VPP4ISLANDS

Virtual Power Plant for Interoperable and Smart isLANDS

VPP4Islands

LC-SC3-ES-4-2020

GA 957852

Deliverable Report

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Lead beneficiary	AMU		
Contributors	All		
Reviewer	TROYA		
Due date	31/10/2020		
Date of final version	31/10/2020		
Dissemination level	PU: Public		
Document approval	Seifeddine BENELGHALI	31.10.2020	

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

Acknowledgement: VPP4ISLANDS is a Horizon 2020 project funded by the European Commission under Grant Agreement no. 957852.

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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	Brunuel 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 fur Telekommunikation und Kooperation EV
GRADO	Comune di Grado
IDEA	INGENIERIA Y DISENO ESTRUCTURAL AVANZADO
IFISC	Institute for cross disciplinary physics and complex systems
INAVITAS	INAVITAS Enerji AS
LIS	Laboratoire d'Informatique et Systèmes
RDIUP	RDI'UP
REGENERA	REGENERA LEVANTE
SCHN	Schneider Electric
TROYA	TROYA CEVRE DERNEGI
UIB	Universitat de les Illes Balears
UEDAS	Uludag electric dagitim

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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.

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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.

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The introduction from the Coordinator, soon after the welcome speech from the President of AMU, was intended to give an overview of the project and recall the steps undertaken so far.

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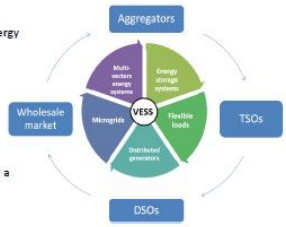
Concepts & Tools

- 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-dimentional Flexibility

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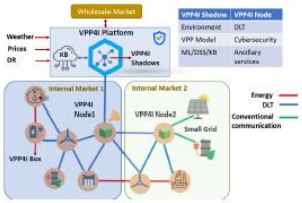
Concepts & Tools

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)

GOKCEADA ISLAND

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Validation and User cases

- Lead Island 2 : FROMENTERA ISLAND (Spain)

Area : 83 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)

Bornholm Island

Grado Islands

Bozcaada Island

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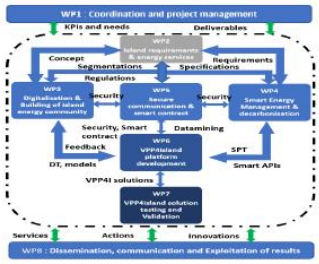
Workpackages



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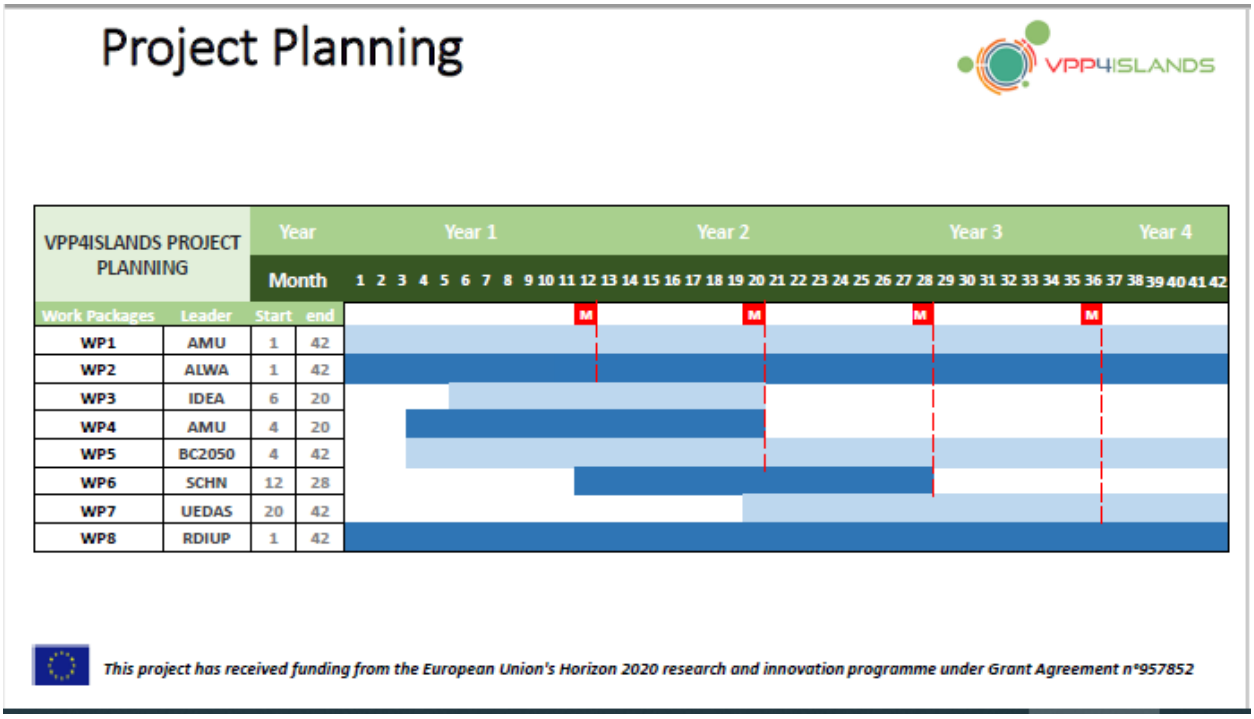

2. CONSORTIUM PRESENTATIONS

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.

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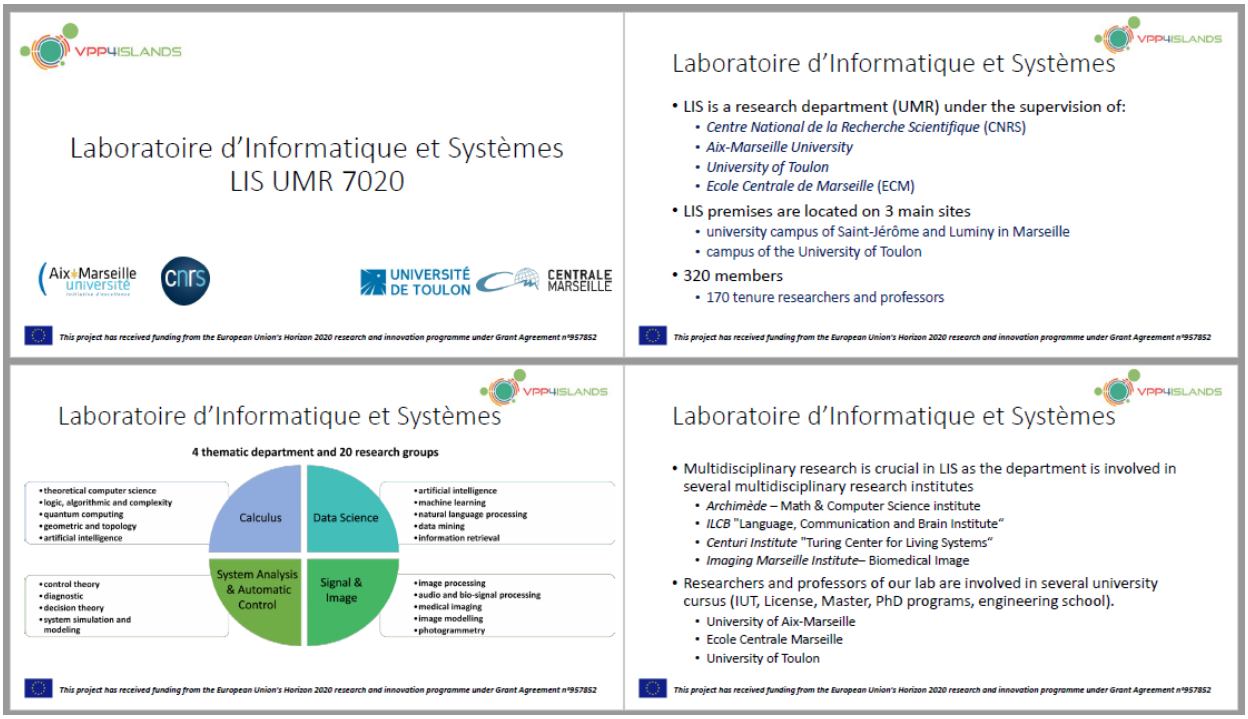
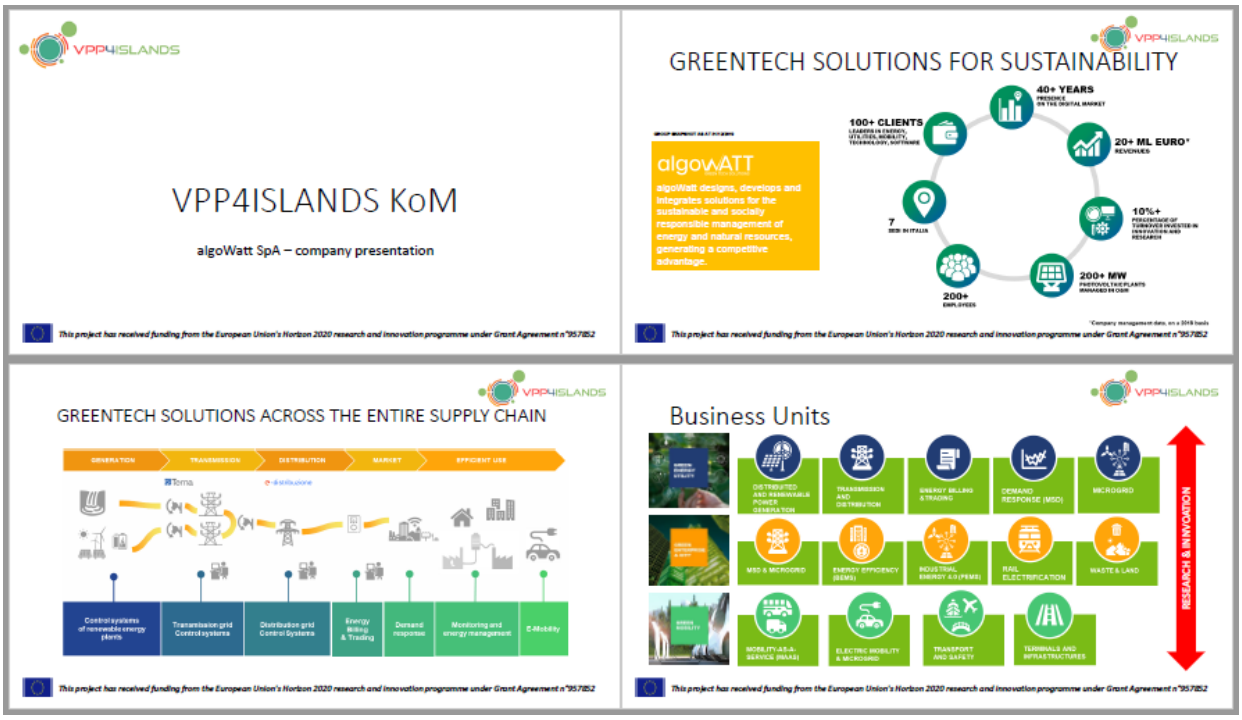
1. AMU



2. ALWA



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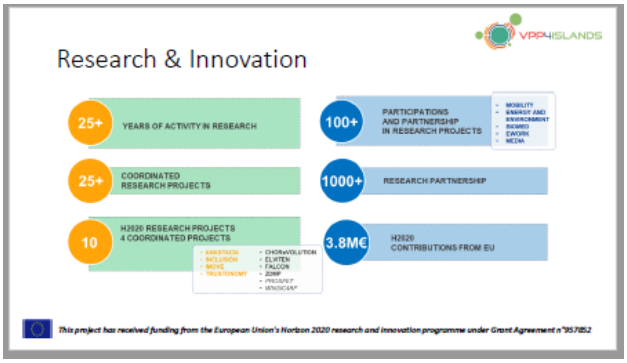
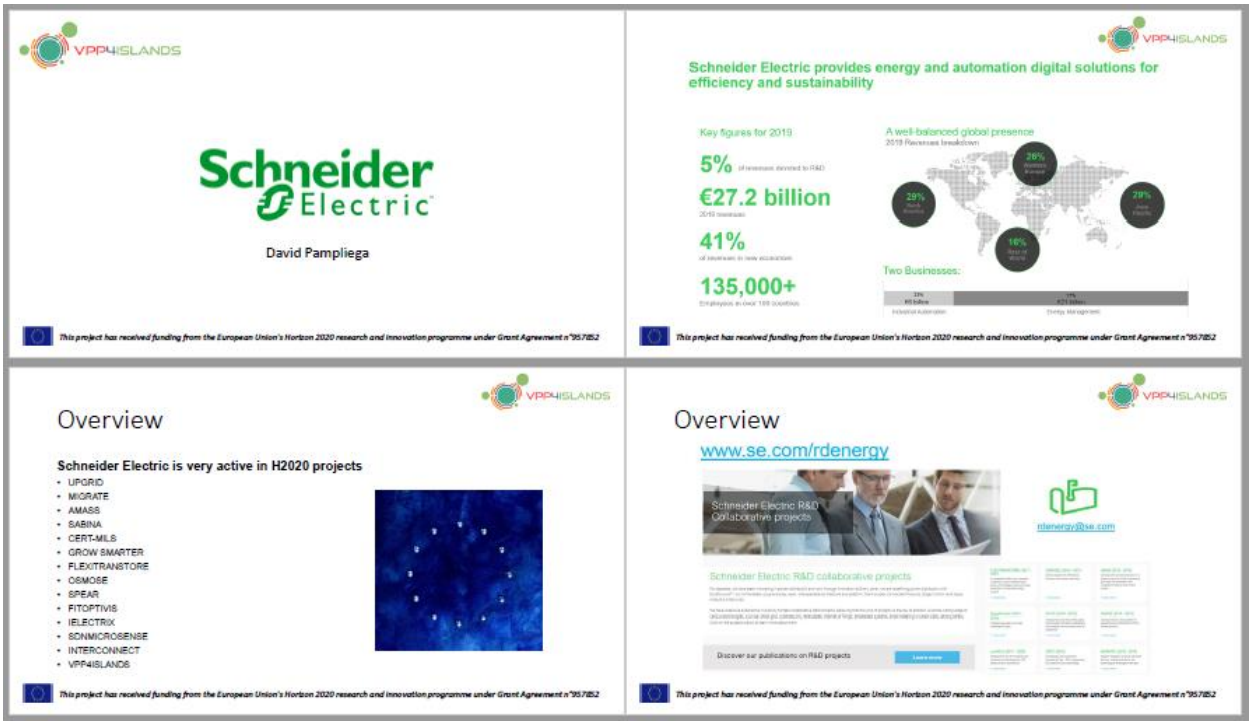


3. SCHN



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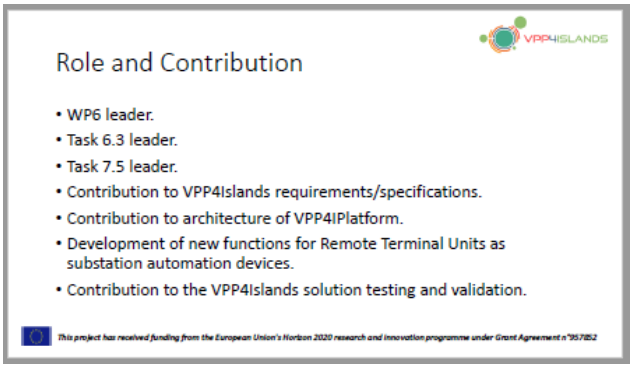

4. BC2050

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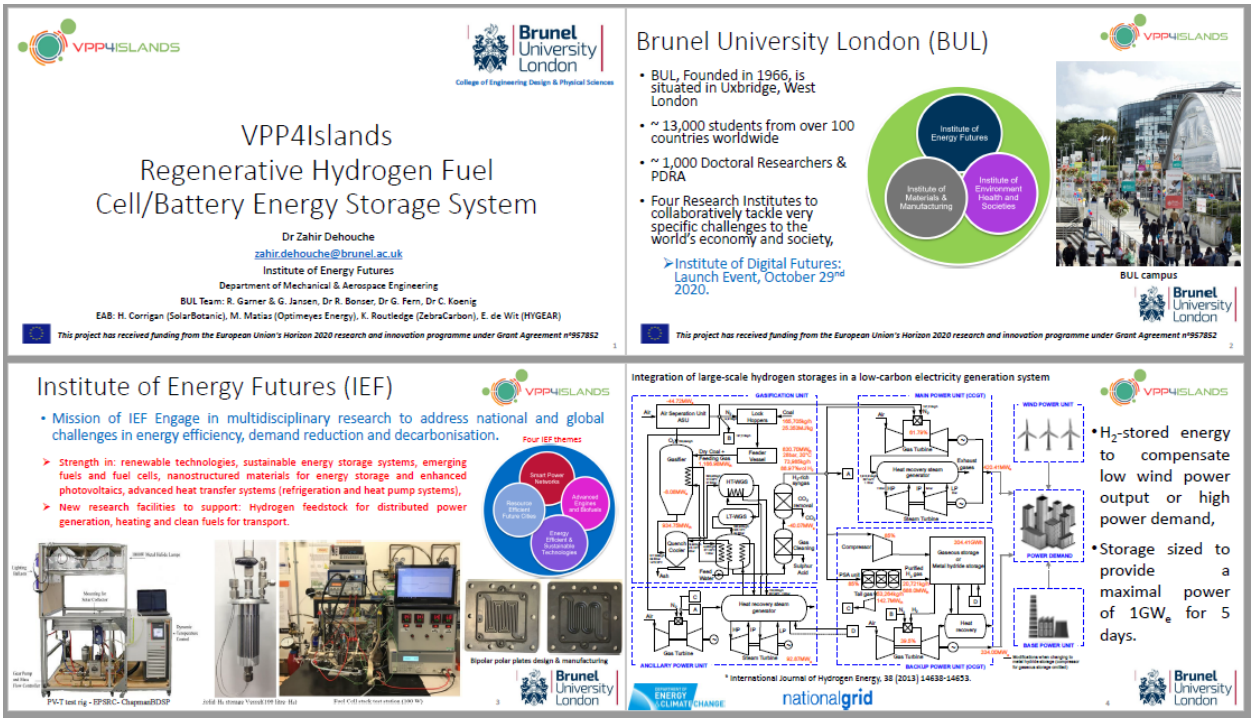
5. BUL



6. REGENERA

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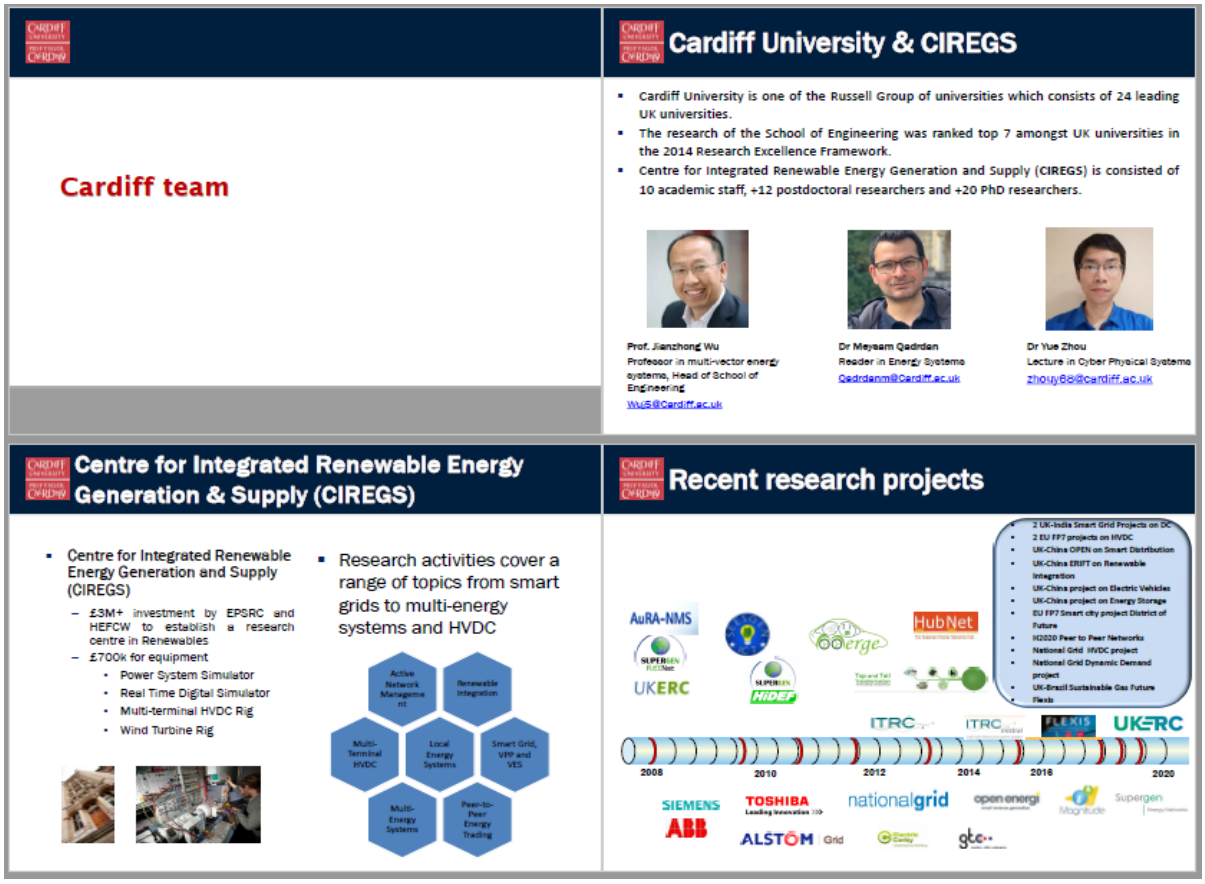
7. CU



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8. CIVI

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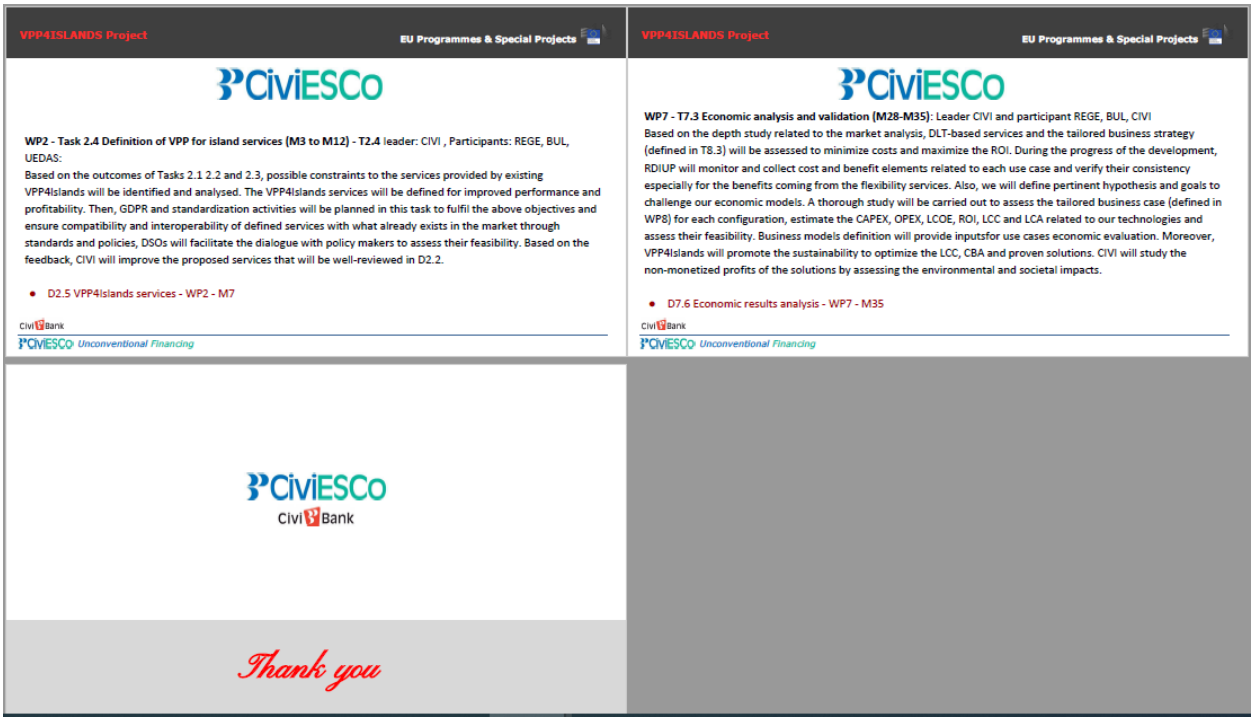
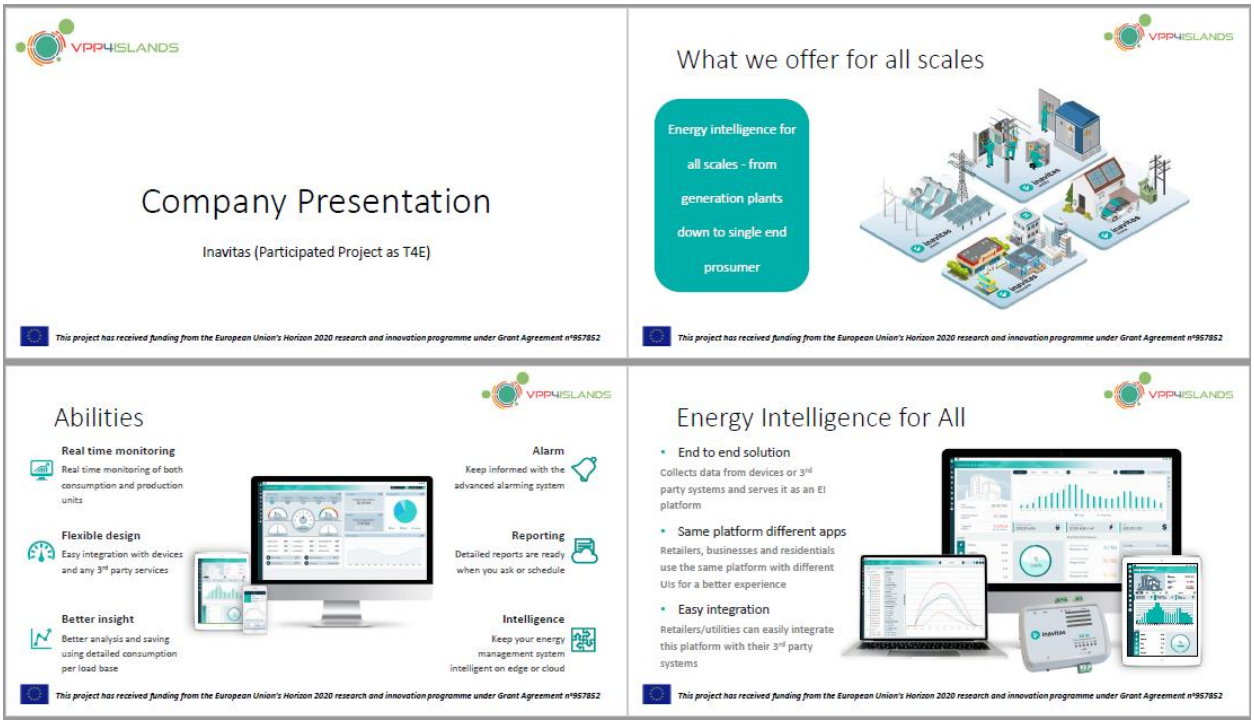


9. INAVITAS



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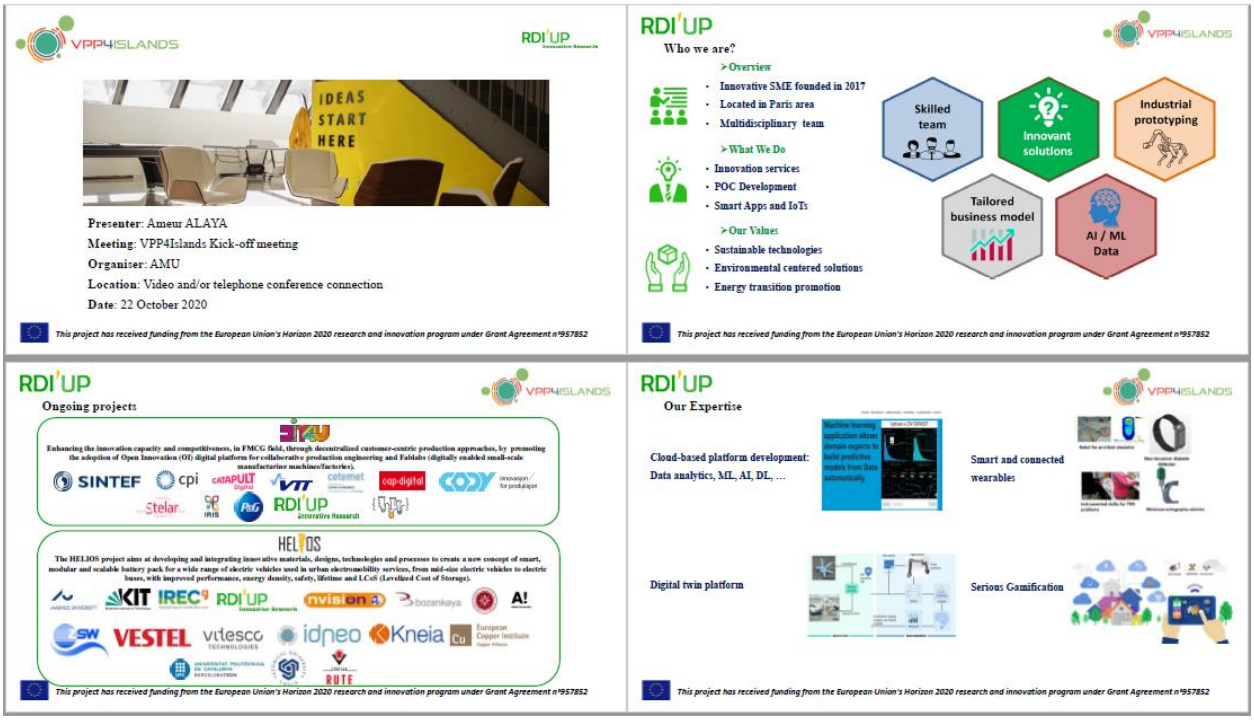
10.IDEA

11.RDIUP



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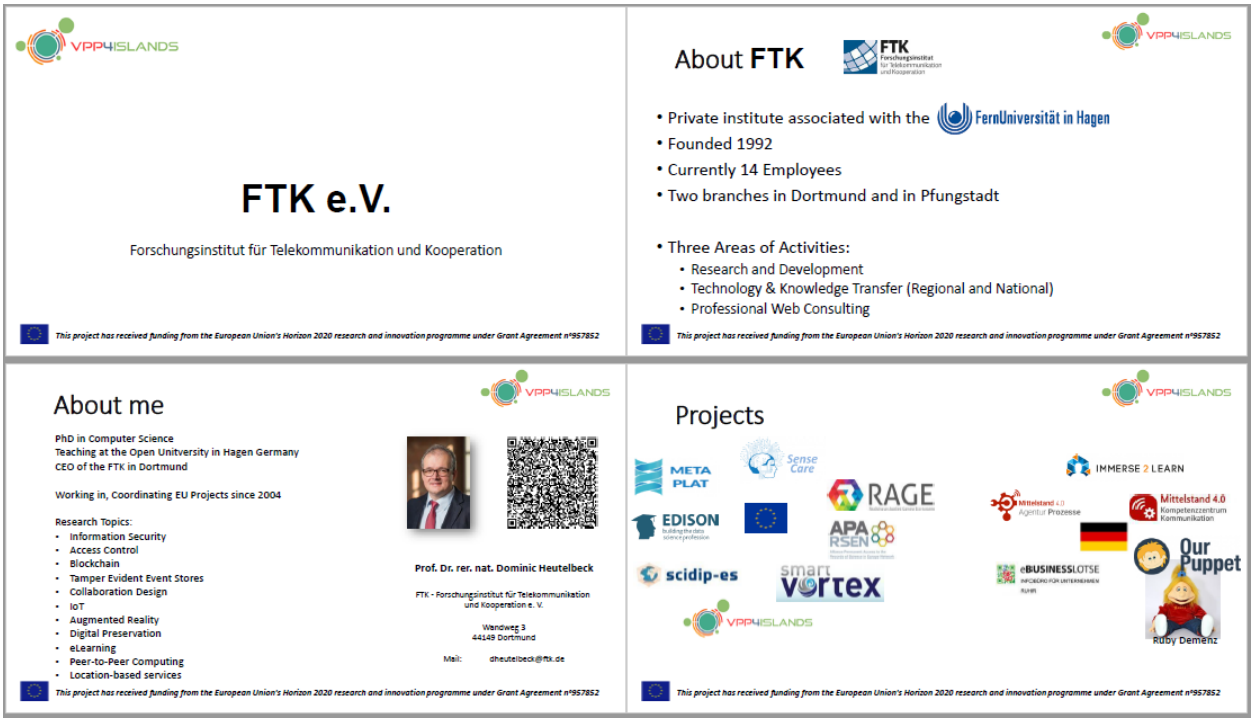
12. FTK



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13.CSIC

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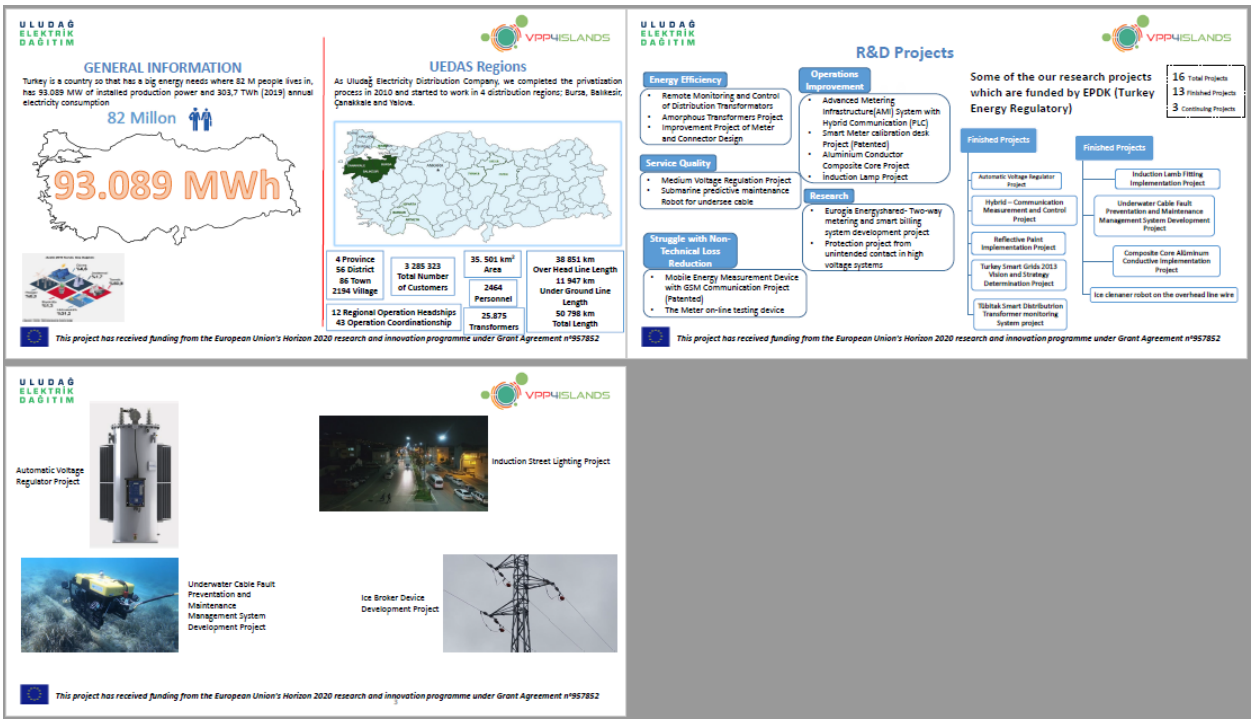
14. TROYA

15. UEDAS



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16. FORMENTERA

CONSELL INSULAR DE FORMENTERA

VPP4ISLANDS: FORMENTERA ISLAND

Formentera Island

- 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

Formentera Island

Previous Studies: Wind Data

	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	16,70 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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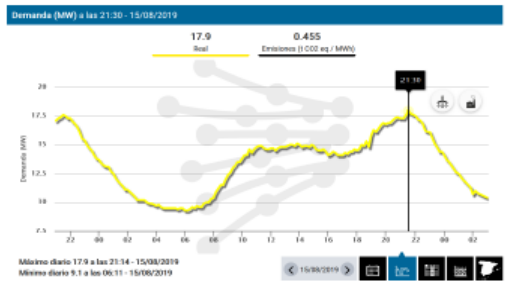
Previous Studies: Solar Radiation

	CLARITY INDEX	DAILY RADIATION (kWh/m2/d)
JANUARY	0,503	2,242
FEBRUARY	0,496	2,897
MARCH	0,534	4,157
APRIL	0,554	5,387
MAY	0,557	6,158
JUNE	0,581	6,725
JULY	0,606	6,838
AUGUST	0,600	6,110
SEPTEMBER	0,571	4,814
OCTOBER	0,538	3,447
NOVEMBER	0,494	2,351
DECEMBER	0,497	2,008

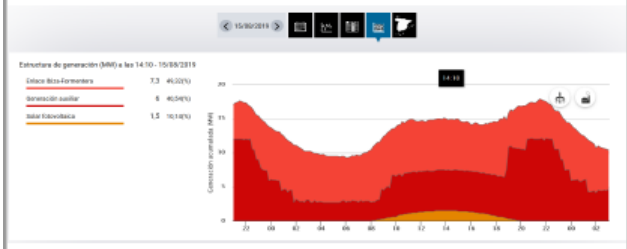
Energy need

High Season (Peak)



Energy need

High Season (Peak)

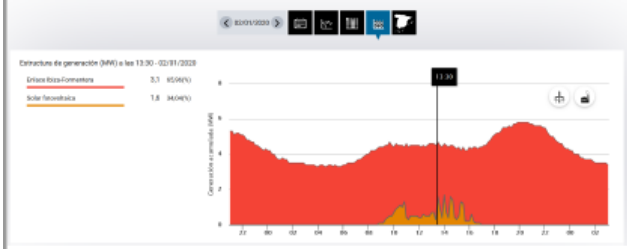


Energy need

Low Season (Valley)

Energy need

Low Season (Valley)



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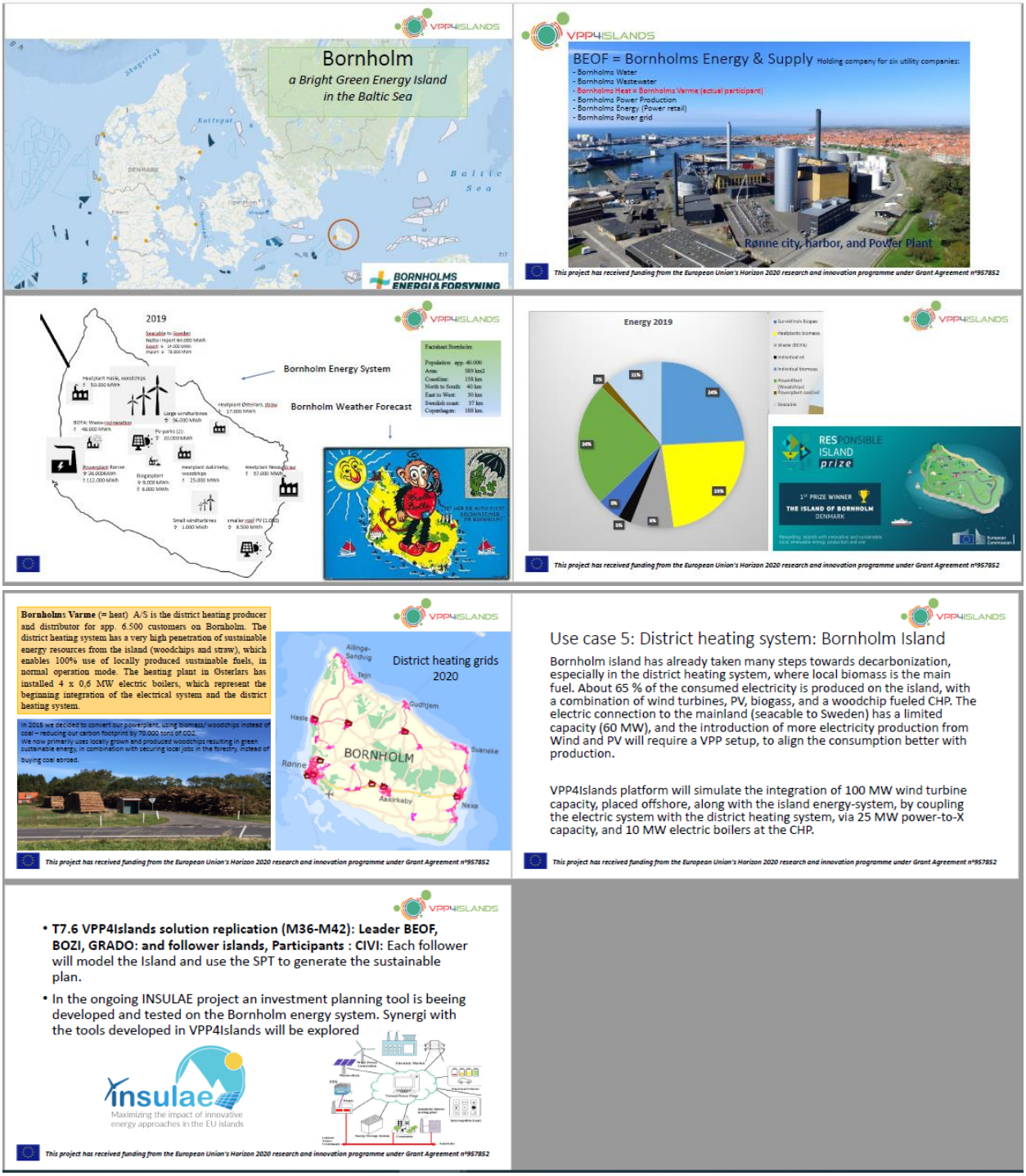
17. BORNHOLMSVARME



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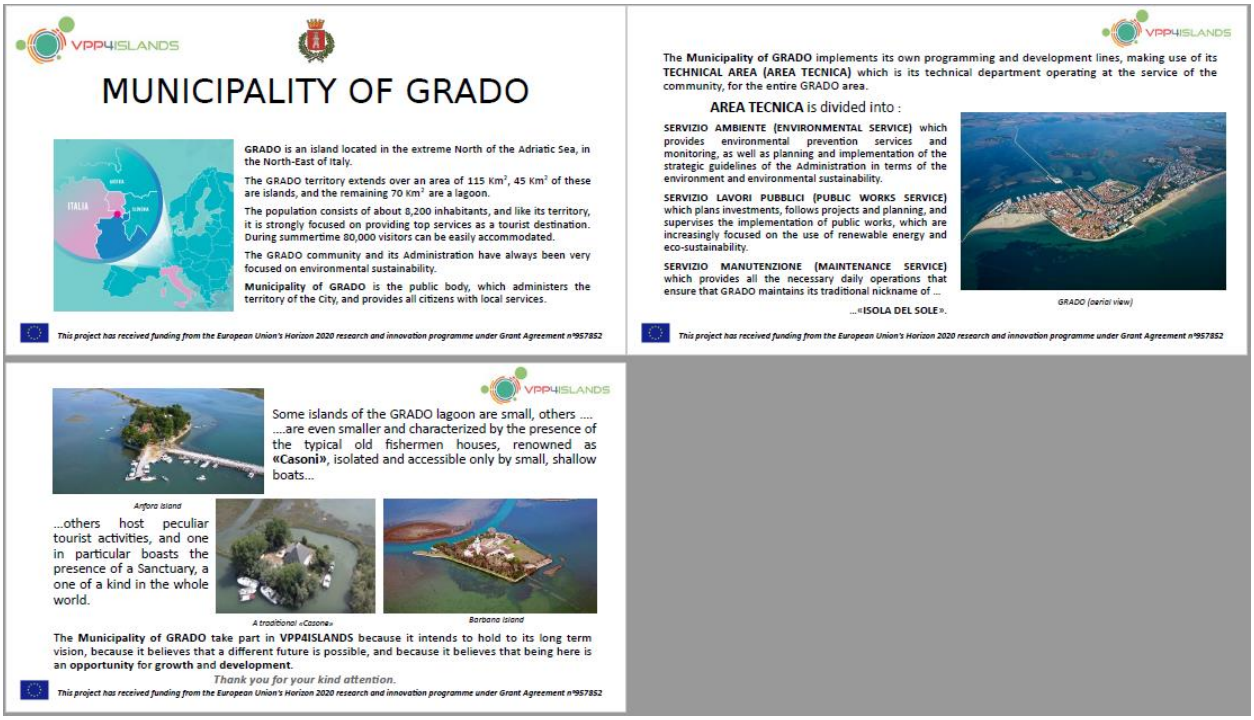
18. BOZI

19. GRADO



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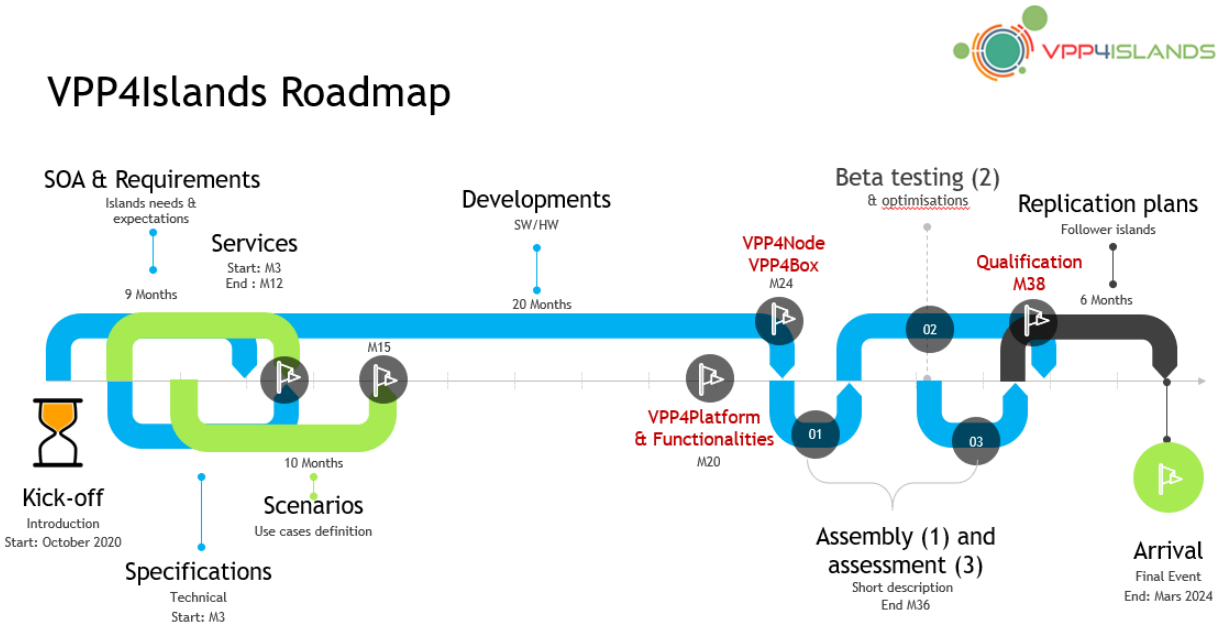
4. ROUND TABLES: MAKING CONNECTIONS

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.



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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	Fréderic 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

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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

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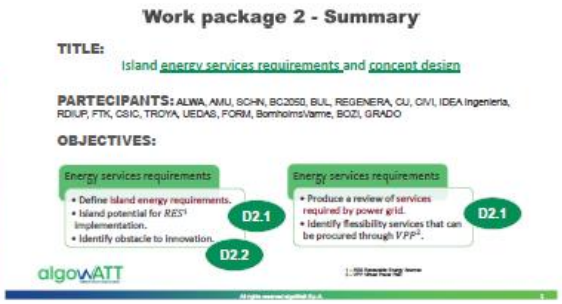
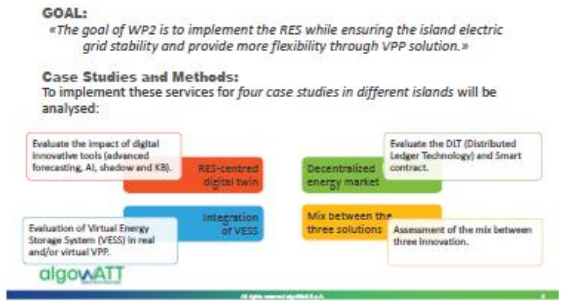
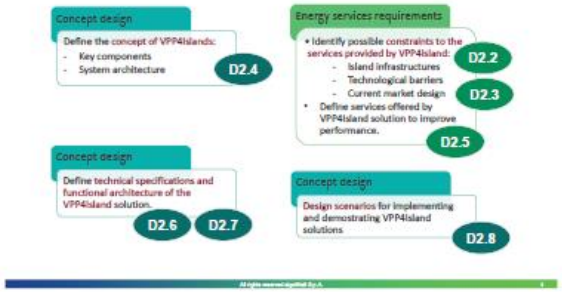
Annex 2 : presentations







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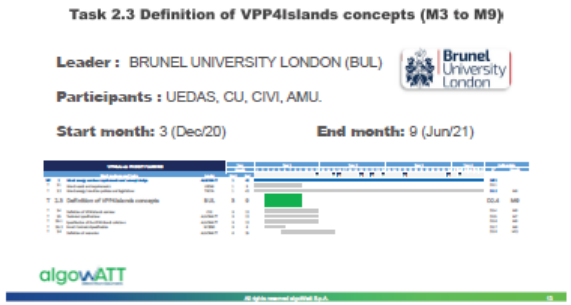

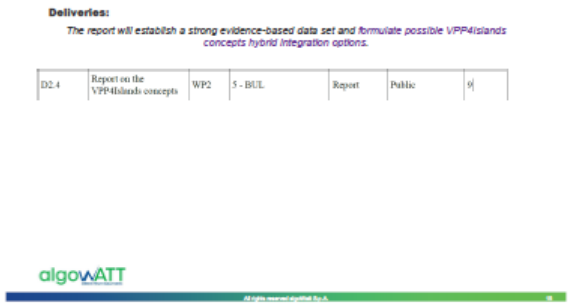

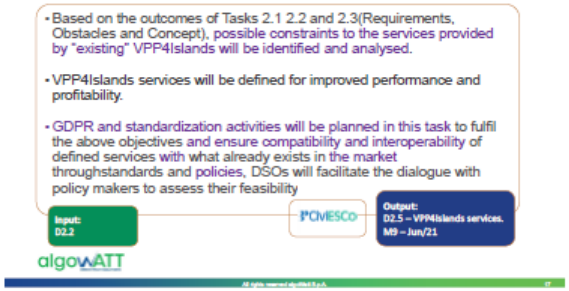

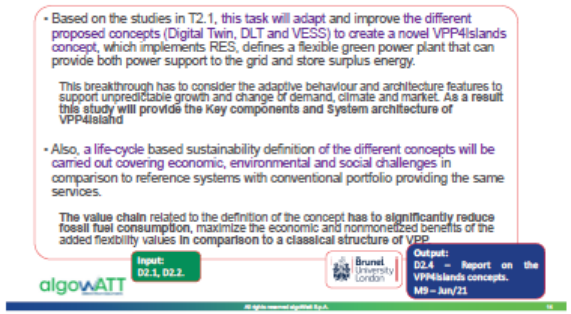

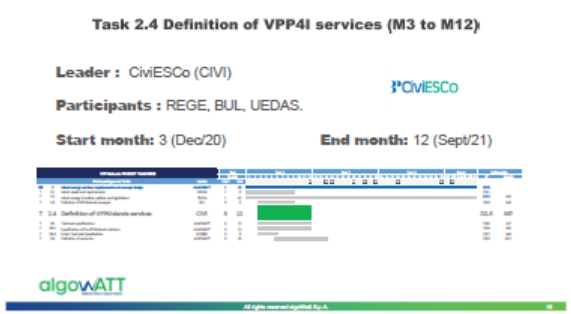

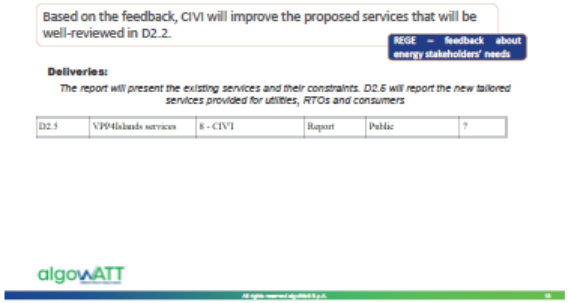

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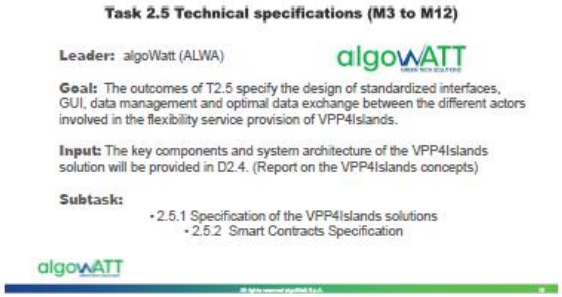

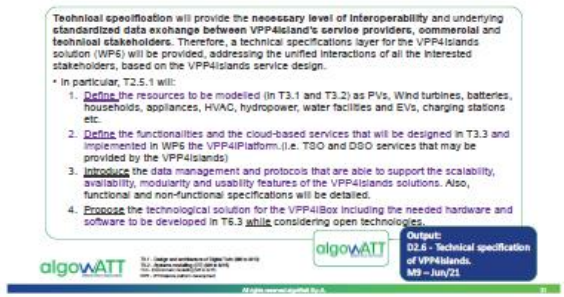

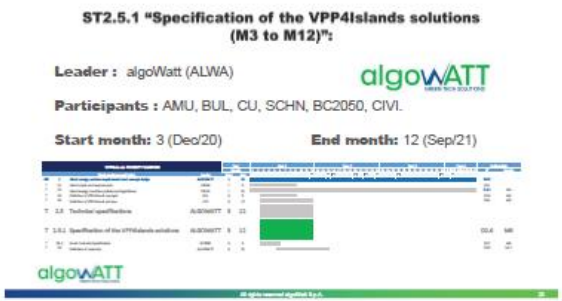

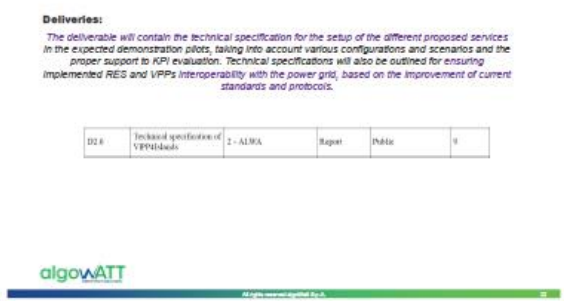

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Deliveries:

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 - RC2050	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 (Formentera, Gökçeada) 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. → algoWATT → **Output:** D2.6 - 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

Participation per Partner	
Partner number and short name	WP2 effort
1 - ASIT	5.00
2 - ALWA	12.00
3 - SOFIS	4.00
4 - RC2050	0.00
5 - IKU	14.00
6 - BIGDUTCH	10.00
7 - CTI	10.00
8 - CTH	9.00
10 - IDEA Spanish	2.00
11 - RDEIP	2.00
12 - FYK	2.00
13 - CSIC	1.00
14 - TROIA	10.50
15 - UEDAS	15.00
16 - FORM	4.00
17 - Bornholm/Vesta	4.00
18 - IRAT	4.00
19 - GRADO	6.00
Total	125.00

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)

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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.

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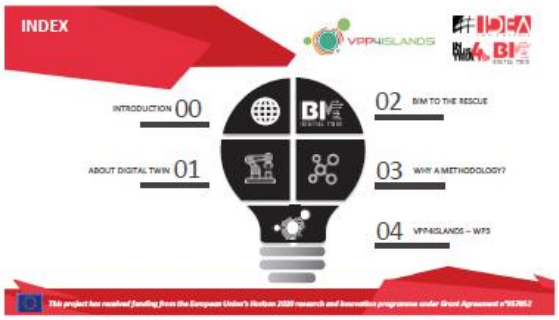

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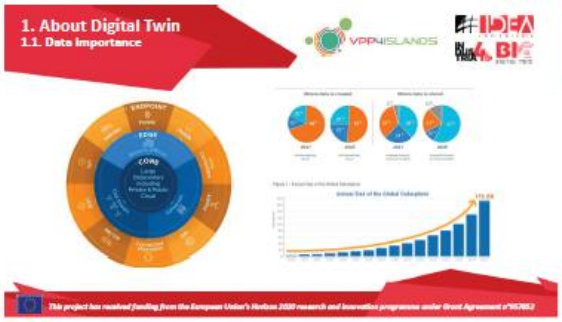

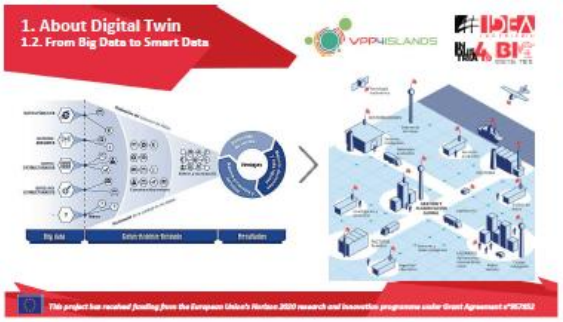

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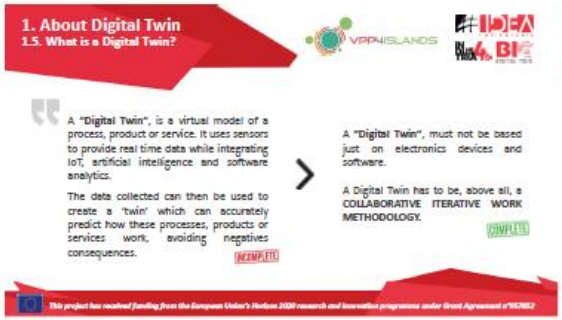

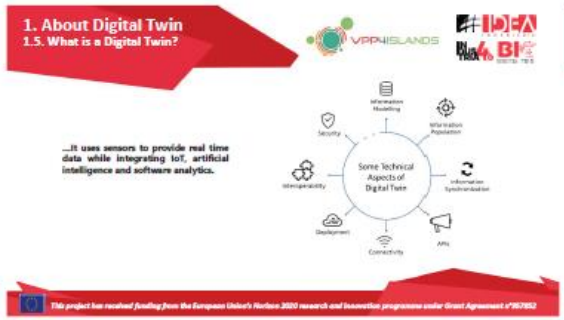

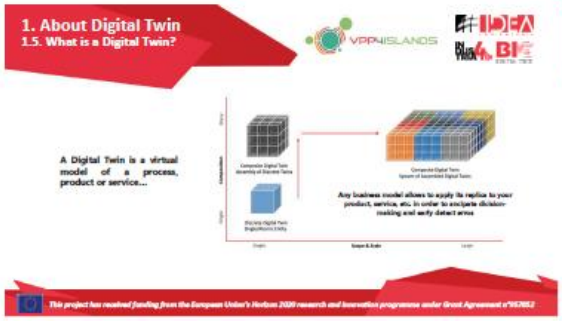

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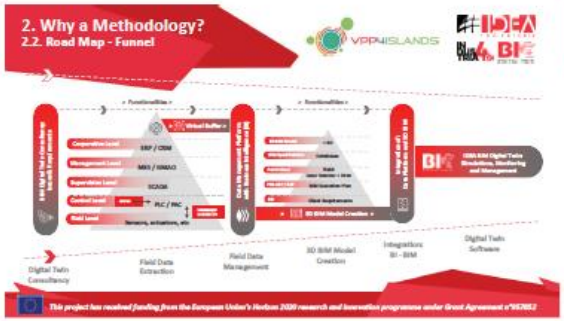

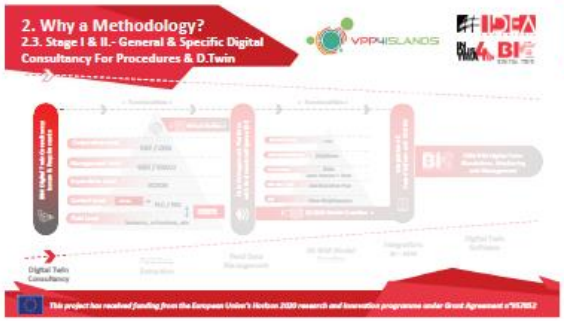

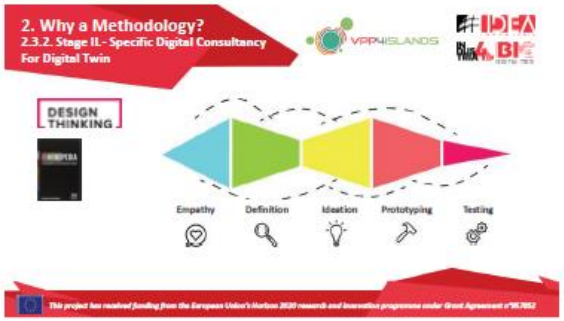

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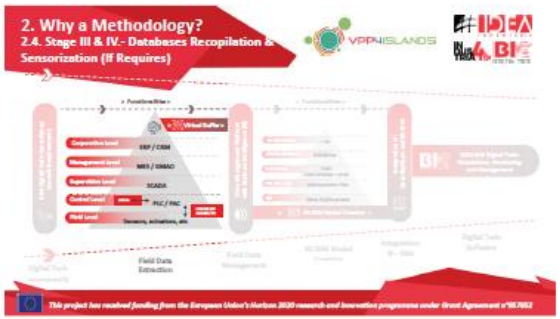

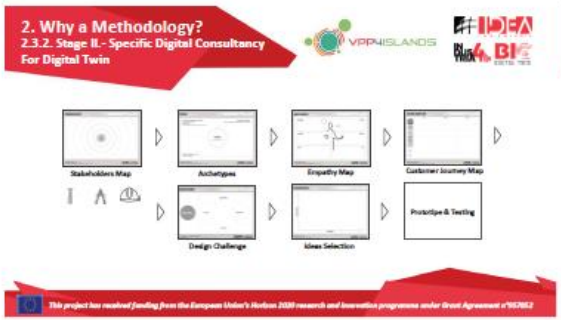

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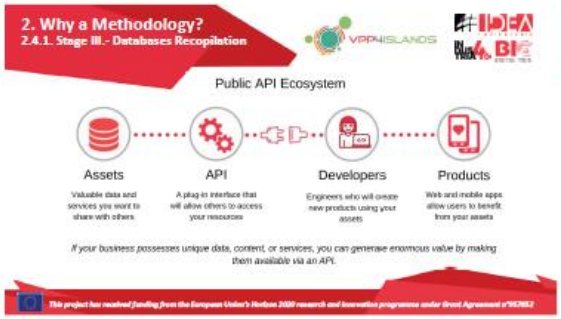

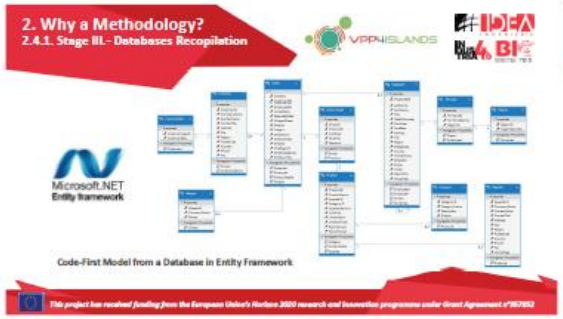

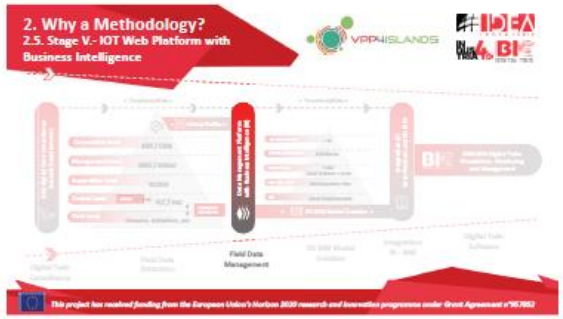

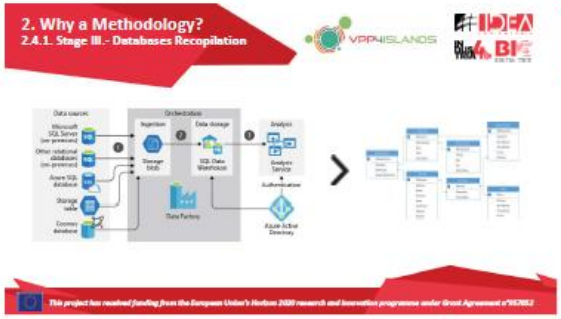

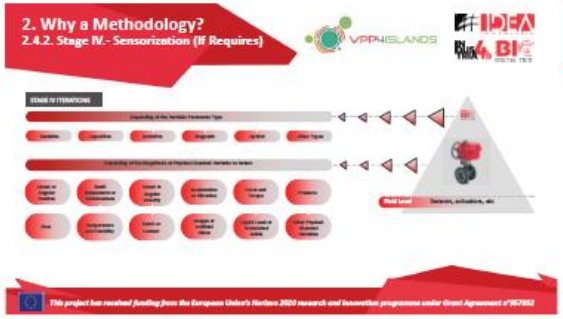

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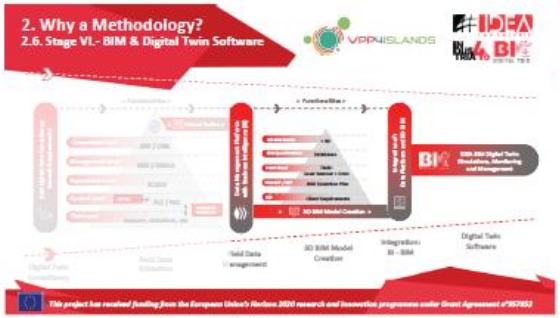

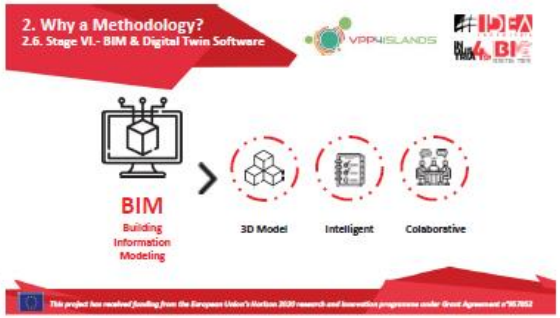

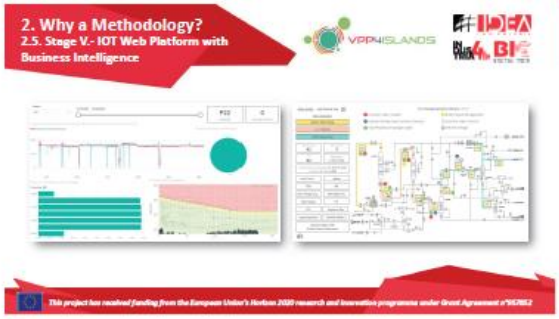

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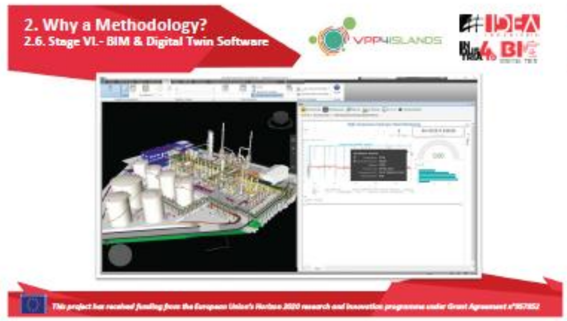

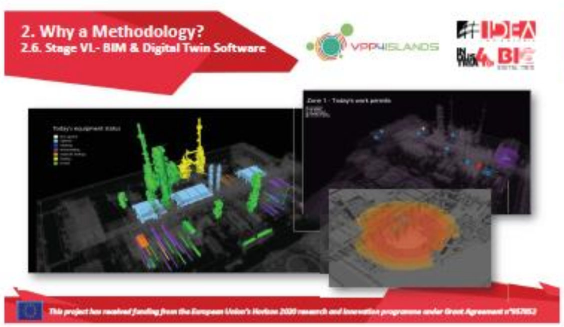

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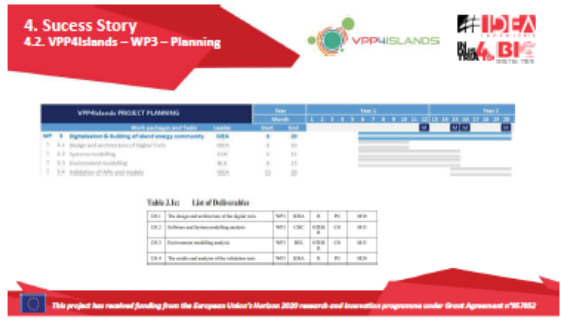

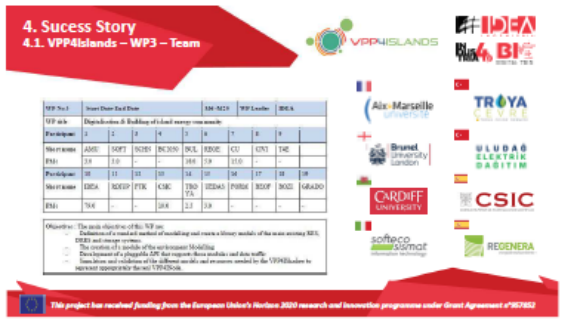

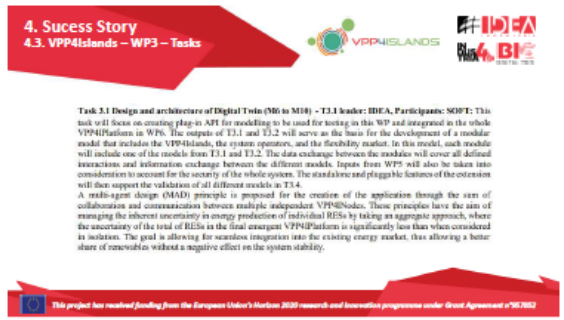

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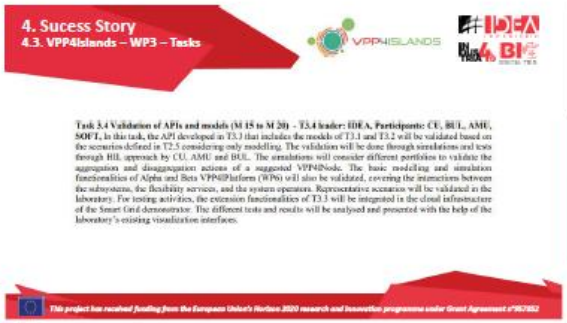

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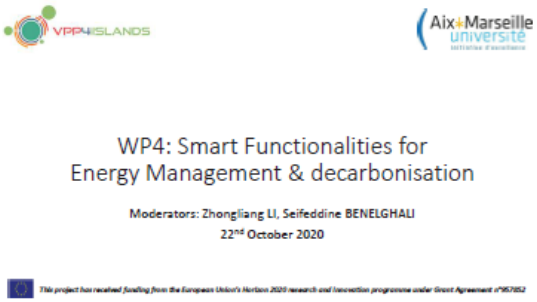

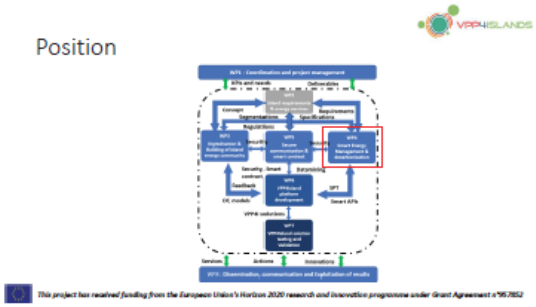

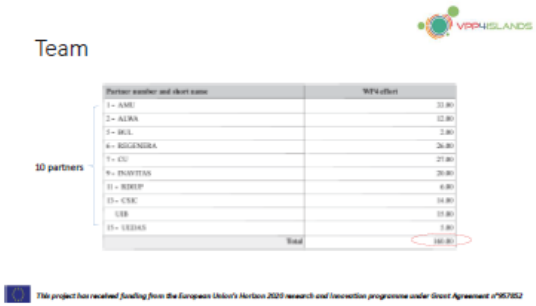

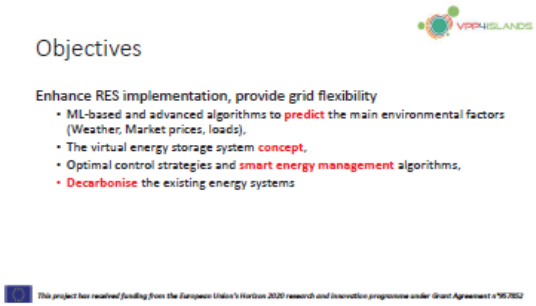

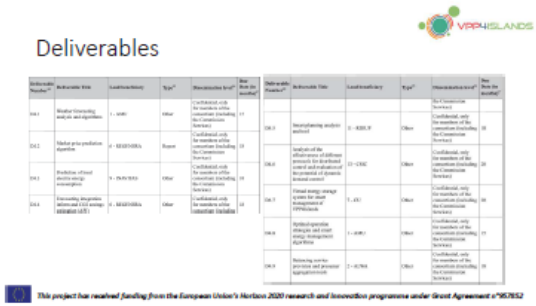

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Tasks

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

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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.

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Tasks

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

T4.5 leader: AMU, participants: BUL, 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 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, BEOF:

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.

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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.

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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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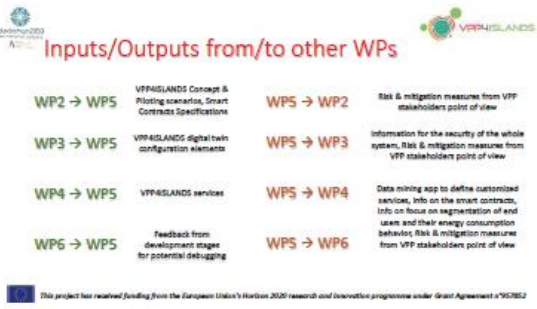

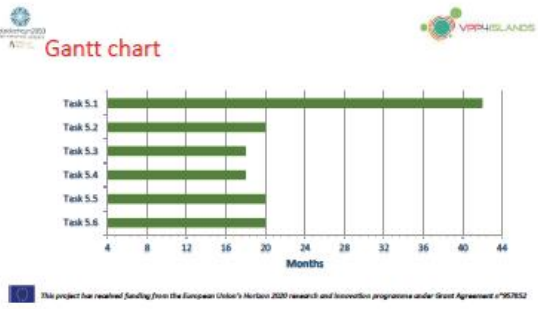

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Task5.1: Risk Assessment

- 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 SAPL 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: Datamining 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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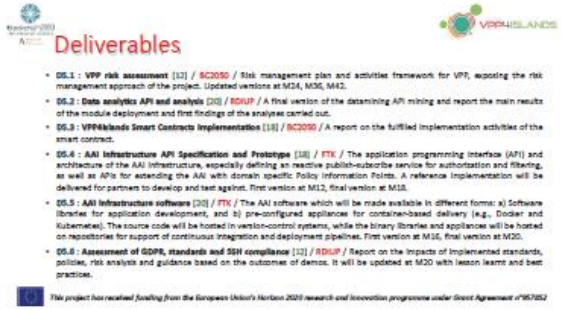

Milestone number	Milestone title	Lead partner	Due Date	Means of verification
MS 5	Proof-of-concept hybrid AAI	FTK	12	An autonomous demonstrator showing the integration of smart contracts and AAI has been developed, and is running in a containerized environment. (D5.3)
MS 6	Hybrid AAI Initial Release	FTK	18	The policy decision point and the smart contract policy information points are released with full documentation (D5.4)
MS 7	Final AAI release	FTK	20	The improved AAI is released and documented. (D5.5)

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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]** – M15-M22
    - Subtask 6.1.3: VPP4IPlatform Deployment **[AMU]** – M20-M26
  - 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 T3.4 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.
  - Intuitional 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 ECs 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 DLT-based smart contract developed in WP5.

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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 compliancy **[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

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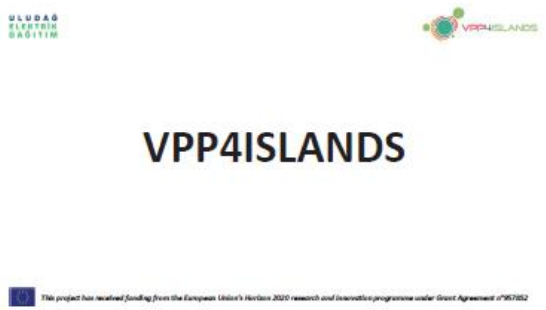

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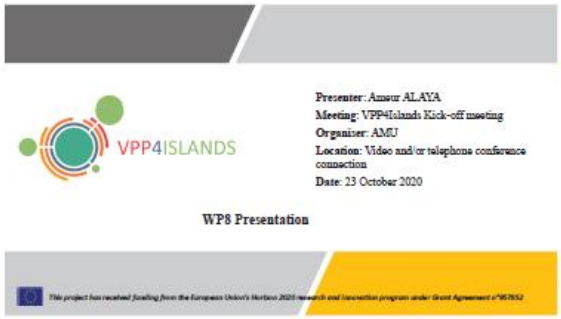

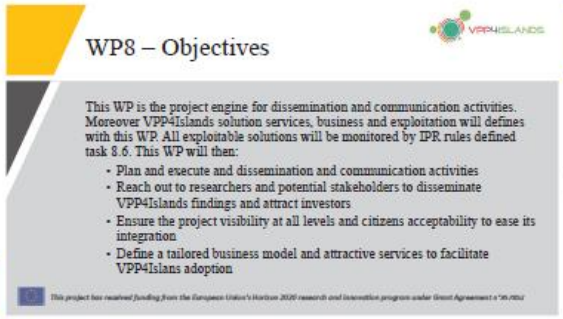

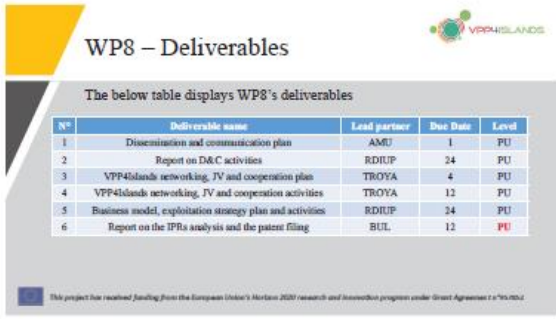

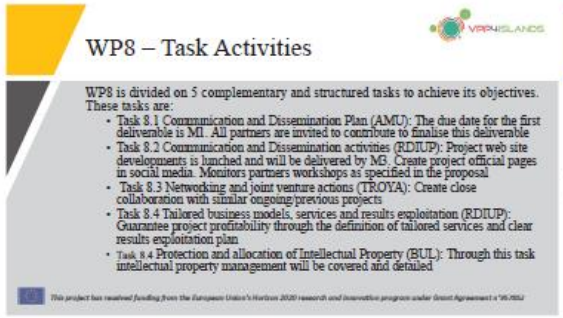

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WP8 – Risk assessments

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

N°	Description	Mitigation
15	Lack of interest among SMEs, aggregators and prosumers (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 RDIUP will include the non-monetized 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 :

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