Sim4Blocks

A UNIVERSAL LANGUAGE FOR FLEXIBLE ENERGY

Aggregators are key to establishing flexible energy services and help **minimise** the cost of running the power system across the **EU** by responding to opportunities in the market on behalf of groups, such as households, to ensure they **consume less** or **produce more.**

Sim4Blocks is an EU-funded project that is making it easier for **aggregators** to improve the flexibility of blocks of buildings with a simple **demand response** (DR) language of interaction between aggregators and **customers.** The goal is to make is easier for aggregators to streamline processes with such standardisation of (often automated) information exchange and bilateral agreements.

A CHALLENGE FOR DEMAND RESPONSE AGGREGATORS

Housing is becoming connected and smarter due to the likes of the Internet of Things and automated decision-making tools. For residential and commercial blocks of buildings, there is a lot of potential flexibility in electricity consumption that aggregators can work with. These flexible assets can range from refrigerators to heat pumps, water heaters, home batteries and hot water boilers. For DR aggregators to exploit these flexible assets in a scalable way, the flexible assets need to be able to communicate in one common language.

COMMUNICATION OF FLEXIBLE ASSETS

A flexible asset refers to an electrical load or production unit, that is capable of responding to external signals to reliably support the grid. Aggregators can provide considerable value to, for example, heat pumps, home batteries and electrical heating systems.

These assets store the energy when it is available and release it when there is more demand than supply, for example, a solar panel when it is sunny or wind turbines when it is windy. Aggregators can sell this flexible capacity to the grid and reward participating residents for their flexibility.

A key challenge for aggregators is unlocking the flexibility of the different assets in a coordinated and scalable way as different assets, i.e. a residential battery or a heat pump, provide information on their flexibility in different ways.

Currently this information is not streamlined, it will take too much time to translate and the cost to work it out will be too high that it just won't be worth it.

In the **Sim4Blocks** project, a universal language, or domain specific language, will be used. It allows a cluster of assets – a battery or heat pump and a block of buildings - to communicate their flexibility to the aggregator in the same language. Aggregators can have more scalable control over the flexibility potential of the supply and demand of a number of assets, aggregating either one building or a clustering of buildings individually, and can offer more options to meet the demands of the grid.
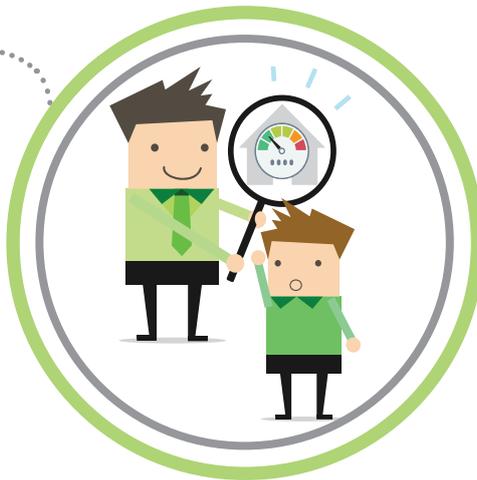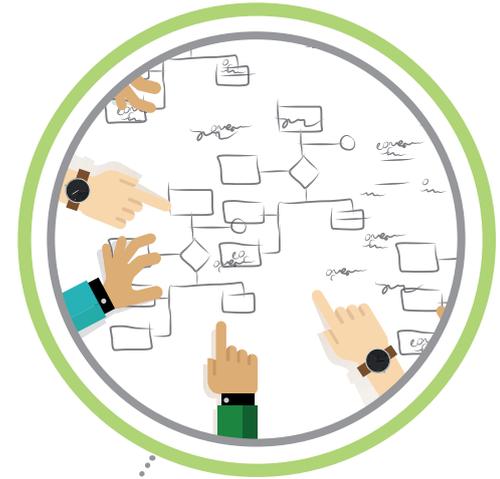
DOMAIN SPECIFIC LANGUAGE

SIMPLE INGREDIENTS:

State-of-the-art literature on DR language

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Sim4Blocks and partners REstore knowledge of the energy market and its interfaces

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The project developed algorithms for a domain specific language

SIMPLE LANGUAGE:

You don't need to be an optimisation specialist to understand it and so local engineers working on the buildings can use it. Yet, it is expressive enough that mathematicians working at the aggregators can work with it.

FIELD TRIALS

With an effective domain specific language, two **Sim4Blocks** pilot sites are implementing the universal language to test of how well the assets can be controlled. The demonstration sites are exploring whether the language is feasible to upscale and simple enough for site managers to use. **Sim4Blocks** is now looking to create a tool that customers can use so they can see the flexibility of their assets using the domain specific language.

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