A state-of-the-art flexibility marketplace and management framework

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Rationale and Motivation

- **Current Status and E.U. Energy Goals :**

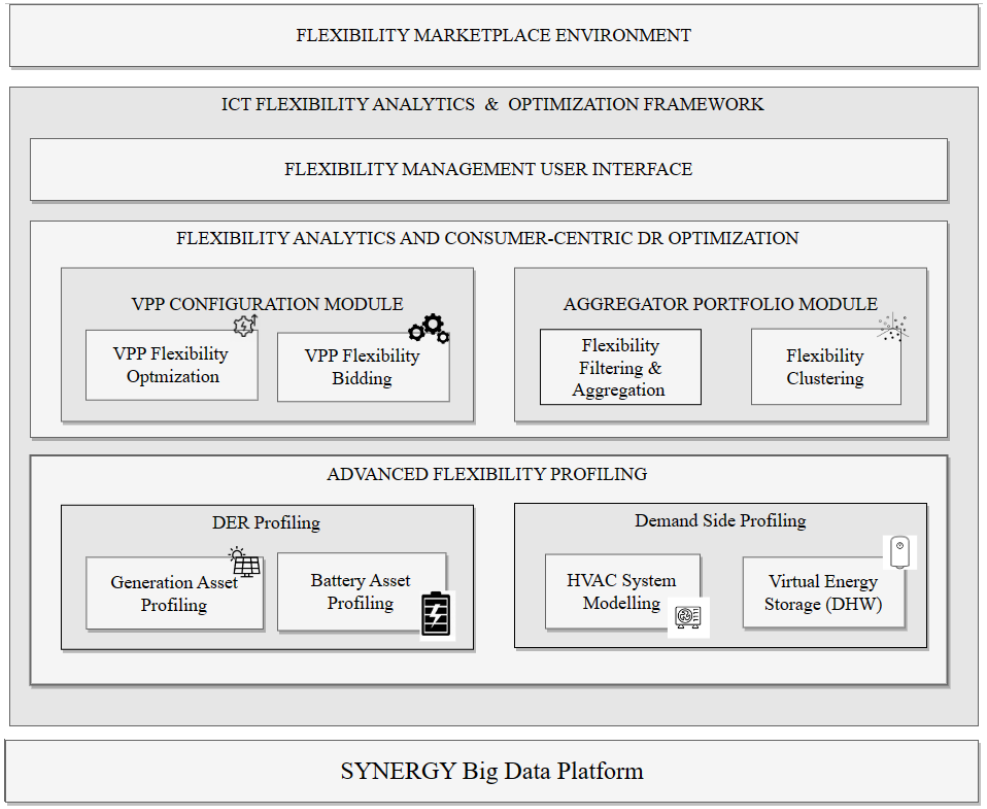
✓ The new geopolitical situation mandates for a rapid transition towards this direction → **REPowerEU** as the plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition

✓ New NECPs and energy directives updating the previous version made available in 2019. On the basis of **REPowerEU** to strengthen the flexibility and resiliency of energy in Europe → September 2023- New Energy efficiency directive setting tangible energy savings target until 2030/ New RES directive

✓ The **European Data Act** made available in 2022 to give both individuals and businesses more control over their data right, copying or transferring data easily from across different services, where the data are generated through smart objects, machines, and devices etc..

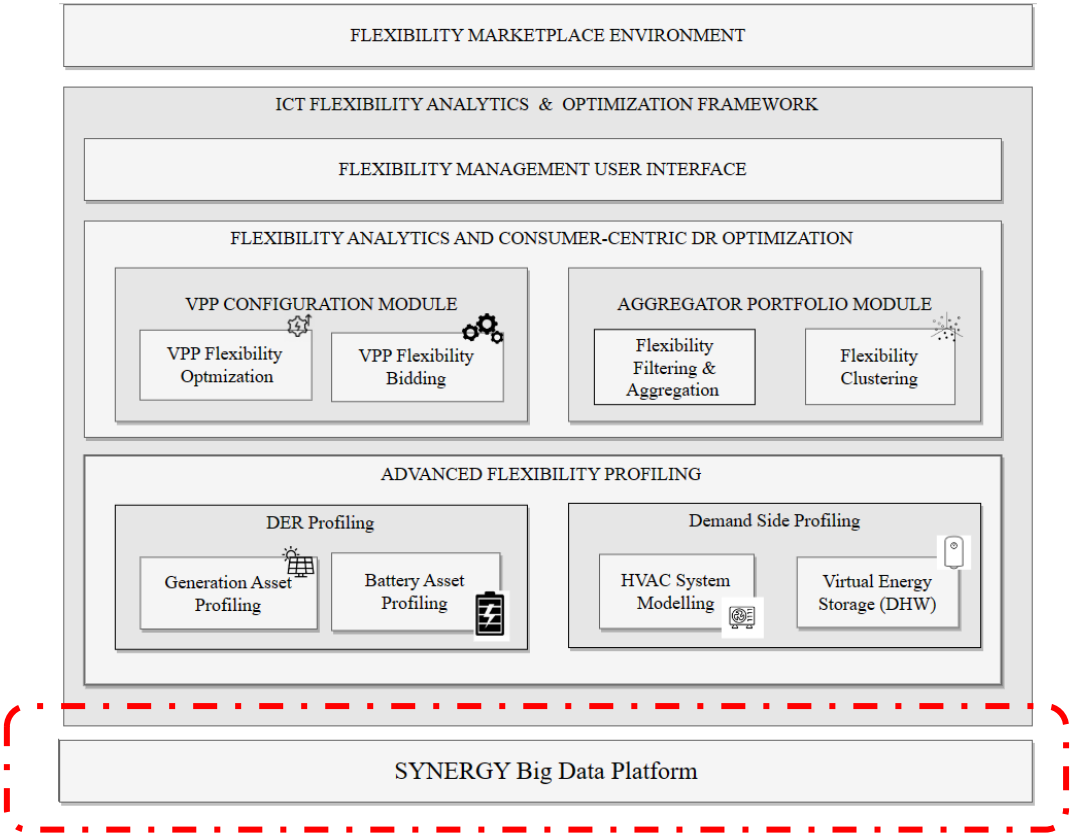
Conceptual architecture of the ICT framework

It is the tool for flexibility managers to take advantage of the data made available in energy data spaces in order to facilitate the analysis of these data and further exploitation of the available flexibility to different and innovative business models and cases.



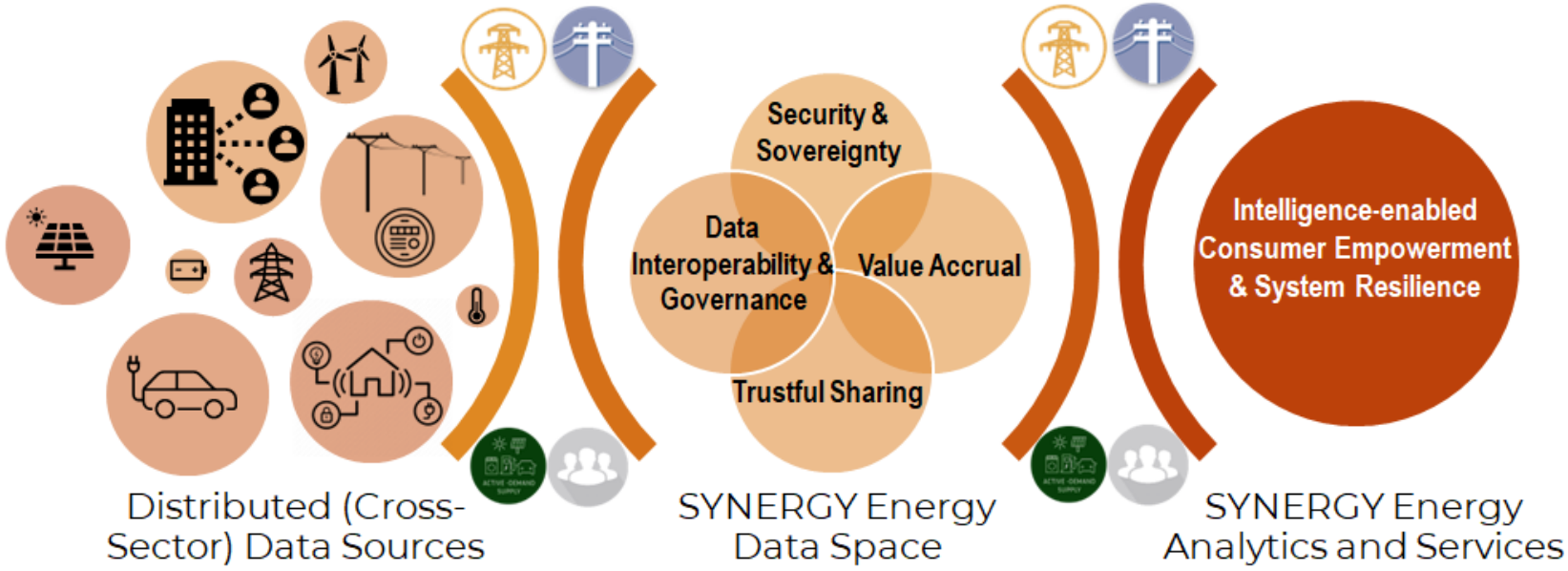
The role of SYNERGY Big Data Platform

Data made available in energy data space by exploiting different integration means and information models on the way to enhance semantic interoperability and data governance.



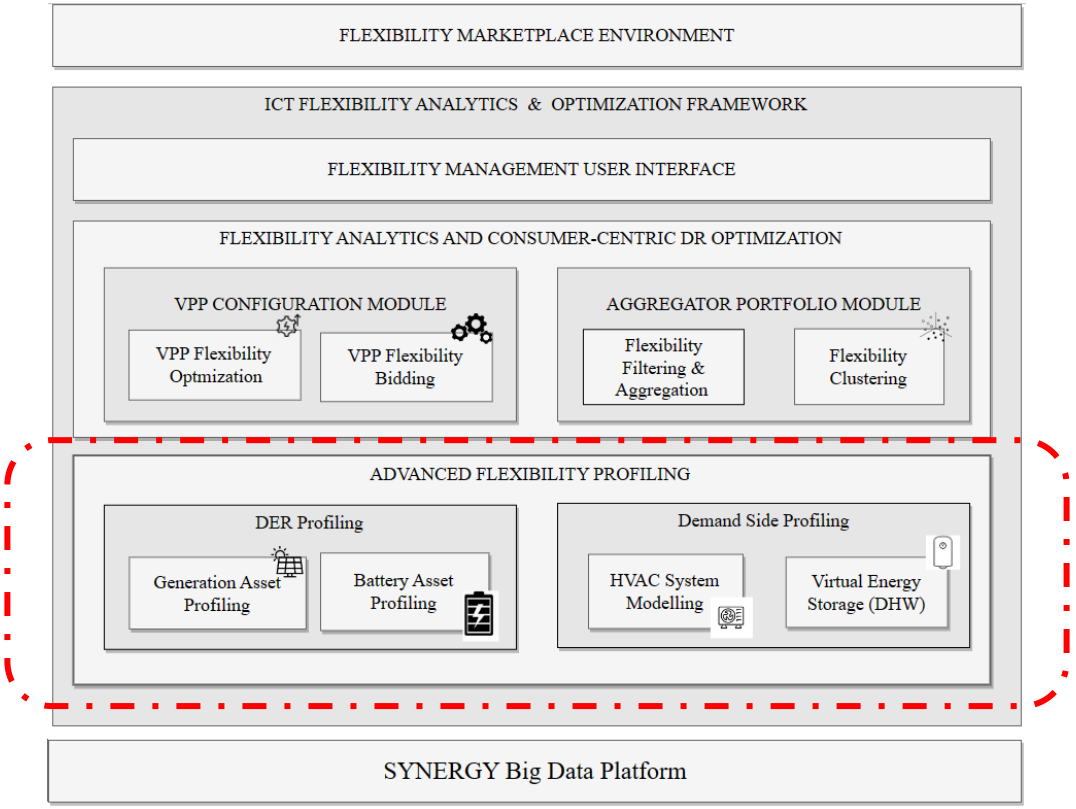
The role of SYNERGY Big Data Platform

To ensure the organized and coordinated management of flexibility assets we should facilitate the timely collection of data and the synchronized management of diverse physical assets acting as flexible sources. Therefore, we establish real-time data integration with a comprehensive big data platform serving as an energy data hub, simplifying data ingestion, management, and sharing.

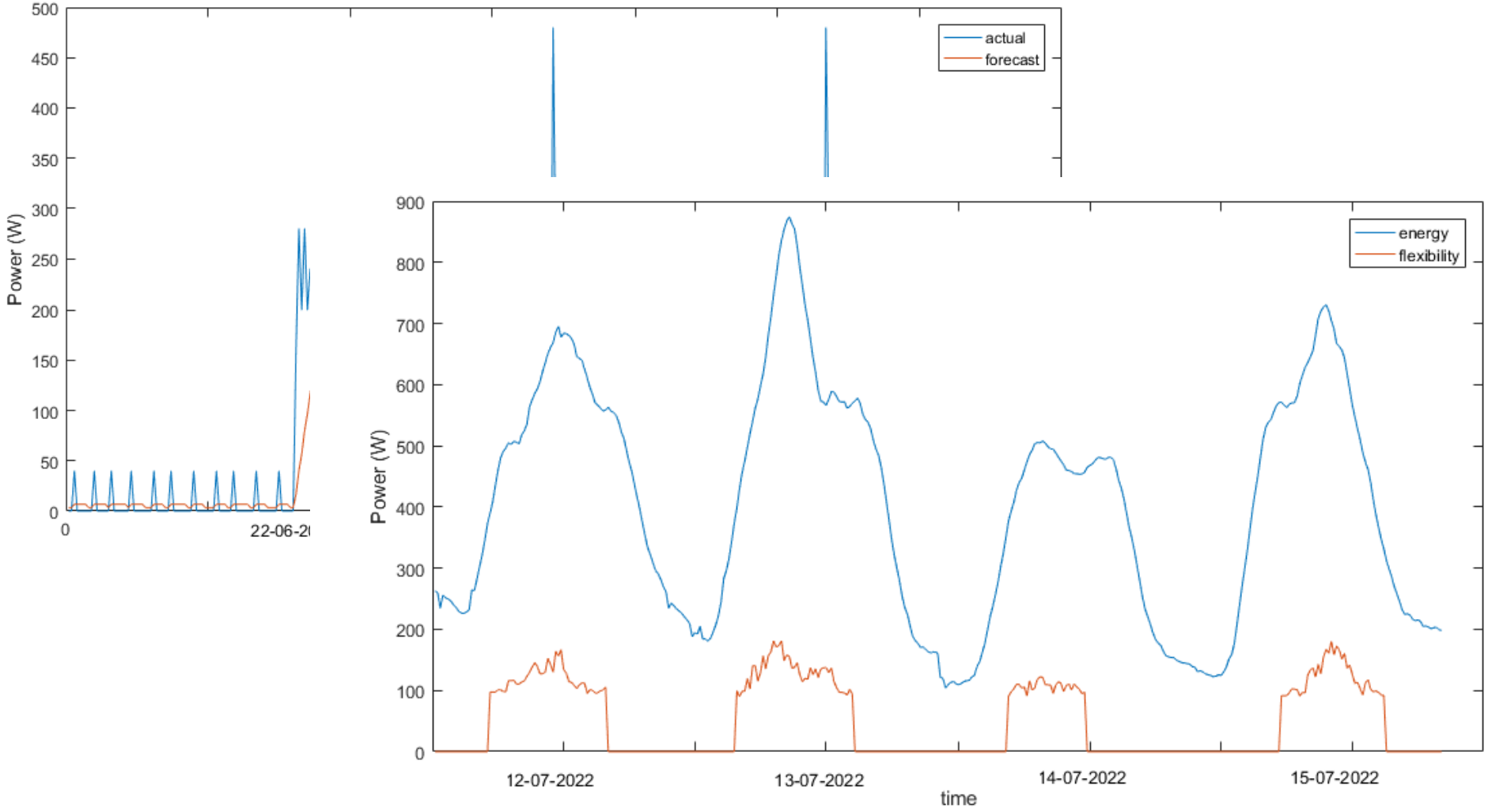


The role of Flexibility Profiling and Analytics

To facilitate the analysis of the data made available from the physical world in order to extract accurate operational baselines and context aware flexibility profiles and forecasts in order to enable fine grained decision making.

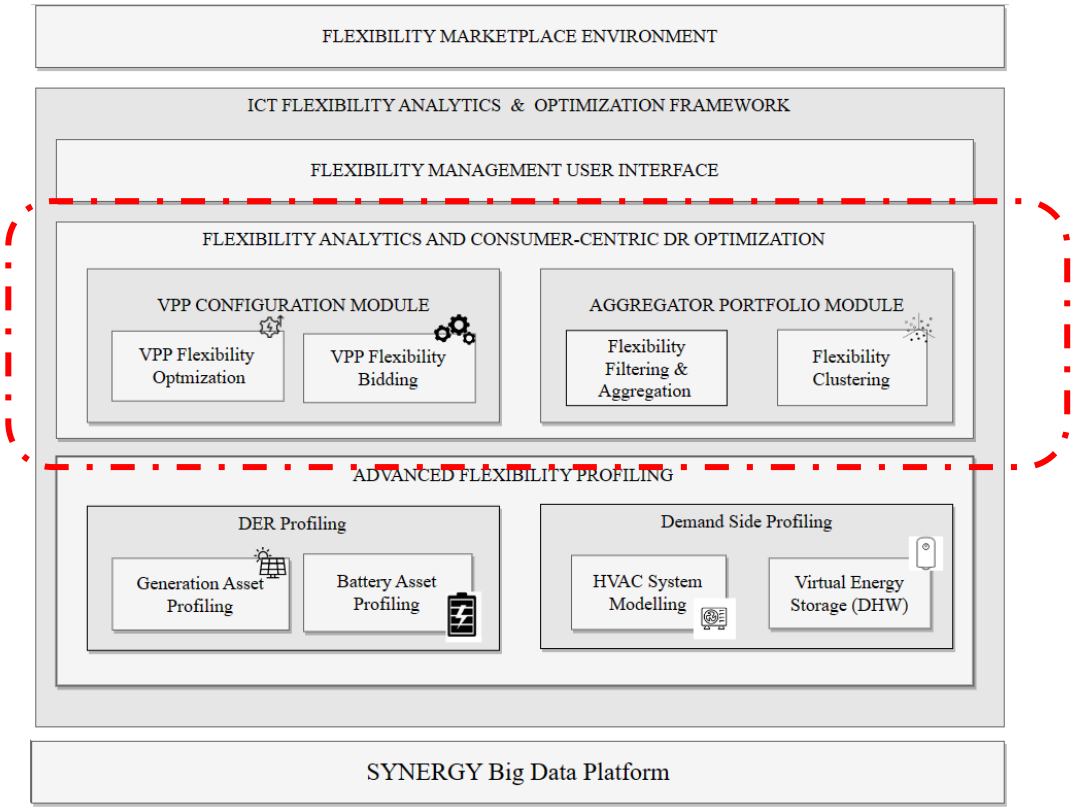


The role of Flexibility Profiling and Analytics



The objective of flex optimization

It is the optimization layer of the ICT framework in order to enable the management of flexibility related information towards setting the appropriate aggregate clusters in order to meet business and market objectives of the main business actors (demand side aggregators)



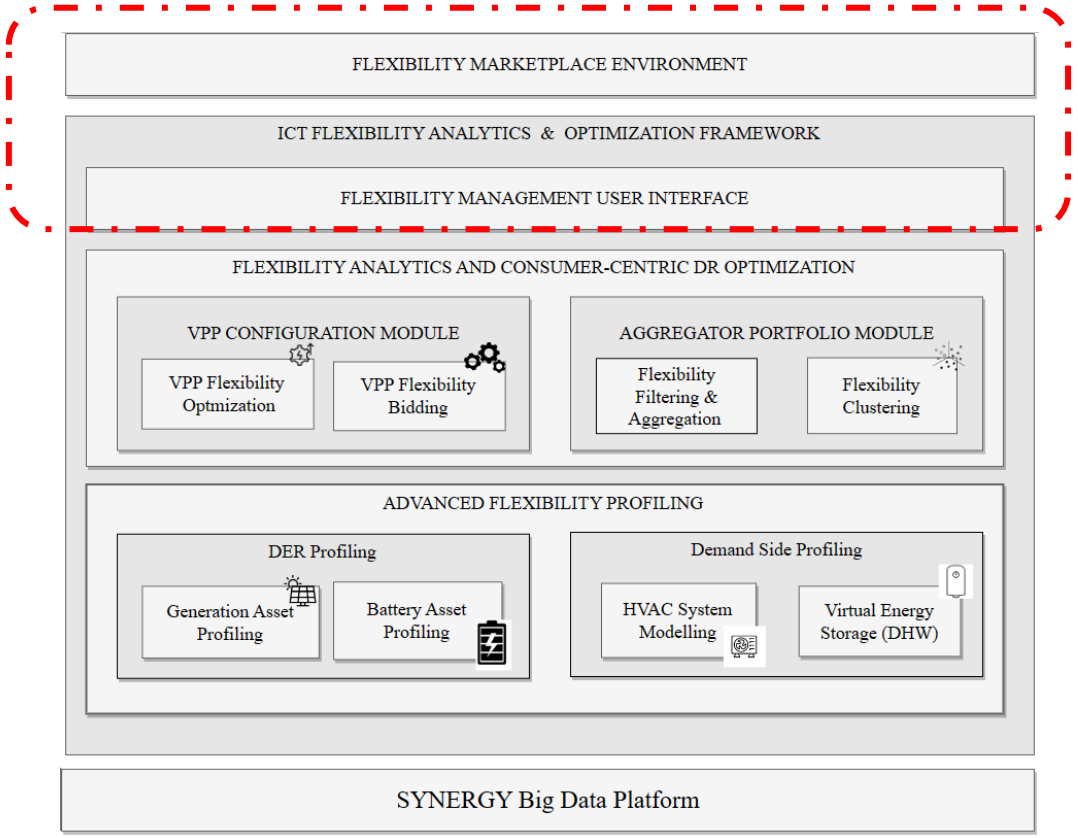
The objective of flex optimization

There are different layers of business analysis and optimization incorporated in the tool:

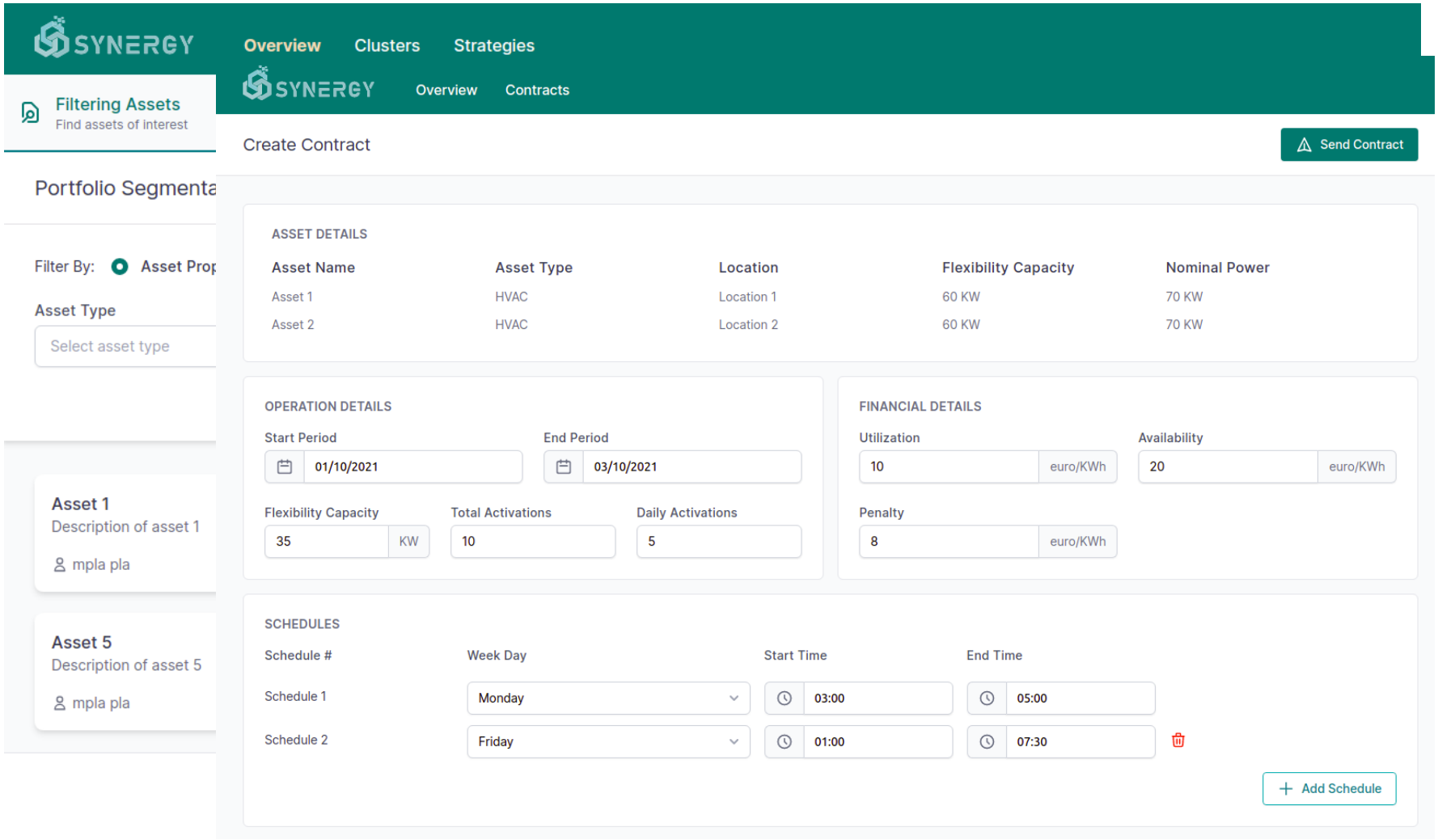
- **Flexibility Aggregation & Filtering** to enable search over the flexible assets available at the portfolio of the aggregator and further aggregation of flexibility profiling data (from the flexibility sources) in order to address the business needs of the aggregator.
- **Flexibility Clustering** to provide fine grained analytics techniques for the management of the flexibility sources available in the portfolio of the aggregator.
- **VPP Configuration** to facilitate the optimal placement of the flexibility sources to 3rd party business campaigns. These business campaigns are triggered by the market as the innovative flexibility marketplaces are evolving now in Europe.
- **VPP optimization** to minimize the cost of flexibility offering taking into account the available flexibility potential of the different DERs in order to address a FlexOrder request ("FlexOrder" signifies the total flexibility requested by external markets, such as network operator (NO) appeals for flexibility to address grid requirements).

The role of flexibility marketplace environment

As the overlay network responsible for the management of flexibility assets and contracts following the provision of a DLT enabled implementation in order to enhance fairness and transparency in the overall contractual and flexibility settlement process.



The role of flexibility marketplace environment



Demonstration Activities & Evaluation

Demo Site in Austria

KPI Name	Description	KPI Value
Flexibility on Offer	Potential flexibility compared to the actual consumption	HVAC: 23%, VPP: 15.26%
Flexibility on Capacity	Potential flexibility compared to nominal capacity	HVAC: 19.3%, VPP: 12.26%
Actual Flexibility Availability	Activated flexibility compared to forecasted flexibility	85.3%
Flexibility Request	Triggered flexibility request compared to forecasted flexibility	90.2%
Flexibility Activation	Activated flexibility compared to triggered flexibility request	94.6%
Flexibility Override	Undelivered flexibility compared to requested flexibility	5.41%

Questions

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