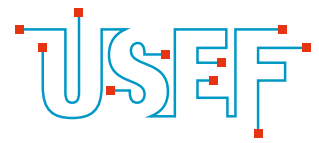


# Erasmus Energy Business Award Nomination



USEF provides a future proof framework for smart energy systems based on an integral, scalable market-based solution that accelerates the commercial development of smart energy products, services and solutions in a coherent way.

## **Title**

The Universal Smart Energy Framework (USEF) - specifications and guidelines for smart energy systems.

## **Executive summary**

There is a global drive to drastically reduce CO<sub>2</sub> emissions due to global warming and a need to reduce our dependence on (imported) fossil fuels. Growing environmental and energy awareness result in energy savings and an increased use of renewable energy. A significant share of it will be derived from local intermittent energy sources such as wind and sun. Coupled with an increasing demand for electricity, largely driven by the large-scale introduction of electric transport, space heating by heat pumps and a growing number of local energy communities, a need emerges for a 'new order' in the supply of energy that optimally matches the changing social context of the 21<sup>st</sup> century. In other words: the energy system must become more 'smart'.

USEF offers a standardized framework that allows accommodating these changes. The Universal Smart Energy Framework, consisting of specifications and guidelines for smart energy systems, acts as a catalyst for a common market for smart energy products in a technology and implementation agnostic way. The framework allows parties in the energy value chain, as well as new entrants from outside the energy world, to set up sustainable businesses that deliver smart energy products, services and solutions that can be rolled out on large-scale in many implementations worldwide in the upcoming decades.



The USEF foundation acts as the steward of the framework and has the ambition to establish it as the de-facto framework for smart energy products, services and solutions. USEF aims that by 2018 ten million Prosumers use USEF compliant products services and solutions throughout Europe and preferably abroad.

More details about the background, scope and concepts behind USEF is available at [www.usef.info](http://www.usef.info). Also, at [www.usef.info/game](http://www.usef.info/game), a novel computer game can be found that explains the ideas behind USEF, allowing the user to experience the Energy Framework real-life.

### Organization to be nominated

The Organization to be nominated is the USEF foundation. The USEF foundation is created in a partnership between energy suppliers, network operators, electrical equipment manufacturers, and consultancy and ICT companies.



### Description of the USEF concept

USEF provides non-discriminatory access to smart energy systems for all active stakeholders at acceptable cost-to-connect

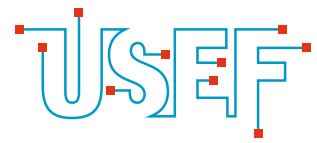
and cost-to-serve levels. The energy framework enables you to seamlessly co-create a fully functional smart energy system and provides an open and consistent framework of specifications, designs and implementation guidelines.

### Design of the Energy Framework

USEF has made three main design choices for the Energy Framework:

#### Integral approach

The Energy Framework is designed taking into account the interests of all stakeholders involved. Without searching for the common denominator between stakeholder that try to introduce new services and technologies individually into the market, each of them will be confronted with the limitations of the design of the current system without being able to effectively alter it to their needs. Most likely the result will be a set of suboptimal incoherent solutions. Therefore, it is essential to apply a close cooperation between all the parties active in the energy system as well as with industries that provide innovative energy services, in order to transform the system into a modern integrated system which meets the needs of all stakeholders in the energy value chain.



### Market-based approach

European guidelines and national legislative implementations are based on three basic market freedoms (connection, transaction, dispatch), which are an essential condition for the energy market liberalization. The transformation into a smart energy system is potentially at odds with these three basic freedoms. USEF provides a Market-based Control Mechanism (MCM) that extends the free market to the regional, local and individual level, offering access to the energy market for all participants. A market-based approach facilitates dispatching all assets at the lowest costs and hence the MCM allows operating the energy system in the most economical achievable way.

### Scalable solution

The introduction of new energy services will be accompanied by the introduction of new market players like Energy Service Companies (ESCOs) or (local) energy communities, who will need access to the energy markets to be able to valorize the value of their energy services. The size of these market players will be significantly smaller, while the number of active parties in the energy system will increase significantly. Simultaneously, the amount of connected devices vehicles that exchange information to market players such as smart meter or charging stations for electric increases significantly as well. This requires standardized market access for new players and standardized communication. Both the cost-to-connect and cost-to-serve will not reach reasonable levels when not taking this scalability into account.

### The USEF concept in more detail

In the Energy Framework, the concept of flexibility plays a major role. Flexibility refers to the possibility to shift energy use of production to times when it creates most value to the energy system, by applying demand response. For example, it makes sense to use energy when the sun is shining on PV-panels and to generate energy at times of high demand. Flexibility is offered by end-users of energy (so-called: Prosumers), that own the devices that make the time-shifting of energy use possible.

Flexibility can be valuable for multiple stakeholders in the energy systems. First of all, the Prosumers themselves may apply the flexibility that they have for in-home optimization

purposes, such as buffering excess solar energy in boilers. Secondly, the grid operator (DSO) may wish use the flexibility for the purpose of peak load reduction on the grid. Finally, the balance responsible party (BRP often the same party as the energy supplier) could use flexibility for balancing purposes.

For this reason, USEF introduces a new role in the energy system: the Aggregator. The Aggregator accumulates flexibility that Prosumers provide and sells it to the DSO and/or BRP, whoever the flexibility is most valuable for. The processes by which the Aggregator sells flexibility in a coherent and transparent way is described in the new introduced Market-Based Control Mechanism. The way the Aggregator can receive the flexibility from Prosumers (and thus controls its devices) in a standardized way is also described by USEF.

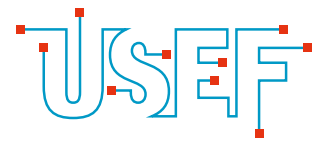
For more details on the content of the Energy Framework, the reader is referred to <http://www.usef.info/Downloads.aspx>.

### Business plan

USEF provides a modular design of a smart energy system that can be customized to the needs of smart energy projects. The Energy Framework is shared or implemented in three different ways:

USEF provides a set of specifications is to accelerate the market introduction and large scale implementation of smart energy solutions. The specifications are exhaustive in such a way that it ensures that the essential interoperability between all the components in a smart energy system can take place. At the same time it leaves room for competition between products, services and solutions from different vendors and market parties, stimulating innovation of their products, providing additional value and functionality to the customers.

To accelerate the development of commercially viable offerings based on the framework, USEF develops a reference implementation of the framework itself. This reference implementation allows you to develop your smart energy products, services and solutions in an unambiguous way. Together these offerings allow the large-scale international deployment of smart grids.



USEF will be validated and improved in a number of large-scale international demonstration projects, which will support the commoditization of these products, services and solutions. Currently two launching customers have already committed to deploy USEF in their demonstration projects in the Netherlands and many more are expected to follow soon.

### **Description of why USEF improves the value to people, business and the planet**

When creating smart energy systems, costs are often incurred locally while benefits are partly generated on a national level. System optimization requires knowledge of the link between flexibility unleashed by USEF locally and the benefits on local (grid) and national (grid, generation and imbalance) level. USEF helps in identifying the smart grid value that is realized along the energy value chain and identify the stakeholders involved.

#### **Value to people:**

USEF enables end-users to participate on the energy market. The end-user is empowered to upload and download energy to and from the network to achieve an economic or environmental benefit. USEF provides a standard for the interactions required to support new services to unleash the flexibility that end-users and new appliances can offer to smart energy system. Flexible prices will trigger active energy trading by all stakeholders in the system. Data from numerous sources will allow the development of information services to help optimize energy consumption and production, along with value-added services like energy management and remote maintenance.

#### **Value to the planet:**

By unleashing the flexibility at the end-user, this flexibility can be optimized to benefit the energy system. By shifting demand to match the production from wind and solar USEF increases the amount of carbon-free electricity that can be used while at the same time fewer resources are required to build backup generation for moments without sun and wind. By lowering the peak demand, transportation losses in the network are avoided. Overall, USEF stimulates that the planet resources are used in a more effective way.

#### **Value to business:**

USEF recognizes a number of essential services that create value propositions and provides descriptions of these so that stakeholders can adapt them to meet their business objectives. These descriptions include cost structures and related revenue streams along with other relevant details. A generic use-case diagram shows the essential interactions between the stakeholders in a smart energy system and a business case tool enables stakeholders to evaluate the business case for their propositions. The new role of an Aggregator that contract end-users, and trade flexibility on behalf of a group of end-users on the energy market is also defined. The Aggregator role is foreseen as a new business for third parties in the energy system.

#### **Contact information**

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