



European
Commission

Horizon 2020

SUPPORTING INNOVATIVE SOLUTIONS FOR **SMART GRIDS AND STORAGE**



October 2018

PROJECT EXAMPLES

*Innovation
and Networks
Executive Agency*

INEA

Innovation and Networks Executive Agency

Making implementation happen

Funding R&I projects for cleaner and more sustainable transport and energy

INEA, the Innovation and Networks Executive Agency, is responsible for managing parts of the energy and transport research funded by the European Union's Horizon 2020 programme. The Agency supports the European Commission in selecting and funding projects in the areas of secure, clean and efficient energy, and smart, green and integrated transport. Around €5.3 billion of EU funding is available to support projects in these fields from 2014 to 2020, of which €3 billion has been earmarked for funding R&I initiatives in the field of energy and €2.3 billion for transport.

The Energy Challenge

The Energy Challenge is designed to support the transition to a reliable, sustainable and competitive energy system by overcoming a number of challenges, such as increasingly scarce resources, growing energy needs and climate change. It is structured around seven specific objectives and research areas:

- Reducing energy consumption and carbon footprint
- Low-cost, low-carbon electricity supply
- Alternative fuels and mobile energy sources
- A single, smart European electricity grid
- New knowledge and technologies
- Robust decision making and public engagement
- Market uptake of energy and ICT innovation



SUPPORTING SMART GRIDS AND STORAGE PROJECTS

Electricity is at the centre of the EU energy system. Smarter and better connected distribution and transmission grids, as well as increased storage support the movement towards an integrated energy system.

In its Horizon 2020 energy portfolio, INEA manages **77 smart grids and storage projects**¹.



€600.42 million in EU funds has been invested in these projects since 2014.



715 organisations from **40 countries** take part in the projects, including technology providers, R&I bodies, regulated operators, electricity market players, local energy communities and consumers.



Electricity markets and ancillary services are **equally** addressed by the projects.



The BRIDGE initiative² unites the Horizon 2020 smart grid and storage projects. It fosters the exchange of information, experience, knowledge and best practices among them.



This brochure presents
examples of EU's Horizon 2020
**SMART GRIDS AND
STORAGE PROJECTS**

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BestRES

FROM ENERGY CONSUMERS TO ACTIVE PROSUMERS

The rising share of distributed generation has a profound impact on European electricity markets. Increased variability and price volatility require a more robust system that allows flexible consumption and production.

The BestRES project aims to strengthen the role of renewable energy aggregators in future electricity market designs, as aggregation can significantly enhance flexibility and accelerate the integration of renewable energy sources.

Renewable energy aggregators are defined as legal entities that aggregate the load or generation of various assets: their aim is to optimise energy production and consumption either technically or economically. As facilitators between the supply and demand sides of the

market, renewable energy aggregators play an important role in the market optimisation.

The BestRES project developed thirteen pioneering business models to boost the integration of renewable energy into the market through the active participation of renewable energy aggregators. Business models combining different technologies into commercially viable products have been implemented in Austria, Belgium, Germany, Italy, Portugal and the United Kingdom.

Based on the experience gained during the project, a set of recommendations has also been drafted to support policy makers in elaborating strategies and ease the transition towards cleaner sources of energy.

Project full title

Best practices and implementation of innovative business models for Renewable Energy aggregators

Topic

Market uptake of existing and emerging renewable electricity, heating and cooling technologies

Total funding

€ 1,994,812.5

EU contribution

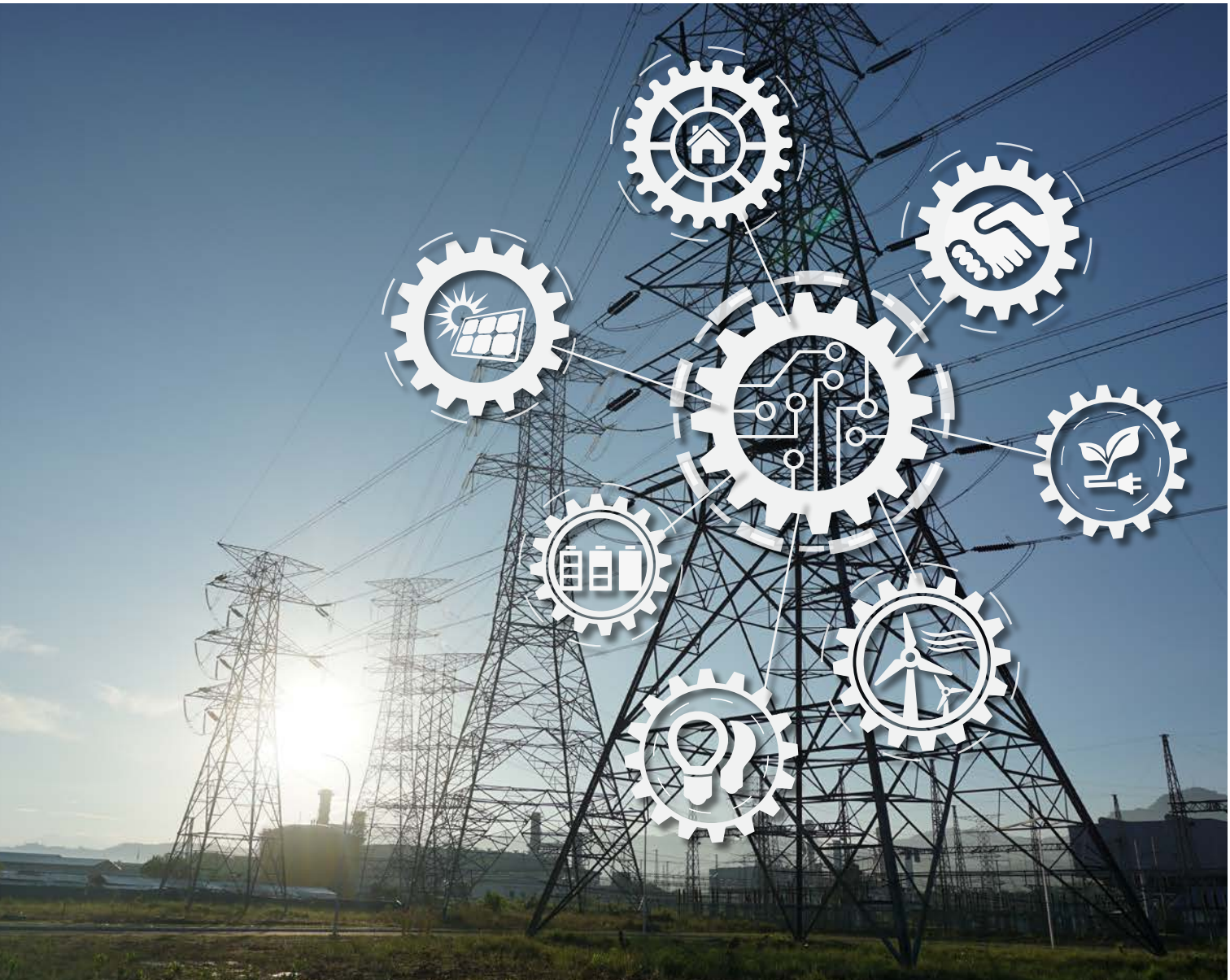
€ 1,994,812.5

Duration

01/03/2016 - 28/02/2019

Website

<http://bestres.eu/>



DOMINOES

MARKET-DRIVEN APPROACH FOR DISTRIBUTED ENERGY

The DOMINOES project aims to lower the entry barriers to the European energy system for distributed resources and flexibility capabilities.

The project focuses on the creation and development of new demand response, aggregation, grid management and peer-to-peer trading service capabilities. For this purpose, DOMINOES is designing, developing and validating a transparent and scalable local energy market structure with enabling ICT components and processes. It also proposes new local market business models.

DOMINOES will show how distribution system operators (DSOs) can dynamically and actively manage grid balance in the future energy system, with a high share of energy independent communities, micro grids and ultra-distributed energy generation.

The project hopes to raise the value of local flexibility by proposing new venues for flexibility use: resources will no longer have to be put on reserve if not used, but can be unleashed on a dynamic basis when most needed.

All stakeholders can benefit from this solution, therefore minimising overinvestment in infrastructure.

DOMINOES will validate its concept at three demo sites: a DSO environment in Évora (Portugal) and a virtual power plant and a microgrid site in Lappeenranta (Finland).

Project full title

Smart Distribution Grid: a Market Driven Approach for the Next Generation of Advanced Operation Models and Services

Topic

Next generation technologies for smart grids, storage and energy system integration

Total funding

€ 3,996,125

EU contribution

€ 3,996,125

Duration

01/10/2017 - 31/03/2021

Website

<http://dominoesproject.eu>



SUPERCONDUCTORS: TOWARDS ULTRA-LIGHT WIND TURBINES

Superconductors have shown the potential to become a key enabling technology of the 21st century. Now, the EcoSwing project is applying them to revolutionise high-torque generators in wind turbines. EcoSwing is nothing less than world's first superconducting low-cost, lightweight drive-train demonstrated on a large-scale modern wind turbine.

Currently wind turbines are getting bigger and bigger in order to increase their energy output, but as a result, their mass is escalating. For example, when doubling the energy production of a turbine, its weight goes up five times. EcoSwing's goal is to replace tonnes of magnets, gears, iron cores and kilometres of copper winding in turbines and replace them with powerful windings of

superconductors.

Thanks to the EcoSwing technology, the generator weight can be reduced by 40% compared to commercial permanent magnet direct-drive generators (PMDD). The additional advantage is that the reliance on rare earth metals is very significantly reduced.

The EcoSwing demonstrator has been successfully tested in a ground-based test laboratory in Bremerhaven in Germany. Now the installation on an existing very modern 3.6 MW wind turbine, located at a demanding coastal site of the North Sea in Western Denmark, is under way with very promising first results.

Project full title

EcoSwing - Energy Cost Optimization using Superconducting Wind Generators - World's First Demonstration of a 3.6 MW Low-Cost Lightweight DD Superconducting Generator on a Wind Turbine

Topic

Demonstration of renewable electricity and heating/cooling technologies

Total funding

€ 13,846,594

EU contribution

€ 10,591,734

Duration

01/03/2015 - 28/02/2019

Website

<https://ecoswing.eu/>



ELECTRIFIC

BETTER USER EXPERIENCE FOR E-VEHICLES

The ELECTRICIFC project focuses on aspects of e-vehicles (EV) such as their attractiveness, social acceptance, and pressure on the power grid. Its goal is to improve driving and charging experiences for EV users. The concept includes coordinated charging of multiple EVs, predicting energy consumption and power demand from e-mobility and monitoring their impact on the power quality in the grid. At the same time, ELECTRIFIC aims to maximise the share of local renewable energy when charging EVs.

To achieve these objectives, ELECTRIFIC facilitates the collaboration between various actors in the e-mobility ecosystem. It also provides them with three different software components. An advanced driver assistance system helps EV drivers to better plan charging and

navigate their trips. A smart charger adjusts the charging capacity of each charging station, considering the power grid's needs. Finally, a charging scheduler optimises the charging of EV fleets, also taking battery-friendly charging into account.

ELECTRIFIC also analyses user profiling variables and investigates which kind of incentives could push users' behaviour towards a more sustainable mobility. Evaluation of these strategies, as well as testing of technical solutions, takes place in Barcelona (Spain), Bavaria (Germany) and the National Park Šumava (the Czech Republic).

Project full title

Enabling seamless electromobility through smart vehicle-grid integration

Topic

Green Vehicles

Total funding

€ 6,152,119

EU contribution

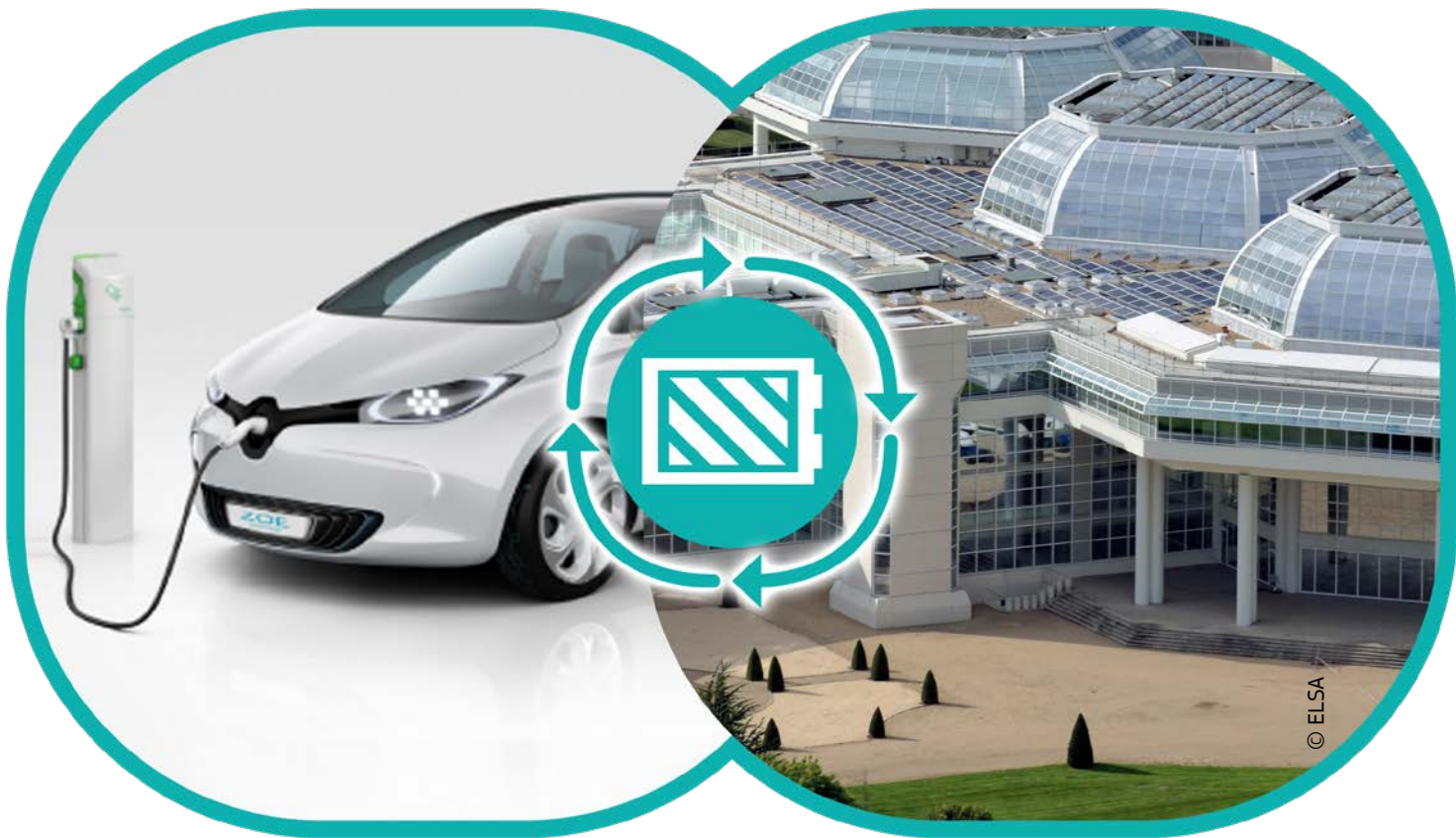
€ 6,152,118

Duration

01/09/2016 - 31/08/2019

Website

<https://electricf.eu/>



© ELSA

BRINGING DISTRIBUTED STORAGE SOLUTIONS TO MARKET

New storage solutions are urgently needed in the energy market to better integrate distributed renewable energy. ELSA is carrying out a demonstration of an eco-friendly and effective electrical storage system, opening the door for its commercial use.

The ELSA storage system is based on second life lithium-ion batteries from the electric vehicle lines Renault Kangoo Z.E. and Nissan LEAF combined with an intelligent energy management system. The use of second life batteries does not only make the system more sustainable, but also safer and more affordable. The system can integrate 12 to 96 kW modules with each battery managed by a separate controller, which makes it highly scalable and capable of managing batteries of different age and quality.

ELSA provides innovative services in a wide range of applications. For instance, in districts, commercial buildings and farms it can raise the degree of energy self-consumption by balancing electricity demand and local PV generation. In charging stations, it can shave peaks of high demand and balance times of high generation. Distribution system operators can use it in sub-stations for frequency and power regulation.

The system has been successfully demonstrated in six different application scenarios in France, Germany, Italy and the United Kingdom.

Project full title

Energy Local Storage Advanced system

Topic

Local / small-scale storage

Total funding

€ 13,083,061

EU contribution

€ 9,861,613

Duration

01/04/2015 - 31/12/2018

Website

<https://www.elsa-h2020.eu/>



FLEXICIENCY

EUROPEAN PLATFORM FOR THE EXCHANGE OF METERING DATA AND SERVICES

The FLEXICIENCY project addresses critical components that are urgently needed to modernise European electricity markets. It develops and tests competitive services for active energy consumers and prosumers.

The project will provide easier access to energy data and related services to all European energy stakeholders in a non-discriminatory way.

The project's objective is to facilitate the deployment of novel services in the electricity retail markets thanks to a prototype of a European Market Place that can boost business-to-business interactions. The platform will accommodate an exchange of data and services across Europe; it is intended to act as a contact point for business deals between electricity stakeholders.

FLEXICIENCY is now in its final phase. Five large-scale demonstrations of the European Market Place platform and its core functionalities are under way in Austria, France, Italy, Spain and Sweden.

The testing includes the main B2B and B2C services developed in the project. The focus is also on a variety of other services, such as software (e.g. market analysis, consumption forecasts), or advanced energy monitoring, local energy control and flexibility services, that could be offered in future energy markets.

Project full title

Energy services demonstrations of demand response, FLEXibility and energy efficiency based on metering data

Topic

Distribution grid and retail market

Total funding

€ 19,053,148

EU contribution

€ 13,946,741

Duration

01/02/2015 - 31/01/2019

Website

<http://www.flexiciency-h2020.eu/>



-----> data
-----> energy

FutureFlow

E-TRADING SOLUTIONS FOR BALANCING AND REDISPATCHING ELECTRICITY

Active energy consumers could become the guardians of the power system, contributing to balancing services of transmission system operators (TSOs). As a result, electricity prices could go down significantly, reducing Europe's dependence on fossil fuels. FutureFlow's goal is to smooth this transition by providing today's energy consumers with key elements to become active actors in the electricity market.

FutureFlow aims to accelerate regional integration of balancing markets. It provides consumers and distributed generators with the infrastructure which enables them to offer flexible balancing and redispatching services. The goal is also to validate whether they are actually capable of providing services of the same quality as conventional actors.

The project already delivered a number of innovative solutions. One of them is a method for selecting the automatic frequency restoration reserve (aFRR) target model based on real-time data in a multi-TSO regionally interconnected power system.

FutureFlow also provides information architecture solutions for real-time testing of distributed energy in a multi-TSO environment. Four demos, with a total capacity of 40 MW of distributed energy running in a second-to-second control loop, are under way in Austria, Hungary, Romania and Slovenia. A comprehensive list of recommendations coming from these tests is on the way.

Project full title

Designing eTrading Solutions for Electricity Balancing and Redispatching in Europe

Topic

Transmission grid and integration of balancing markets

Total funding

€ 12,985,243

EU contribution

€ 12,985,234

Duration

01/01/2016 - 31/12/2019

Website

<http://www.futureflow.eu/>



intEgrid
bridging
the gap

© InteGrid

SMARTER GRIDS FOR SMARTER CITIZENS

InteGrid has the ambition to make electrical grids in Portugal, Slovenia and Sweden smarter, by bridging the gap between citizens and technology providers such as utilities, aggregators and manufacturers.

The project's main goal is to demonstrate innovative solutions for smart grids in three pillars:

- distribution grids flexibility;
- integration of residential and industrial consumers through energy management technology devices;
- a grid-market hub to connect consumers and grids.

InteGrid already defined its use cases and three demos are currently starting. In Portugal, the project is engaging with energy consumers to see how to increase their participation in the energy system. The objective is also to foster the

management of the distribution grid with a high share of renewable energy sources.

In Slovenia, the focus is on a commercial customer who also produces renewable energy. InteGrid is analysing the interactions of a local distribution system operator (DSO) with its energy storage, while also monitoring e-vehicles charging stations and domestic customers connected to the same power grid.

In Sweden, InteGrid is examining two eco-districts in Stockholm. In the first one, it gathers data on the overall comfort, automation and consumers' feedback from 150 sub-metered apartments. In the second one, InteGrid engages with a local bottom-up energy initiative and collects feedback on how to increase the level of local identity, trust and safety.

Project full title

Demonstration of INTElligent grid technologies for renewables INTEgration and INTERactive consumer participation enabling INTERoperable market solutions and INTERconnected stakeholders

Topic

Demonstration of smart grid, storage and system integration technologies

Total funding

€ 14,533,618

EU contribution

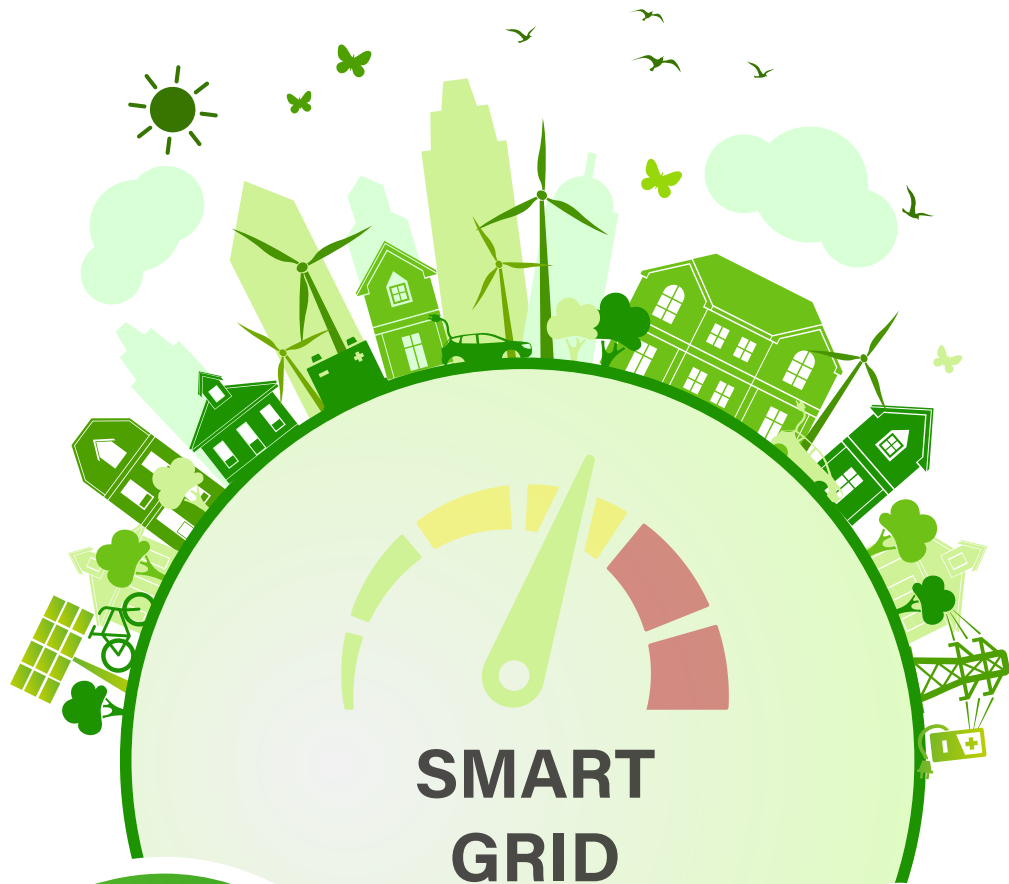
€ 11,320,811

Duration

01/01/2017 - 30/06/2020

Website

<https://integrid-h2020.eu/>



**SMART
GRID**

CONNECTING STAKEHOLDERS OF THE ENERGY VALUE CHAIN

The inteGRIDy project investigates how to cope with peak demand and grid balancing by integrating novel solutions at grid level, focusing on demand response, storage capabilities and use of electric vehicles. The aim is to achieve successful cooperation between energy stakeholders and to validate inteGRIDy innovations on a large scale.

The project plans to integrate cutting-edge technologies, solutions and mechanisms in a series of replicable tools connecting various stakeholders of the energy value chain. The goal is to facilitate the optimal and dynamic operation of the distribution grid, foster the stability and coordination of distributed energy and enable new collaborative storage schemes with a high share of renewables.

inteGRIDy is carrying out ten pilots in eight European countries. The pilots focus on aspects such as demand response, smart distribution grids, energy storage and smart grid integration of electric vehicles.

The main outcome of inteGRIDy will be a proposal for a tool framework, integrating and coordinating the new innovations as well as already existing technologies. inteGRIDy's overall progress is continuously monitored, measured and verified based on specific quantitative and qualitative indicators.

The project is currently almost half way through. The framework of tools is being developed and the integration in the pilots is on the way.

Project full title

integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

Topic

Demonstration of smart grid, storage and system integration technologies

Total funding

€ 15,743,171

EU contribution

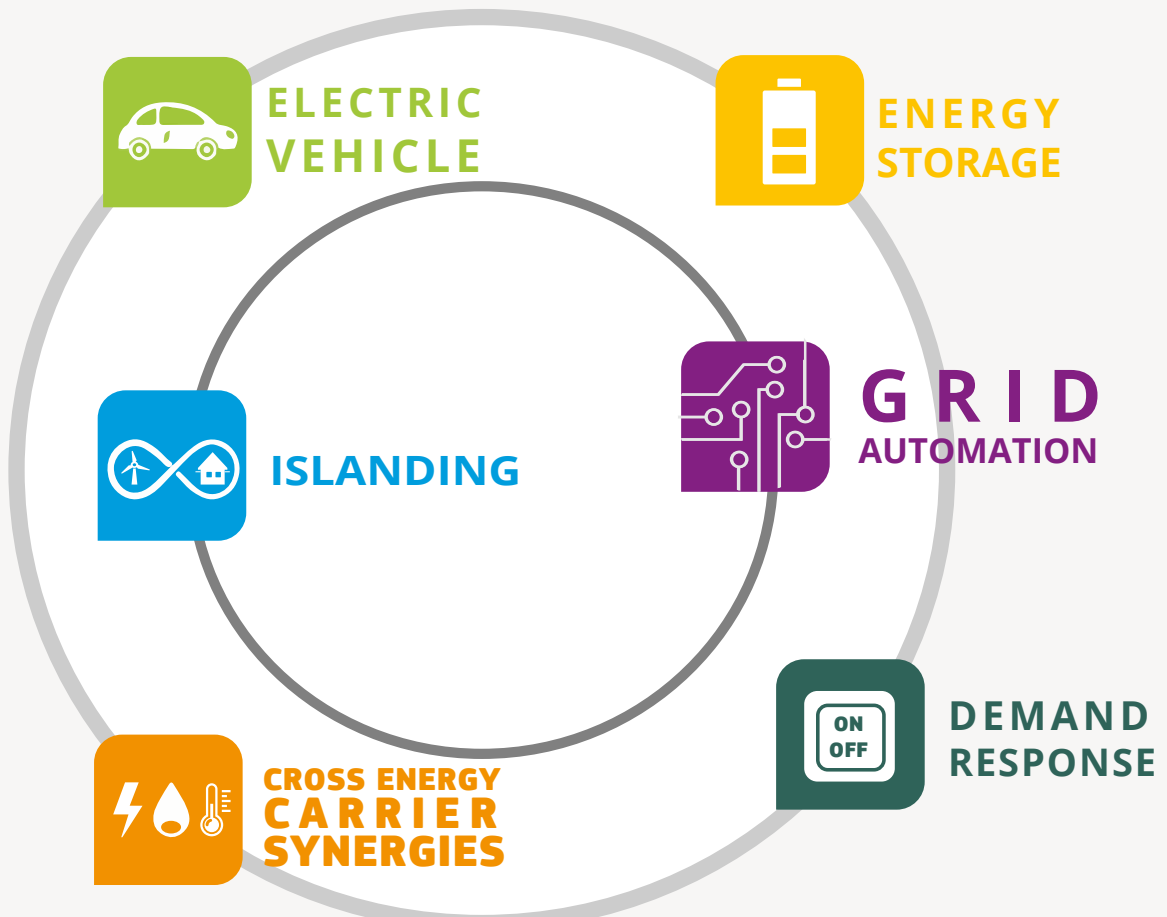
€ 12,329,013

Duration

01/01/2017 - 31/12/2020

Website

<http://www.integridy.eu/>



InterFlex

INNOVATIVE SOLUTIONS FOR THE EUROPEAN ELECTRIC POWER SYSTEMS

The European electric power systems are undergoing dramatic changes. Currently, more and more power is being generated from renewable energy sources, predominantly connected to the distribution grid. On that same grid, millions of electric vehicle charging stations are likely to be deployed all over Europe within the coming years. The distribution grid needs to urgently adapt to these rapidly changing energy flows. In this context, distribution system operators (DSOs) play a major role in exploring innovative ways to manage energy flows on a local scale and to relieve the grid's constraints.

InterFlex is built upon six demonstration projects in five EU countries (Czech Republic, France, Germany, The Netherlands and Sweden) dealing with grid automation

and digitalisation, and covering multiple interactions between renewable power generation and multi-energy consumers (electricity, heat, gas) in the context of new customer needs and behaviours. The idea is that DSOs in the demos act as enablers, giving market signals to power producers, consumers, prosumers, their aggregators, or even to third parties such as municipalities, which in return stimulate the market players to offer generation and/or consumption flexibilities.

InterFlex prepares the deployment of new electricity grid solutions and business models, while formulating policy recommendations and replication rules coming from the results obtained in the ten demos.

Project full title

Interactions between automated energy systems and Flexibilities brought by energy market players

Topic

Demonstration of smart grid, storage and system integration technologies

Total funding

€ 22,766,242

EU contribution

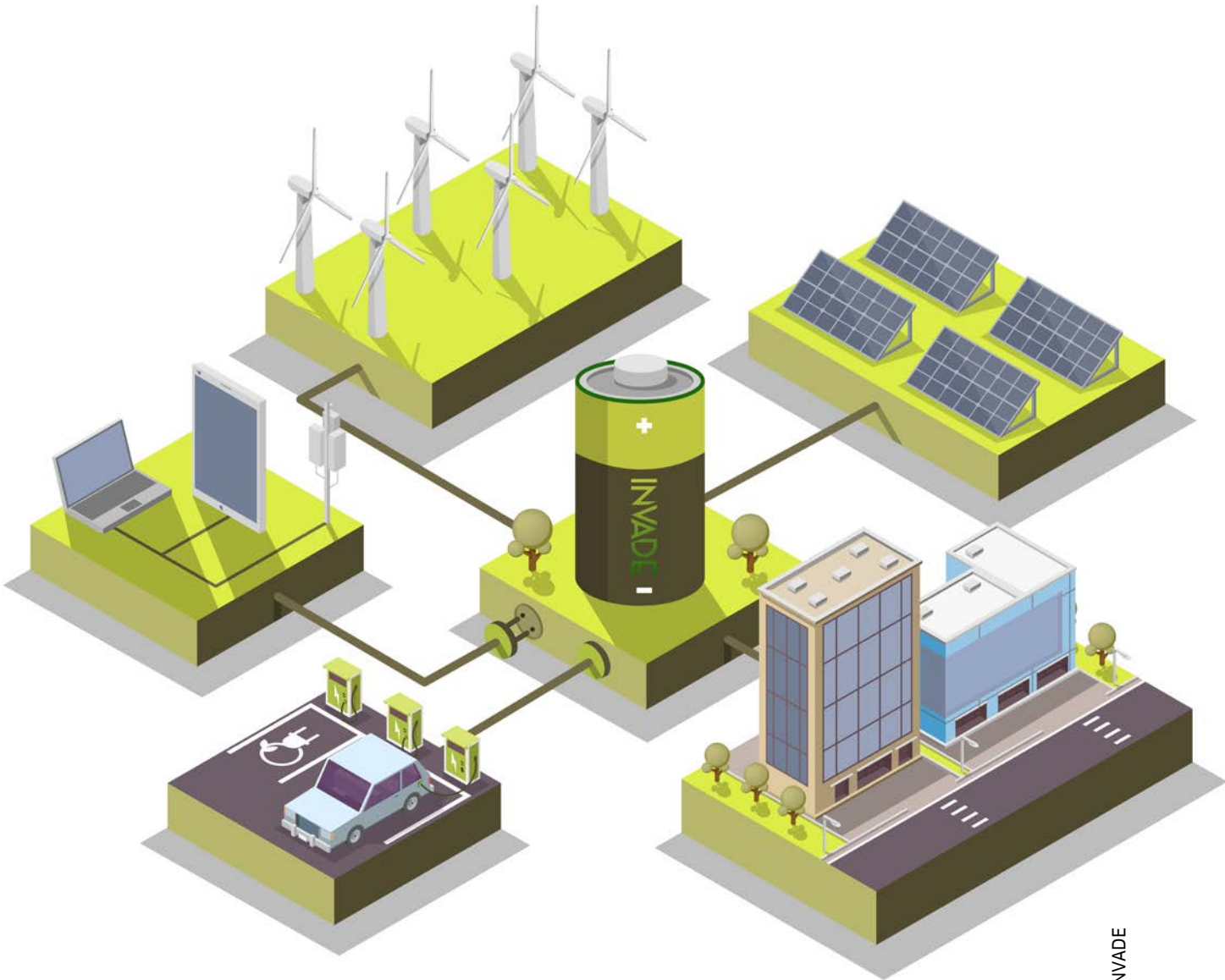
€ 17,009,413

Duration

01/01/2017 -31/12/2019

Website

<https://interflex-h2020.com/>



INVADE

FLEXIBILITY MANAGEMENT PLATFORM FOR E-VEHICLES AND BATTERIES

INVADE is a big research and innovation project in the field of smart grids and storage. Its main objective is to deliver a cloud-based flexibility management platform integrated with electric vehicles and battery storage at mobile, distributed and centralised levels. The goal is to change the way energy is used, stored and generated by using renewable energy more effectively, optimising the supply of electricity and making services more user-centric.

Twelve European partners cooperate on designing new business models and the INVADE platform which will be tested at sites in Bulgaria, Germany, the Netherlands, Norway and Spain.

Exploitation of the project results has been at the core of the project since its launch. An exploitation user group with members from various energy and technology companies is working on commercialisation of the project's findings.

Two big events were organised in Bulgaria and Norway with a total of 190 participants. In the second half of the project, INVADE's focus is on verification at the pilot sites and dissemination and exploitation of its results.

Project full title

Smart system of renewable energy storage based on INtegrated EVs and bAtteries to empower mobile, Distributed and centralised Energy storage in the distribution grid

Topic

Demonstration of smart grid, storage and system integration technologies

Total funding

€ 16,305,988

EU contribution

€ 13,273,627

Duration

01/01/2017 - 31/12/2019

Website

<https://h2020invade.eu/>



MIGRATE

PREPARING THE POWER SYSTEM FOR RENEWABLE ENERGY

In 2016, twelve European transmission system operators (TSOs) have launched the EU-funded project MIGRATE. Its goal is to find solutions for the technological challenges that the power grid is currently facing, and will face even more in the future, due to an increasing share of renewable energy sources, such as wind turbines or PV panels.

In order to keep the future power system stable in a scenario where the transmission grid is heavily impacted by the shutdowns of conventional power plants, TSOs have to provide new requirements, i.e. grid protection schemes.

First results of MIGRATE have already shown that a huge share of renewable energy sources in the existing framework of grid codes can be added to the power

system while keeping it stable. Furthermore the project has investigated the demand of converters for controlling the power grid operating with 100% renewable energy.

MIGRATE will also provide new recommendations and requirements for the currently converter-dominated power system in order to support the European policy implementation and to allow more renewable energy in the power system.

Project full title

Massive InteGRATion of power Electronic devices

Topic

Transmission grid and wholesale market

Total funding

€ 17,855,205

EU contribution

€ 16,733,999

Duration

01/01/2016 - 31/12/2019

Website

<https://www.h2020-migrate.eu/>



© NETfficient

NETfficient

INNOVATIVE DECENTRALISED ENERGY STORAGE SOLUTION

NETfficient brings together thirteen partners from seven countries to trial a future-proof energy system on the German Island of Borkum. The pilot is designed to meet the challenges of a mainly decentralised, mainly renewables based energy system, using decentralised storage solutions connected and managed via a cloud-based Energy Management Platform. The project developed a range of technology packages for typical applications, which are currently being tested on the island.

A 1MW/ 500MWH hybrid energy storage system (HESS) consisting of Li-Ion-batteries provides balancing and ancillary services in the medium voltage grid. Forty home-systems consisting of photovoltaics (PV), smart meters and storage systems, including Li-Ion batteries,

HESS-systems, second life vehicle batteries and hydrogen storage were installed on the island. Five non-residential buildings on Borkum have been provided with PVs and Lithium-Ion batteries or HESS. The project installed 50 LED street lights powered by PV energy in combination with a 4 kW photovoltaic system and a 15 kWh Lithium-Ion battery storage system. Two large low-temperature thermal storage tanks powered by PV maintain the temperature at “Nordsee Aquarium Borkum”.

The Energy Management Platform aggregates all distributed energy generation and storage units, thus enabling a virtual power plant. Options for integration with the wholesale market are being explored.

Project full title

Energy and economic efficiency for today's smart communities through integrated multi storage technologies

Topic

Local / small-scale storage

Total funding

€ 11,404,647

EU contribution

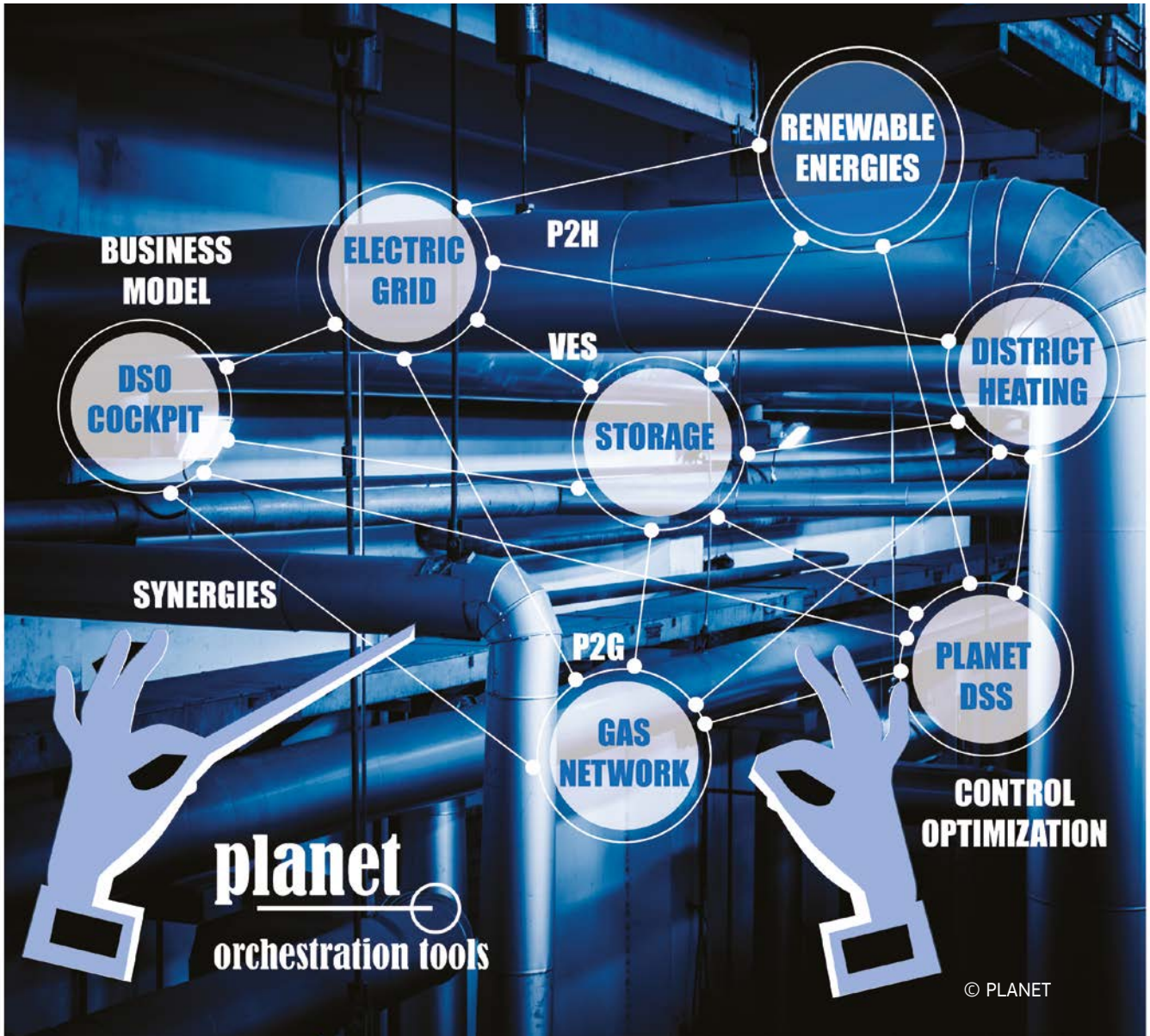
€ 8,993,599

Duration

01/01/2015 - 31/12/2018

Website

<http://netfficient-project.eu/>



PLANET

USING ENERGY CONVERSION FOR FUTURE ENERGY STORAGE SYSTEMS

Renewable energy sources (RES) are a viable substitute to fossil fuels that could bring global CO₂ emissions drastically down. Due to the high variability of the energy demand, however, new energy storage systems integrating RES are needed to avoid energy curtailment. The PLANET project is tapping into the potential of conversion technologies such as power-to-gas, power-to-heat and combined heating and cooling to overcome this challenge.

PLANET is developing a decision support system integrated in an ICT monitoring cockpit for policy makers and network operators. The system aims to facilitate RES integration by using conversion/storage technologies to transform the conventional heating/cooling systems into flexible energy resources. This leads to increasing flexibility to

better respond to local energy generation, grid conditions and market variation.

The system will help the stakeholders to leverage innovative energy conversion in alternative carriers and storage technologies to explore, identify, evaluate and assess optimal grid planning and management strategies for future scenarios, including a fully decarbonised energy system.

The data collected in the two experimental sites in France and Italy will be used as input for the creation of virtual energy storage models and, in the second phase, used to compare and validate the results obtain by the PLANET simulation.

Project full title

Planning and operational tools for optimising energy flows and synergies between energy networks

Topic

Tools and technologies for coordination and integration of the European energy system

Total funding

€ 3,999,695

EU contribution

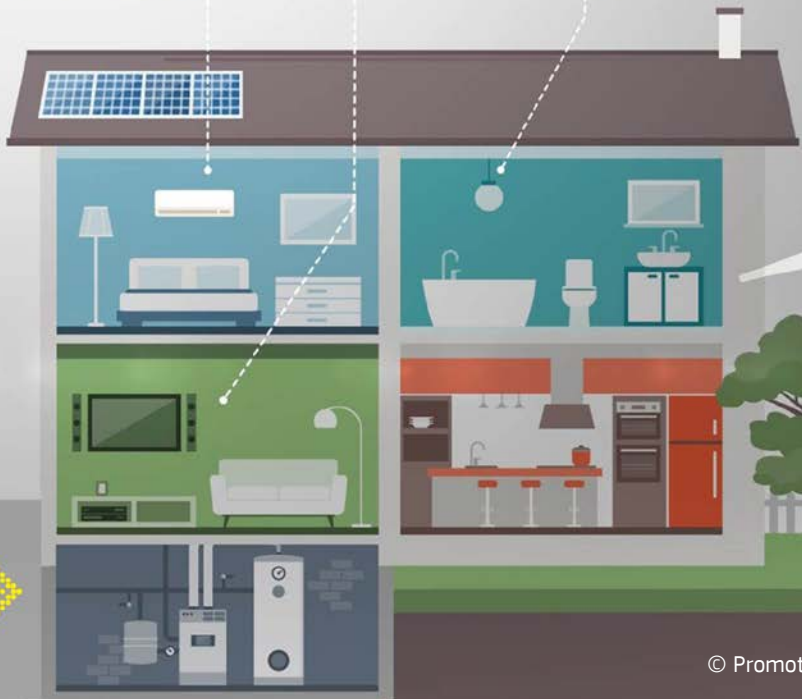
€ 3,999,695

Duration

01/11/2017 - 31/10/2020

Website

<https://www.h2020-planet.eu/>



© Prometheus 5

Prometheus 5

ALTERNATIVE SOLUTION FOR HEAT AND POWER GENERATION

One of major challenges of the global energy system is that energy demand is constantly on the rise, but that conventional technologies generate expensive and polluting power in an inefficient way. This phenomenon is most visible in decentralised areas, due to the fact that the current power generation/distribution structure is based on a centralised grid concept.

Prometheus 5 is a multi-fuel micro power generating unit which can tap into the need for efficient and cleaner energy supply, presenting lower operating and maintenance cost compared to, for example, renewables or internal combustion engine generators. The unit has no moving parts, and it doesn't produce any noises or vibrations.

Prometheus 5 is designed for dual operation, to function either as a stand-alone power system delivering up to 5 kW electric power or as a combined heat and power (CHP) system, delivering additionally up to 7 kW thermal energy in the form of hot water. Electricity is produced through Hydrogen and Fuel Cells, without burning fuel, hence emitting only very small quantities of atmospheric pollutants, such as NO_x, SO_x and particulates. Furthermore, the amount of CO₂ produced is less than 30% of that produced by conventional technologies because of the very high efficiency of the unit.

Project full title

Energy efficient and environmentally friendly multi-fuel power system with CHP capability, for stand-alone applications

Topic

Power and heat generation

Total funding

€ 1.731.996,25

EU contribution

€ 1.212.397,38

Duration

01/09/2016 - 28/02/2019

Website

<http://www.prometheus5.com/>

<http://www.helbio.com/>



RESERVE

STABILISING THE GRID IN A 100% RENEWABLE SCENARIO

Energy systems with a high share of renewable energy sources (RES) call for new techniques to ensure system stability. Before the transition towards 100% RES in the energy mix can happen, these innovative technologies need to be validated and harmonised as ancillary service definitions and network codes.

RESERVE addresses these challenges by developing new frequency and voltage concepts to ensure system stability and new communication techniques for future grid automation services based on 5G mobile technology.

The proposed solutions are implemented through an innovative pan-European real-time simulation infrastructure and validated in field trials in Ireland. These trials include the deployment of domestic scale batteries,

solar PV arrays and a V2G charger which are currently testing voltage control techniques developed within the project on real live distribution networks. At the same time, the frequency control solutions are being tested in a laboratory trial in Romania.

Following preliminary consultations with relevant stakeholders and based on the technical results, RESERVE has drafted a list of the most important Network Codes (NC) required to ensure a smooth transition to a high RES scenario. It has also made a proposal for a new NC dedicated to the storage. More results are on the way.

Project full title

Renewables in a Stable Electric Grid

Topic

Next generation technologies of renewable electricity and heating/cooling

Total funding

€ 4,996,653

EU contribution

€ 4,996,653

Duration

01/10/2016 – 30/09/2019

Website

<http://www.re-serve.eu/>



SHAR-Q

COMBINING RENEWABLE ENERGY SOURCES AND ELECTRICAL ENERGY STORAGE

The SHAR-Q project aims to establish an interoperability network that connects the capacities of neighbourhooding and wide regional renewable energy sources (RES) and electrical energy storages (EES) ecosystems. Thanks to this collaboration, energy capacities can be shared among all participating actors therefore decreasing the overall energy storage requirements.

SHAR-Q provides interoperability of energy assets reflecting the needs of future energy markets. Sharing of storage capacities, deployed at distributed locations, can bring significant savings on the required storage capacities and in turn can significantly reduce the unit cost of energy output.

The project exploits the opportunities raised by the synergies among the participating actors, such as:

- Complementarity of the consumption profiles of the participating actors;
- E-vehicle charging using vehicle-to-grid methods where EV batteries are used as energy buffers;
- More reliable prediction of power generation by distributed RES that are located in the same geographical area;
- More energy storage flexibility due to a larger overall size of EES and RES capacities, leading to lowering unit-cost of energy retrieved from storages.

Project full title

Storage capacity sharing over virtual neighbourhoods of energy ecosystems

Topic

Next generation technologies for smart grids, storage and energy system integration

Total funding

€ 4,043,875

EU contribution

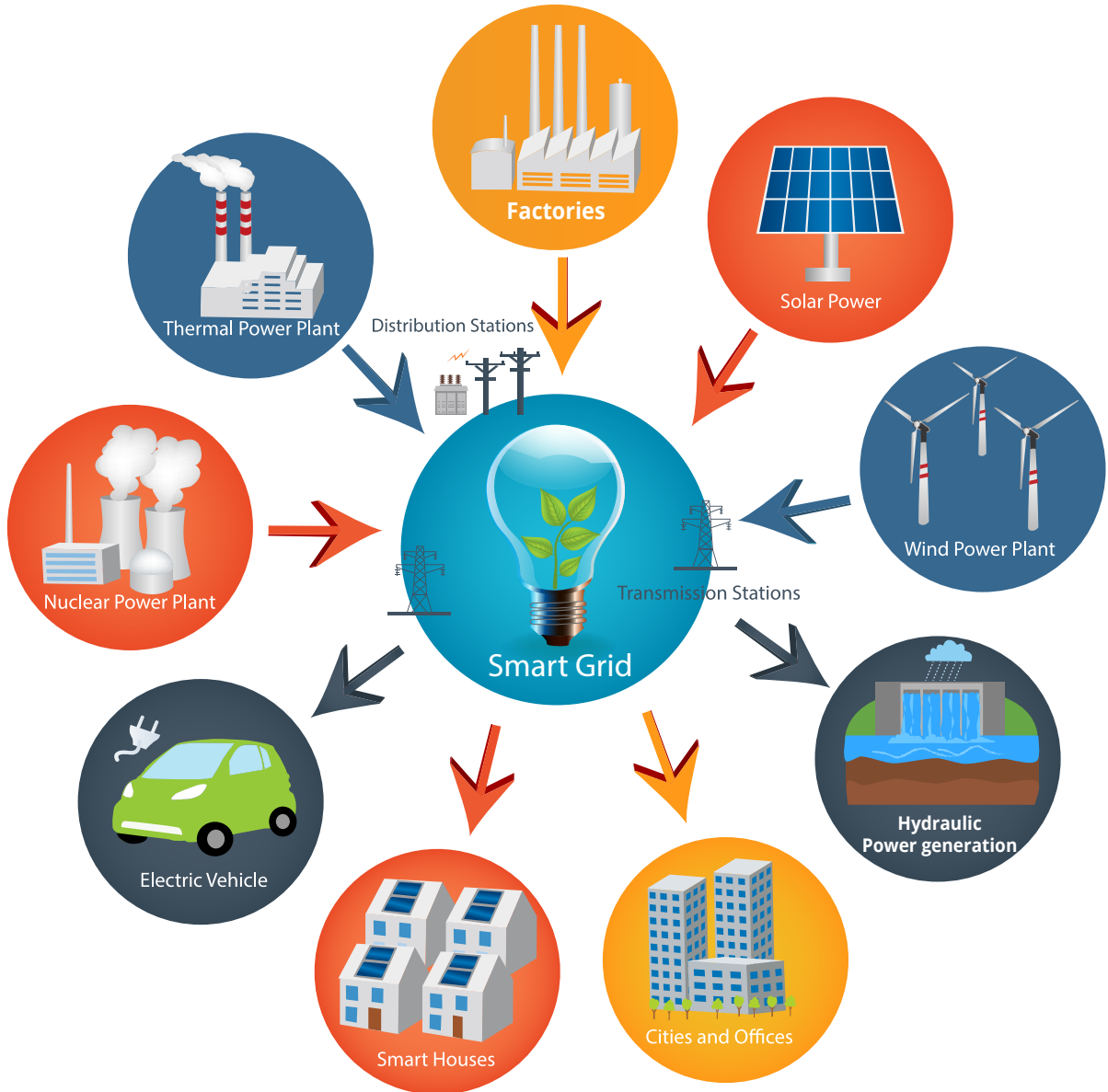
€ 4,043,875

Duration

01/11/2016 - 31/10/2019

Website

<http://www.sharqproject.eu/home>



TOWARDS ANCILLARY SERVICES FROM DISTRIBUTION NETWORKS

SmartNet compares the technical and economic performance of five transmission and distribution system operators (TSO-DSO) interaction schemes and different real-time market architectures allowing ancillary services (AS) from distributed energy sources (DER).

For this purpose, an ad hoc simulation platform has been developed, modelling in detail TSO and DSO networks and AS markets and implementing a very detailed dataset of generators and loads. Simulations are being carried out on future scenarios (2030) for Denmark, Italy and Spain. The same platform is also implemented in a laboratory in order to test real network equipment on the simulation scenarios.

Three physical pilots are under way in order to implement a smart centralised coordination scheme (basing control strategies on an estimation of the virtual capability of the distribution grid) and to experiment with flexibility services that can be offered by some DER. They include, for example, thermal inertia of indoor swimming pools, distributed back-up batteries of radio-base stations of an IT operator.

SmartNet plans to analyse the results of its simulations and physical pilots in relationship to the present regulatory framework in order to understand barriers and critical points. Based on this analysis, the project will propose a set of guidelines for enabling ancillary services from distributed energy sources.

Project full title

Smart TSO-DSO interaction schemes, market architectures and ICT Solutions for the integration of ancillary services from demand side management and distributed generation

Topic

Transmission grid and wholesale market

Total funding

€ 12,657,928

EU contribution

€ 12,657,928

Duration

01/01/2016 - 31/12/2018

Website

<http://smartnet-project.eu/>



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SOGNO

CLOUD-BASED ENERGY SERVICES FOR A SECURE ENERGY SUPPLY

The SOGNO project will provide turnkey cloud services, simplifying the life of distribution system operators, by implementing next generation data-driven monitoring and control systems.

The upcoming 5G mobile communication standard and products will enable low latency data transmission with very high levels of network availability. Cloud services for distribution system operators (DSOs) will include state estimation, power control, load and generation forecasting, power quality evaluation and fault location, isolation and service restoration.

Implementing the new SOGNO services will help DSOs to decrease investments and operational costs, operate their grids economically and sustainably, and be ready

for a future energy mix with up to 100 % renewable energy sources.

The services are currently being validated in two laboratory trials in Estonia and Germany and in three field trials in Germany, Ireland and Romania. With the ambitious goal of combining hardware, software solutions and research activities in different areas, such as advanced deep learning, 5G communications, and cloud virtualisation, SOGNO is building a new philosophy of power grid management.

Project full title

Service Oriented Grid for the Network of the Future

Topic

Next generation technologies for smart grids, storage and energy system integration

Total funding

€ 3,999,945

EU contribution

€ 3.999.945

Duration

01/01/2018 - 30/06/2020

Website

<https://www.sogno-energy.eu/>



WISEGRID

SMARTER SYSTEMS, EMPOWERED CITIZENS

WiseGRID's main objective is to provide a set of solutions and technologies to increase the smartness, stability and security of an open, consumer-centric European energy grid. The project will combine enhanced use of storage technologies, significantly increased share of renewable energy sources (RES) and integration of charging infrastructure to favour the large-scale deployment of electric vehicles.

The project hopes also to make a difference in the market by delivering nine tools that will facilitate the creation of an open energy market where not only 'traditional' utilities, but also players such as electric cooperatives, prosumers and small and medium enterprises (SMEs), can play an active role, contributing effectively to the transition to energy democracy.

So far, WiseGRID has finalised the design and development of its technological products and has started the deployment phase in its five demonstration sites: Crevillent (Spain), Flanders (Belgium), Terni (Italy) and Mesogia and Kythnos (Greece).

WiseGRID's results are already generating high expectations as illustrated by it winning a prize in the category of technology and design at the Good Practice of the Year award ceremony, as well as two prizes at this year's European Sustainable Energy Week (EUSEW): in the business category and as the Citizens' choice.

Project full title

Wide scale demonstration of Integrated Solutions and business models for European smartGRID

Topic

Demonstration of smart grid, storage and system integration technologies

Total funding

€ 17,595,500

EU contribution

€ 13,854,247

Duration

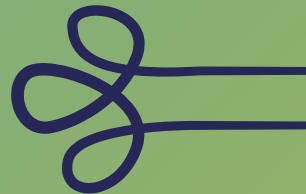
01/11/2016 - 30/04/2020

Website

<https://www.wisegrid.eu/>

This brochure presented
examples of smart grids and storage projects
financed by the EU's Horizon 2020 programme.

Factsheets of all 60 INEA-managed
smart grids and storage projects
are available on
INEA's website
(www.ec.europa.eu/inea)
in the Horizon 2020 section.





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