Virtual Power Plant for Interoperable and Smart isLANDS

VPP4ISLANDS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957852

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Project presentation

Exploiting the full potential of intermittent renewable energy sources like the sun and wind has received a helping hand from so-called virtual power plants (VPPs).

VPPs remotely aggregate distributed energy resources from different physical locations into a network that reliably distributes energy around the clock. Islands face many challenges in terms of energy supply, demand side management and energy security.

The EU H2020 funded VPP4ISLANDS project is revolutionising conventional VPP by integrating virtual energy storage technology, digital twin and distributed ledger technology to enable enhanced VPPs and the creation of smart energy communities on islands.

VPP4ISLANDS

Coordinator
Aix Marseille University

Overall project budget: 7 223 108,75 €
EU contributions: 6 119 378,75 €

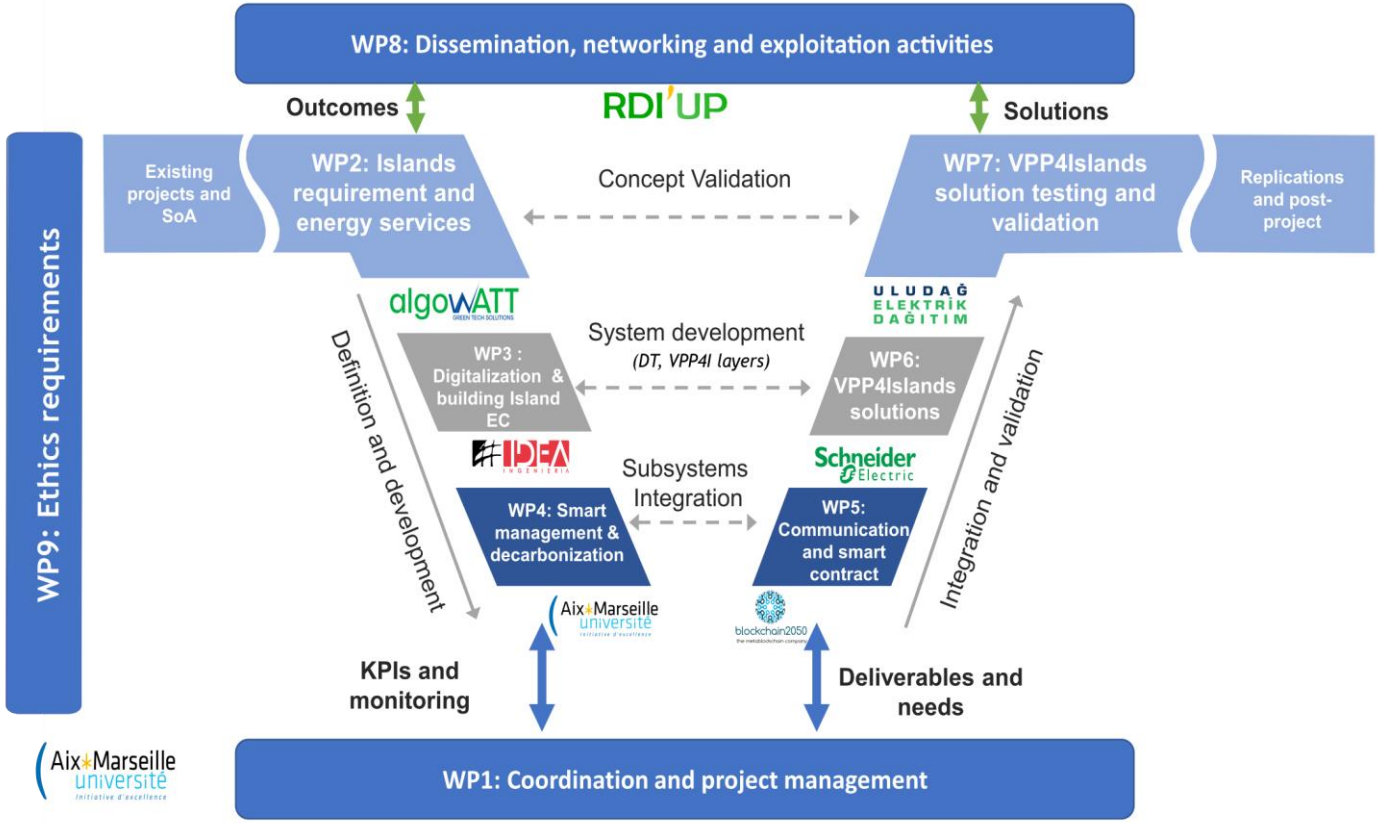
Start date: 1 October 2020
End date: 31 Mars 2024
Duration: 42 months

Aix*Marseille université — France
Brunel University London — UK
inavitas — Turkey
blockchain2050 — Netherland
IDEA INGENIERIA — Spain
algoWATT — Italy
FTK Forschungsinstitut für Telekommunikation und Kooperation — Germany
Cardiff University — UK
REGENERA energy&environment — Spain
Schneider Electric — Spain
CIVIESCO — Italy
CSIC — Spain
TROYA ÇEVRE DERNEĞİ — Turkey
BORNHOLMS ENERGI & FORSYNING — Denmark
RDI'UP Innovative Research — France
Consell Insular de Formentera — Spain
Bozcaada Belediyesi 1923 — Turkey
Italy
ULUDAĞ ELEKTRİK DAĞITIM — Turkey

Work plan

The work plan is composed of 9 work packages (see the figure below) enhancing implementation of RES, reducing fossil fuel consumption while ensuring the electric grid structures stability on islands. The stability of the electric power production is ensured by the developed cloud-based distributed Virtual Power Plant (VPP) that aggregates the capacities of intermittent Distributed Renewable Energy Resources (DRER) and reduce the use of fossil fuels. The WP1 is devoted to ensure the proper coordination and management of the project.

The WP2 is devoted to identify islands needs in terms of energy production and the exploitable RES and clearly the VPP value chain. The work packages WP3 to WP6 are dedicated to develop Digital twin, IoT integration and smart functionalities including the DLT in order to develop VPP4IPlateform needed in order to achieve VPP4Island objectives. The results of WPs 2-6 will be integrated to demonstration and validation environment in WP7 to provide real-life results of different use cases. The WP8 is reserved for the dissemination, communication and exploitation activities of the project results. Finally, an additional WP9 is defined to analyze the ethics requirements of the whole project.



Aix-Marseille University has more than 80,000 students including 10,000 international students, 8,000 faculty and staff members, 12 doctoral schools, and nearly 3,300 PhD students. In the frame of VPP4ISLANDS project, AMU will ensure coordination and project management. AMU team will also contribute to the development of AI-based prediction tools, the implementation of smart optimization engine, and the design and deployment of VPP4INodes.

https://www.univ-amu.fr/

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Marseille, France

University

LABORATOIRE D'INFORMATIQUE & SYSTÈMES

AlgoWatt SpA is an Italian SME created in early 2020 from the fusion of TerniEnergia SpA and Softeco Sismat Srl. ALWA designs, develops and integrates green tech solutions, guaranteeing a competitive advantage to its customers in Green Mobility, Green Enterprise & City, Green Energy Utility domains.
Thanks to our proven industrial profile as a solution provider and systems integrator in the digital energy field, we are working with our partners on the VPP4ISLANDS project to implement their innovations and help them reduce the risks and costs associated with product development.

https://algowatt.com/en/

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Genova, Italy

SME

Sevilla, Spain

Large enterprise

Schneider Electric's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. We call this Life Is On. Also, we drive digital transformation by integrating world-leading process and energy technologies, end-point to cloud connecting products, controls, software and services, across the entire lifecycle. In the H2020 VPP4ISLANDS project, Schneider Electric is the responsible for the RTUs that will be used in the VPP4IBox.

https://www.se.com/ww/en/

Rotterdam, Netherlands

SME

From EDI to Internet, from Internet to Blockchain this is the principle of our project partner H2020 VPP4ISLANDS Blockchain2050 Already 30 years story in IT domain BC2050 as an experienced integrator of Blockchain technology will contribute to our project solution with the design and development of a Blockchain environment by implementing trackable and tamper proof transactions via smart contracts between all the actors involved in the VPP4ISLANDS architecture.

https://www.blockchain2050.io/

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UXBRIDGE, UK

University

An academic partner in our H2020 VPP4ISLANDS project; Brunel University London Founded in 1966, is situated in Uxbridge, West London 13 000 students from over 100 countries worldwide, 1 000 Doctoral Researchers & PDRA, Four Research Institutes to collaboratively tackle very specific challenges to the world's economy and society, BUL Institute of Digital Futures. BUL will develop experimentally validated energy models of various types of islands. All the mathematical models and optimization algorithms developed and tested will be built on field data provided by the island partners.

https://www.brunel.ac.uk/

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Murcia, Spain

ESCO (SME)

REGENERA that was founded in 2007 in the Region of Murcia, Spain. It provides services in energy consultancy, energy management, industrial construction, hydraulic works, among other. We provide holistic solutions to increase energy efficiency, harvest renewable resources, reduce impact on environment and boost competitiveness of our clients. In our H2020 Project VPP4ISLANDS, it implements technologies for the generation and management of electrical energy using renewable sources.

https://regeneralevante.com/

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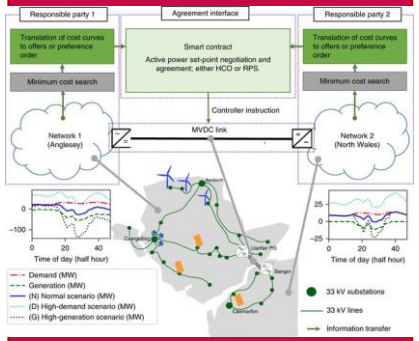
Wales, United kingdom

University

Cardiff University is our partner H2020 VPP4ISLANDS, Cardiff is one of the Russell Group of universities which consists of 24 leading UK universities. The research of the School of Engineering was ranked top 7 amongst UK universities in the 2014 Research Excellence Framework. Cardiff University will strongly participate in VPP4ISLANDS technical specifications definition, lead Modelling Virtual Energy Storage System and investigating its flexibility provision. Moreover, Cardiff University will use its smart grid lab in order to validate the developed APIs and extensions functionalities.



https://www.cardiff.ac.uk/

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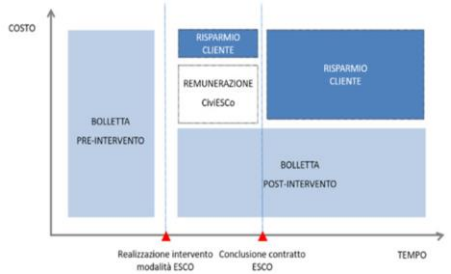
Udine UD, Italy

SME

In our H2020 VPP4ISLANDS, CIVIESCo is an Energy Service Company currently controlled by Civibank, a credit institution based in Friuli Venezia Giulia. Our activities are linked to the field of energy efficiency. CIVIESCO will define islands potential services, perform an economic analysis and validation for VPP4ISLANDS solution and significantly participate in business model development and results exploitation.



https://www.civiesco.it/

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Ankara, Turkey

SME

INAVITAS is a company that serves 20 of the 21 distribution system operators (OSDs) in Turkey in energy quality monitoring systems, SCADA, Distribution Management and Outage Management with its comprehensive solution - called Inavitas Utility. INAVITAS will provide in our project H2020 VPP4ISLANDS software development for the platform by developing the interfaces required for generation, storage and consumption facilities. In addition, the necessary algorithms and forecasts will be executed using these interfaces.

https://inavitas.com/

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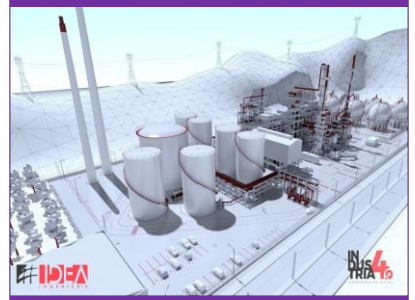
Cartagena, Spain

SME



IDEA With nearly 10 years of experience and a human team of 100 people, IDEA partner of our H2020 project VPP4ISLANDS are established in the sectors of industry, oil and gas, mining, energy and architecture. Carry out projects in more than 25 countries, through our four main services: Project Engineering, EPC, Recruitment & Outsourcing and Digital Transformation 4.0. IDEA will mainly focus on the development and deployment of digital twin platform. In addition, IDEA will participate in the deployment and validation of VPP4ISLANDS solutions.

https://ideaingenieria.es/fr/

(+34) 968 500 805

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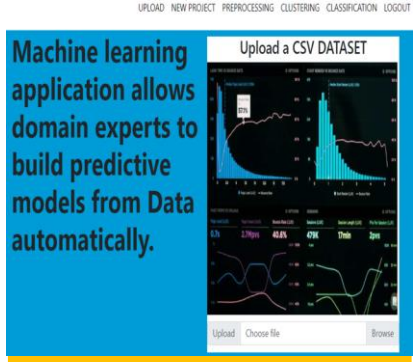
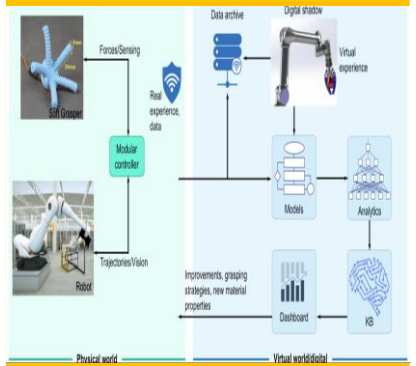
RDI'UP

Les Mureaux, France

SME

The French innovative SME RDIUP is specialized in the development of smart APIs and the exploitation and dissemination of innovative solutions. RDIUP will lead the communication, business models and exploitations activities, develop the data analytics Application, Decision Support System and define replication plans through a smart planning tool (SPT) for the European Islands.





https://www.rdiup.com/

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Dortmund, Germany

RTO

FTK Forschungsinstitut für Telekommunikation und Kooperation

FTK (Research Institute for Telecommunication and Cooperation), our partner in the H2020 VPP4ISLANDS project, is a private institute founded in 1992, their main activities are R&D Technology & Knowledge Transfer (Regional and National); and Professional Web Consulting. FTK is responsible for the secure integration between locally deployed hard- and software tools with the distributed smart contracts with a focus on secure resource sharing and access control.

STREAMING ATTRIBUTE POLICY LANGUAGE

https://www.rdiup.com/

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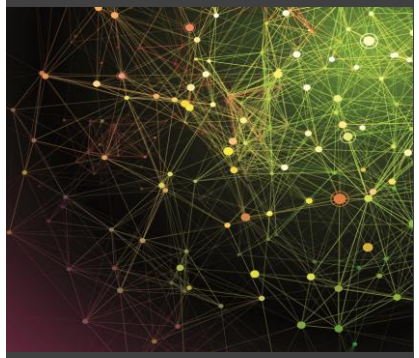
Madrid, Spain

University

CSIC is the largest public research institution in Spain. CSIC participates in VPP4ISLANDS through the Institute for Cross-Disciplinary Physics and Complex Systems, IFISC, as a Joint Research Unit with University of the Balearic Islands (UIB). IFISC's research addresses the analysis of phenomena in nonlinear physics and complex systems with emphasis on social systems, ICT and Big Data, mobility, transport systems and power grids. CSIC-IFISC will lead the tasks on systems modeling and distributed and shared control and participate in tasks involving the decision support system and smart planning tool, the virtual energy storage system and the energy management system.



https://ifisc.uib-csic.es

Çanakkale, Turkey

SME

TROYA Environmental Association was founded in 2009 with an aim to raise awareness of clean energy, climate action and energy democracy. TROYA presents and promotes renewable energy and agricultural development models to improve the regional economy and create a positive impact on the world. In the H2020 VPP4ISLANDS project, TROYA's task is to plan and organise networking, joint venture and cooperation activities, provide necessary information regarding relevant policies and legislation for the energy transition in the islands.

https://www.troyacevre.org/

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ULUDAĞ ELEKTRİK DAĞITIM

BURSA, Turkey

DSO

UEDAS is our partner in this H2020 project. As Uludağ Electricity Distribution Company, UEDAS completed the privatization process in 2010 and started working in 4 distribution regions. Their main task in the project will be to test the solutions on the Gökçeada island and assess the relevance of the VPP4ISLANDS products. UEDAS will validate the stabilization of microgrids thanks to the energy systems managed by the VPP4I-Platform.

https://www.uedas.com.tr/

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Consell Insular de Formentera

Formentera, Spain

Leading Island

Formentera is our partner in the European H2020 VPP4ISLANDS project. Formentera is one of the four main and inhabited islands of the Spanish archipelago of the Balearic Islands. As a lead island, Formentera will adopt VPP4ISLANDS solutions to test the standalone use case. Formentera implications and use case are significant to assess the flexibility of an autonomous non interconnected island.

https://www.consellinsulardeformentera.cat/

BORNHOLMS ENERGI & FORSYNING

Rønne, Denmark

Follower Island

Bornholm, our H2020 VPP4ISLANDS project partner, is an island follower in Denmark that has already taken many steps towards decarbonization, especially in the district heating system. BEOF as a follower island, will leverage the VPP4ISLANDS platform to develop a realistic strategy for total decarbonization of the island and how to deal with fluctuations in electricity by defining a replication plan.

https://beof.dk/

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BOZCAADA BELEDİYESİ 1923

Bozcaada, Turkey

Follower Island

The center of the turkish island of Bozcaada, our partner of the H2020 VPP4ISLANDS project, is a site of 1st degree archaeological protection, the rest of the island is an environmental protection site. Its strategy of a carbon-free island by 2030, is based on use of 100% electric transport and EV charging BOZI will model and generate a tailored planning and launch the replication of the VPP4ISLANDS solutions to achieve its own strategy.

http://www.bozcaada.bel.tr/

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Grado, Italy

Follower Island

GRADO, our partner of the H2020 VPP4ISLANDS project, is an island located in Italy. The GRADO community has always been very focused on environmental sustainability and implements its own lines of programming and development, using its AREA TECNICA. GRADO island as follower island with proximity to the mainland will test its use case of upgrading its network from 4G to 5G . This use case will allow real time monitoring of the electric grid. The tested use case will be thoroughly planned using the VPP4Island smart planning module and initiation of replication will carried out

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Project contacts

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