GridFlex Challenge
#TechForSustainability

August 2021

SIEMENS

Our Team

Ralf Blumenthal
Global Product Manager SI DG
linkedin.com/in/ralf-blumenthal

José Pastor
Data Scientist SI DG
linkedin.com/in/josepastorp

Benno Blumoser
Head of Innovation Siemens AI Lab
linkedin.com/in/bernd-benno-blumoser-066676

Paloma Pareja
Project Manager at Digital Grid
linkedin.com/in/paloma-pareja-martín-2a100117

SIEMENS

Agenda

1. The Smart Grid and Grid Edge
2. The GridFlex challenge in a nutshell
3. Sustainability implications
4. Guiding approaches
5. Q&A

Smart Grid and Grid Edge

Smart Grid: Is an electricity network/grid enabling a two-way flow of electricity and data whereby smart metering is often seen as a first step.

Grid Edge: Is the new dimension between intelligent grids, smart buildings and prosumers, that is opening up space for new business opportunities. Solutions at the grid edge enable buildings, infrastructures and industries to optimize their energy efficiency.

SIEMENS

Active players in the Smart Grid

New business models can arise in Grid Edge from monetizing flexibilities

Smart Electrical Grids

Resilience, efficiency, compliance

Grid Edge

Flexibility & capacity

+ New Business Models

Buildings

Flexibility, while efficiently operating in comfort & safety

Regulated ⟷ Deregulated

Vertical integrated utility

Transmision System Operators (TSOs)	Distribution System Operators (DSO)	Generation Companies (GenCo.)	Aggregator.	Retailer	E-Car Op.	Industry	Infrastructure, Campus etc.	Prosumer

Flexibility + Capacity

Capacity Requests

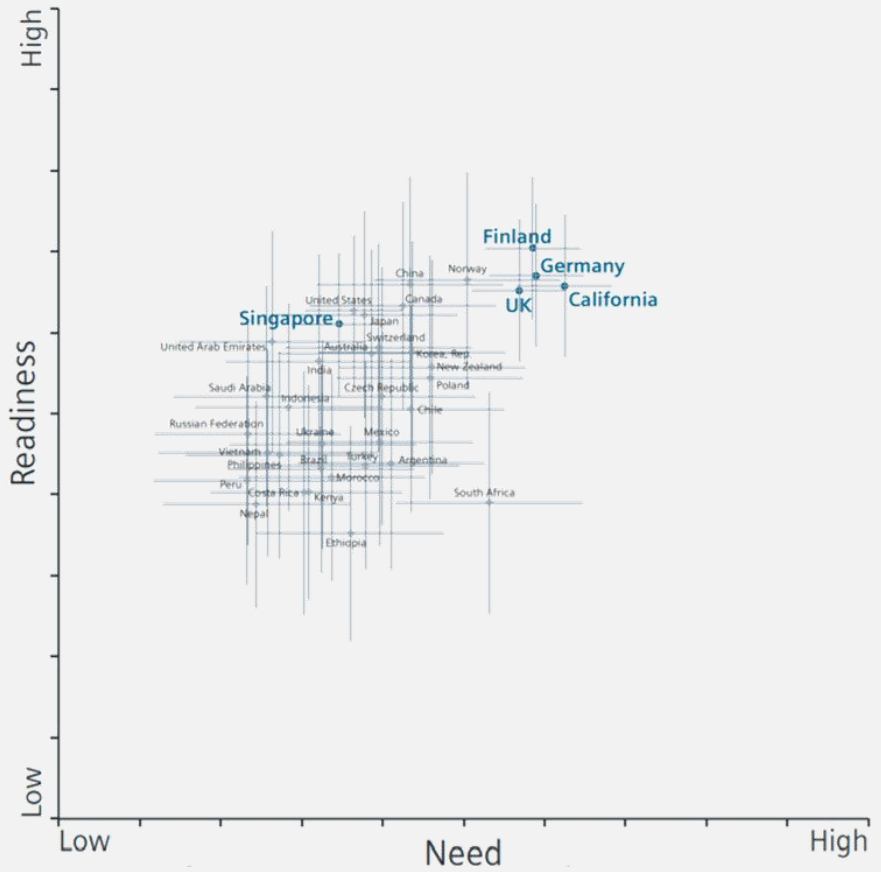
Flexibility request's and Grid Constraint Info

Flexibility + Capacity

Players involved in the challenge

SIEMENS

Grid Edge markets



Readiness: for grid edge solutions is the state of having the necessary economic, political, technical, and social preconditions for the effective deployment of related technologies and services at scale.

Need: for grid edge solutions is the extent to which grid edge solutions can support the clean energy transition and enable a region's future aspirations.

SIEMENS

Agenda

1. The Smart Grid and Grid Edge
2. The GridFlex challenge in a nutshell
3. Sustainability implications
4. Guiding approaches
5. Q&A

The challenge in a nutshell

Discovering and using **flexibilities** in the **Power Grid** to **increase energy efficiency** and therefore to **reduce carbon footprint** while **increasing revenue streams**.

What is a Grid flexibility? It is the capability of a power system to maintain balance between generation and load during uncertainty, resulting in increased grid efficiency, resiliency and the integration of variable renewables into the grid.

To have a truly **Sustainability** Impact, technical developments need to be binded to a business case.

BUSINESS MODEL
50%

TECHNICAL SOLUTION
50%

SIEMENS

Agenda

1. The Smart Grid and Grid Edge
2. The GridFlex challenge in a nutshell
3. Sustainability implications
4. Guiding approaches
5. Q&A

3. Sustainability Implications

Increased use of renewable resources

Reduce line loss by optimizing reactive power compensation

Integrate EV Charging

Improve the utilization efficiency of power generation resources by optimizing scheduling

Improve the utilization efficiency of electrical equipment by demand response (DR)

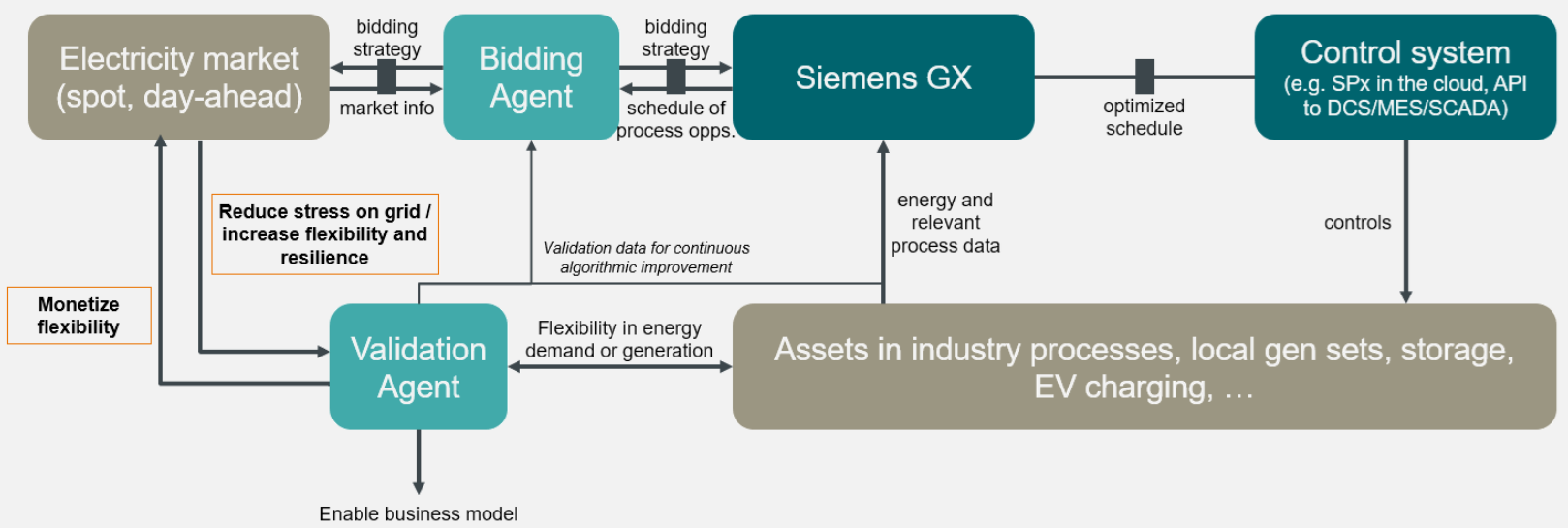
SIEMENS

Agenda

1. The Smart Grid and Grid Edge
2. The GridFlex challenge in a nutshell
3. Sustainability implications
4. Guiding approaches
5. Q&A

SIEMENS

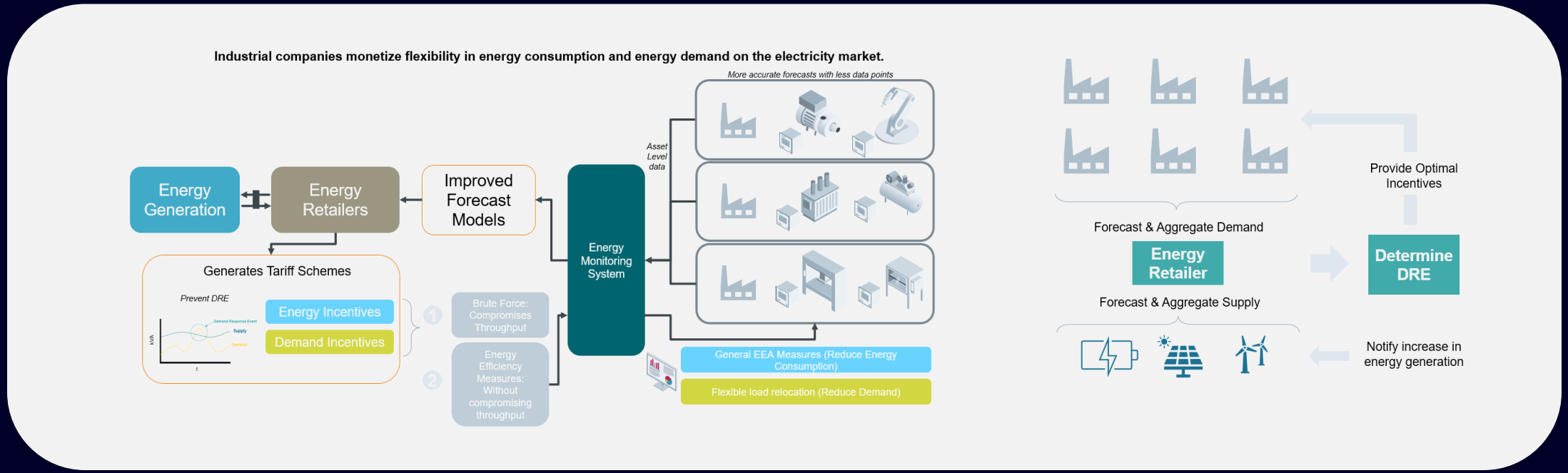
Guiding approach 2



It is a general practice that Energy retailers buy energy from energy generation companies and prosumers, to then offer bids to the final electricity customers. The continuous bidding is currently done manually or semi-automathically, which leaves plenty of space for optimization. A business model would be to create an interface between energy retailers and the final industrial consumers, in the form of an automated intelligent energy trader, that can be powered by reinforcement learning technologies to be rewarded on the profits or carbon emissions related to the bids.

SIEMENS

Guiding approach 2



One of the most adverse events in a Smart Grid happen when energy demand surpasses the supply, the so-called Demand Response Events (DRE). In order to prevent this situation, energy retailers need to provide with energy incentives and demand incentives in order to balance as much as possible both supply and demand. A potential solution and business model would be to enable an interface between industrial consumers and energy retailers, in the form of a more reliable forecaster and energy incentive assistant system, so as to incentivize lower operation energy consumption in light of an incomming DRE or also notify energy generators to increase their supply.

SIEMENS

Agenda

1. The Smart Grid and Grid Edge
2. The GridFlex challenge in a nutshell
3. Sustainability implications
4. Guiding approaches
5. Q&A