# Flexibility-based VPP Configurator and DR Strategies Optimization Tool - FLEXopt

The optimisation of flexibility delivered by building assets allows the creation of new direct revenue for building end-users, through provisioning the flexibility-based ancillary service to other market participants via aggregator intermediaries. The FLEXopt tool shall allow building managers to gain and maintain better insights into their flexibility portfolio, ensuring the utilisation of a maximum amount of flexibility that does not jeopardise the user comfort, nor does it threaten the proper functioning of the building assets.

Through the tool, the flexibility will be activated by the aggregator to meet third parties’ requests (i.e., system operators). The building manager will be able to visualize the results of the flexibility analytics and activations performed by aggregators in an intuitive and user-friendly manner for building managers. The flexibility service user may be either the network operator seeking to resolve and optimize the operational network conditions or a balance group operator or another market participant.

On top of the delivered flexibility analytics, the tool shall perform flexibility optimization analytics by providing flexibility segmentation, classification, and clustering of available flexibility resources. At the same time, the tool shall ensure a smooth operation of building assets under evolving conditions, enabling the optimal utilisation of flexibility and creation of revenue at the same time. The flexibility optimisation delivered by a portfolio of different building assets accompanied by Virtual Power Plant (VPP) configuration maximises the revenue creation space of the demand response aggregators, respecting at the same time operational and contractual limits.

The optimisation algorithms and VPP configuration models shall be directed towards meeting the request of the flexibility users, such as network operators, and shall consider: (i) flexibility characteristics (capacity, duration, ramp up/down time, shifting, shedding etc.) in terms of suitability for specific services; (ii) contractual parameters (from contracts signed between consumers/prosumers and aggregators) referring to number of activations, remuneration amount, etc. (iii) selected flexibility made available by consumers/prosumers.

## Architecture

The Flexibility-based VPP Configurator and DR Strategy Optimization Tool consists in the following components:

* **FLEXopt: The Data Ingestion interface:** which is used to retrieve from the BEYOND Cloud based platform data as well as ready-made analytics and models.
* **FLEXopt: Building manager Data Storage:** a semi-persistent storage facility which is used to temporary hold data that come from the BEYOND and to store tool relevant configuration settings, relevant for building managers, as well as logs regarding the operations performed by the other components in a persistent manner.
* **FLEXopt: Portfolio Analytics Dashboard for Building Managers:** enables the creation of customized dashboards for visualizing the results of the flexibility analytics and activations performed by aggregators in an intuitive and user-friendly manner for building managers.
* **FLEXopt: Aggregator Data Storage:** a semi-persistent storage facility which is used to temporary hold data that come from the BEYOND platform in order to load them in the other components, and to store tool relevant configuration settings, relevant for aggregators, as well as logs regarding the operations performed by the other components in a persistent manner.
* **FLEXopt: VPP Configuration Engine:** enables the VPP configuration of available flexibility towards flexibility activation requests from third parties (i.e., DSOs, balancing capacity market) to aggregators and facilitates segmentation, classification, and clustering of available flexibility source.
* **FLEXopt: Portfolio Analytics Dashboard for Aggregators:** enables the creation of customized dashboards for visualizing the results of the flexibility analytics in an intuitive and user-friendly manner for aggregators.
* **FLEXopt: Aggregator Flexibility Scheduler:** permits the scheduling and selection of flexibility delivered by aggregators to third parties (i.e., DSOs, balancing capacity market).
* **Data Exposure Interface:** enables delivery of notifications about flexibility activations to the BEYOND platform (input for PEASH and stakeholders i.e. building managers)

Diagram

Description automatically generated

Figure 1 FLEXopt tool architecture

## Screenshots

2-4 screenshot with a small narrative to explain you application (functions, outputs). No need to have all view, just what is very essential

## Code Location

The code is located in the BEYOND code repositorty under the following URL

http://www.xxxx.x.x.x.x.x

## Ordered Backlog of Features

Here we need to have the features/functions that have been derived from the requirements (done in D2.6).

If possible (it would be preferred) break them down into more fine grained ones, so that we can easily split them to what is being developed/delivered/scheduled

### Features Implemented

Figure 1‑2: APPLICATION Features Implemented

|  |  |
| --- | --- |
| Functional Feature ID (respective Req. ID) | Description |
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### Features scheduled for the next period

Figure 1‑3: APPLICATION Requirements for the next period

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| Functional Feature ID | Description |
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## APIs

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| --- | --- | --- |
| Method | Path | Description |
| POST | {realm}/protocol/openid-connect/token | Token retrieval for user or service |
| PUT | /{realm}/users/{id} | User Update |
| DELETE | /{realm}/users/{id} | User Deletion |
| POST | /{realm}/users | Create User and set user attributes |
| GET | {realm}/users?username={username} | Retrieve user attributes by username |
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**Full List of Features (for internal use, to monitor progress)**

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| --- | --- | --- | --- |
| Functional Features ID (respective Req. ID) | Description | Status (Not Started/ Ongoing /Finished) | Estimated Delivery Date |
| FLEXOPT\_FF001 | The tool shall **display** flexibility activated by **aggregators**  in an intuitive, customizable, and user-friendly manner for **building managers**. These insights will be available on the **Portfolio Analytics Dashboard for Building Managers.** | Ongoing |  |
| FLEXOPT\_FF002 | The tool shall enable customizable **display** of activated flexibility for **building managers**.  An example of such an insight would be to display utilized or underutilized flexibility by **aggregators**., activated flexibility per certain building, technical and user constraints etc. This will be enabled in the **Portfolio Analytics Dashboard for Building Managers.** | Ongoing |  |
| FLEXOPT\_FF003 | The tool shall enable the **selection** of engaged flexibility per location, building and flexibility assets for aggregators through the **Portfolio Analytics Dashboard for Aggregators.** | Ongoing |  |
| FLEXOPT\_FF004 | The tool shall enable customizable display of **available** flexibility for **aggregators**. The customization of such insight might involve historical load profiles per flexibility assets, buildings, locations, activations limitations etc. in the **Portfolio Analytics Dashboard for Building Managers.** | Ongoing |  |
| FLEXOPT\_FF005 | The toll shall allow the display of third-party (i.e. DSO) requests coming from the in the **Portfolio Analytics Dashboard for Aggregators.** | Ongoing |  |
| FLEXOPT\_FF006 | The tool shall provide insights / visualization of daily flexibility configurations delivered by **VPP Configuration engine** in the **Portfolio Analytics Dashboard for Aggregators.** | Ongoing |  |
| FLEXOPT\_FF007 | The **VPP Configuration Engine** should deliver **segmentation**, **classification**, and **clustering** of available flexibility source. The **VPP Configuration Engine** should enable proper **VPP configuration** to meet flexibility activation requests **from third parties** (i.e., DSOs, balancing capacity market) | Ongoing |  |
| FLEXOPT\_FF08 | The tool may allow graphical visualization of parameters influencing the delivery of flexibility over time in the **Portfolio Analytics Dashboard for Aggregators.** | Ongoing |  |
| FLEXOPT\_FF09 | The tool shall allow automated VPP configuration for **aggregators** through **Aggregator Flexibility Scheduler.** | Ongoing |  |
| FLEXOPT\_FF10 | The tool may provide continuous monitoring of the VPPs and re-configuration if overrides occur in flexibility signals. | Ongoing |  |
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