

Grid Flex Challenge

Discover business models and technical solutions using the flexibilities in the smart grid.

[1]

The power grid is a key element in the strive to transition to sustainable energy sources and decarbonization. The so-called grid edge, an unregulated market interfacing with regulated grids, still has a huge overlooked potential for new business models and untapped revenue streams. On top, services and solutions of current grid players seldomly consider the potential from asset-level understanding of energy consumption and generation “behind the meter”. This can lead to grid operators and energy traders not being able to make use of the full potential available and controllable large-scale energy flexibilities often found on Industries and Infrastructures (I&I) side, to the benefit of a decarbonized energy grid. In parallel, this situation prevents industrial customers from additional revenue streams through increased participation on the grid.

While there are current data driven solutions for managing loads and supply and demand of the grid, these solutions are not driven through AI at scale and many available data streams from asset level metering and process level are not used. Automated trading agents, forecasting modules, load optimization algorithms can help manage optimally the flexibilities on the grid and help monetize them.

We believe that finding a solution for this can further support the smart grid to better manage revenue streams and optimize their player operations, i.e. reduce energy consumption and increase energy efficiency, thereby reducing carbon emissions.

That is why we need you! Join our #GridFlexChallenge as a part of the #techforsustainability campaign to solve problems and create impacts that matter.

Grid Edge

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

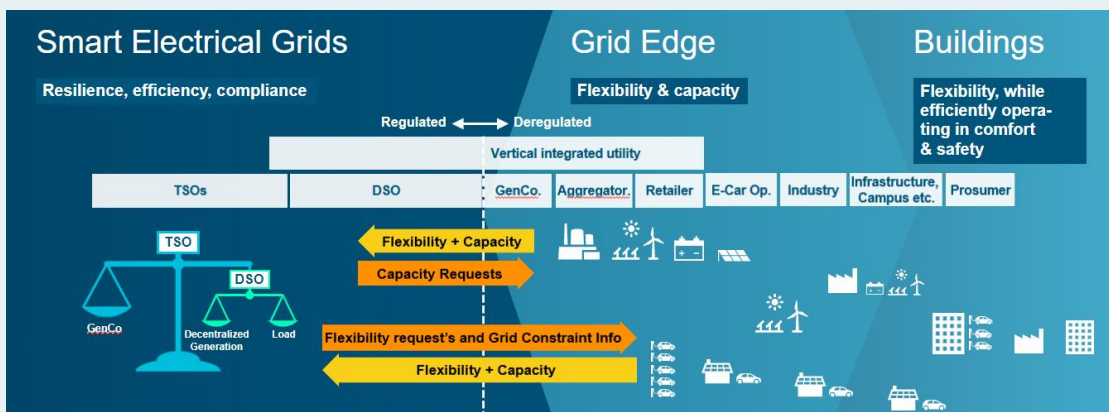
They empower customers to intelligently integrate renewables and to take control of their energy supply. Grid edge technologies support infrastructure for eMobility expansion. They help us to enhance the way we live and work – creating environments that care. [2]

Global trends in the Energy Sector [3]:

Decarbonization: The commitment towards a green future has never been stronger. Decarbonization will be driven by the growing share of renewables in the energy mix, advances in storage technologies and changes in demand patterns.

Decentralization: The energy system is amid a transformation into a heterogeneous, interconnected network of large- as well as small-scale generation sites, storage facilities and other flexible loads (e.g. electric vehicles, smart buildings).

Digitalization: The rise of smart devices and the utilization of the billions of data points is -as well as with most industries -disrupting the energy sector. On a grid level, a digital representation of the physical infrastructure, advanced data algorithms can be leveraged to plan and use the infrastructure more efficiently, defer grid investments, manage constraints, detect faults, minimize outage times, and enhance flexibility.



Players in the Smart Grid

What is expected from the Grid Flex Challenge?

We encourage participants to take part in the challenge to discover business models and technical solutions to take advantage of flexibilities in the grid from industry & infrastructure clients to support the energy transition on the power grid. The two main components are:

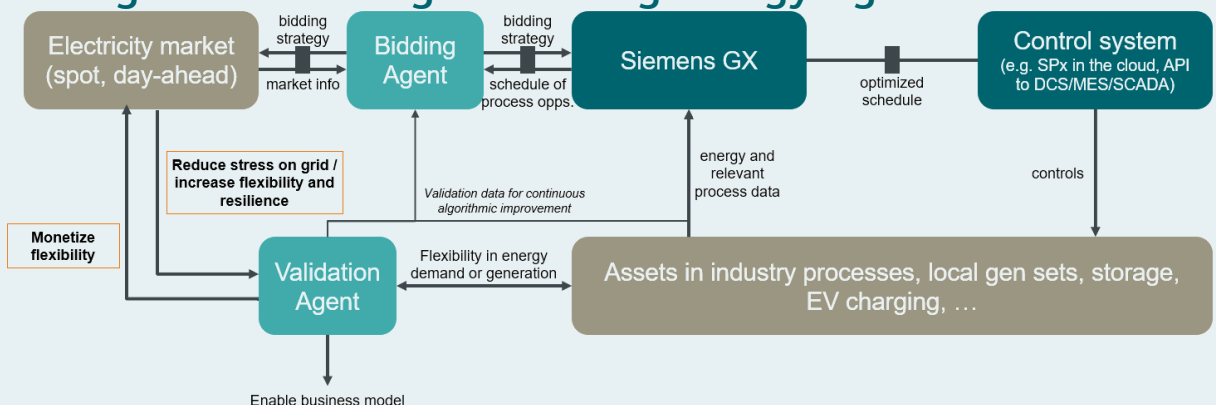
- 1. Business model ideation:** The proposed innovation should have a market potential. In order to better map the business model we strongly encourage the framework of Business Model Canvas (BMC) to identify and detail the key elements of the model. It is important to mention that some conditions for the business model are not ready yet, but it is important to foresee business potentials in future energy sector.
- 2. Development of a technical solution:** The business model should be accompanied by its corresponding technical solution in the form of a Minimum Viable Product (MVP) or Proof of Concept (PoC), that includes the data processing or optimization algorithms, software and interfaces and related.

Data provided by the challenge: Siemens Grid Edge we will provide you with the necessary datasets which include (and are not limited to):

- Highly granular energy and process data from industrial and infrastructure players at submetering level
- EV charging data
- Renewables generation data
- Energy data from energy retailers

The participants are free to choose any business model and pertinent technical solutions. However, to facilitate here we present some helpful ideas to guide the ideation process of the participants.

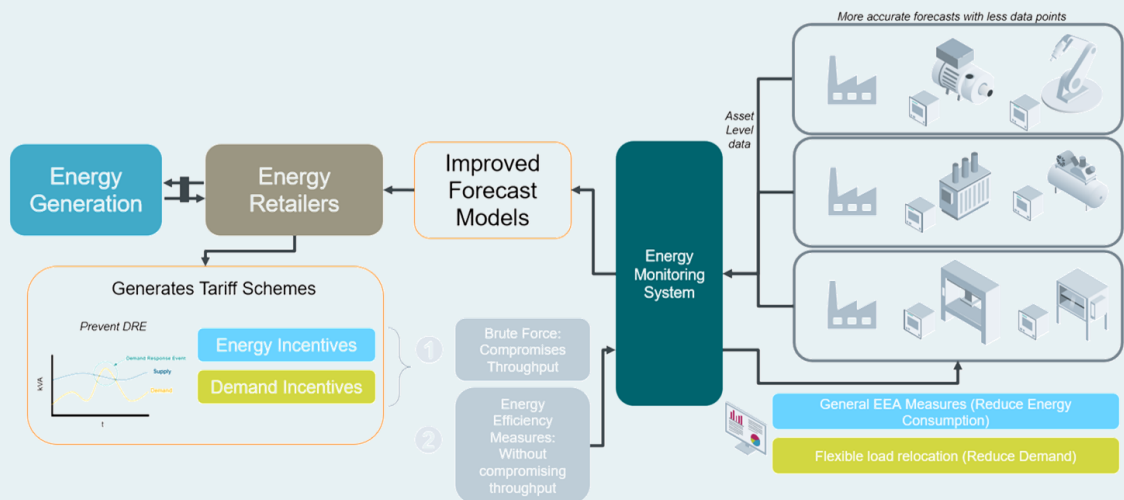
Guiding Idea 1: Intelligent Trading Energy Agent for I&I



Scheme of an intelligent bidding agent as the interface between energy retailers and industrial energy consumers

Although energy tariffs accross the world have different structures and regulations, 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-automatically, 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. The idea becomes much more relevant when there is data from submetering level from industrial customers, which can significantly improve the forecasts and enable more reliable and profitable bids. These bids can also be evaluated by prosumer industries that could opt to shift/delay operations if the benefits of doing so enable better economic profits and/or carbon emission reductions.

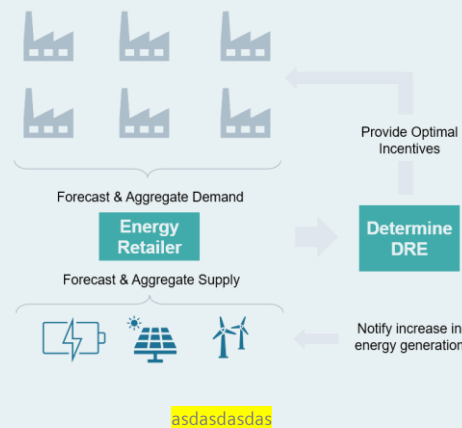
Guiding Idea 2: Smart forecasting and incentive assistant



Scheme of a smart forecaster and incentive assistant to aid minimizing DRE and intelligently meet supply and demand

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 their clients with energy incentives and demand incentives in order to balance as much as possible both supply and demand. The role that forecasts play in this regard is of crucial importance, since they can enable an accurate estimation of DRE and therefore propose the right energy and demand incentives to "nudge" the curves and protect the smart grid. 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 incoming DRE or also notify energy generators to increase their supply.

We strongly encourage you to find innovative solutions with us and help shape the energy transition and improve sustainability in the grid sector!



[1] Picture: <https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy>
[2] https://new.siemens.com/global/en/products/energy/topics/smart-grid.html?gclid=CjwKCAjwruSHBhAtEiwA_qCpjXFimg40UNfWEpWUJ_YH9N6jIOfRNt2ROZdH5M8wXCT3iXiBFh_UxoCGhwQAvD_BwE
[2] <https://new.siemens.com/global/en/company/topic-areas/smart-infrastructure/grid-edge.html>