

## ITEA Success Story

# SEAS

Semantic web enables disruptive business models in the energy realm

**The ITEA project SEAS is at the heart of energy transition. Their revolution: cost-effective, environmentally friendly and customer-focused energy streams through efficient interaction between providers, consumers and prosumers ... everywhere.**

The project set out to enable interoperability of energy, ICT and automation systems at consumption sites, introducing dynamic and intricate ICT-based solutions to control, monitor and estimate energy consumption. It also explored business models and solutions to enable energy-market participants to

incorporate micro-grid environments and active customers. The SEAS platform will allow the charging of electric cars, the production of warm water, the triggering of home appliances (dishwashers, washing machines, refrigerators, etc...) and other activities requiring electricity, in accordance with weather information, available production capacity, local constraints of the distribution grid and many other factors. These operations will be enabled automatically, by remote control, without further consequences in the distribution of energy (over or under-voltage, etc.), at the best price for consumers.

The project resulted in three main outcomes:

1. The Smart Energy API Standard, a semantic information model, which serves as a means

for energy IT systems to connect intelligently to each other and transparently to users.

2. The Smart API software development kit (SDK), which makes it possible for system manufacturers, IT integrators and the like to apply this Smart Energy API Standard in an out-of-the-box fashion.
3. The Smart API Services reference framework, which is the reference design model for compatible IT systems and a highly innovative, future-proof open architecture that allows for interoperability, innovation and different kinds of business models based on an advanced dynamic ontology dedicated to the smart energy grid.

The added value of the developed architecture and the use of semantic web technology is a

high level of adaptability to the evolution of hardware and management of smart city, smart grid and smart home.

The scope and range of the project is evident from 120 use cases classified in six main categories along with 30 ontologies for the energy domain. In addition to two demonstrator scenarios defined on autonomous buildings and microgrids, 16 pilots in four different countries and distributed data platforms were installed and supplemented with a Microgrid Context Awareness Framework, including algorithms. This was demonstrated on a dataset of 40 houses (2125 metering points) and four billion data entries plus a Last Mile Data Acquisition Hybrid Network.

#### Cross-domain exploitation

In terms of revenues, the SEAS exploitation in the short term (2017) is expected to be €2 million, with medium-term exploitation (2018) anticipated to be €25 million and long-term revenues (2019 to 2021) as much as €600 million.

ENGIE (project leader of the SEAS project) introduced the DAPM (data access point manager), a dedicated middleware and appstore for city areas, open to third party applications and data. This new “City as a Service” model breaks down not only the energy silos but also other verticals in a first step towards interoperability. Data management thus operates horizontally across domains – transport, water, heating, lighting, even weather information and traffic regulation, bringing urban management to a higher level. DAPM has already been taken up by Aubagne (for public lighting) and is being considered in Rennes, Marseille, Saint-Nazaire in France and Barcelona in Spain. A partnership for prototyping has already been signed between ENGIE & Intel, the latter providing dedicated chipsets, cybersecurity and artificial intelligence solutions for large-scale industrialisation. The DAPM architecture has been chosen by ENGIE as the reference architecture for the company’s overall service platform. The market potential using the service platform including the applications (cumulative from 2017 to 2020) is approximately US\$70 billion for the geographical regions where the ENGIE competence already exists.

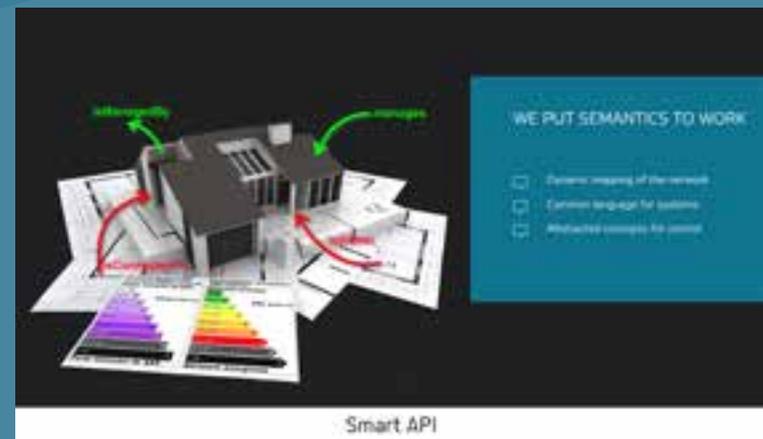
The impact of the results is wholeheartedly underlined by Engie’s CTO who compared the impact of SEAS with that of the international banking standard SWIFT that allows safe and secure money transfers between banks all over the world.

*“SEAS is a standard that will allow any kind of energy – heat, cold, gas, electrons – to be transferred securely and automatically with embedded artificial intelligence between devices that either produce, store or consume. This is a really, really major development in the IoT for energy, one that is going to transform the future.”*

Finnish company Asema Electronics markets the Smart API SDK and its specification. Furthermore, Asema IoT Central is a software that embeds the functionality of the Smart API into a development platform that can be used by organisations who want to implement their own energy and mobility IoT solutions. The Asema IoT Central is used in smart cities for smart waste management, smart lighting, vehicle sharing, smart charging and building management – this offers a single, holistic view of all city data across various departments and organisations within the city. Coordination between departments and organisations can now be made much more effortlessly and automatically. For instance, cities can combine the routes and tasks of people managing infrastructure: an electrician repairing a street light can check the status of waste containers and water pipes while on site, plan daily routes based on tasks from multiple interconnected systems, and report these to the corresponding systems with one interface. Planning and coordination can be shared between subcontractors from whom the cities buy services, while the city management gets one integrated map and dashboard of the city, including service vehicle locations, street lights, electric vehicle charging and parking.

The Enerim EMS (Energy Management System) from the Finnish partner Empower also builds

on the SEAS results. It is an energy domain network and market-process orchestration system that allows the network to be balanced with market and control functionalities. Enerim EMS enables energy companies and energy-intensive communities or industrial customers to manage their energy assets and market positions more efficiently. Market participants and renewable energy integrators benefit from Enerim EMS enabled access to multiple market levels and can create shared energy positions based on the distributed energy resources. The Enerim CIS (Customer Information System) solution that builds on SEAS knowledge in connectivity is gradually becoming the premier new energy customer information management and billing solution. It is deployed now to facilitate emerging data-hub enabled retail markets in Finland with over 45% of the national distribution metering points it manages over the next years. Finally, Empower is already taking the concept further within another ITEA project (M2MGrids) involving NOKIA as a multinational connectivity enabler.



As SEAS project leader and senior project coordinator at Engie, Philippe Bourguignon, explains: “SEAS was the first ITEA project on semantics with a big impact, but it will not be the only one. M2mGrids and BaaS are two ITEA projects with the same semantics technology as SEAS, with the involvement of big players like NOKIA and Siemens. Thanks to this, ITEA can have a big footprint.”

#### More information

<https://itea3.org/project/seas.html>