HORIZON-CL5-2022-D3-01-11

Demonstration of innovative forms of storage and their successful operation and integration into innovative energy system and grid architectures

AGISTIN

Advanced Grid Interfaces for innovative STorage INtegration

Project Summary

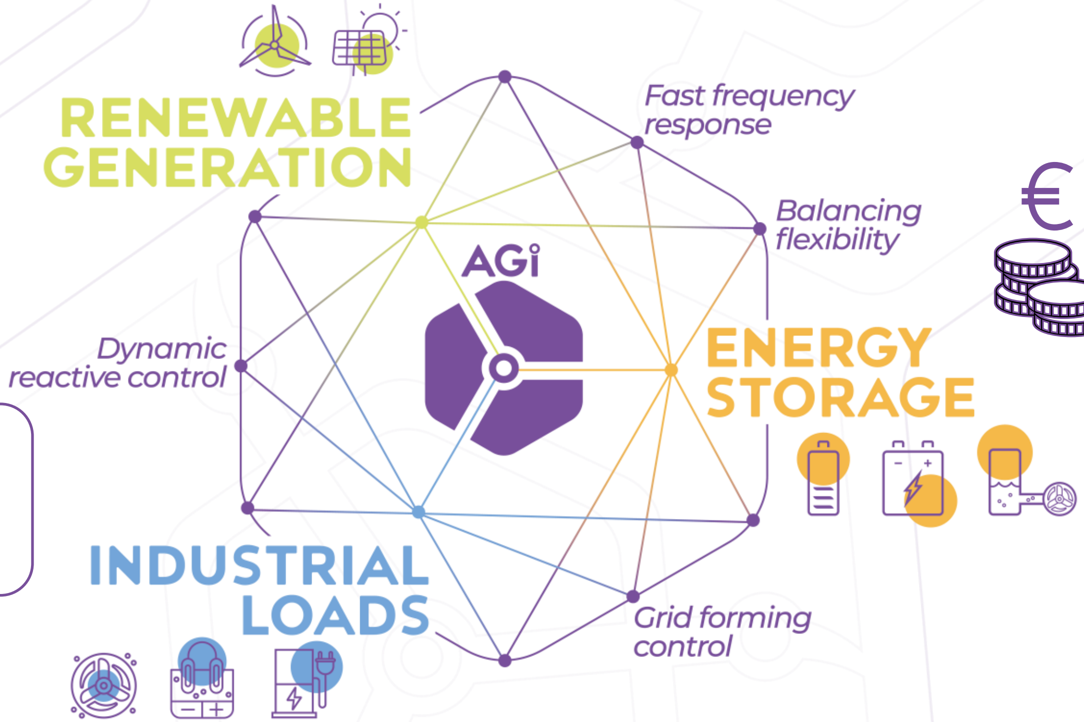
The Advanced Grid Interfaces for innovative STorage INtegration (AGISTIN) project has received funding from the European's Union Horizon Europe research and innovation programme under grant agreement N°101096197

AGISTIN OVERVIEW

AGISTIN will enable industrial grid users to rapidly deploy renewables through advanced integration of innovative energy storage technologies at the interface with the grid.

January 2023
December 2026

13 partners
1 associate partner
9 countries



€8,8 M
Project total cost
7.9 M€
EU contribution

Innovative storage technologies

Objectives

S01 Demonstrate the performance and value of innovative storage technologies providing flexibility and grid services.

S02 Design advanced grid interfaces to integrate energy storage with industrial grid users and on-site generation, resulting in potential for enhanced economic and technical performance

S03 Demonstrate the technical feasibility of the innovative coupling of multiple forms of energy storage, production and demands into innovative energy systems and novel grid topologies.

Objectives

Enable innovative storage, coupled through the proposed advanced grid integration technologies, to provide the new grid services needed in the energy transition

S04

Reduce material use and embedded emissions by innovative approaches of energy storage integration with industrial grid users.

S05

Propose innovative business models to easily enable energy storage integration with significant grid users.

S06

IDENTIFY NEEDS

NEEDS

Economic

Exploiting flexibility deriving from onsite renewables and storage impacts economics and operation of the overall system.

Technical

Power, energy and cycling limitations have an impact on storage operations and useful life.

Environmental

Reduce needed resources, equipment and losses, minimising economic and environmental system costs.

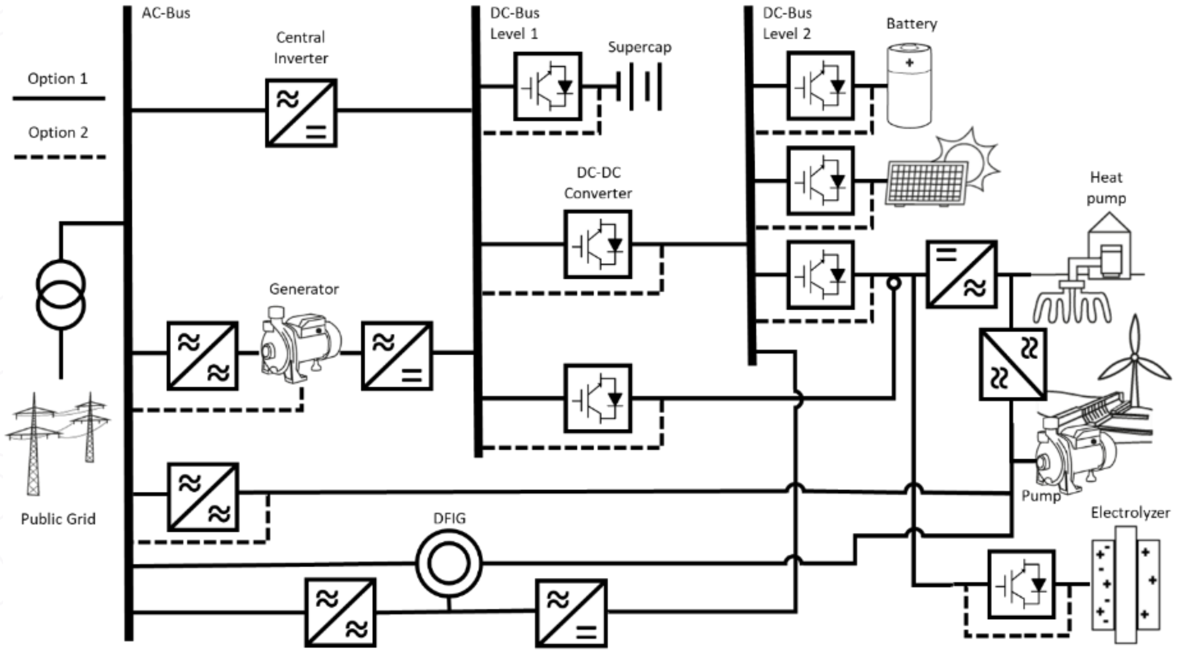
Regulatory

Define regulatory requirements for relevant AGISTIN grid services

Advanced Grid Interface (AGI)

DC coupling of hybrid load, renewables, storage

AGISTIN proposes innovative integration of energy storage with grid users that contain loads and onsite production using an innovative Advanced Grid Interface.



▶ Integrate multiple assets

- Involve 3 or more assets on the grid users' side (e.g., motor, electrolyser, battery, solar PV)

▶ Provide enhanced grid services

- Grid forming or fast frequency containment reserve (FCR)

▶ Implement a plant level controller

- Controls the grid facing inverter and the converters to grid users' assets

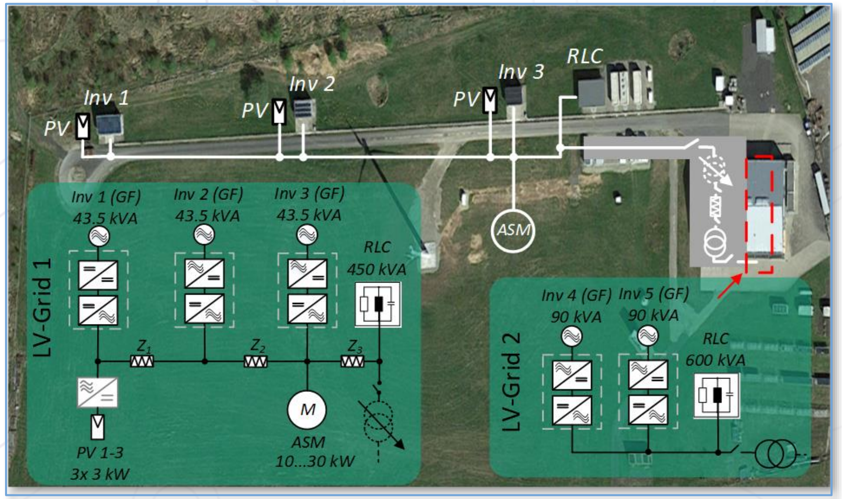
▶ Extendable

- Allows addition of further assets in time

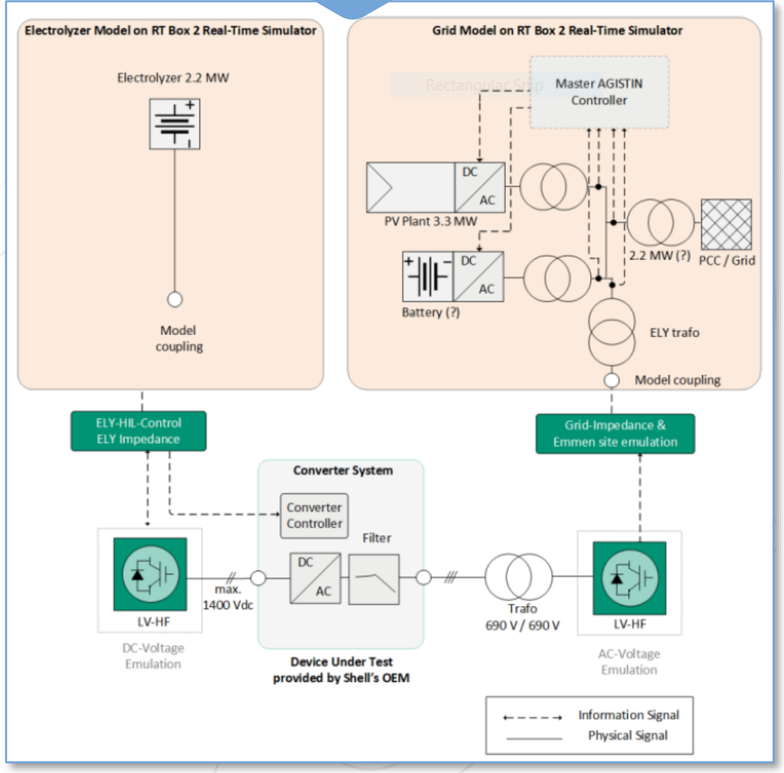
Agistin test sites

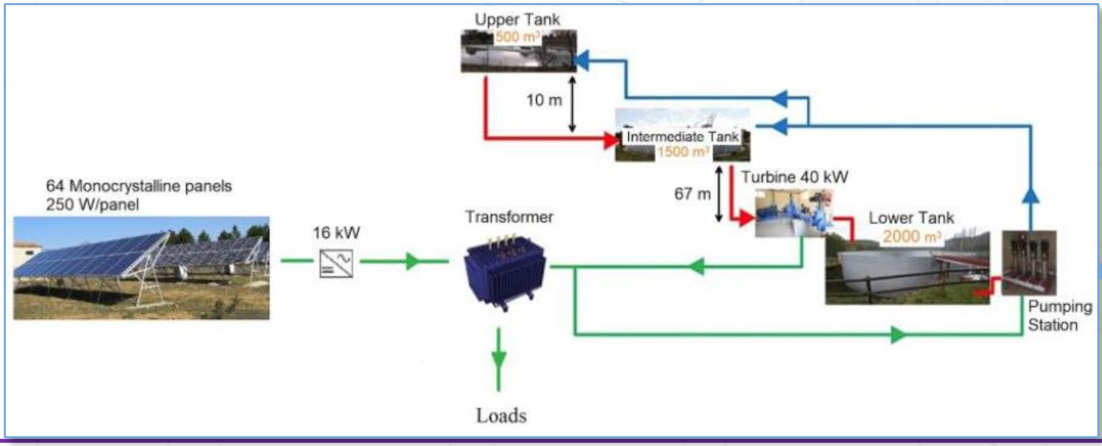
Proposed approaches and storage technologies will be tested in an environment reflecting the actual power system conditions.

FGH fast charging of electric vehicles application testing



FGH-IWES electrolysis application tests

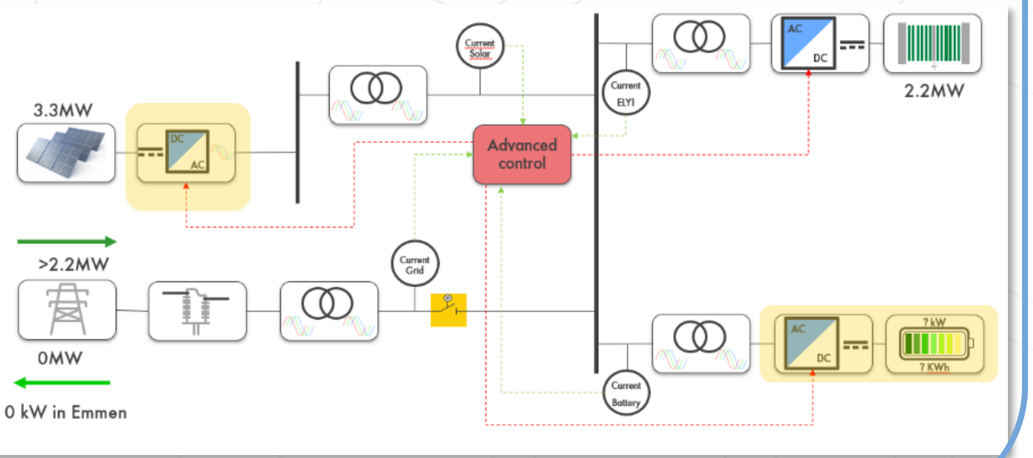




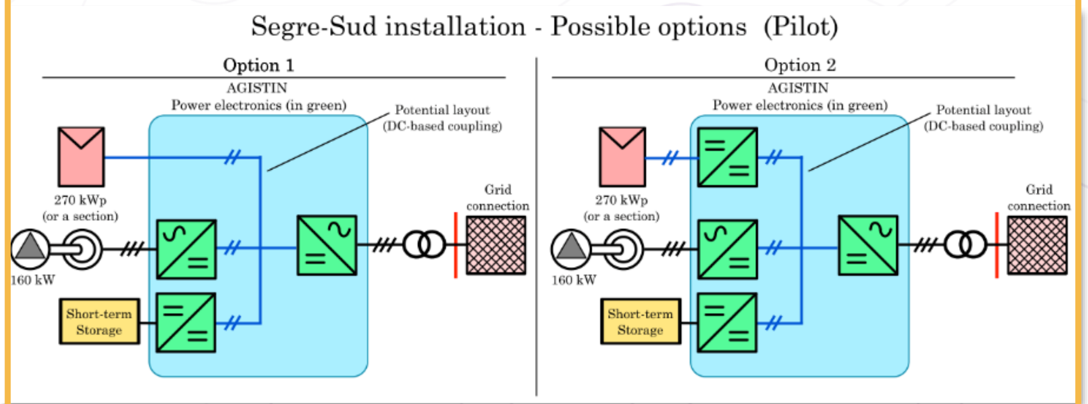
CDR-CIEMAT pumping tests

Two Major Demonstrations

Green Hydrogen Production



Irrigation Systems



infraestructures.cat

Milestones

M02 – WP2
SoA of Connection Network Codes

M06 – WP2
Innovative energy storage integration requirements, incentives and constraints

M15 – WP3
AGI topology design tool completed

M18 – WP4
Test scenarios & use cases defined &Test centre setup adjusted to the scenarios

High performance batteries characterised in modelling results

M20 – WP2
Test Setup completed and GFI/GFL implemented on inverters

M24

WP2

LCA methodology for storage integrated in AGI

WP3

General generic model template available for benchmark simulations

M25

WP5

Improved plant dynamics & new ancil-lary services with AGISTIN concept at PQ4Wind

M30

W6

AGISTIN sizing, operation and control tools completed for irrigation systems

M32

WP5

Successful operation of the tested inver¬ter and at SHL’s site demonstrating improved plant dynamics

M36

WP3

Control optimisation code ready to provide to other work packages

WP6

Hydraulic, electrical & storage assets designed and constructed for field installation

Milestones

M42

WP6

AGISTIN field tests completed and vali¬dated in both test locations (CDR/ICAT)

M44

WP2

Business model opportunities

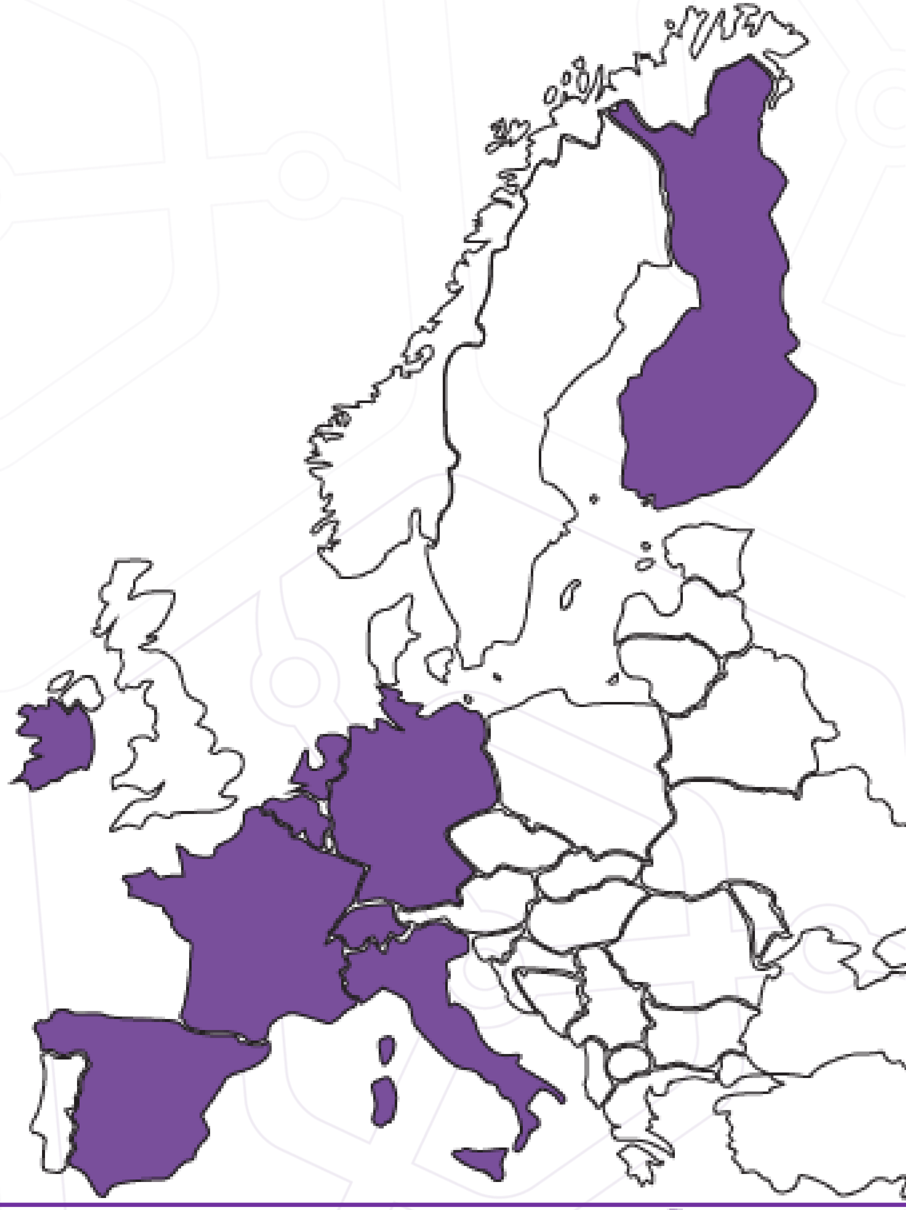
M45

WP4

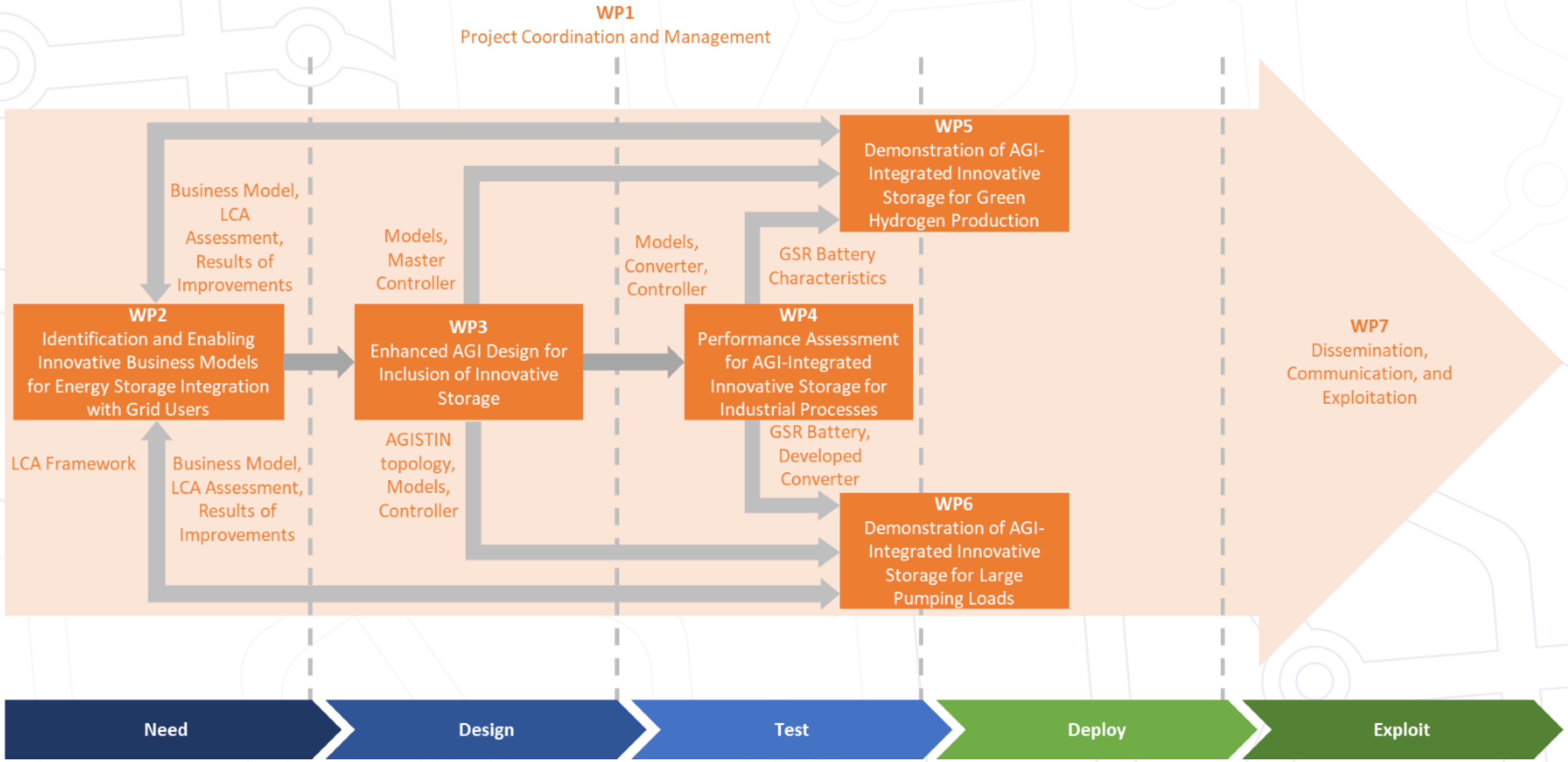
Simulations and test scenarios are validated in the laboratory

The consortium

Participant organisation name	Acronym
EPRI EUROPE DAC	EPRI
UNIVERSITAET KASSEL	UKL
RTE RESEAU DE TRANSPORT D'ELECTRICITE	RTE
FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	FHG
FUNDACION CARTIF	CTF
CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS-CIEMAT	CDR
SHELL GLOBAL SOLUTIONS INTERNATIONAL BV	SHL
UNIVERSITAT POLITECNICA DE CATALUNYA	UPC
GEYSER BATTERIES Oy	GSR
INFRAESTRUCTURES DE LA GENERALITAT DE CATALUNYA SA	ICAT
EUROPEAN ASSOCIATION FOR STORAGE OF ENERGY	EASE
RINA Consulting	RINA



Work Program



Project Gantt chart

	Month		Year 1				Year 2				Year 3				Year 4			
	Start	End	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP1 - Project Coordination and Management	1	48																
T1.1 Internal communication and contractual, administrative and financial project management	1	48																
T1.2 Technical coordination and quality assurance	1	48																
T1.3 Research knowledge and data management mechanism	1	48																
T1.4 Ethics assessment and management	1	48																
WP2 - Identification and enabling innovative business models for energy storage integration with grid users	1	48																
T2.1 Assessing and monitoring regulatory, network code & economic barriers of integrating storages at industrial sites	1	48																
T2.2 Functional requirements of industrial users for integrating innovative storages	1	6																
T2.3 Identifying business model opportunities for storage embedded in AGI	13	44																
T2.4 Devise a methodology to conduct LCA for energy storage integration via AGI by focus grid users	10	24																
T2.5 Propose guidelines for future requirement for the integration of innovative storage embedded in AGI	30	48																
WP3 - Enhanced AGI Design for inclusion of innovative forms of storage	1	46																
T3.1 Verification of potential and alignment with customer and system needs	1	8																
T3.2 AGI power and ICT topology for storage integration and external interface definition	4	15																
T3.3 Development of generic AGI model templates	9	32																
T3.4 Modelling of Innovative Storage	1	24																
T3.5 Development of Optimisation and Control Methods for Real-Time AGI Operation	12	40																
T3.6 Simulative benchmarking of the AGI options	18	46																
WP4 - Performance assessment for AGI-integrated innovative storage for industrial processes	1	45																
T4.1 Alignment of test scenarios, use-cases and testing activity	10	18																
T4.2 Implementation structure for validation of the fast-charging technology of electric vehicles	13	24																
T4.3 Implementation of AGI-models on prototype inverters	13	34																
T4.4 Laboratory tests and characterisation of Aqueous ECR batteries	1	19																
T4.5 EExecution of the tests to validate AGI storage usage in the defined use cases	22	45																
T4.6 AGISTIN techno economic design tool for transforming irrigation canals into innovative energy storage systems	1	12																
WP5 - Demonstration of AGI-integrated innovative storage for green H2 production	8	48																
T5.1 Data-verified EMT models replicating Shell's green hydrogen site including storage	8	22																
T5.2 Translating models into a real-time simulation platform	15	22																
T5.3 Evaluating AGISTIN storage concept by PHiL testing of Shell's inverter at PO4Wind	18	22																
T5.4 Testing AGISTIN developments at Shell's industrial green hydrogen production site	18	22																
T5.5 Technical, economic and sustainability assessment of the AGISTIN storage concept for green hydrogen	23	42																
WP6 - Demonstration of AGI-integrated innovative storage for large pumping loads	1	48																
T6.1 AGISTIN real-time operation & control for innovative irrigation canal-based energy storage systems	12	30																
T6.2 Demo sites assets design and construction for AGISTIN concept field deployment	18	36																
T6.3 CDR test-bed system AGISTIN concept demo site	18	36																
T6.4 Segrià-sud canal pumping station AGISTIN demo site	30	48																
T6.5 Technical, economic and sustainability assessment of the AGISTIN stoage concept for irrigation canal-based storage	23	42																
WP7 - Dissemination, Communication and Exploitation	1	48																
T7.1 Dissemination and Communication Actions	1	48																
T7.2 Exploitation and Business Plan Rollout	1	48																

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