DREAM-GO

D2.4

Support Document to Deliverable D2.4

Demand Response Registration Digital (D2RD) framework for DR programs models, including the short and real-time DR models conceived and developed in the scope of DREAM-GO – Final release

Deliverable

MARIE CURIE ACTIONS

HISTORY OF CHANGES		
VERSION	PUBLICATION DATE	CHANGE
1.0	03.07.2018	Draft organization and preliminary contents
1.1	30.07.2018	Revised version by the coordinator
2.0	07.09.2018	Inclusion of additional contributions by partners
2.1	24.09.2018	New version with consolidated contributions, sent to review
3.0	27.09.2018	Final version
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Demand Response Registration Digital (D2RD) framework for DR programs models, including the short and real-time DR models conceived and developed in the scope of DREAM-GO – Final release

This document has the purpose of supporting the Demand Response Registration Digital (D2RD) framework for Demand Response (DR) programs and models, including the short and real-time DR models conceived and developed in the scope of DREAM-GO, which is envisaged in Task 2.3, and the output of Deliverable 2.4. This document results from an evolution of the tool presented in Deliverable 2.2. The new version takes advantage of more detailed properties for the considered entities and uses them for more sophisticated DR models' conceptualization and simulation. The DR registration framework is developed to include the short and real-time DR programs and models conceived and designed in the scope of the project. This deliverable is important to support the project execution and the outcomes of the subsequent work packages with a strong conception and modelling approach provided by this task. It is also important because it allows considering the feedback from the simulation and experimental studies in the models resulting from the project and the incorporation in the D2RD framework of the most updated and adequate models.

The D2RD framework was developed as a component of Tools Control Center (TOOCC) system, described in Deliverable 3.1. An architectural perspective of the D2RD integrated into TOOCC is represented in Figure 1. The diagram shows the interaction of the several components for register the consumers information, such as the other entities, and simulate DR models. The framework takes advantage of the use of real tariffs and real-time pricing. When the model is prepared, the DR manager can execute the DR algorithm and then proceed to the simulation in real-time in a laboratory which is able to simulate a house and its appliances. In this way, it is possible to analyse the impact of different entities and models under DR management.

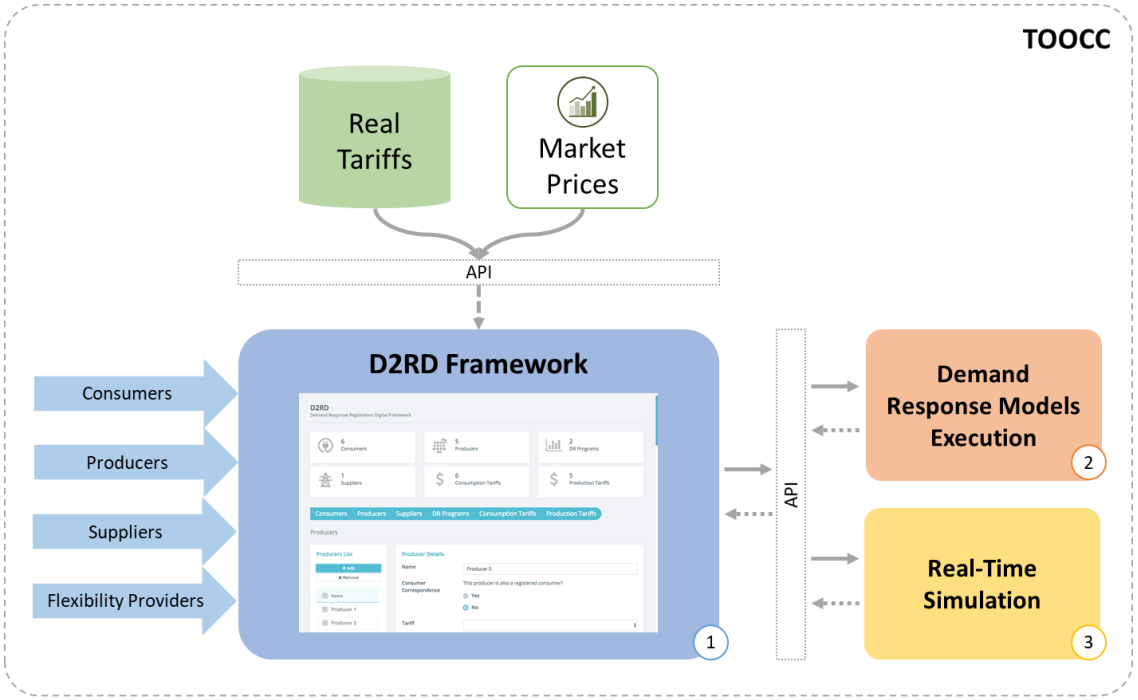

Figure 1 – Architectural model representation of D2RD integration in TOOCC

The developed framework presents an interface between the user and the DR programs implemented in the scope of DREAM-GO. The conception of the program and models is based on the definition of a set of attributes that are used to characterize the DR programs and presented in Deliverable 2.3. For each identified characteristic, a range or a set of possible assigned values are identified. This tool supported the subsequent conception and development of the DR programs and models, which are classified in several types according to the set of characteristics they present.

The DR programs are modelled considering the participating entities (Independent System Operators (ISOs), curtailment service providers, aggregators including Virtual Power Players (VPP), consumers of several types, Balance Responsible Parties (BRP), and Energy Communities), the ways that can be used for their interaction in short and real-time DR events, the required technologic means, and the DR contracts and consumer remuneration methodologies.

Figure 2 shows the consumer's registration interface page, which allows to register new consumers and edit the existing ones. The registration of new consumers considers the consumption profiles that will be used by DR manager to apply the existing DR models. This and other profiles can be imported from a file (Figure 3), simplifying the introduction of values, especially in cases when the required information is extensive.

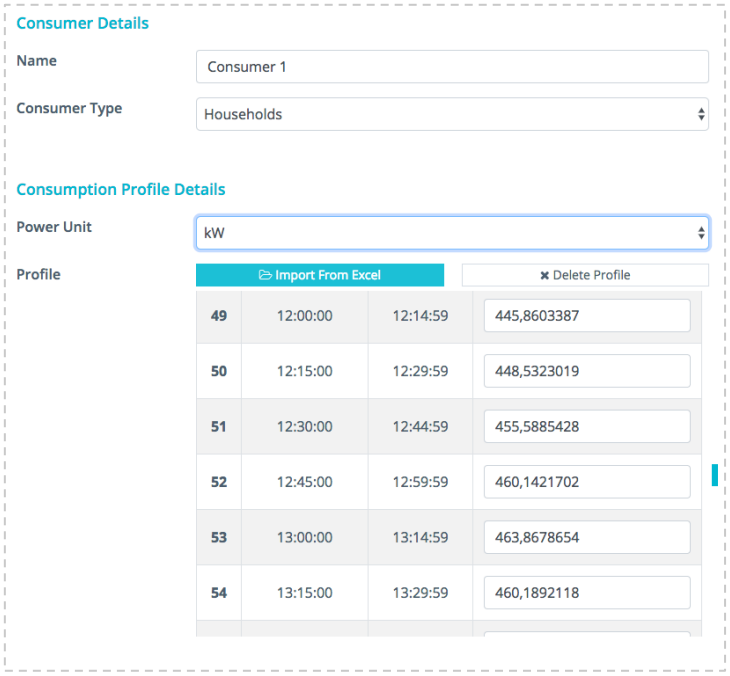

Figure 2 – Consumer's registration interface page

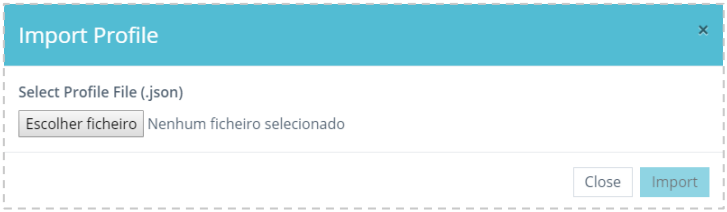

Figure 3 – Importing consumption profile from a file

The Figure 4 shows the creation and configuration page for producers. These producers can be considered as prosumers, by associating their information to an existing consumer.

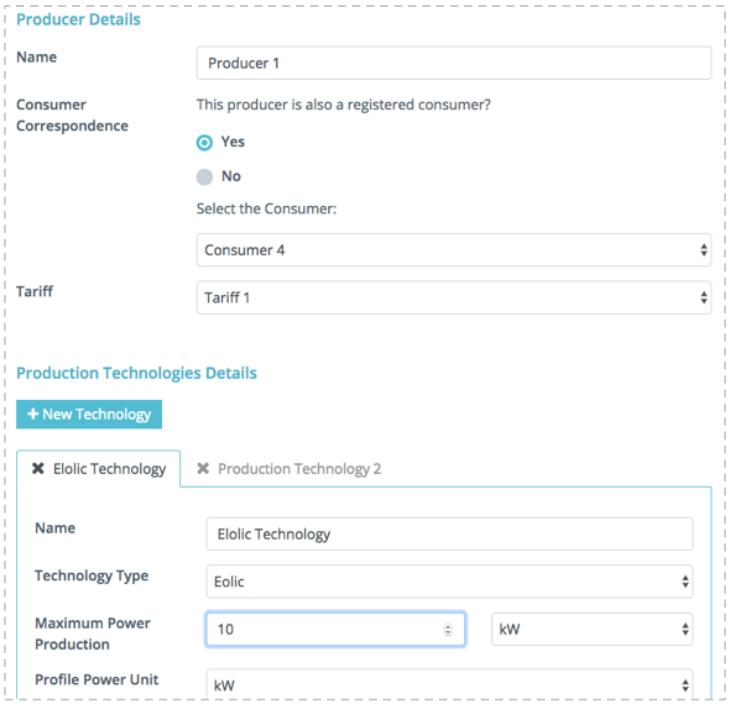

Figure 4 – Producer's registration interface page

One producer can have one or more production technologies, which can be from different types (e.g., wind, photovoltaic, etc.). For each one, information must be filled about the maximum production capacity and the production profile that will also be considered by the DR manager.Figure 5 shows an interface where the DR Aggregators can manage their DR Programs, according to the characteristics referenced in the previous deliverables, which allow the execution of the conceived models in the project scope.

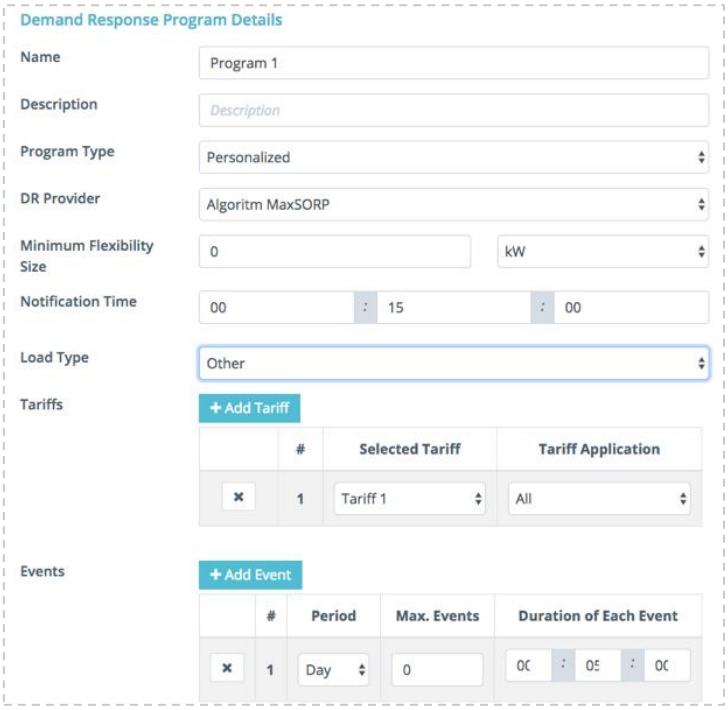

Figure 5 – DR Aggregator's registration interface page

The tariffs for consumption and production used by the models can be based, or be equal, to real tariffs from several countries. Figure 6 shows the form to be filled by a retailer to

create and personalize its tariffs for consumption. The tariffs prices can be filled with actual tariffs values or real-time pricing. This allows better analysis of the impact of the real pricing methods or experiment with new ones. Tariffs personalization makes the system more flexible.

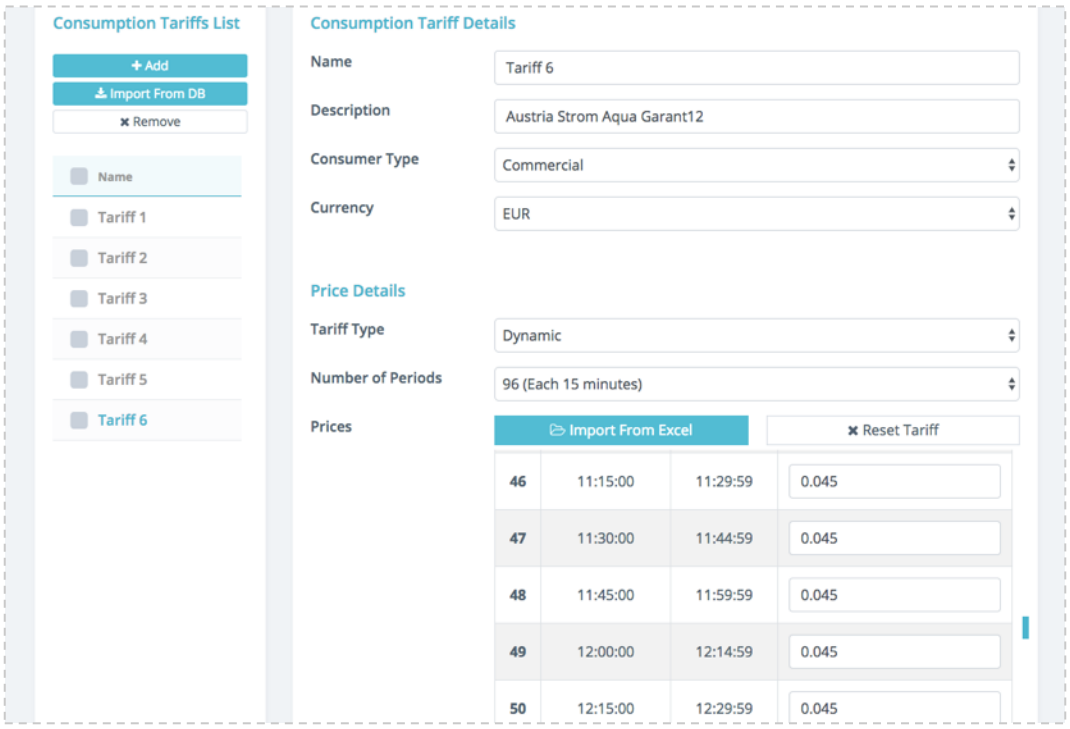

Figure 6 – Retailer Consumption Tariff's registration interface page

Figure 7 shows another registration interface, which is directed to consumers' registration of their flexibility for energy reduction/increase at each moment, which can correspond to different time intervals (e.g.: each 15 minutes).

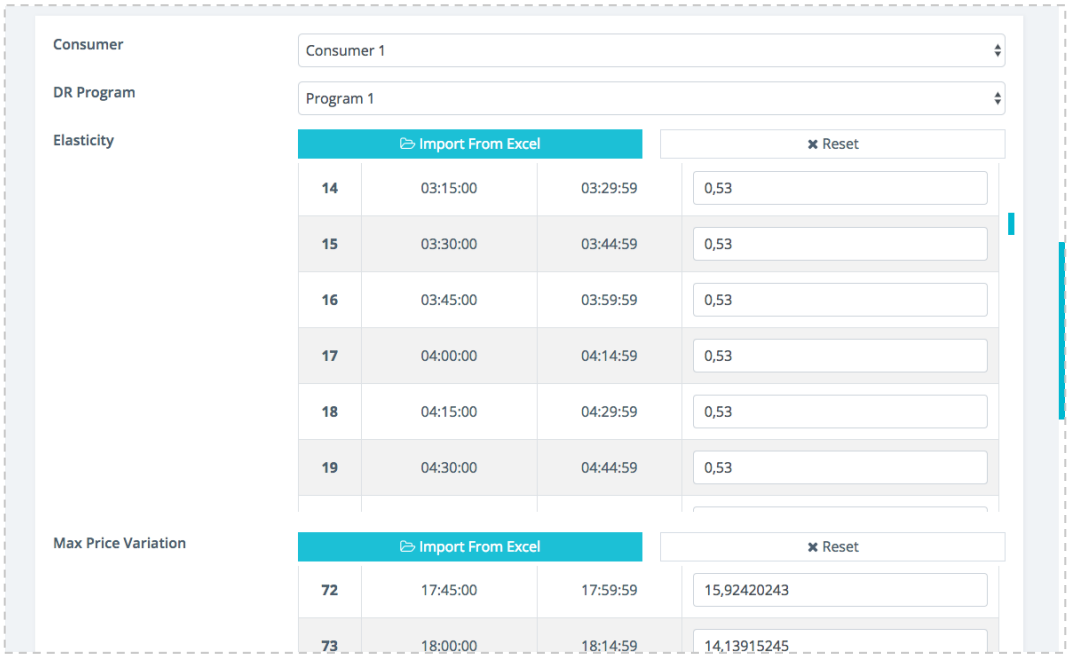

Figure 7 – Consumer's registration of flexibility for elasticity and price reduction and increase interface page

It can be seen in Figure 7 that consumers can define their consumption elasticity for each hour of the considered day, which is a value that represents the expected variation of the

consumption according to the energy price. This means that when the price increases, the consumption is expected to decrease, and when the price decreases, the consumption is expected to increase. The maximum consumption increase and decrease can be specified by the consumer, as well as the corresponding prices. This type of information can be used by aggregators and DR managers to execute algorithms that manage the DR at each specific moment, considering variations in the energy price.

The obtained results not only can demonstrate the general impact of DR on the whole network but also the influence of a single entity in the model. Moreover, it can be also observed the impact of the DR in the consumption profile of each entity.

The D2RD framework thus enables consumers to register their flexibility, their expected consumption, and their envisaged costs for using such flexibility. This is important information that can be managed by different entities, considering each consumer in particular, or as a group by aggregating the information from different consumers.