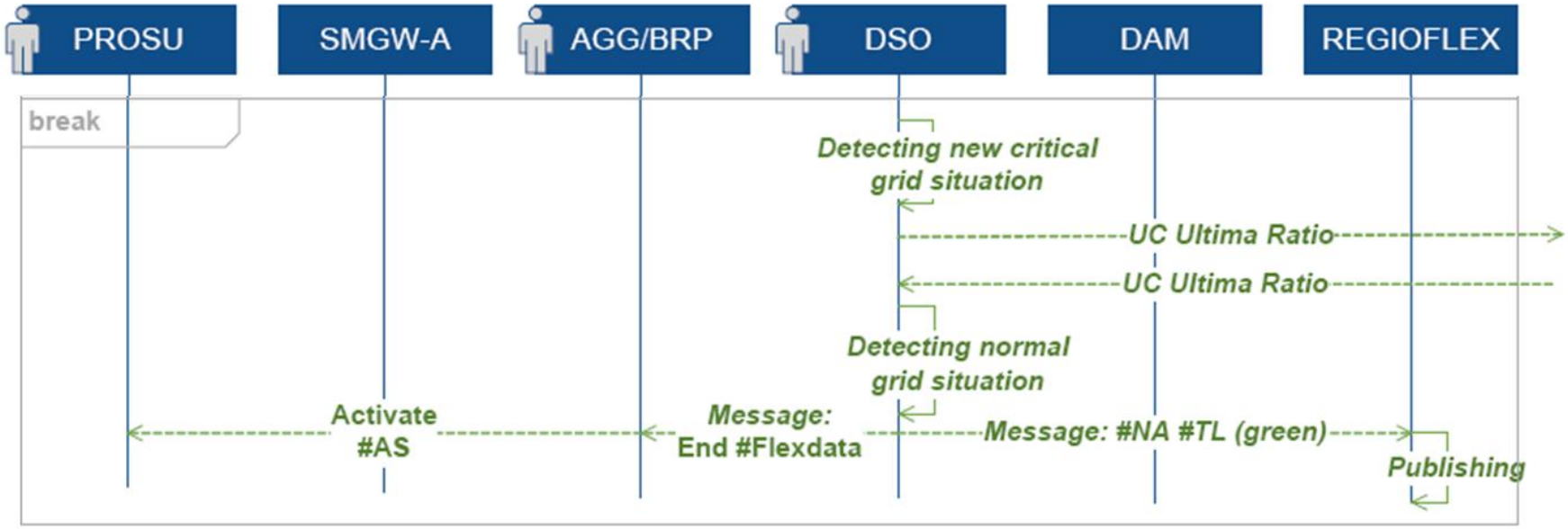
VDE – Netzwerk Zukunft

Back up

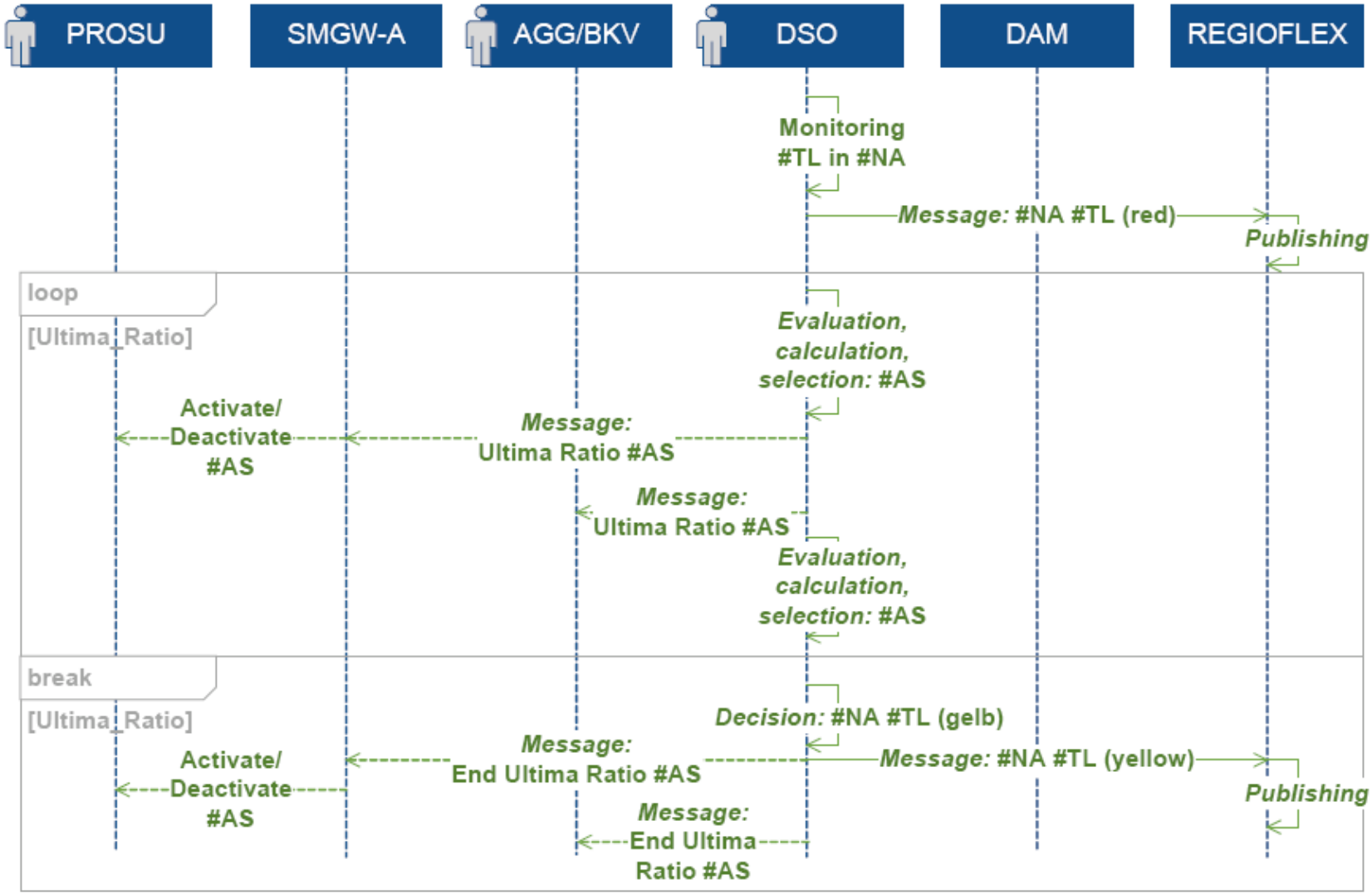
Use Case: Using flexibility (1/3)



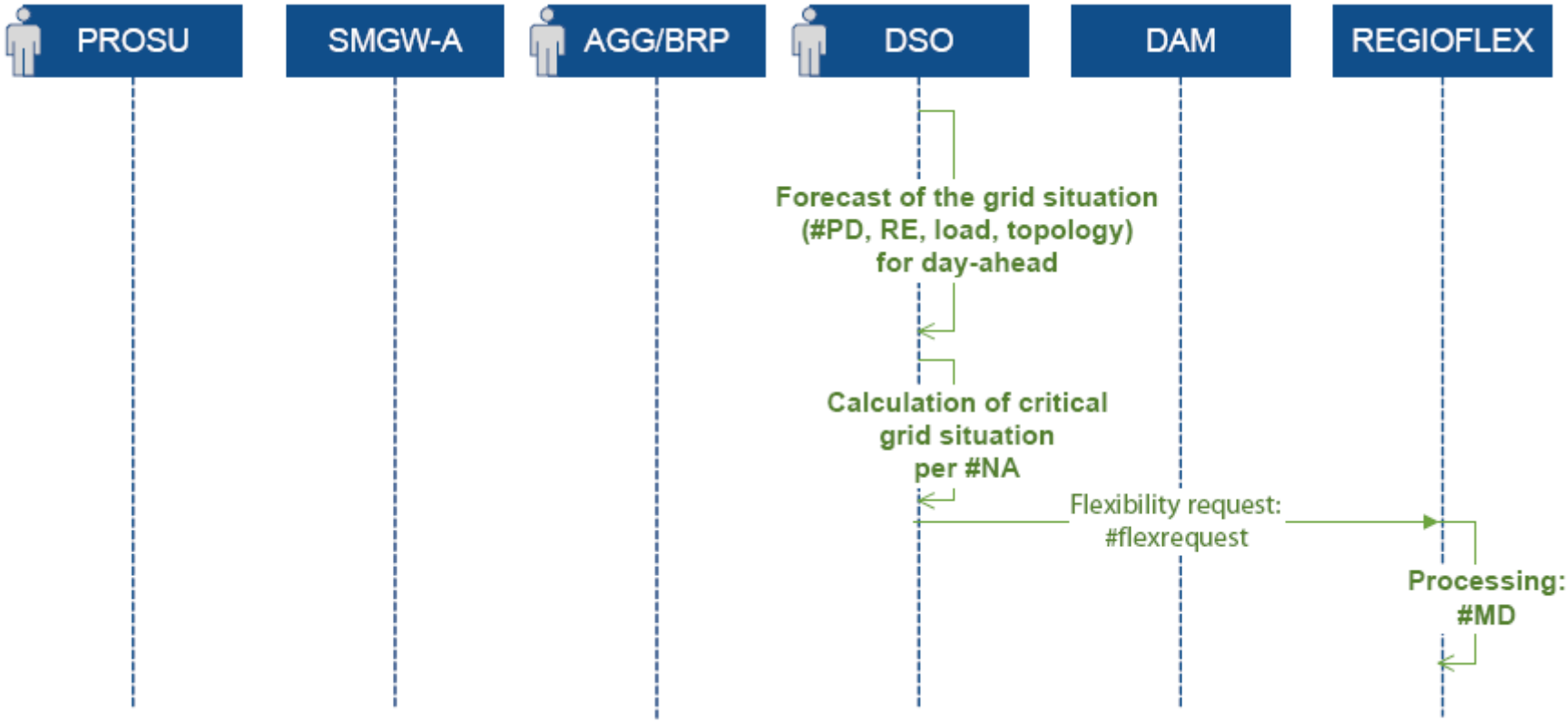
Use Case: Using flexibility (2/3)



Use Case: Using flexibility (3/3)



Use Case: Day ahead planning



Use Case: Flexibility offering