

Virtual Power Plant for Interoperable and Smart isLANDS

VPP4Islands

LC-SC3-ES-4-2020

GA 957852

Deliverable Report

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Contributors	All		
Reviewer	TROYA		
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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
ALWA	AlgoWatt
AMU	Aix-Marseille Université
BC2050	Blockchain2050
BornholmsVarme	Bornholms Varme A/S
BoZI	Bozcaada Belediye Baskanligi
BUL	Brunel University
CIVI	CIVIESCO srl
CSIC	Consejo Superior de Investigaciones Científicas
CU	Cardiff University
DAFNI	Network of Sustainable Greek Islands
FORM	Consell Insular de Formentera
FTK	FTK Forschungsinstitut für Telekommunikation und Kooperation EV
GRADO	Comune di Grado
IDEA	INGENIERIA Y DISEÑO ESTRUCTURAL AVANZADO
IFISC	Institute for cross disciplinary physics and complex systems
INAVITAS	INAVITAS Enerji AS
LIS	Laboratoire d'Informatique et Systèmes
RDIUP	RD'UP
REGENERA	REGENERA LEVANTE
SCHN	Schneider Electric
TROYA	TROYA CEVRE DERNEGI
UIB	Universitat de les Illes Balears
UEDAS	Uludag electric dagitim



EXECUTIVE SUMMARY

This report summarizes the activities undertaken at the kick-off meeting, held in remote in October 22nd, 23rd 2020. The meeting, organized by the project coordinator AMU, established an ambitious agenda that generated discussions around key topics related to each WP. All partners were represented during the kick off. VPP4Islands project consortium is composed of 2 large company, 1 DSO, 6 SMEs, 3 universities, 2 RTOs, 3 islands municipalities, and 2 non-profits organisations. The following report outlines the activities carried out during the kick-off meeting and some of the main outcomes.



1. INTRODUCTION AND AGENDA

The VPP4ISLANDS kickoff meeting was held on 22nd, 23rd 2020, completely in remote due to the pandemic outbreak that reached Europe in the first months of 2020 and that obliged to travel limitation all along the year.

The challenging objectives for this kick-off meeting were: to create team building and engagements after some months from the proposal submission and to move from the vision highlighted at the proposal stage to actual implementation; to identify WP interdependencies and establish timelines and contribution to first deliverables. All 19 partners from 8 different countries participated at this two-day event. The DAFNI representative was also present in the first day, as a member of the External Advisory Board.

The planning of the activities undertaken during the meeting are outlined in the following tables

Kick off meeting – Day 1

Topic	Activities
Introduction	Welcome from the President of AMU, Prof E. Berton Welcome and introduction from VPP4ISLANDS coordinator
Participants' presentation	Presentation from each partner
Round tables	Round tables animated by leaders of WP2: Island energy services requirements and concept design WP3: Digitalisation & Building of Island Energy Community WP4: Smart Functionalities for Energy Management & decarbonisation

Kick off meeting – Day 2

Topic	Activities
Administrative grant management	Overview of Management structure, Ethics aspects, Periodic and continuous reporting
Round tables	Round tables animated by leaders of WP5: Secure communication & smart contract WP6: WP6: VPP4Islands platform development WP7: VPP4Islands solution testing and Validation WP8: Communication, Dissemination and Exploitation
Conclusions and roadmap	The coordinator summarizes the main outcomes and next steps. A process roadmap is shared among partners.

Concepts & Tools

- Virtual Energy Storage System

The aggregation of various controllable components of energy systems:

- Conventional energy storage systems
- Flexible loads,
- Distributed generators,
- Microgrids,
- local DC networks,
- Multi-vector energy systems.

Through the coordination of each unit, a VESS is formed as a **single high capacity ESS with reasonable capital costs.**

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Concepts & Tools

- Multi-dimensional Flexibility

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Concepts & Tools

The project aims to develop three tools:

VPP4I-Platform: is a data and information service provider based on advanced software tools

VPP4I-Node: ensure a distributed control or provide setting points for individual energy system of each consumer/prosumer through VPP4I-Box.

VPP4I-Box: hardware with embedded software at each consumer/prosumer location that enables communication with the VPP4I-Node

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Validation and User cases

- Demonstration area VESS

The electrical generators within the demonstration site include:

- two biomass power stations,
- Solar farm,
- wind farm / Tidal Lagoon,
- numerous behind-the-meter renewable generation and storage systems.

In terms of consumers the demonstration site includes:

- the Welsh Water Treatment plant (with onsite electrical generation), a cement works, a paper mill, an Amazon warehouse, schools, hospitals, council offices, the University of South Wales Hydrogen Centre, Cardiff University's Gas Turbine research...

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Validation and User cases

- Lead Island 1 : GOKCEADA ISLAND (Turkey)

Area : 279 km²
Population : 9403 (2019)

Power installations:

- Connected to the mainland
- Diesel generators : 4x770 kVA
- Wind turbine : 2x 900 kW
- Solar plant : 200 kW
- Energy storage system: 50 kW (->1 MW)

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Validation and User cases

- Lead Island 2 : FROMENTERA ISLAND (Spain)

Area : 85 km²
Population : 12111

Power needs:

- Winter : 7 MW
- Summer : 18 MW

Power installation:

- Connected to Mallorca island
- Solar plant: 2 MW

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Validation and User cases

- Follower Islands
- Bornholm Island (Denmark)
- Bozcaada Island (Turkey)
- Grado Islands (Italy)

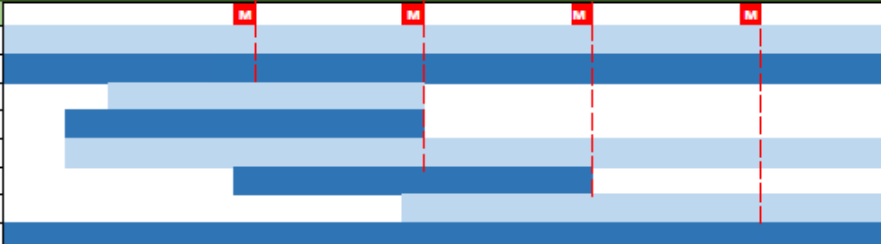
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Workpackages

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Project Planning

VPP4ISLANDS PROJECT PLANNING				Year 1												Year 2												Year 3												Year 4											
				Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Work Packages	Leader	Start	end																																																
WP1	AMU	1	42																																																
WP2	ALWA	1	42																																																
WP3	IDEA	6	20																																																
WP4	AMU	4	20																																																
WP5	BC2050	4	42																																																
WP6	SCHN	12	28																																																
WP7	UEDAS	20	42																																																
WP8	RDIUP	1	42																																																



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2. CONSORTIUM PRESENTATIONS

The presentations from partners ran smoothly and gave opportunities to the teams to know better each other, for the new team members in particular, and to show more in detail their expertise.



1. AMU

Laboratoire d'Informatique et Systèmes LIS UMR 7020

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Laboratoire d'Informatique et Systèmes

- LIS is a research department (UMR) under the supervision of:
 - Centre National de la Recherche Scientifique (CNRS)
 - Aix-Marseille University
 - University of Toulon
 - Ecole Centrale de Marseille (ECM)
- LIS premises are located on 3 main sites
 - university campus of Saint-Jérôme and Luminy in Marseille
 - campus of the University of Toulon
- 320 members
 - 170 tenure researchers and professors

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Laboratoire d'Informatique et Systèmes

4 thematic department and 20 research groups

<ul style="list-style-type: none"> theoretical computer science logic, algorithmic and complexity quantum computing geometric and topology artificial intelligence 	<ul style="list-style-type: none"> artificial intelligence machine learning natural language processing data mining information retrieval
<ul style="list-style-type: none"> control theory diagnostic decision theory system simulation and modeling 	<ul style="list-style-type: none"> image processing audio and bio-signal processing medical imaging image modelling photogrammetry

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Laboratoire d'Informatique et Systèmes

- Multidisciplinary research is crucial in LIS as the department is involved in several multidisciplinary research institutes
 - Archimède – Math & Computer Science institute
 - ILCB "Language, Communication and Brain Institute"
 - Centuri Institute "Turing Center for Living Systems"
 - Imaging Marseille Institute– Biomedical Image
- Researchers and professors of our lab are involved in several university cursus (IUT, License, Master, PhD programs, engineering school).
 - University of Aix-Marseille
 - Ecole Centrale Marseille
 - University of Toulon

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2. ALWA

VPP4ISLANDS KoM

algoWatt SpA – company presentation

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GREENTECH SOLUTIONS FOR SUSTAINABILITY

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GREENTECH SOLUTIONS ACROSS THE ENTIRE SUPPLY CHAIN

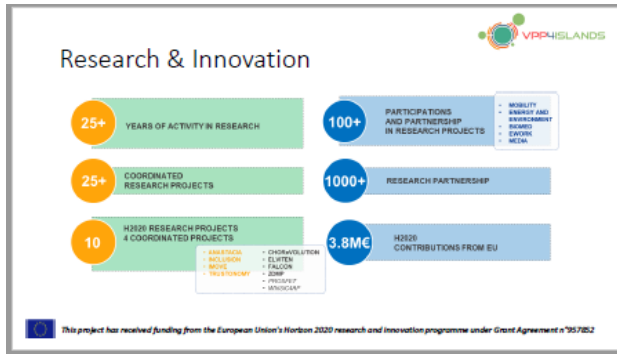
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Business Units

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Research & Innovation



- 25+ YEARS OF ACTIVITY IN RESEARCH
- 25+ COORDINATED RESEARCH PROJECTS
- 10 H2020 RESEARCH PROJECTS (4 COORDINATED PROJECTS)
 - ELITEA
 - EXCELSON
 - MOUSE
 - TRUSTENOVY
 - CHARAKOLITIKON
 - ELITEN
 - FALCON
 - JUMP
 - PROSPECT
 - MONOCROP
- 100+ PARTICIPATIONS AND PARTNERSHIP IN RESEARCH PROJECTS
 - MOBILITY
 - ANALYTICS AND DATA SCIENCE
 - HEALTH
 - ENERGY
 - MECA
- 1000+ RESEARCH PARTNERSHIP
- 3.8M€ H2020 CONTRIBUTIONS FROM EU

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3. SCHN



David Pampliega

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Schneider Electric provides energy and automation digital solutions for efficiency and sustainability

Key figures for 2019

- 5% (of revenues devoted to R&D)
- €27.2 billion 2019 revenues
- 41% of turnover in new acquisition
- 135,000+ Employees across 138 countries

A well-balanced global presence
2019 Performance breakdown

- 39% (Profit)
- 30% (Operating)
- 79% (Cash)
- 16% (EVA)

Two Businesses:


- EN: 49.500 Employees (Energy Management)
- EA: 42.000 Employees (Energy Automation)

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Overview

Schneider Electric is very active in H2020 projects

- UPGRID
- MICROATE
- AMASS
- SABINA
- CERT-MILS
- GROW SMARTER
- FLEXITRANSTORE
- OSMOSE
- SPEAR
- FITOPTIVIS
- IELECTRIX
- SDNMICROSENSE
- INTERCONNECT
- VPP4ISLANDS



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Overview

www.se.com/rdenery

Schneider Electric R&D Collaborative projects

Schneider Electric R&D collaborative projects

Discover our publications on R&D projects

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Role and Contribution

- WP6 leader.
- Task 6.3 leader.
- Task 7.5 leader.
- Contribution to VPP4Islands requirements/specifications.
- Contribution to architecture of VPP4IPlatform.
- Development of new functions for Remote Terminal Units as substation automation devices.
- Contribution to the VPP4Islands solution testing and validation.

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4. BC2050

Blockchain2050 BV

From EDI to Internet, from Internet to Blockchain
30 years story in IT domain


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Blockchain2050 products & services


Work Areas	Products & Services	Description
Supply Chain Management	LogChain	Location and recipient real-time tracking of a dispatched product, by utilizing Blockchain technology.
Earth Observation & Space Data	Satfotos	Open Satellite Imagery Marketplace which allows anyone to purchase Satellite Images and EO data.
Healthcare	TAP2SOS	IoT bracelet for retrieving blockchain-secured medical data.
	DoctorCloud	Cloud-based solution that interconnects interactive medical identification bracelets with any e-health data platform.
Public & Private Sector	Waste Management Platform	Platform for logging and certifying waste flow, of any type, within a given waste station or even a network.
	Files Authentication Manager	Blockchain-enabled application for signing and verifying documents.
	Certifications on Blockchain	Platform for issuing and verifying certifications, utilizing specialized blockchain techniques for full GDPR compliance.
	Metablockchain	Novel blockchain environment that offers an application generator designed to support developers of blockchain-based information systems.
	Know Your Customer (KYC)	DLT-based KYC verification process platform.
	SocialPolis Marketplace	Blockchain-based platform for making wholesalers trading simpler.

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
The Blockchaiz050 Team




Dr. NIKOS BOGONIKOLOS
Founder of Blockchain2050 BV. He has a mathematical background (Diploma of University of Patras, Greece) and delivered post-graduate and doctorate research in Kharisov National Economic University.




Mr. PETER TJIA
He holds a B.Sc. in Business Administration. He focused his professional education to Law & Security, became a Risk Security Expert and he continued his further his studies on Information & Security.




Dr. PANAGIOTIS CHRISTODOULOU
He holds a PhD in Computer Engineering & Informatics from the Cyprus University of Technology. He completed his undergraduate and postgraduate studies at the Manchester University, UK (MEng) and



Prof. SPIROS LIOTHANASSIS
Professor and Director of Pattern Recognition Lab at University of Patras, School of Engineering, Department of Computer Engineering and Informatics




Prof. ANDREAS ANDREOU
Professor at the Department of Electrical Engineering, Computer Engineering and Informatics of the Cyprus University of Technology, Nicosia, as well as the local market.



Prof. SOKRATIS KATSIKAS
Professor and Rector of the Open University of Cyprus in Nicosia, and Professor at the Center of Cyber and Information Security and Communication Technology, Norwegian University of Science and Technology in Trondheim, Norway.

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5. BUL

VPP4Islands Regenerative Hydrogen Fuel Cell/Battery Energy Storage System

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Institute of Energy Futures
Department of Mechanical & Aerospace Engineering
BUL Team: R. Garner & G. Jansen, Dr R. Bonser, Dr G. Fern, Dr C. Koenig
EAB: H. Corrigan (SolarBotanic), M. Matias (Optimeyes Energy), K. Routledge (ZebraCarbon), E. de Wit (HYGEAR)

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Brunel University London (BUL)

- BUL, 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,
 - Institute of Energy Futures
 - Institute of Materials & Manufacturing
 - Institute of Environment Health and Society
 - Institute of Digital Futures; Launch Event, October 29th 2020.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

Institute of Energy Futures (IEF)

- Mission of IEF Engage in multidisciplinary research to address national and global challenges in energy efficiency, demand reduction and decarbonisation.
- Strength in: renewable technologies, sustainable energy storage systems, emerging fuels and fuel cells, nanostructured materials for energy storage and enhanced photovoltaics, advanced heat transfer systems (refrigeration and heat pump systems),
- New research facilities to support: Hydrogen feedstock for distributed power generation, heating and clean fuels for transport.

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Integration of large-scale hydrogen storages in a low-carbon electricity generation system

- H₂-stored energy to compensate low wind power output or high power demand,
- Storage sized to provide a maximal power of 1GW_e for 5 days.

International Journal of Hydrogen Energy, 38 (2013) 14430-14453.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

6. REGENERA

REGENERA was founded in 2007 in the Region of Murcia, Spain. We provide 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.

OUR BUSINESS LINES

- Energy Consulting
- Technical Installation
- Maintenance
- Energy Services
- Innovation

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OUR EXPERIENCE IN EUROPEAN FUNDED PROJECTS

REGENERA has extensive experience in the participation of European projects. REGENERA currently has 6 H2020 projects and 2 Life projects financed, in addition to other R&D&I projects founded at a national and regional level.

Furthermore, REGENERA has been awarded as an Innovative SME by the Ministry of Economy, Industry and Competitiveness of the Spanish Government thanks to its high participation in international R&D programmes.

OUR INNOVATION PRIORITIES

- Demand Response and Energy Flexibility, Renewables and energy management
- Smart Grids and Smart Solutions for improving Energy Efficiency and Flexibility
- Smart Cities and Mobility, official installer for EV charging points
- Water Energy-nexus, Circular Economy, Industrial Symbiosis
- ESCO Business Models, energy service strategies
- Market study, VNA (Value Network Analysis), regulatory and stakeholder framework
- LCA (Life-Cycle Assessment), Environmental and social impact assessment

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OUR ROLE IN VPP4ISLANDS

WP 2:
Task 2.1 Island needs and requirements. Identify types and services that the implemented RES and VPPs can provide to reach VPP4island strategic objectives and analyse feedback about energy stakeholders' needs.
Task 2.4 Definition of VPP for island services.

WP 3:
Task 3.3 Environment modelling.

WP 4:
Task 4.1 Forecasting.
Subtask 4.1.2. Market prices (Leader). This task aims to develop models for forecasting the price in the day-ahead and balancing market.
Subtask 4.1.4. Energy and CO₂ savings (Leader). Identified flexibility potentials, energy demand prediction by an algorithm in order to reduce the energy costs and GHG emissions.





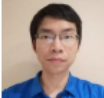




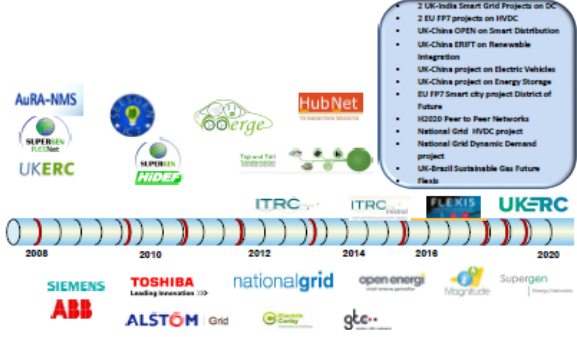
WP 7:
T7.3 Economic analysis and validation.
T7.4 Environment and social assessment.

WP 1, WP 5, WP 8

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7. CU

 <h3>Cardiff team</h3>	 <h3>Cardiff University & CIREGS</h3> <ul style="list-style-type: none"> Cardiff University 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. Centre for Integrated Renewable Energy Generation and Supply (CIREGS) is consisted of 10 academic staff, +12 postdoctoral researchers and +20 PhD researchers. <div style="display: flex; justify-content: space-around;"> <div data-bbox="857 562 959 659">  <p>Prof. Jianzhong Wu Professor in multi-vector energy systems, Head of School of Engineering WuJ@Cardiff.ac.uk</p> </div> <div data-bbox="1057 562 1159 659">  <p>Dr Meysam Qadrdan Reader in Energy Systems Qadrdanm@Cardiff.ac.uk</p> </div> <div data-bbox="1256 562 1359 659">  <p>Dr Yue Zhou Lecture in Cyber Physical Systems zhouy8@cardiff.ac.uk</p> </div> </div>
 <h3>Centre for Integrated Renewable Energy Generation & Supply (CIREGS)</h3> <ul style="list-style-type: none"> Centre for Integrated Renewable Energy Generation and Supply (CIREGS) <ul style="list-style-type: none"> £3M+ investment by EPSRC and HEFCW to establish a research centre in Renewables £700k for equipment <ul style="list-style-type: none"> Power System Simulator Real Time Digital Simulator Multi-terminal HVDC Rig Wind Turbine Rig Research activities cover a range of topics from smart grids to multi-energy systems and HVDC <div style="display: flex; justify-content: center; align-items: center;">  </div> 	 <h3>Recent research projects</h3> <div style="display: flex;"> <div style="flex: 1;">  <p>2008: AuRA-NMS, SIEMENS, UKERC, ABB</p> <p>2010: SIEMENS, TOSHIBA, nationalgrid, ALSTOM</p> <p>2012: goerge, HubNet, ITRC, open energi, gte</p> <p>2014: ITRC, nationalgrid, open energi, gte</p> <p>2018: ITRC, nationalgrid, open energi, gte</p> <p>2020: ITRC, nationalgrid, open energi, gte</p> </div> <div style="flex: 1; border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> 2 UK-India Smart Grid Projects on DC 2 EU FP7 projects on HVDC UK-China OPEN on Smart Distribution UK-China ERIIT on Renewable Integration UK-China project on Electric Vehicles UK-China project on Energy Storage EU FP7 Smart city project District of Future HC2020 Peer to Peer Networks National Grid HVDC project National Grid Dynamic Demand project UK-India Sustainable Gas Future Flex </div> </div>



8. CIVI

Company Profile & Background

Alessandra Cassisi

OUR GENESYS EU Programmes & Special Projects

European Investment Bank → CiviBank → CIVIESCO

EUROPEAN PROJECT
CIVIBANK CLIMATE ACTION ITALY

€ 30 mln credit line to be invested in energy efficiency operations and sustainable investments based on RES

↓

Replication and Upscaling at EU Level

OUR TARGET EU Programmes & Special Projects

INNOVATION. FINANCE. LOCAL ECONOMIC GROWTH. SUSTAINABILITY.

OUR MISSION EU Programmes & Special Projects

- Enabling processes of urban regeneration through the energy efficiency in the public and private sectors
- Engaging, as per EU 2020 guidelines, the local territory towards a virtuous process with a long term vision, that allows him to boost a new local economy, based on more knowledge and innovation, more efficient, more green and more proactive, creating new jobs
- Developing all the above actions in synergie with the networks of local entrepreneurship, establishing new partnerships with R&D institutions

Change as an Opportunity

OUR BUSINESS MODEL EU Programmes & Special Projects

Main objective of CIVIESCO interventions is generating «savings» for its own clients with a respective revenue stream applying the EScO model, based on the obtained results in terms of energy savings, accurately measured through the assets performances post-intervention.

Costs: ENERGY BILLS PRE-RETROFIT, ENERGY BILLS POST-RETROFIT

Client Savings: CLIENT SAVINGS, REVENUES CIVIESCO

Time axis

R&D&I PROJECTS OFFER EU Programmes & Special Projects

Development of R&D&I Projects with a relevant positive Environmental - Economic - Social impacts

CIVIESCO Advisory – Energy Service Company

Technical Advisory: Project Design, Management & Supervision

Financial Advisory: Supporting Project Developers to the operation construction

Energy Efficiency | Smart City | Smart Airport | Smart Port | Nature Based Solutions

Assets Renovation | Cultural Heritage Adaptive Reuse | Blockchain applications | Circular Economy

INNOVATIVE FINANCING

BUSINESS MODELS AND FINANCIAL SCHEMES AS REPLICABLE AND EXPLOITABLE RESULTS

R&D&I PROJECTS OFFER EU Programmes & Special Projects

2016: € 30 mln credit line to be invested in energy efficiency operations and sustainable investments based on RES

↓

Replication and Upscaling at EU Level

2020: Participation to 10 projects financed by EC (5 M Euro grants)

- no.2 Smart City projects - SPARCS, ATELIER
- no.1 Smart Islands projects - VPP4ISLANDS
- no.3 Energy Community projects - REDREAM, IBCOME, LIGHTNESS
- no.1 Circular Economy in Cities - FUSILLI
- no.3 EE Market & techs boost - AUTODAN, ENSNARE, WARES

and

1 Contract for Consultancy Service to the EC on Smart City Projects (EIP-SCC Initiative) 5 years contract (2020-2025)

Smart City Projects | SPARCS & ATELIER EU Programmes & Special Projects

SPARCS Smart City Project

Duration: Oct 2019 - Oct 2024

Total budget: € 21,91 M

Total Grant: € 16,34 M

ATELIER Smart City Project

Duration: Nov 2019 - Nov 2024

Total budget: € 23,74 M








Total Grant: € 19,70 M

Lighthouse Cities (Finland): ESPOO, (Netherlands): EILAND, (Spain): RISA, (Latvia): RIGA, (Hungary): BUDAPEST, (Portugal): MATOSINHOS, (Greece): KIFISSIA, (Denmark): COPENAGHEN, (Slovakia): BRATISLAVA, (Poland): KRAKOV



<p>VPP4ISLANDS Project EU Programmes & Special Projects</p>  <p>WP2 - Task 2.4 Definition of VPP for island services (M3 to M12) - T2.4 leader: CIVI , Participants: REGE, BUL, UEDAS: Based on the outcomes of Tasks 2.1 2.2 and 2.3, possible constraints to the services provided by existing VPP4islands will be identified and analysed. The VPP4islands services will be defined for improved performance and profitability. Then, GDPR and standardization activities will be planned in this task to fulfil the above objectives and ensure compatibility and interoperability defined services with what already exists in the market through standards and policies, DSOs will facilitate the dialogue with policy makers to assess their feasibility. Based on the feedback, CIVI will improve the proposed services that will be well-reviewed in D2.2.</p> <ul style="list-style-type: none"> D2.5 VPP4islands services - WP2 - M7 <p><small>CiviBank CivIESCO Unconventional Financing</small></p>	<p>VPP4ISLANDS Project EU Programmes & Special Projects</p>  <p>WP7 - T7.3 Economic analysis and validation (M28-M35): Leader CIVI and participant REGE, BUL, CIVI Based on the depth study related to the market analysis, DLT-based services and the tailored business strategy (defined in T8.3) will be assessed to minimize costs and maximize the ROI. During the progress of the development, RDIUP will monitor and collect cost and benefit elements related to each use case and verify their consistency especially for the benefits coming from the flexibility services. Also, we will define pertinent hypothesis and goals to challenge our economic models. A thorough study will be carried out to assess the tailored business case (defined in WP8) for each configuration, estimate the CAPEX, OPEX, LCOE, ROI, LCC and LCA related to our technologies and assess their feasibility. Business models definition will provide inputs for use cases economic evaluation. Moreover, VPP4islands will promote the sustainability to optimize the LCC, CBA and proven solutions. CIVI will study the non-monetized profits of the solutions by assessing the environmental and societal impacts.</p> <ul style="list-style-type: none"> D7.6 Economic results analysis - WP7 - M35 <p><small>CiviBank CivIESCO Unconventional Financing</small></p>
 <p><i>Thank you</i></p>	

9. INAVITAS

 <h3>Company Presentation</h3> <p>Inavitas (Participated Project as T4E)</p> <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	 <h3>What we offer for all scales</h3> <div style="border: 1px solid teal; padding: 5px; display: inline-block;"> <p>Energy intelligence for all scales - from generation plants down to single end prosumer</p> </div>  <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>
 <h3>Abilities</h3> <ul style="list-style-type: none"> Real time monitoring Real time monitoring of both consumption and production units Flexible design Easy integration with devices and any 3rd party services Better insight Better analysis and saving using detailed consumption per load base Alarm Keep informed with the advanced alarming system Reporting Detailed reports are ready when you ask or schedule Intelligence Keep your energy management system intelligent on edge or cloud  <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	 <h3>Energy Intelligence for All</h3> <ul style="list-style-type: none"> End to end solution Collects data from devices or 3rd party systems and serves it as an EI platform Same platform different apps Retailers, businesses and residential use the same platform with different UIs for a better experience Easy integration Retailers/utilities can easily integrate this platform with their 3rd party systems  <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>



10. IDEA

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

IDEA IN FIGURES

RE-EVOLUTION

IDEA IN SPAIN: 137

TURNOVER EVOLUTION

EMPLOYEES EVOLUTION

CERTIFICATIONS

EDUCATION

+11 YEARS | **+26 COUNTRIES** | **+500 PROJECTS** | **+6 MK** | **+137 PEOPLE** | **+43 WOMEN**

AWARDS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

SERVICES

- PROJECT ENGINEERING**: IDEA renders multidisciplinary engineering services for the development of industrial projects based on BIM technology.
- TURNKEY PROJECTS (EPC-INTELLIGENT)**: IDEA carries out the Project Management using management procedures for the control of design, procurement, construction and start-up.
- RECRUITMENT & OUTSOURCING**: IDEA offers the R&D service as an extra resource which provides with successful solutions for hiring professionals.
- DIGITAL TRANSFORMATION 4.0**: The latest technology for the management and maintenance of industrial installations based on Digital Twin solutions.
- ARCHITECTURE**: IDEA is committed to an architecture based on singularity, avoiding standardization and impersonalization of spaces.
- ENERGY**: Large experience in the installation of electrical distribution networks, telecommunications networks and renewable energies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

SECTORS

- INDUSTRIAL
- OIL & GAS
- MINING
- ENERGY
- BUILDING

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement #957852

11. RDIUP

Presenter: Ameer ALAYA
Meeting: VPP4Islands Kick-off meeting
Organiser: AMU
Location: Video and/or telephone conference connection
Date: 22 October 2020

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement #957852

RDI'UP

Who we are?

- Overview**
 - Innovative SME founded in 2017
 - Located in Paris area
 - Multidisciplinary team
- What We Do**
 - Innovation services
 - POC Development
 - Smart Apps and IoT's
- Our Values**
 - Sustainable technologies
 - Environmental centered solutions
 - Energy transition promotion

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement #957852

RDI'UP

Ongoing projects

Enhancing the innovation capacity and competitiveness in FMCG field, through decarbonized customer-centric production approaches, by promoting the adoption of Open Innovation (OI) digital platform for collaborative production engineering and Fablabs (digitally enabled small-scale manufacturing machines/factories).

HELIOS

The HELIOS project aims at developing and integrating innovative materials, design, technologies and processes to create a new concept of smart, modular and scalable battery pack for a wide range of electric vehicles used in urban electromobility services, from mid-size electric vehicles to electric buses, with improved performance, energy density, safety, lifetime and LCOE (Levelized Cost of Storage).

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement #957852

RDI'UP


Our Expertise

- Cloud-based platform development:** Data analytics, ML, AI, DL, ...
- Smart and connected wearables**
- Digital twin platform**
- Serious Gamification**

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement #957852



RDI'UP
Our team



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Reda BENADDA
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Antoine LEFFERVE
Expert in Marketing
antoine.lefferve@rdiup.com

Supported by:



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

12. FTK





FTK e.V.

Forschungsinstitut für Telekommunikation und Kooperation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

About FTK

- Private institute associated with the  FernUniversität in Hagen
- Founded 1992
- Currently 14 Employees
- Two branches in Dortmund and in Pfungstadt

- Three Areas of Activities:
 - Research and Development
 - Technology & Knowledge Transfer (Regional and National)
 - Professional Web Consulting

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

About me

PhD in Computer Science
Teaching at the Open University in Hagen Germany
CEO of the FTK in Dortmund

Working in, Coordinating EU Projects since 2004

Research Topics:

- Information Security
- Access Control
- Blockchain
- Tamper Evident Event Stores
- Collaboration Design
- IoT
- Augmented Reality
- Digital Preservation
- eLearning
- Peer-to-Peer Computing
- Location-based services



Prof. Dr. rer. nat. Dominic Heutelbeck

FTK - Forschungsinstitut für Telekommunikation und Kooperation e. V.

Wandweg 3
44149 Dortmund

Mail: dheutelbeck@ftk.de

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

Projects



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852



13. CSIC



CSIC-IFISC



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852




Institute for Cross-Disciplinary Physics and Complex Systems
Palma de Mallorca, Spain
<https://ifisc.uib-csic.es>

A joint Research Institute of Spanish Higher Research Council (CSIC) and University of the Balearic Islands (UIB)

17 permanent staff researchers. A total of 70 scientists from 18 nationalities

Mission: Cross-Disciplinary and Strategic research in Complex Systems



Socio-technical networks



Photonics



Biosystems



Quantum processes



Earth systems



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852




IFISC participates in VPP4ISLANDS as a Joint Research Unit, in which UIB is a Third Party associated to CSIC.

IFISC does not have static research groups. Teams are dynamically assembled to tackle specific research topics.

Team:



Pere Colet
Research Professor



Damià Gomila
Senior researcher



Giulia Ruzzene
Postdoc



María Martínez-Barbeito
PhD student



Simona Obreja
IFISC project manager



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852




Topics of research

- Modeling power grid dynamics subject to stochastic demand fluctuations.
- Frequency fluctuations and power grid stability with a progressive penetration of smart devices including dynamic demand control (DDC). Effect of introducing communication between smart devices.
- Grid resilience and blackouts. Effect of fluctuating renewable sources (wind, photo-voltaic) on stability & resilience.
- Implementation of large-scale batteries: to compensate for lack of inertia (s/min time scales), intraday variations (hours time scale), interday (few days time scale).
- Effect of local generation (prosumers) and distributed storage (electric cars & domestic batteries).




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Main contributions to the project

WP3 and WP4 tasks:

- 3.2 Systems modeling (leader)
- 4.2 DSS and Smart Planning Tool
- 4.3 Distributed and shared control (leader)
- 4.4 Virtual energy storage system
- 4.5 Energy management system and optimal operation strategy



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14. TROYA

Troya Environmental Association

Troya Environmental Association was founded in 2009 in Canakkale and works on the topic clean energy and energy democracy for Climate Action.

One of the greatest achievements of the Troya Environmental Association is the energy cooperative it has established in 2017.

Troya has ties with all Renewable Energy Cooperatives and coordinates them.

Troya organizes international conferences in order to expand the capacities of these cooperatives and increase their efficiency.

TROYA ENERJİ KOOPERATİFİ

Troya is working to bring to the forefront the models that will revive the regional economy.

In this regard, provides agricultural sanctions, agricultural development models, use of renewable energy models in agriculture and their governance models.

TROYA will contribute to the project by;

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15. UEDAS

ULUDAĞ ELEKTRİK DAĞITIM

GENERAL INFORMATION

Turkey is a country so that has a big energy needs where 82 M people lives in, has 93.089 MW of installed production power and 303.7 TWh (2019) annual electricity consumption

82 Million

93.089 MWh

UEDAS Regions	
4 Province	35.501 km ² Area
56 District	38.853 km Over Head Line Length
86 Town	11.947 km Under Ground Line Length
2194 Village	2464 Personnel
12 Regional Operation Headships	25.875 Transformers
43 Operation Coordinationship	

ULUDAĞ ELEKTRİK DAĞITIM

R&D Projects

Energy Efficiency

- Remote Monitoring and Control of Distribution Transformers
- Amorphous Transformers Project
- Improvement Project of Meter and Connector Design

Service Quality

- Medium Voltage Regulation Project
- Submarine predictive maintenance Robot for undersea cable

Struggle with Non-Technical Loss Reductions

- Mobile Energy Measurement Device with GSM Communication Project
- The Meter on-line testing device

Operations Improvement

- Advanced Metering Infrastructure(AMI) system with Hybrid Communication (PLC)
- Smart Meter calibration desk Project (Patented)
- Aluminium Conductor Composite Core Project
- Induction Lamp Project

Research

- Europe Energysmart-Two-way metering and smart billing system development project
- Protection project from unintended contact in high voltage systems

Some of our research projects which are funded by EPDK (Turkey Energy Regulatory)

Finished Projects

- Automatic Voltage Regulator Project
- Hybrid - Communication Measurement and Control Project
- Reflective Paint Implementation Project
- Turkey Smart Grids 2013 Vision and Strategy Determination Project
- Sibatak Smart Distribution Transformer monitoring System project

Finished Projects

- Induction Lamp Filling Implementation Project
- Underwater Cable Fault Prevention and Maintenance Management System Development Project
- Composite Core Aluminium Conductor Implementation Project
- Ice cleaner robot on the overhead line wire

16 Total Projects
13 Finished Projects
3 Continuing Projects

Automatic Voltage Regulator Project

Underwater Cable Fault Prevention and Maintenance Management System Development Project






Induction Street Lighting Project

Ice Breaker Device Development Project

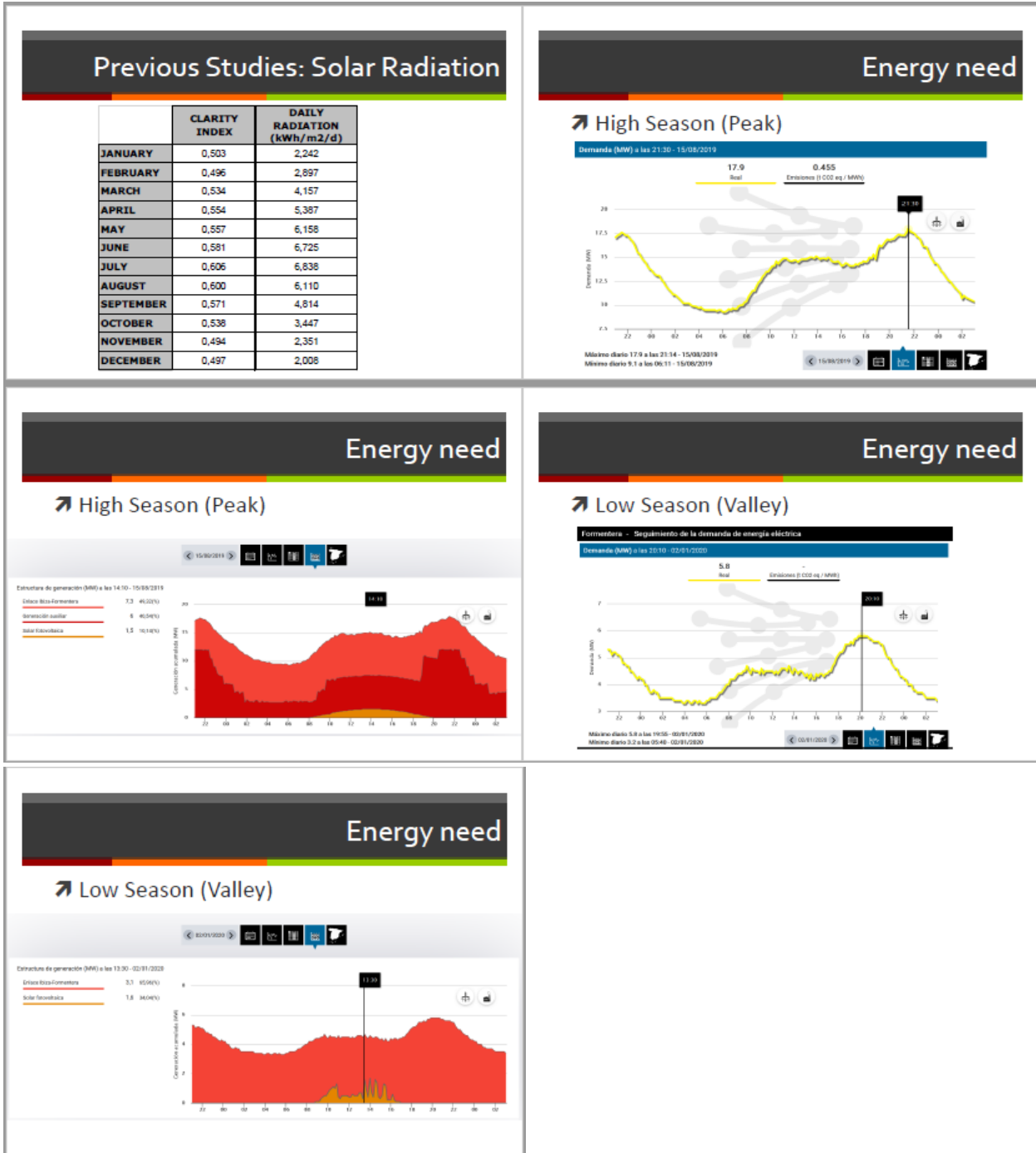
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852



16. FORMENTERA

<p>CONSELL INSULAR DE FORMENTERA</p> <p>VPP4ISLANDS: FORMENTERA ISLAND</p>  	<p>Formentera Island</p> <ul style="list-style-type: none"> ➤ Location: Formentera Island (Balearic Islands) ➤ 83,4 km² ➤ 12.111 registered inhabitants ➤ High seasonal population variability ➤ Population in High Season: near 43.000 people ➤ Natural Park "Ses Salines" ➤ Protected land and maritime zone 																																							
<p>Formentera Island</p>  	<p>Previous Studies: Wind Data</p> <table border="1"> <thead> <tr> <th></th> <th>AVERAGE WIND</th> <th>MAX</th> </tr> </thead> <tbody> <tr><td>JANUARY</td><td>3,73 m/s</td><td>17,20 m/s</td></tr> <tr><td>FEBRUARY</td><td>3,80 m/s</td><td>12,95 m/s</td></tr> <tr><td>MARCH</td><td>5,63 m/s</td><td>18,70 m/s</td></tr> <tr><td>APRIL</td><td>5,44 m/s</td><td>15,95 m/s</td></tr> <tr><td>MAY</td><td>4,50 m/s</td><td>12,45 m/s</td></tr> <tr><td>JUNE</td><td>3,67 m/s</td><td>11,45 m/s</td></tr> <tr><td>JULY</td><td>3,73 m/s</td><td>17,20 m/s</td></tr> <tr><td>AUGUST</td><td>4,59 m/s</td><td>15,45 m/s</td></tr> <tr><td>SEPTEMBER</td><td>2,91 m/s</td><td>10,20 m/s</td></tr> <tr><td>OCTOBER</td><td>5,26 m/s</td><td>17,45 m/s</td></tr> <tr><td>NOVEMBER</td><td>5,03 m/s</td><td>20,45 m/s</td></tr> <tr><td>DECEMBER</td><td>4,25 m/s</td><td>13,45 m/s</td></tr> </tbody> </table>		AVERAGE WIND	MAX	JANUARY	3,73 m/s	17,20 m/s	FEBRUARY	3,80 m/s	12,95 m/s	MARCH	5,63 m/s	18,70 m/s	APRIL	5,44 m/s	15,95 m/s	MAY	4,50 m/s	12,45 m/s	JUNE	3,67 m/s	11,45 m/s	JULY	3,73 m/s	17,20 m/s	AUGUST	4,59 m/s	15,45 m/s	SEPTEMBER	2,91 m/s	10,20 m/s	OCTOBER	5,26 m/s	17,45 m/s	NOVEMBER	5,03 m/s	20,45 m/s	DECEMBER	4,25 m/s	13,45 m/s
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17. BORNHOLMSVARME

Bornholm
a Bright Green Energy Island
in the Baltic Sea

BORNHOLMS ENERGI & FORSYNING

BEOF = Bornholms Energy & Supply Holding company for six utility companies:

- Bornholms Væster
- Bornholms Væstevæster
- Bornholms Væstvarme (actual participant)
- Bornholms Power Production
- Bornholms Energy (Power retail)
- Bornholms Power grid

Rønne city, harbor, and Power Plant

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

2019

Available to Sweden:
Heat: 10,000 MWh
Electricity: 4,000 MWh
Heat: 7,000 MWh

Bornholm Energy System

Bornholm Weather Forecast

Factsheet Bornholm

- Population: approx. 40,000
- Area: 360 km²
- Coastline: 150 km
- North to South: 40 km
- East to West: 30 km
- Swedish coast: 27 km
- Copenhagen: 100 km

Energy 2019

- Renewable Energy: 65%
- Waste (BIOGA): 10%
- Individual oil: 10%
- Individual biomass: 10%
- Power (heat): 5%
- Waste (heat): 5%
- Thermostatic control: 5%
- Gas: 5%

RESponsible Island Prize

1st PRIZE WINNER
THE ISLAND OF BORNHOLM DENMARK

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

Bornholms Væstvarme (= heat) AS is the district heating producer and distributor for approx. 6,500 customers on Bornholm. The district heating system has a very high penetration of sustainable energy resources from the island (woodchips and straw), which enables 100% use of locally produced sustainable fuels, in normal operation mode. The heating plant in Osterlars has installed 4 x 0.6 MW electric boilers, which represent the beginning integration of the electrical system and the district heating system.

In 2018 we decided to convert our powerplant, using biomass/woodchips instead of coal – reducing our carbon footprint by 70,000 tons of CO₂. We now primarily use locally grown and produced woodchips resulting in green sustainable energy, in combination with securing local jobs in the forestry, instead of buying coal abroad.

District heating grids 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

Use case 5: District heating system: Bornholm Island

Bornholm island has already taken many steps towards decarbonization, especially in the district heating system, where local biomass is the main fuel. About 65 % of the consumed electricity is produced on the island, with a combination of wind turbines, PV, biogas, and a woodchip fueled CHP. The electric connection to the mainland (seacable to Sweden) has a limited capacity (60 MW), and the introduction of more electricity production from Wind and PV will require a VPP setup, to align the consumption better with production.

VPP4Islands platform will simulate the integration of 100 MW wind turbine capacity, placed offshore, along with the island energy-system, by coupling the electric system with the district heating system, via 25 MW power-to-X capacity, and 10 MW electric boilers at the CHP.

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T7.6 VPP4Islands solution replication (M36-M42): Leader BEOF, BOZI, GRADO: and follower islands, Participants : CIVI: Each follower will model the Island and use the SPT to generate the sustainable plan.



In the ongoing INSULAE project an investment planning tool is being developed and tested on the Bornholm energy system. Synergy with the tools developed in VPP4Islands will be explored

insulae
Maximizing the impact of innovative energy approaches in the EU islands










This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852



18. BOZI

  <p>Municipality of Bozcaada</p>  <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	 <p>Bozcaada's:</p> <ul style="list-style-type: none"> • Official population is 3000 people • Winter population is 1000 Summer population is 4000 • Tourism season is 100 days • Receiving around 1.200.000 visitors during summer • The center of the island is 1st degree archeological protection site • Rest of the island is environmentally protection site • Any type of construction is subject to permission from city council • Main industries are : Tourism, Vineries, Winemaking, Agriculture <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>
<p>Bozcaada:</p> <ul style="list-style-type: none"> • The wind farm is the first BOT energy plant in TR • The wind farm is on the grid since 2000 and has 17 turbines – each is 600 KwA • Average energy consumption is 1.5 MW and peak is 3 MW • The island is self sufficient –energy wise but also connected to mainland with an underwater cable. • Shuttle services belongs to Municipality are electric vehicles <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	  <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>

19. GRADO

  <p>MUNICIPALITY OF GRADO</p>  <p>GRADO is an island located in the extreme North of the Adriatic Sea, in the North-East of Italy.</p> <p>The GRADO territory extends over an area of 115 Km², 45 Km² of these are islands, and the remaining 70 Km² are a lagoon.</p> <p>The population consists of about 8,200 inhabitants, and like its territory, it is strongly focused on providing top services as a tourist destination. During summertime 90,000 visitors can be easily accommodated.</p> <p>The GRADO community and its Administration have always been very focused on environmental sustainability.</p> <p>Municipality of GRADO is the public body, which administers the territory of the City, and provides all citizens with local services.</p> <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	 <p>The Municipality of GRADO implements its own programming and development lines, making use of its TECHNICAL AREA (AREA TECNICA) which is its technical department operating at the service of the community, for the entire GRADO area.</p> <p>AREA TECNICA is divided into :</p> <p>SERVIZIO AMBIENTE (ENVIRONMENTAL SERVICE) which provides environmental prevention services and monitoring, as well as planning and implementation of the strategic guidelines of the Administration in terms of the environment and environmental sustainability.</p> <p>SERVIZIO LAVORI PUBBLICI (PUBLIC WORKS SERVICE) which plans investments, follows projects and planning, and supervises the implementation of public works, which are increasingly focused on the use of renewable energy and eco-sustainability.</p> <p>SERVIZIO MANUTENZIONE (MAINTENANCE SERVICE) which provides all the necessary daily operations that ensure that GRADO maintains its traditional nickname of ... «ISOLA DEL SOLE».</p>  <p><small>GRADO (aerial view)</small></p> <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>
  <p>Some islands of the GRADO lagoon are small, others are even smaller and characterized by the presence of the typical old fishermen houses, renowned as «Casoni», isolated and accessible only by small, shallow boats...</p> <p><i>Arfora island</i></p> <p>...others host peculiar tourist activities, and one in particular boasts the presence of a Sanctuary, a one of a kind in the whole world.</p>   <p><i>A traditional «Casoni»</i> <i>Barbano island</i></p> <p>The Municipality of GRADO take part in VPP4ISLANDS because it intends to hold to its long term vision, because it believes that a different future is possible, and because it believes that being here is an opportunity for growth and development.</p> <p><i>Thank you for your kind attention.</i></p> <p><small>This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852</small></p>	

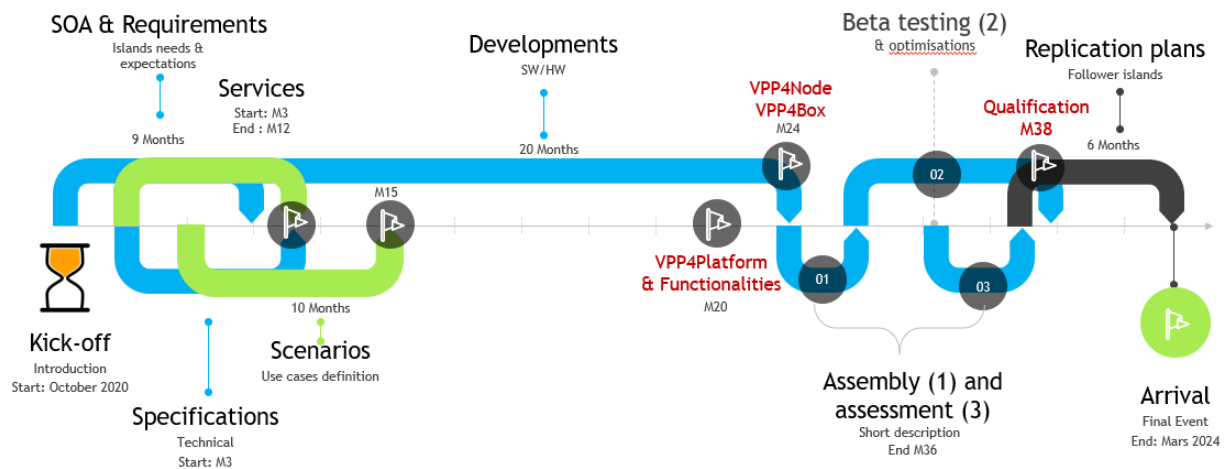
4. ROUND TABLES: MAKING CONNECTIONS

The more operational part of the kick-off meeting was certainly the one dedicated to the discussions around the technical and scientific workpackages. The WP discussions were held in the form of round tables, where at the beginning of each session, WP leaders made introductory presentations for their respective WPs and led discussions. With the involvement of the task leaders, the focus was put on the objectives, the key deliverables and deadlines, the interdependencies and linkages across WPs. The presentations are collected in Annex 2. The key outcomes from the meeting were recorded and will contribute to working reports and future deliverables.

5. CONCLUSIONS AND ROADMAP

The kickoff meeting brought together the entire consortium to ensure the coordination of activities between work packages. Effective WP round tables which included the participation of all consortium representatives, resulted in inputs supporting the agreed roadmap.

VPP4Islands Roadmap



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852



Annex 1 : meeting participants

SHORT NAME	PARTNER	Name SURNAME
AMU	Aix-Marseille University	Seifeddine BEN ELGHALI
AMU	Aix-Marseille University	Michel BENSOAM
AMU	Aix-Marseille University	Li ZHONGLIANG
AMU	Aix-Marseille University	Mustapha OULADSINE
AMU	Aix-Marseille University	Mohamed ZERROUGUI
AMU	Aix-Marseille University	Frédéric BECHET
AMU	Aix-Marseille University/Protisvalor	Micaela VIOLA
ALWA	algoWatt SpA	Stefano BIANCHI
ALWA	algoWatt SpA	Diego PISERA
ALWA	algoWatt SpA	Antonio MONNE
ALWA	algoWatt SpA	Federico NEBIACOLOMBO
SCHN	Schneider Electric	Francisco RAMOS
SCHN	Schneider Electric	David PAMPLIEGA
BC2050	Blockchain2050	Ioannis DONTAS
BUL	Brunel University London	Zahir DEHOUCHE
BUL	Brunel University London	Robert GARNER
BUL	Brunel University London	Carola Koenig
REGENERA	REGENERA LEVANTE	Victor FABREGAT TENA
CU	Cardiff University	Jianzhong WU
CU	Cardiff University	Yue ZHOU
CIVI	CIVIESCO srl	Michele STANO
CIVI	CIVIESCO srl	Angelo GIORDANO
INAVITAS	INAVITAS Enerji AS	Şafak BAYKAL
INAVITAS	INAVITAS Enerji AS	Anil AYDIN
IDEA	Ingenieria Y Diseno Estructural Avanzado	Pedro Ignacio MORENO
IDEA	Ingenieria Y Diseno Estructural Avanzado	Clara Osuna
RDIUP	RDI'UP	Habib NASSER
RDIUP	RDI'UP	Ameur ALAYA
RDI'UP	RDI'UP	Daria Dah
FTK	FTK Forschungsinstitut fur Telekommunikation und Kooperation EV	Dominic HEUTELBECK
CSIC / UIB	Consejo Superior de Investigaciones Científicas	Pere COLET
CSIC / UIB	Consejo Superior de Investigaciones Científicas	Damià GOMILA



TROYA	TROYA CEVRE DERNEGI	Oral KAYA
TROYA	TROYA CEVRE DERNEGI	Melis YILMAZ
TROYA	TROYA CEVRE DERNEGI	Banu AKKOK
UEDAS	Uludag electric dagitim	Mehmet KOÇ
UEDAS	Uludag electric dagitim	Cem KIZILKAYA
FORM	Consell Insular de Formentera	Antonio Jesús SANZ IGUAL
BornholmsVarme	Bornholms Varme A/S	Torben JØRGENSEN
BOZI	Bozcaada Belediye Baskanligi	Levent DEMIR
GRADO	Comune di Grado	Maria GENOVESE
GRADO	Comune di Grado	Gianluca BREGANT
GRADO	Comune di Grado	RafDouglas C. TOMMASI
DAFNI	DAFNI	Petros Marcopoulus



Annex 2 : presentations



algowATT
GREEN TECH SOLUTIONS

Stefano Bianchi
Antonio Monne
Diego Piserà

Work package 2 - Summary

TITLE: Island energy services requirements and concept design

PARTICIPANTS: ALWA, AMU, SCHN, BC2050, BUL, REGENERA, CIVI, IDEA Ingeneria, RDIUF, FTX, CSIC, TROYA, UEDAS, FORM, BornholmsVarme, BOZI, GRADO

OBJECTIVES:

- Energy services requirements (D2.2)**
 - Define island energy requirements.
 - Island potential for RES¹ implementation.
 - Identify obstacle to innovation.
- Energy services requirements (D2.1)**
 - Produce a review of services required by power grid.
 - Identify flexibility services that can be procured through VPP².

GOAL:
«The goal of WP2 is to implement the RES while ensuring the island electric grid stability and provide more flexibility through VPP solution.»

Case Studies and Methods:
To implement these services for four case studies in different islands will be analysed:

- Evaluate the impact of digital innovative tools (advanced forecasting, AI, shadow and KB).
- RES-centred digital twin
- Decentralized energy market
- Evaluate the DIT (Distributed Ledger Technology) and Smart contract.
- Mix between the three solutions
- Assessment of the mix between three innovation.
- Integration of VESS
- Evaluation of Virtual Energy Storage System (V ESS) in real and/or virtual VPP.



VPP4ISLANDS KICK-OFF MEETING
22 & 23 October 2020

14:00 - 14:50 Round Table 1 -
WP2: Island energy services requirements and concept design
ALWA - WP2 Leader

Concept design (D2.4)
Define the concept of VPP4Islands:
- Key components
- System architecture

Energy services requirements (D2.2)
Identify possible constraints to the services provided by VPP4Island:
- Island infrastructures
- Technological barriers
- Current market design

Energy services requirements (D2.3)
Define services offered by VPP4Island solution to improve performance.

Concept design (D2.6)
Define technical specifications and functional architecture of the VPP4Island solution.

Concept design (D2.7)


Concept design (D2.8)
Design scenarios for implementing and demonstrating VPP4Island solutions

Task 2.1 "Island needs and requirements" (M1 to M9)

Leader: ULUDAĞ ELEKTRİK DAĞITIM (UEDAS)

Participants: BUL, REGE, ALWA, SCHN, CIVI, TROYA.

Start month: 1 (Oct/20) **End month:** 9 (Jun/21)




Task 2.3 Definition of VPP4Islands concepts (M3 to M9)

Leader : BRUNEL UNIVERSITY LONDON (BUL)



Participants : UEDAS, CU, CIVI, AMU.

Start month: 3 (Dec/20)

End month: 9 (Jun/21)

Task	Start	End	Status
1.1	03/12/20	03/01/21	Completed
1.2	03/12/20	03/01/21	Completed
2.3	03/12/20	09/06/21	In Progress
2.4	03/12/20	12/09/21	Not Started

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Deliveries:

The report will establish a strong evidence-based data set and formulate possible VPP4Islands concepts hybrid integration options.

D2.4	Report on the VPP4Islands concepts	WP2	S - BUL	Report	Public	9
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• Based on the outcomes of Tasks 2.1 2.2 and 2.3(Requirements, Obstacles and Concept), possible constraints to the services provided by "existing" VPP4Islands will be identified and analysed.

• VPP4Islands services will be defined for improved performance and profitability.

• GDPR and standardization activities will be planned in this task to fulfil the above objectives and ensure compatibility and interoperability of defined services with what already exists in the market through standards and policies, DSOs will facilitate the dialogue with policy makers to assess their feasibility

Input: D2.2

CIVESCO

Output: D2.5 - VPP4Islands services, M9 - Jun/21

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Based on the studies in T2.1, this task will adapt and improve the different proposed concepts (Digital Twin, DLT and VESS) to create a novel VPP4Islands concept, which implements RES, defines a flexible green power plant that can provide both power support to the grid and store surplus energy.

This breakthrough has to consider the adaptive behaviour and architecture features to support unpredictable growth and change of demand, climate and market. As a result this study will provide the Key components and System architecture of VPP4Islands

• Also, a life-cycle based sustainability definition of the different concepts will be carried out covering economic, environmental and social challenges in comparison to reference systems with conventional portfolio providing the same services.

The value chain related to the definition of the concept has to significantly reduce fossil fuel consumption, maximize the economic and nonmonetized benefits of the added flexibility values in comparison to a classical structure of VPP

Input: D2.1, D2.2



Output: D2.4 - Report on the VPP4Islands concepts, M9 - Jun/21

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Task 2.4 Definition of VPP4I services (M3 to M12)

Leader : CivESCO (CIVI)



Participants : REGE, BUL, UEDAS.

Start month: 3 (Dec/20)

End month: 12 (Sept/21)

Task	Start	End	Status
1.1	03/12/20	03/01/21	Completed
1.2	03/12/20	03/01/21	Completed
2.3	03/12/20	09/06/21	In Progress
2.4	03/12/20	12/09/21	Not Started

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Based on the feedback, CIVI will improve the proposed services that will be well-reviewed in D2.2.

REGE - feedback about energy stakeholders' needs

Deliveries:

The report will present the existing services and their constraints. D2.6 will report the new tailored services provided for utilities, RTOs and consumers

D2.5	VPP4Islands services	8 - CIVI	Report	Public	?
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Task 2.5 Technical specifications (M3 to M12)

Leader: algoWatt (ALWA)



Goal: The outcomes of T2.5 specify the design of standardized interfaces, GUI, data management and optimal data exchange between the different actors involved in the flexibility service provision of VPP4Islands.

Input: The key components and system architecture of the VPP4Islands solution will be provided in D2.4. (Report on the VPP4Islands concepts)

Subtask:

- 2.5.1 Specification of the VPP4Islands solutions
- 2.5.2 Smart Contracts Specification



Technical specification will provide the necessary level of interoperability and underlying standardized data exchange between VPP4Islands' service providers, commercial and technical stakeholders. Therefore, a technical specifications layer for the VPP4Islands solution (WP6) will be provided, addressing the unified interactions of all the interested stakeholders, based on the VPP4Islands service design.

- In particular, T2.5.1 will:
 1. **Define** the resources to be modelled (in T3.1 and T3.2) as PVs, Wind turbines, batteries, households, appliances, HVAC, hydropower, water facilities and EVs, charging stations etc.
 2. **Define** the functionalities and the cloud-based services that will be designed in T3.3 and implemented in WP6 the VPP4IPlatform. (i.e. TSO and DSO services that may be provided by the VPP4Islands)
 3. **Introduce** the data management and protocols that are able to support the scalability, availability, modularity and usability features of the VPP4Islands solutions. Also, functional and non-functional specifications will be detailed.
 4. **Propose** the technological solution for the VPP4IBox including the needed hardware and software to be developed in T6.3 while considering open technologies.

Output: D2.6 - Technical specification of VPP4Islands. M3 - Jun/21



ST2.5.2 Smart Contracts Specification (M3 to M6)

Leader : Blockchain2050 CV (BC2050)



Participants : FTX, CU, UEDAS, TROYA, CIVI.

Start month: 3 (Dec/20)

End month: 6 (Mar/21)



ST2.5.1 "Specification of the VPP4Islands solutions (M3 to M12)":

Leader : algoWatt (ALWA)



Participants : AMU, BUL, CU, SCHN, BC2050, CIVI.

Start month: 3 (Dec/20)

End month: 12 (Sep/21)



Deliveries:

The deliverable will contain the technical specification for the setup of the different proposed services in the expected demonstration pilots, taking into account various configurations and scenarios and the proper support to KPI evaluation. Technical specifications will also be outlined for ensuring implemented RES and VPPs interoperability with the power grids, based on the improvement of current standards and protocols.

D2.6	Technical specification of VPP4Islands	1 - ALWA	Report	Public	0
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This subtask will define precisely the objective, the scope and the contents of the smart contracts to be implemented.

• The protocol for the dispatch of the flexibility requests inside the implemented VPP will be described. To this end, will be defined:

1. data to coordinate
2. data to exchange
3. transactions to support

• The performance requirements stemming from the quasi real time environment will be quantified (e.g. number of transactions per second, mean time to confirmation).

• We will investigate ways to valorise the most flexibility, while keeping an eye on reliability and overall cost for the system as a whole. We will put in place the relevant incentives from a game theory perspective to prevent market manipulation (e.g. flexibility hoarding) or predatory behaviours (e.g. over-selling flexibility in the hope it will not be activated). This could be achieved through proper market design, potentially in combination with external mechanisms (e.g. reputation tokens or escrow system).

• The smart contracts will also integrate a protocol for the settlement of flexibility activations, including penalties.

Output: D2.6 - VPP4Islands Smart Contracts Specifications. M6 - Mar/21



Deliveries:

The deliverable will contain a report on the definition of requirements, specifics and contents of VPP4islands smart contracts.

D2.7	VPP4islands Smart Contracts Specification	4 - Dec/2020	Report	Public	6
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- A number of representative scenarios, based on the selected services identified in T2.4, will be demonstrated in the use cases (Formigera, Gólgasda) to evaluate capabilities and values of VPP4islands. Evaluation will be implemented and assessed in WP7.
- The scenarios will also be defined to provide a basis for comparing values of various configurations, especially the electrochemical storage system, based on relevant KPIs.
- The scenarios will take into consideration the whole market structure and the environmental constraints. Scenarios will be formed considering characteristics of case studies, market structure and relevant KPIs.

Input: T2.4

Output: D2.8 - Technical specification of VPP4islands, M11 - Aug/21

Deliveries:

The deliverable will formalize several complementary piloting scenarios to demonstrate capabilities and values of the VPP4islands proposed services and solutions, providing input to WP3, WP4 and WP6 for the definition of the supporting functionalities, the associated architecture and the design and implementation approaches.

D2.8	Scenarios for studying VPP4islands concept	2 - ALWA	Report	Public	11
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WP2 Participation

Partner (initials and short name)	Participation per partner	WP2 effort
1- ALWA		5,00
2- ALWA		12,00
3- SCDS		4,00
4- SCDS		3,00
7- ICL		14,00
8- ERGONERGA		10,00
9- ICL		10,00
10- ICL		6,00
101- ICL		2,00
11- ERGONERGA		2,00
12- ICL		2,00
13- ICL		1,00
14- ICL		10,00
15- UEDAS		15,00
16- ICL		4,00
17- ICL		4,00
18- ICL		4,00
19- ICL		4,00
20- ICL		4,00
Total		121,00

Task 2.6 "Definition of scenarios (M6 to M15)":

Leader: algowATT (ALWA)



Participants: all partners.

Start month: 6 (Mar/21)

End month: 12 (Sep/21)



Milestones WP2

Milestone number	Milestone title	Lead beneficiary	Date (in months)	Means of verification
MS2	Requirements and needs	15 - UEDAS	3	D2.1
MS3	Technical specifications of VPP4islands solutions	2 - ALWA	9	two reports on technical specification of VPP4islands and be reviewed internally and by AB
MS4	Scenarios for studying VPP4islands concept	2 - ALWA	11	A report will be published in which a number of representative scenarios for studying the identified KPIs of VPP4islands are described.

BUSINESS OFFICES

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SMART ENERGY SOLUTIONS





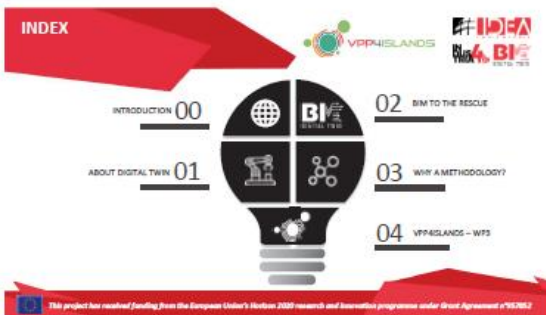
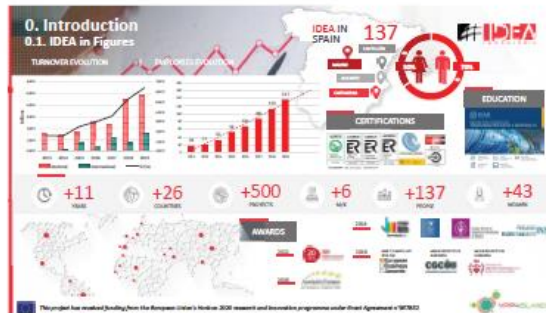
KICK-OFF MEETING
22nd & 23rd October, 2020

WP3: Digitalisation & Building of Island Energy Community

Pedro Ignacio Moreno Cuéllar
Digital Transformation Manager

Clara Osuna Yébenes
R+D Engineer

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PEDRO L. Moreno Cuéllar
D.T. MANAGER
PROJECT MANAGER

- BEng (Honours) Energy & Environmental Engineering > Edinburgh Napier University
- Máster Advanced Administration & Project Management > UCAM
- Máster Occupational Risk Prevention > UCAM

CLARA Osuna Yébenes
R+D ENGINEER
BIM MANAGER

- Civil Engineering > Universidad de Granada
- Máster (MSc) Civil Engineering > Swansea University
- Máster BIM & Big Data Analyst Manager > Universidad Europea Miguel de Cervantes

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CLARA OSUNA YEBENES



1. About Digital Twin
1.1. Data Importance

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1. About Digital Twin
1.2. From Big Data to Smart Data

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1. About Digital Twin
1.3. 2019-One World Trend

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1. About Digital Twin
1.2. From Big Data to Smart Data

Obtaining insights from data requires to convert Big Data into Smart Data. Smart Data focuses on the value of the information: it pretends to generate an extra value in the activity undertaken and, from the decision making process, taking the most appropriate actions in consequence.

Big Data + Analytics = Smart Data

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1. About Digital Twin
1.2. From Big Data to Smart Data

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1. About Digital Twin
1.4. What Do Clients Think About It?

- Futuristic Utopian Technology
- Change My Workflows Completely
- Difficult Implementation. Hard to learn
- Too Expensive Licences. Not Profitable

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1. About Digital Twin 1.5. What is a Digital Twin?

A "Digital Twin" is a virtual model of a process, product or service. It uses sensors to provide real time data while integrating IoT, artificial intelligence and software analytics.

The data collected can then be used to create a 'twin' which can accurately predict how these processes, products or services work, avoiding negatives consequences.

A "Digital Twin", must not be based just on electronics devices and software.

A Digital Twin has to be, above all, a COLLABORATIVE ITERATIVE WORK METHODOLOGY.

1. About Digital Twin 1.5. What is a Digital Twin?

...It uses sensors to provide real time data while integrating IoT, artificial intelligence and software analytics.



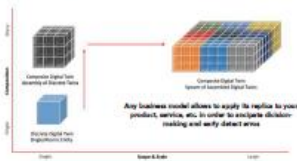
1. About Digital Twin 1.6. Digital Twin in Figures



Source: Industry Experts, Secondary Research, and MarketsandMarkets Analysis

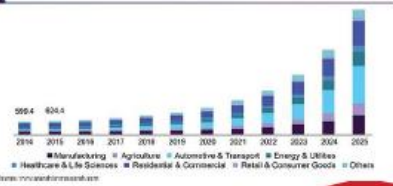
1. About Digital Twin 1.5. What is a Digital Twin?

A Digital Twin is a virtual model of a process, product or service...



1. About Digital Twin 1.6. Digital Twin in Figures

U.S. digital twin market size, by end use, 2014 - 2025 (USD Million)



2. Why a Methodology? 2.1. Road Map - Pyramid



2. Why a Methodology? 2.2. Road Map - Funnel

Strategic Level: VPP4ISLANDS, H2020, BI, I4.0
Operational Level: ERP / CRM, BIM / BIMCO, ICA/CA, PLC / PAC, Sensors, actuators, etc.
Technical Level: IIoT, Cloud, Edge, 5G, AI, AR/VR, Digital Twin, Digital Twin Software

Stages: Digital Twin Consultancy, Field Data Extraction, Field Data Management, 3D BIM Model Creation, Integrations BI - BIM, Digital Twin Software

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2. Why a Methodology? 2.3.1. Stage I - General Digital Consultancy For Procedures

Level LD: I4.0 & IIoT / IIoM Introduction
Level LC: General IIoT/IIoM
Level LB: IIoT Industry Plan/IIoT
Level LA: IIoT IIoM

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2. Why a Methodology? 2.3.2. Stage II - Specific Digital Consultancy For Digital Twin

Level LD: Generalized Support
Level LC: Lean Strategy
Level LB: Design Thinking
Level RA: Automation

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2. Why a Methodology? 2.3. Stage I & II - General & Specific Digital Consultancy For Procedures & D.Twin

Strategic Level: VPP4ISLANDS, H2020, BI, I4.0
Operational Level: ERP / CRM, BIM / BIMCO, ICA/CA, PLC / PAC, Sensors, actuators, etc.
Technical Level: IIoT, Cloud, Edge, 5G, AI, AR/VR, Digital Twin, Digital Twin Software

Stages: Digital Twin Consultancy, Field Data Extraction, Field Data Management, 3D BIM Model Creation, Integrations BI - BIM, Digital Twin Software

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2. Why a Methodology? 2.3.1. Stage I - General Digital Consultancy For Procedures

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2. Why a Methodology? 2.3.2. Stage II - Specific Digital Consultancy For Digital Twin

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2. Why a Methodology? 2.3.2. Stage II - Specific Digital Consultancy For Digital Twin

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2. Why a Methodology? 2.3.2. Stage II - Specific Digital Consultancy For Digital Twin

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2. Why a Methodology? 2.4. Stage III & IV - Databases Recopilation & Sensorization (if Requires)

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2. Why a Methodology? 2.3.2. Stage II - Specific Digital Consultancy For Digital Twin

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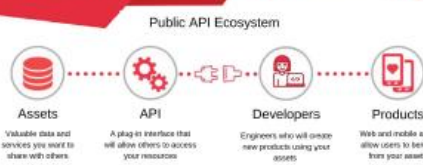
2. Why a Methodology? 2.4.1. Stage III - Databases Recopilation

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2. Why a Methodology?

2.4.1. Stage III - Databases Recapitulation



Public API Ecosystem

- Assets:** Valuable data and services you want to share with others.
- API:** A play-in interface that will allow others to access your resources.
- Developers:** Engineers who will create new products using your assets.
- Products:** Web and mobile apps allow users to benefit from your assets.

If your business possesses unique data, content, or services, you can generate enormous value by making them available via an API.

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2. Why a Methodology?

2.4.1. Stage III - Databases Recapitulation




Code-First Model from a Database in Entity Framework

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2. Why a Methodology?

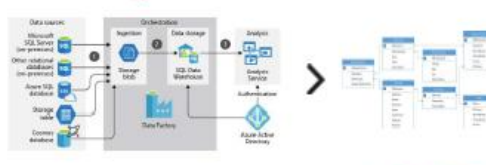
2.5. Stage V - IOT Web Platform with Business Intelligence



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2. Why a Methodology?

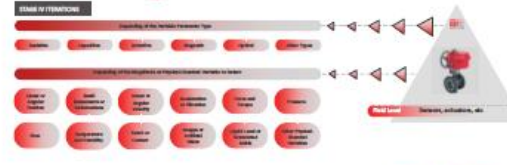
2.4.1. Stage III - Databases Recapitulation



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2. Why a Methodology?


2.4.2. Stage IV - Sensorization (If Requires)



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2. Why a Methodology?

2.5. Stage V - IOT Web Platform with Business Intelligence



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2. Why a Methodology?
2.5. Stage V.- IOT Web Platform with Business Intelligence



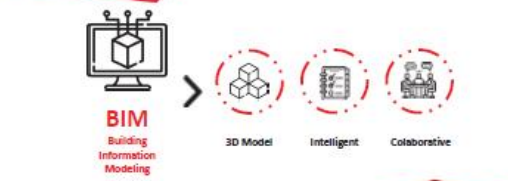
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2. Why a Methodology?
2.6. Stage VI.- BIM & Digital Twin Software




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2.6. Stage VI.- BIM & Digital Twin Software



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2. Why a Methodology?
2.5. Stage V.- IOT Web Platform with Business Intelligence



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2. Why a Methodology?
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2. Why a Methodology?
2.6. Stage VI- BIM & Digital Twin Software



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2. Why a Methodology?
2.6. Stage VI- BIM & Digital Twin Software



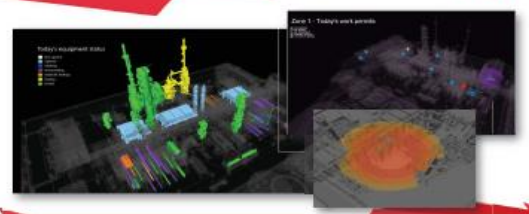
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2. Why a Methodology?
2.6. Stage VI- BIM & Digital Twin Software



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2. Why a Methodology?
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2. Why a Methodology?
2.6. Stage VI- BIM & Digital Twin Software



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2. Why a Methodology?
2.6. Stage VI- BIM & Digital Twin Software



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3. Advantages

3.1. General Main Features

- Realistic Technology -Today
- Does Not Change My Workflows
- Quick Implementation, Easy to learn
- Cheaper Than Other Solutions

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3. Advantages

3.2. Particular Main Features

- Operation**
 - Plant Global Management.
 - Energy Efficiency Improvement.
 - Operational Efficiency Improvement.
 - Reduction of Operating Costs.
- Maintenance**
 - High Level Predictive Maintenance.
 - Discovery of Opportunities for Improvement.
 - Spares Supply Improvement.
- Reliability**
 - Interconnection and Data Traceability.
 - Future Scenarios Simulation.
 - Reduced Downtimes
- Health & Safety**
 - Reduction of Insurance Costs.
 - Improvement of Planning and Safety.
 - Workers Control Improvement.

... Among others.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

4. Success Story

4.2. VPP4Islands – WP3 – Planning

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

3. Advantages

3.1. General Main Features

Problems and Improvements Opportunities which can be Solved by a Digital Twin

- Avoid problems before they occur. Predicting in a virtual environment directly, means cost-time savings which are translated into a greater efficiency, productivity, quality and economic benefits.
- Prevent downtimes. Applied to production, improving operational efficiency, avoiding downtimes.
- Develop new business opportunities. It allows exploring new ways of adding client value.
- Plan the future through simulations. If regulations or work systems change somehow, the digital twin allows anticipating possible incidents.
- Customize production to customer's requirements. Before facing real problems in production, a digital twin could simulate how the item will respond according to the client specifications.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement n°957852

4. Success Story

4.1. VPP4Islands – WP3 – Team

WP No.	Start Date	End Date	IM-2023	WP Leader	BCA					
WP 1	1	2	3	4	5	6	7	8	9	10
WP 2	11	12	13	14	15	16	17	18	19	20
WP 3	21	22	23	24	25	26	27	28	29	30

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4. Success Story

4.3. VPP4Islands – WP3 – Tasks

Task 3.1 Design and architecture of Digital Twin (M0 to M10) - T3.1 leader: IEHA, Participants: SOPT: This task will focus on creating plug-in API for modelling to be used for testing in this WP and integrated in the whole VPP4Islands in WP6. The outputs of T3.1 and T3.2 will serve as the basis for the development of a modular model that includes the VPP4Islands, the system operators, and the flexibility market. In this model, each module will include one of the models from T3.1 and T3.2. The data exchange between the modules will cover all defined interactions and information exchange between the different models. Inputs from WP5 will also be taken into consideration to account for the security of the whole system. The standards and plugable business of the ecosystem will then support the validation of all different modules in T3.4.

A multi-agent design (MAD) principle is proposed for the creation of the application through the team of collaboration and communication between multiple independent VPP4Nodes. These principles lays the basis of managing the inherent uncertainty in energy production of individual BESs by taking an aggregate approach, where the uncertainty of the total of BESs in the final emergent VPP4Platform is significantly lower than when considered in isolation. The goal is allowing for seamless integration into the existing energy market, thus allowing a better share of renewables without a negative effect on the system stability.

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4. Success Story

4.3. VPP4Islands – WP3 – Tasks

Task 3.2 Systems modeling (DT) (M6 to M15) - T3.2 leader: CSC, Participants: IEA, BUL, AMU and CU;
In this task, the different systems connected and controlled by the VPP4Node and VPP4Bus will be modeled (PV, Wind turbines, batteries, smart grids, appliances, HVAC, hydroponics, water treatment and EV), charging stations etc.). The modeling will be based on the analysis performed in T3.1. The resources included in the pool of the VPP4Island will cover the whole spectrum: HVAC, small turbines, PV, charging system etc.) and DER, including RES, TMS/EMS operation systems, plants, electrical and thermal storage, electric vehicles, powertrains, and centralized buses and power grids. T3.2 will be able to model and build virtual E.C.s. An example of the VPP4Node and the resources in its pool is illustrated in Figure 1. In this, the information exchange and the different systems within the VPP4Island are shown. The DT will be reinforced by the Knowledge graph and AI module in T3.2.

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4. Success Story

4.3. VPP4Islands – WP3 – Tasks

Task 3.4 Validation of APIs and models (M 15 to M 20) - T3.4 leader: IEA, Participants: CU, BUL, AMU, SOFT, In this task, the API developed in T3.1 that includes the models of T3.1 and T3.2 will be validated based on the scenarios defined in T3.2 considering only modeling. The validation will be done through simulations and tests through HIL approach by CU, AMU and BUL. The simulations will consider different portions to validate the aggregation and disaggregation actions of a suggested VPP4Node. The basic modeling and simulation functionalities of Alpha and Beta VPP4Platform (VPP) will also be validated, covering the interactions between the subsystems, the flexibility services, and the system operators. Representative scenarios will be validated in the laboratory. For testing activities, the extension functionalities of T3.1 will be integrated in the cloud infrastructure of the Smart Grid demonstrator. The different tests and results will be analysed and presented with the help of the laboratory's existing visualization interfaces.

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4. Success Story

4.3. VPP4Islands – WP3 – Tasks

Task 3.3 Environment modeling (M6 to M15) - T3.3 leader: CSC, Participants: IEA, BUL, AMU, VPP and BIF;
The objective of the VPP4Island is to create a platform that allows the integration of different VPP4Nodes and to modelled modeling in the task service provider (RaaS), smart grids, etc. The system bus and all components (grid, storage, EMS and distributed energy system (DES) are supported. The modeling and simulation of the system will be done through HIL approach by CU, AMU and BUL. The resources included in the pool of the VPP4Island will cover the whole spectrum: HVAC, small turbines, PV, charging system etc.) and DER, including RES, TMS/EMS operation systems, plants, electrical and thermal storage, electric vehicles, powertrains, and centralized buses and power grids. T3.2 will be able to model and build virtual E.C.s. An example of the VPP4Node and the resources in its pool is illustrated in Figure 1. In this, the information exchange and the different systems within the VPP4Island are shown. The DT will be reinforced by the Knowledge graph and AI module in T3.2.

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THANKS FOR YOUR ATTENTION

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Position



WP4: Smart Functionalities for Energy Management & decarbonisation

Moderators: Zhongliang LI, Seifeddine BENEGLHALI
22nd October 2020

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Plan

VPP4ISLANDS PROJECTS		WP	Task
Task ID	Task Name	Start	End
1	WP1: Identification and project management	2020	2021
2	WP2: System architecture	2020	2021
3	WP3: System implementation	2020	2021
4	WP4: Smart functionalities for energy management and decarbonisation	2020	2021
5	WP5: System evaluation	2020	2021
6	WP6: Dissemination, communication and exploitation of results	2020	2021



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Team

Partner number and short name	WP4 effort
1 - ASM	22.00
2 - ALMA	22.00
3 - BCL	2.00
4 - BSGENIEUR	26.00
5 - C2C	27.00
6 - ENUSTEIN	20.00
11 - BDEP	6.00
13 - CSC	14.00
15B	17.00
15+ UREHS	7.00
Total	180.00

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Objectives

- Enhance RES implementation, provide grid flexibility
- ML-based and advanced algorithms to **predict** the main environmental factors (Weather, Market prices, loads).
- The virtual energy storage system **concept**.
- Optimal control strategies and **smart energy management** algorithms.
- Decarbonise** the existing energy systems

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Deliverables

Deliverable Number	Deliverable Title	Lead Institution	Type*	Horizon 2020 ID**	Start Date	End Date	WP4 Effort	WP4 Contribution
D1.1	System architecture	ASM	WP	101011085	2020	2021	22.00	WP4 Contribution
D1.2	System implementation	ASM	WP	101011085	2020	2021	22.00	WP4 Contribution
D1.3	Smart functionalities for energy management and decarbonisation	ASM	WP	101011085	2020	2021	22.00	WP4 Contribution
D1.4	System evaluation	ASM	WP	101011085	2020	2021	22.00	WP4 Contribution
D1.5	Dissemination, communication and exploitation of results	ASM	WP	101011085	2020	2021	22.00	WP4 Contribution

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Tasks

Task 4.1 Forecasting (M4 to M20)

T4.1 leader: AMU, **Participants:** T4E, CIVI, REGE

Description:

- Weather
- Market prices
- Local energy consumption
- Energy and CO2 savings



Tasks

Task 4.3 Distributed and shared control (M9 to M20)

T4.3 leader: CSIC, **Participants:** AMU, CU

Description:

- Numerical simulations based on the model developed in Task 3.2.
- Test several protocols of distributed control.
- Be implemented in WP6.
- Estimate the potential of HVAC devices.
- Consider the use of storage solutions.



Tasks

Task 4.5 Energy management system and optimal operation strategy (M4 to M20)

T4.5 leader: AMU, **participants:** BUJ, CSIC, T4E

Description:

- Develop a two level of optimization.
- Inputs from WP4 (T4.1, T4.2, T4.3) and WP3 (T3.2).
- The higher level - solve conflicting interests and achieve an overall optimal performance.
- The second level - generation of set-points for each asset in the VPP4INode.
- ML for the flexibility will be developed.



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Tasks

Task 4.2 Decision support system (DSS) and Smart Planning Tool (SPT) (M9 to M20)

T4.2 leader: RDIUP, **Participants:** CSIC, AMU, REGE

Description:

- AI-based DSS module.
- Consider multi-parametric aspects.
- Maximize decarbonization.
- Interact with WP3, WP5, and T4.1, T4.5.
- Be validated and used in WP7.



Tasks

Task 4.4 Virtual energy storage system (M4 to M20)

T4.4 leader: CU, **Participants:** AMU, CSIC

Description:

- Part of the smart management of the VPP4islands
- Model VESS components and controllers.
- Develop a VESS control method.
- Model, predict and overcome the power imbalance of supply and demand.



Tasks

Task 4.6 Balancing service provision and prosumer aggregation (M4 to M18)

T4.6 leader: ALWA, **Participants:** CU, RDIUP

Description:

- Balancing Service Providers (BSP).
- Support Production and Load Aggregators (PLA)
- Consider scalability and reliability constraints.
- Maximize local flexibility provision.
- Compare centralised coordination methods with the decentralised solutions.



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Kick off meeting

Round Table 4

WPS: Secure communication & smart contract
WP Leader: BC2050

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Objectives

WPS is responsible to ensure information security and trusted processes, as well as some aspects of physical security in the implementation of VPPs as part of the critical energy grid infrastructure.

Ensure confidentiality, integrity, and availability of information in the VPP.

Provide strategies based on smart contracts for eliminating the need for intermediaries by establishing smart contracts among VPP members and/or between the VPP, power infrastructure owners, and consumers with the goal of reducing cost and increasing flexibility.

Ensure trust between stakeholders.

Provide methods and tools for integrating the VPP members systems and infrastructure with the VPP4islands systems following a minimal disclosure principle and by granting individuals final control over resource availability by establishing hybrid Authentication and Authorization infrastructures connecting local systems to the smart contracts.

Examine physical security requirements for deploying VPP4islands interfaces in the infrastructures of VPP4islands members.

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Tasks

- Task 5.1 - Risk Assessment (M4 - M42) – Task Leader: BC2050
- Task 5.2 - Data analytics and knowledge elaboration (M4 - M20) - Task Leader: RDIUP
- Task 5.3 - Smart Contracts Implementation (M6 - M18) - Task Leader: BC2050
- Task 5.4 - Hybrid Authentication and Authorization Infrastructure (M6 - M18) - Task Leader: FTK
- Task 5.5 - Authentication and Authorization Infrastructure (M12 - M20) - Task Leader: FTK
- Task 5.6 - GDPR, standards and SSH compliance (M4 - M20) – Task Leader: RDIUP

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Partners and efforts in WPS

Partners	Effort (PMa)
ALGOWATT	3.00
BC2050	26.80
BUL	1.00
REGENERA	4.00
CU	6.00
RDIUP	21.00
FTK	22.00
Total:	83.80



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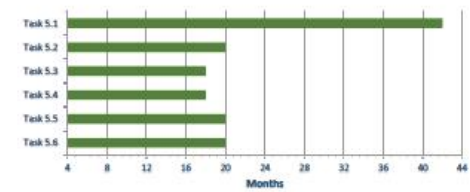
Inputs/Outputs from/to other WPs

WP2 → WPS	VPP4ISLANDS Concept & Pricing scenarios, Smart Contracts Specifications	WPS → WP2	Risk & mitigation measures from VPP stakeholders point of view
WP3 → WPS	VPP4ISLANDS digital twin configuration elements	WPS → WP3	Information for the security of the whole system, Risk & mitigation measures from VPP stakeholders point of view
WP4 → WPS	VPP4ISLANDS services	WPS → WP4	Data mining app to define customized services, info on the smart contracts, info on focus on segmentation of end users and their energy consumption behavior, Risk & mitigation measures from VPP stakeholders point of view
WPS → WP6	Feedback from development stages for potential debugging	WPS → WP6	

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Gantt chart



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Task5.1: Risk Assessment

- LEADER: BC2050
- PARTICIPANTS: all
- DURATION: M4-M42
- SCOPE: T5.1 is addressing the risks of VPP stakeholders during operation as opposed to the consortiums risks with regards to achieving project goals. An in-depth risk assessment with the individual VPP stakeholders will be performed twice, measures will be proposed to be adopted. These risks and mitigation measures will be fed into the requirements engineering of the rest of WPs. The assessment activities will be aligned with the validation activities defined in WP7.
- OUTPUT: Report on VPP risk assessment

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Task5.3: Smart Contracts Implementation

- LEADER: BC2050
- PARTICIPANTS: RDIUP, FTK
- DURATION: M6 – M18
- SCOPE: Development of smart contracts: configuration of the environment, the conditions, the parameters, the rules etc. of the envisioned transactions, relevant code. *Some info:* Solidity language, Ethereum blockchain, Kovan testnet usage etc.
- OUTPUT: Report on the fulfilled implementation activities of the smart contracts.

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Task5.5: Authentication and Authorization Infrastructure

- LEADER: FTK
- PARTICIPANTS: BC2050
- DURATION: M12 – M20
- SCOPE: Definition of the requirements for integrating the blockchain services and methodologies developed in T5.3 and the AAI developed in T5.4 based on the VPP4Islands services as defined by WP2-3-4. Delivery of open source tools for accessing blockchain smart contracts within the AAI and to realize matching administrative models extending the SAPI tools and services. In addition, T5.5 is to provide APIs for the other WPs to easily integrate and utilize with the AAI.
- OUTPUT: AAI Infrastructure software

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Task5.2: Data analytics and knowledge elaboration

- LEADER: RDIUP
- PARTICIPANTS: FTK, BC2050
- DURATION: M4-M20
- SCOPE: Data analytics / data mining API
 - Design, adaptation and implementation of data mining application.
 - A specific protocol to train and test the different machine learning and verify the reliability of the results. The security of data collection and exchange will be ensured.
 - Specific activity to focus on the segmentation of end users and the detection of important and lasting changes in their energy consumption behavior.
 - A knowledge graph with AI approaches to be used with gathered data to establish monitoring approaches of physical systems and processes.
 - A secure computation offloading scheme for Cloud-Node-Edge environment to classify workloads and select available edges based on Reinforcement Learning.
 - A Machine Learning (Neural Network) based task offloading and resource allocation algorithm which will use an experience replay training method to improve the defined model.
- OUTPUT: Data mining API mining and Report on the main results of the module deployment and first findings of the analyses carried out.

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Task5.4: Hybrid Authentication & Authorization Infrastructure

- LEADER: FTK
- PARTICIPANTS: BC2050
- DURATION: M6 – M18
- SCOPE: Application of Authentication and Authorization Infrastructure (AAI) architectural patterns so to ensure the data sovereignty, to provide flexible means of implementing cybersecurity requirements based on infrastructure and local requirements. API & architecture of the AAI especially defining a service for authorization and filtering, as well as APIs for extending the AAI with domain specific Policy Information Points. A reference implementation will also be delivered for partners to develop and test against.
- OUTPUT: AAI Infrastructure API Specification and Prototype

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Task5.6: GDPR, standards & SSH compliance

- LEADER: RDIUP
- PARTICIPANTS: ALGOWATT , BC2050, BUL, REGENERA, CU, FTK
- DURATION: M4 – M20
- SCOPE: To ensure that all WP5 developments comply with GDPR, relevant regulations and SSH considerations defined in WP2. All resulting lessons learnt & best practices from the demos will also be assessed & reported later.
- OUTPUT: Report on WP5 assessment of GDPR, standards and SSH compliance.

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Deliverables

- **DS.1 : VPP risk assessment [12] / IC2050** / Risk management plan and activities framework for VPP, exposing the risk management approach of the project. Updated versions at M24, M36, M42.
- **DS.2 : Data analytics API and analysis [20] / RDUP** / A final version of the datamining API mining and report the main results of the module deployment and first findings of the analyses carried out.
- **DS.3 : VPP4ISLANDS Smart Contracts Implementation [18] / IC2050** / A report on the fulfilled implementation activities of the smart contract.
- **DS.4 : AAI Infrastructure API Specification and Prototype [10] / FTK** / The application programming interface (API) and architecture of the AAI Infrastructure, especially defining an reactive public-subscribe service for authorization and filtering, as well as APIs for extending the AAI with domain-specific Policy Information Points. A reference implementation will be delivered for partners to develop and test against. First version at M12, final version at M30.
- **DS.5 : AAI Infrastructure software [20] / FTK** / The AAI software which will be made available in different forms: a) Software libraries for application development, and b) pre-configured appliances for container-based delivery (e.g., Docker and Kubernetes). The source code will be hosted in version-control systems, while the binary libraries and appliances will be hosted on repositories for support of continuous integration and deployment pipelines. First version at M18, final version at M30.
- **DS.6 : Assessment of GDPR, standards and SSH compliance [12] / RDUP** / Report on the impacts of implemented standards, policies, risk analysis and guidance based on the outcomes of demos. It will be updated at M30 with lessons learnt and best practices.

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Thank you for your attention!



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WP5 Milestones

Milestone number	Milestone title	Lead partner	Due Date	Means of verification
MS 5	Proof-of-concept hybrid AAI	FTK	12	An autonomous demonstrator showing the integration of smart contracts and AAI has been developed, and is running in a containerized environment. (DS.3)
MS 6	Hybrid AAI Initial Release	FTK	18	The policy decision points and the smart contract policy information points are released with full documentation (DS.4)
MS 7	Final AAI release	FTK	20	The improved AAI is released and documented. (DS.5)

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WP6 VPP4Islands platform development

Kick-off Meeting 22nd-23rd October 2020

David Pampliega – Schneider Electric

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Participants

- AMU – 10 PM
- ALWA – 21 PM
- SCHN – 21 PM
- BC2050 – 8.6 PM
- BUL – 1 PM
- CU – 5 PM
- INAVITAS – 20 PM
- IDEA – 2 PM
- RDIUP – 3 PM
- UEDAS – 5 PM

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Task Overview

- WP6: VPP4Islands platform development [SCHN] – M12-M28
 - Task 6.1: Development of VPP4IPlatform [ALWA] – M12-M22
 - Subtask 6.1.1: Design and architecture of VPP4IPlatform [ALWA] – M12-M18
 - Subtask 6.1.2: User-Interface development [INAVITAS] – M12-M22
 - Subtask 6.1.3: VPP4IPlatform Deployment [AMU] – M20-M28
 - Task 6.2: Development of VPP4INode [AMU] – M12-M24
 - Task 6.3: Realisation of the VPP4IBox [SCHN] – M12-M24
 - Task 6.4: Solution Assembly [ALWA] – M24-M28

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Objectives

- Integrate, connect, and combine modules from earlier work packages to realize the VPP4Islands solution.
- Allow individual nodes act autonomously as a distributed platform.
- Solving the unreliability of renewable energy sources through collaboration and aggregation.

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WP6 dependencies



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Task 6.1 Development of VPP4IPlatform

- Leader: ALWA
- Participants: RDIUP, BC2050, SCHN, IDEA, INAVITAS, AMU
- Objectives
 - Creation of VPP4IPlatform.
 - Outputs from T2.4, T3.1 and T3.2 will serve as the basis for the definition of the information exchange and interactions between all involved actors and the flexibility market.
 - The architecture will be defined according to the data exchange between the actors.
 - Inputs from WP5 will also be considered regarding the security of the system.

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Subtask 6.1.1 Design and architecture of VPP4IPlatform



- Leader: ALWA
- Participants: RDIUP, BC2050, SCHN
- Objectives
 - Definition of the principles for information sharing using a **multi-agent based approach**, to improve collaboration principles based on past interactions.
 - Use cases to guide the architecture and business activity of the platform.
 - Integration of data analytics/AI, Machine Learning, modelling module, extensions, functionalities and GUIs defined in T2.4 and in WP4.
 - Consideration of value chain, life cycle costing (LCC) and Life cycle assessment (LCA) from WP2.
 - Compliance with GDPR and other relevant regulations.

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Subtask 6.1.3 VPP4IPlatform Deployment



- Leader: AMU
- Participants: ALWA, IDEA, INAVITAS, BC2050
- Objectives
 - Development of the VPP4IPlatform, following the SCRUM methodology.
 - An open environment will be selected to integrate the different functionalities, APIs, device management, GIS and libraries.
 - Two versions of the platform will be developed:
 - Alpha, with the initial modules and allowing to test basic functionalities and carry out testing operations. This version will be tested in T2.4 and compared with the smart grid lab of CU.
 - Beta, a stable version that will integrate all improved modules to be used in WP7 and create demonstrations and qualification.
 - Also, a knowledge base and a modelling of different scenarios will be elaborated to create a "shadow" of the different demonstrations proposed by UEDAS and FORM.

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Task 6.3 Realisation of the VPP4IBox



- Leader: SCHN
- Participants: AMU, RDIUP
- Objectives
 - The Virtual Power Plant is a concept that requires substation devices, more interoperability (with other connected devices and protocols), modularity, security and efficiency.
 - In this context, new functionalities for substation automation devices will be developed, to provide control systems that comply with the new requirements of the VPP and the island environments.

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Subtask 6.1.2 User-Interface development



- Leader: INAVITAS
- Participants: ALWA, RDIUP
- Objectives
 - User interfaces will be based on the architecture and design of the VPP4IPlatform.
 - User trends and needs will be used for the solution development process.
 - Global trends will be followed at interface designs.
 - Intuitive processes are going to be provided to the users by obtaining feedback from them.

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Task 6.2 Development of VPP4INode



- Leader: AMU
- Participants: RDIUP
- Objectives
 - Deploy the NB-IOT and a modular GMS module as a second alternative.
 - The VPP4INode is a gateway that will ensure a distributed communication with VPP4IBoxes, creating VPPs, smart EGs and internal P2P market, and acting autonomously within the network of nodes.
 - In the network, each node periodically will communicate the local supply and demand information to neighboring nodes, augmented by forecasting information from T4.3.
 - Based on this, each node will be able to dynamically interact with other nodes to resolve inequalities in the expected supply and demand by performing energy transactions using the DU-based smart contract developed in WPS.

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Task 6.4 Solution Assembly



- Leader: ALWA
- Participants: IDEA, RDIUP, SCHN, CU, BUL, BC2050, ALWA, AMU, UEDAS
- Objectives
 - Assembly of all modular functionalities, APIs and interfaces.
 - Plan, host and execute the migration to a European cloud-based platform as a service (Datacenter in Europe) for scaling up. The migration to larger servers to support the traffic growth is expected from third parties using the proposed web-based services.
 - The three solutions (T6.1, T6.2 and T6.3) will be tested together to validate the whole architecture.

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Deliverables



- D6.1: VPP4IPlatform software [ALWA] – M22 – CO
- D6.2: VPP4INode software [AMU] – M24 – CO
- D6.3: VPP4IBox and report on development and analysis [SCHN] – M24 – CO
- D6.4: Results of assembly and guide of installation and configuration [ALWA] – M28 – PU

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Risks



- Cyber-attacks to the platform [Low, Medium] - Precautions will be taken to improve the security and to maintain a high level of resistance. Regular backups will be made of database and website functionality.
- DERs are likely to use heterogeneous technology which can prove difficult to integrate with the VPP4Islands infrastructure [Medium, Low] - The VPP4I-Box will provide a hardware module facilitating communications to the VPP4Islands infrastructure, acting as a 'bridge' for heterogeneous technology components.
- Integration complexity regarding data exchange and interface compliance [Medium, Medium] - The platform will integrate several complementary tools/functionalities and will be deployed in several significant pilots. An integration methodology will guide the partners to integrate all the main components/building blocks.
- The degree of central control in the system could present challenges when it comes to the latency and security, potentially reducing the stability of the system [Low, Medium] - Depending on results from initial simulations and tests, other solutions will be investigated relying on more decentralized modes of control.

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Milestones



- MS11: VPP4I-Platform release [ALWA] – M22 - Software released and documented
- MS12: VPP4I-Node release [AMU] – M24 - Software released and documented
- MS13: VPP4I-Box prototype [SCHN] – M24 - VPP4I-Box tested and running
- MS14: VPP4Islands ecosystem [ALWA] – M28 - VPP4Islands factory tested and running

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Q&A



VPP4ISLANDS

We will do the VPP application on Gökçeada



These islands are fed by submarine cables from the mainland, and when the energy is cut from the mainland, the energy of the island is lost.



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Gökçeada, Sozcaada, Marmara, Avşa, Ekinlik and Paşalimanı Islands in UEDAŞ operation area.



GÖKÇEADA

Population 9.440 in winter, over 40.000 in summer
Demand power 6 MW.
Area 279 km²



There is a diesel generator as a backup supply system only on Gökçeada from the islands and it feeds the grid by being activated in case of emergency.

UEDAS has 4x770 kVA diesel generators.



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WP8 Presentation

Presenter: Amour ALAYA
Meeting: VPP4Islands Kick-off meeting
Organiser: AMU
Location: Video and/or telephone conference connection
Date: 23 October 2020

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WP8 – Objectives




This WP is the project engine for dissemination and communication activities. Moreover VPP4Islands solution services, business and exploitation will define with this WP. All exploitable solutions will be monitored by IPR rules defined task 8.6. This WP will then:

- Plan and execute and dissemination and communication activities
- Reach out to researchers and potential stakeholders to disseminate VPP4Islands findings and attract investors
- Ensure the project visibility at all levels and citizens acceptability to ease its integration
- Define a tailored business model and attractive services to facilitate VPP4Islands adoption

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WP8 – Deliverables




The below table displays WP8's deliverables

N°	Deliverable name	Lead partner	Due Date	Level
1	Dissemination and communication plan	AMU	1	PU
2	Report on D&C activities	RDIUP	24	PU
3	VPP4Islands networking, JV and cooperation plan	TROYA	4	PU
4	VPP4Islands networking, JV and cooperation activities	TROYA	12	PU
5	Business model, exploitation strategy plan and activities	RDIUP	24	PU
6	Report on the IPRs analysis and the patent filing	BUL	12	PU

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WP8 – Overview



- Objectives
- Task Activities
- Deliverables
- Milestones
- Risk Assessment
- Plan of actions

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WP8 – Task Activities



WP8 is divided on 5 complementary and structured tasks to achieve its objectives. These tasks are:

- Task 8.1 Communication and Dissemination Plan (AMU): The due date for the first deliverable is M1. All partners are invited to contribute to finalise this deliverable
- Task 8.2 Communication and Dissemination activities (RDIUP): Project web site developments is lunched and will be delivered by M3. Create project official pages in social media. Monitors partners workshops as specified in the proposal
- Task 8.3 Networking and joint venture actions (TROYA): Create close collaboration with similar ongoing previous projects
- Task 8.4 Tailored business models, services and results exploitation (RDIUP): Guarantee project profitability through the definition of tailored services and clear results exploitation plan
- Task 8.4 Protection and allocation of Intellectual Property (BUL): Through this task intellectual property management will be covered and detailed

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WP8 – Milestones



N/A

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WP8 – Risk assessments



The below table displays WP8's risks and their mitigation plan

Nº	Description	Mitigation
15	Lack of interest among SMEs, aggregators and promoters (L, Low, I High)	We will facilitate the participation of target groups to visit the workshops and virtual infodays and promote the involvement of end-users through basic open services
16	The difficulty to define a sustainable business model (L, Low, I High)	To mitigate this RDUUP will include the non-monetary profits in the business model to guarantee the durability of the VPP4I factory.


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WP8 – Plan of actions



The below diagram presents WP8 activities plan for the upcoming year :

VPP4I leads: WP8 1st year plan of action	Task	From October 2020 to September 2021												Responsibility	
		1	2	3	4	5	6	7	8	9	10	11	12		
1	Developed the self communication plan	1	1												RMU
2	Project website	1	8												Subcontract
3	Project mobile phone-videos 1	8	8												Subcontract
4	Project mobile phone-videos 2	8	12												Subcontract
5	Creation of project web pages on social media	2	8												RMU
6	Project list presentation	8	8												RMU
7	Project list presentation	11	12												RMU
8	Presentations 1	8	8												RMU
9	Presentations 2	11	12												RMU
10	Participation to webinar														RMU
11	Participation to webinar														RMU
12	Participation to webinar														RMU
13	VPP4I final networking, PV and cooperative plan	1	8												RMU
14	VPP4I final networking, PV and cooperative plan	8	12												RMU
15	VPP4I final networking, PV and cooperative plan	8	12												RMU
16	VPP4I final networking, PV and cooperative plan	8	12												RMU

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