

# THE UMEI

## step by step

2020 EUniversal project developed a universal approach on the use of flexibility by System Operators and their interaction with the new flexibility markets, enabled through the development of the UMEI.

The UMEI consists on a set of OpenAPI specifications which allows for the exchange of information between System Operators, FMOs, and FSPs for the purpose of mobilisation and activation flexibility, without the need for a central platform or mediator system.

 [euniversal.eu/the-umei](https://euniversal.eu/the-umei)

 [github.com/euniversal/umei-api-specification](https://github.com/euniversal/umei-api-specification)

## POTENTIALITY - WHAT DOES IT ALLOW TO DO?

The UMEI defines a set of standard rules to enable an agnostic, adaptable, and modular combination of different APIs to link DSOs and market parties with flexibility market platforms, in coordination with other flexibility users. This approach allows distributed communication without the need for a central hub.

In its current structure, the UMEI covers the following flexibility process phases:

- Prequalification phase - In this phase, basic master data like portfolios, grid nodes, etc are set up
- Pre-trading phase
  - Defining baselines, the expected power usage, for portfolios
  - Defining flexibility zones - the expected demand for flexibility and aggregation of resources
  - Extracting this information, along with market and portfolio information, for use in the next phase
- Trading phase
  - Posting orders, reading orders, and trades
- Post-trading phase
  - Providing meter readings for assets used in trades

Flexibility Zones	Portfolio	Baseline	Market	Order	Trade	Meter Reading
 Flexibility Zones Used by DSOs to define specific flexibility areas, composed by a set of portfolios	 Manage Portfolios Used by FSPs to submit and manage portfolio on the market.	 Baseline Managing portfolio baselines Used by FSPs to manage baselines on the market platform.	 Market List All Markets Used by market participants to retrieve the available markets.	 Order Manage Market Orders Used by the DSOs and FSPs to execute orders' related operations in the market platform.	 Trade List Market Trades Used by market participants to retrieve the market trades.	 Meter Reading Manage Meter Readings Used by the DSOs to manage metering data submission both to the FMO and the FSP.

Fig. 1 - UMEI API Groups

## SETUP - HOW TO USE IT?

OpenAPI [<https://www.openapis.org>] was used as the definition language. This is the most common and well-supported way of defining APIs accessible using the standard web technologies of today - JSON over HTTP.

Steps for the implementation:

1. Map the interactions for your flexibility related process and information to be exchanged
2. Identify the involved actors in the exchange of information
3. Identify which actor is going to provide and receive information upon request (reactively)
4. Check the UMEI list of available APIs and identify which one fits the purpose



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864334



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5. The actor identified in 3. will be the one to host the chosen API (implement server-side code) and make it available for the other(s)
6. For the implementation, actors can leverage on OpenAPI features enabled by Swagger and generate client and server-side boilerplate code

The setup process for the implementation implies that there's the possibility to have more than one hosting actor for the system, and no need for a mediation platform, making the UMEI a truly distributed data exchange interface. This makes the usage of the UMEI particularly straightforward for actors which act mostly as UMEI API clients (case of DSO and FSP), since they just need to invoke a API endpoint to send and retrieve information.

Example of process mapping and API selection:

Step Description	Actors			UMEI Endpoint
	DSO	FMO	FSP	
Send flexibility orders to the market	X	X (API host)	X	POST /Orders
Retrieve market clearing results	X	X (API host)	X	GET /Trades
Create a new portfolio of flexible resources		X (API host)	X	POST /Portfolios
Periodically send meter readings to the FSP	X		X (API host)	POST /MeterReadings/create-multiple
Retrieve meter readings	X (API host)	X	X	GET /MeterReadings

## CONTRIBUTION - HOW TO IMPROVE?

The UMEI prototype is already available on GitHub <https://euniversal.github.io/umei-api-specification/>

The UMEI is open to be used by any interested parties, being set as an open-source component to enable market based flexibility.

Updates to the specifications are already being developed in other research projects tackling TSO-DSO coordination and electric mobility. Developments can also be proposed by the users or potential new users, whenever new needs arise, since all can collaborate to its evolution, through the GitHub.

Further technical enhancements may include:

- Complementing the UMEI with APIs to allow:
  - Compatibility with TSO (e.g. for pre-qualification purposes)
  - Inclusion of other flexibility process steps (e.g. financial settlement)
  - Flexibility register synchronization
- Developing and distributing an official client library, in one or more languages
- Developing and distributing an official implementation validation test suite or set of tools



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