Annual Conference RDI projects in the Center

25 October, 10:00 – 13:00 CEST

MODERATION:
Kristina Starborg, SWEA

Co-funded by the European Union

25/10 Morning: RDI Projects in the Center

Agenda

Moderation: Kristina Starborg (SWEA)

10:00	Welcome and introduction
10:05	Challenge 1: Integrated Net-zero-emissions Energy System
10:25	Challenge 2: Enhanced zero emission Power Technologies
10:45	Challenge 3: Enabling Climate Neutrality with Storage Technologies, Renewable Fuels and CCU/CCS
11:05	Challenge 4: Efficient zero emission Heating and Cooling Solutions
11:25	*Coffee break*
11:45	Challenge 5: Integrated Regional Energy Systems
12:05	Challenge 6: Integrated Industrial Energy Systems
12:25	Challenge 7: Integration in the Built Environment
12:45	Wrap-up
13:00	Closing

Challenge 1: Integrated Net-zero-emissions Energy System

Michele de Nigris (RSE)

Co-funded by the European Union

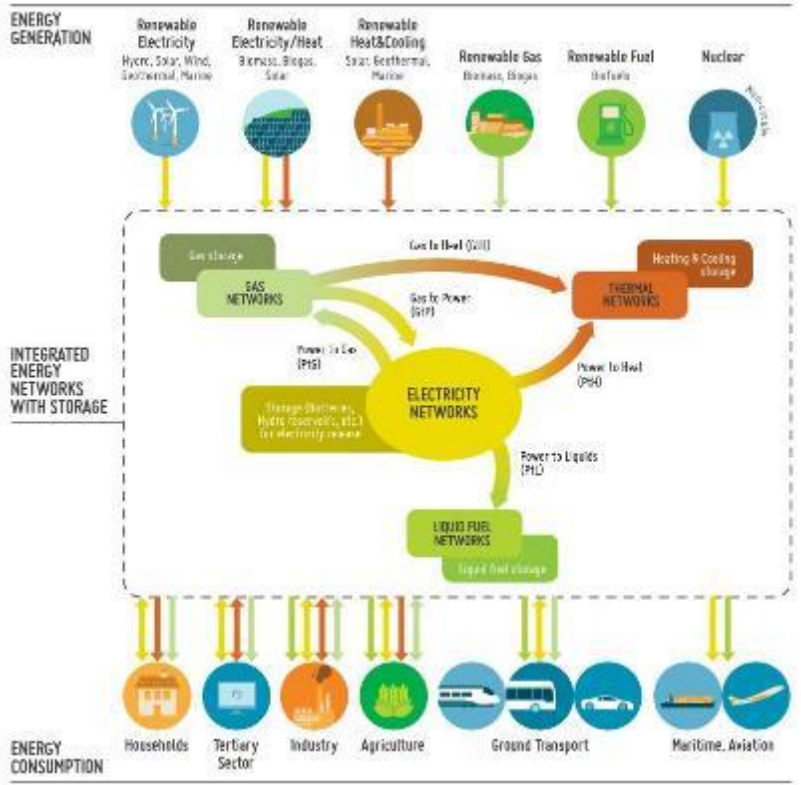
TRI 1 – Integrated Net-zero-emissions Energy System

Challenge → TRI 1 implements the CETPartnership Challenge 1, concerning the "Optimised, integrated European net-zero emission energy system"

Mission → develop the optimised, integrated European net-zero emissions energy system, where electricity distribution and transmission grids are seen as the "backbone" of the future low-carbon energy systems

TRI 1 selected projects will have the opportunity to develop and demonstrate solutions and instruments to build and operate the future energy system:

- based on the **electric grid**, given that electricity is the main vector for renewable energy
- characterized by the i**ntegration of different energy vectors, grids and systems** (gas, fuels, hydrogen) through storage and P2X
- in which **renewable energy** consumption is maximized, introducing flexibility services along the value chain
- pervaded by **digital technologies**
- characterized by higher level of **circularity**, with energy efficiency at its core, and greater direct **electrification of end-use sectors**
- characterized by the **participation of citizens** as prosumers or members of energy communities



Souce: ETIP SNET Vision 2050

TRI 1 talks with SIES2022 project

SMART INTEGRATED ENERGY SYSTEMS

Welcome to Paul Tuohy

Smart Energy Systems ERA-Net

SMART INTEGRATED ENERGY SYSTEMS

SIES 2022 Project

Virtual Power Plant Clusters for Industry and District Decarbonisation

Virtual Power Plant (VPP) solutions to maximise value from renewables, storage, flex and smart controls

SIES 2022

Name of the project and acronym

Smart Integrated Energy Systems by 2022	**SIES2022**

Consortium partners

- Main contact person: Paul Tuohy (paul.tuohy@strath.ac.uk)
- Coordinating organisation: **University of Strathclyde – Electrical, Energy Systems (SCO)**
- List of consortium partners:
  Energy Technology Centre (ETC) – Industry Lead, SIES Centre (SCO)
  Power Networks Demonstration Centre (PNDC) – Networks (SCO)
  Best Transformer (BEST) – New Smart Transformers for Flex (TUR)
  Magtel – Industry Lead in Spain parallel VPP implementation (ESP)
  Innovatium – Engaged observer partner (SCO)

http://sies-project.com/project.html

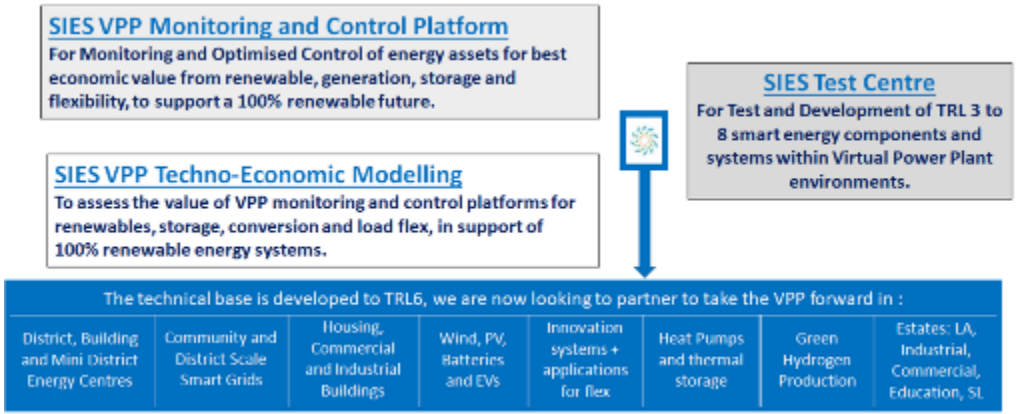
SMART INTEGRATED ENERGY SYSTEMS

SIES 2022: Challenge, Solutions, Next Steps

Virtual Power Plants (VPP) can support decarbonisation but techno-economic solutions are not yet well developed.

SIES 2022 solutions:

- **VPP Control Platform**
- **VPP Value Assessment Modelling**
- **Test and Development Centre**
- **Demonstrators: Flex, Gen, Store, Heat, H2, EV, H2EV, Network**



We now seek partners to deploy the SIES outcomes

SIES Centre can support Industry with VPP 'system-in-the-loop'

http://sies-project.com/project.html

SMART INTEGRATED ENERGY SYSTEMS

SIES 2022: VPP Monitoring and Control Platform

VPP Software Design

PyEMLab Structure

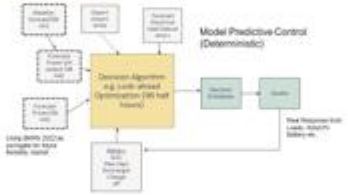
- PyEMLab used as the base structure for VPP platform [1-2]
- Module structure shown below

VPP Platform Code-Base

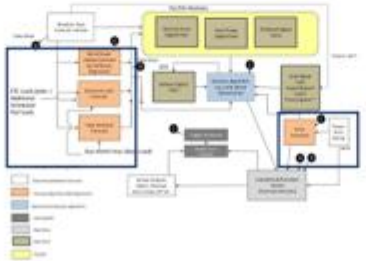
VPP Forecasting

- Forecasting Key part of VPP Functionality
- Data →Learn → Predict →Review
- Prices, Wind Power, Solar, Heat demand, Power demand (Load)
- Weather forecasts used as input
- Using various forecasting techniques including multi linear regression Machine learning eg XGBoost etc.

Forecasting Overview



Forecasting Modules



VPP Hardware Overview

VPP Asset Network

- Two key components –
  - VPP platform hosted on server on or off site. Currently offsite.
  - Energy Management Control System. (EMCS) at comprises of an Energy Asset Server, local asset network (Modbus RS485) and AWS
- EMCS is used to provide a control and data logging interface between the Virtual Power Plant (VPP) application and the various energy assets and meters installed at the energy pools.
- ECMS gathers operational data from assets at the various energy pools
- ECMS interfaces with AWS database & provides logging of instantaneous data from assets.
- Assets are connected to Modbus network.
- AWS used to host a cloud server which forms the central hub for EMCS data and interaction with separate VPP application.
- Local assets: VLAN over LAN (Energy Asset Network (EAN)). EAN uses Modbus Gateway and RTU's (TCP - RS485) and essentially forms a Modbus network.
- Modbus gateways are used to interface to the various existing Modbus RTU (RS485) devices to Modbus TCP, and to interface with the EMCS server.

VPP Operation

Energy Management Control System (EMCS)

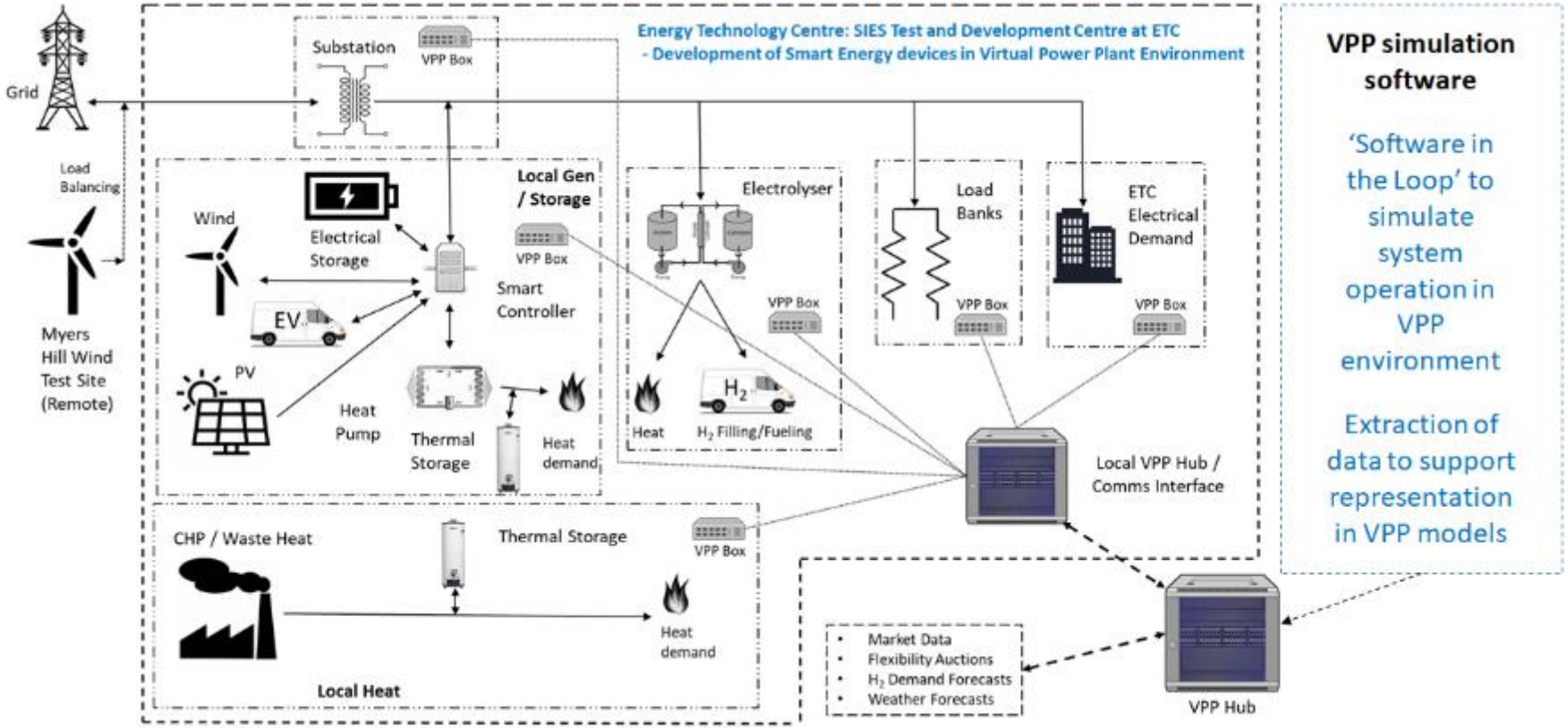
- EAN located at local site i.e. Energy Technology Centre (ETC)
- Module structure shown below

References

Currently running > 1 year across multiple sites; at TRL6

SMART INTEGRATED ENERGY SYSTEMS

SIES 2022: Virtual Power and Flex Technology Plant Test and Development Centre TRL3-8

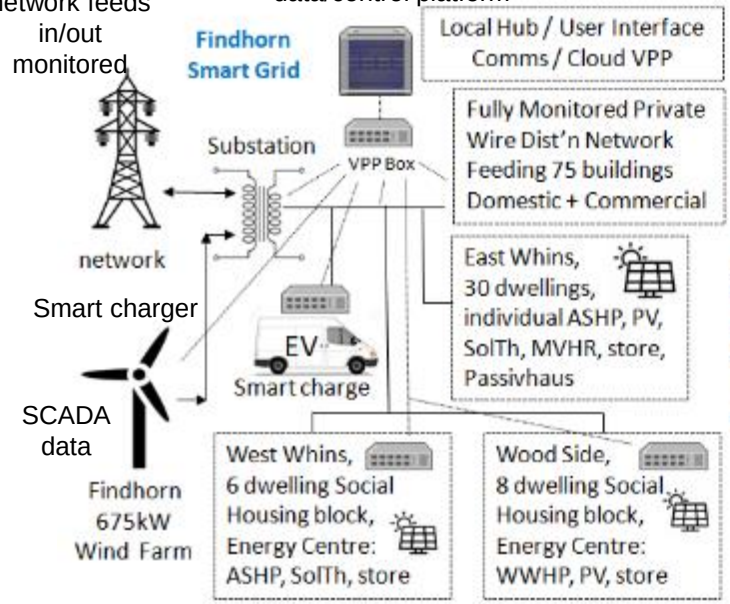


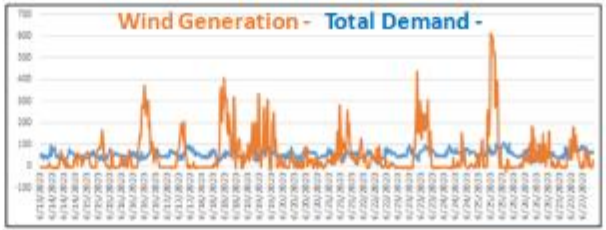
http://sies-project.com/project.html

SIES 2022: VPP Demonstrations Findhorn

All substation + network feeds in/out monitored

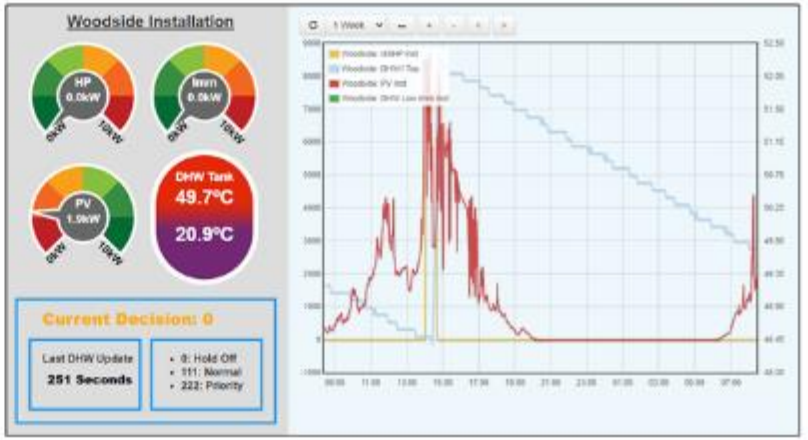
Low cost Pi/OEM data/control platform





Smart Control implemented at Energy Centres to optimise cost e.g. self consumption of PV and Wind and optimum use of tariffs

> 400% increase in self-consumption of PV / wind



Other relevant scenario's modelled:

- Battery Storage at windfarm (Li-ion, Flow)
- District vs Micro-district vs per dwelling Heat Pump and EV transition impacts
- Industrial Estate or Community Scale Smart Energy Systems
- Energy Centres for Housing Blocks PV+HP+Store+EV
- PV vs Solar Thermal evaluation
- Network capacity mapped for HP, EV scenarios

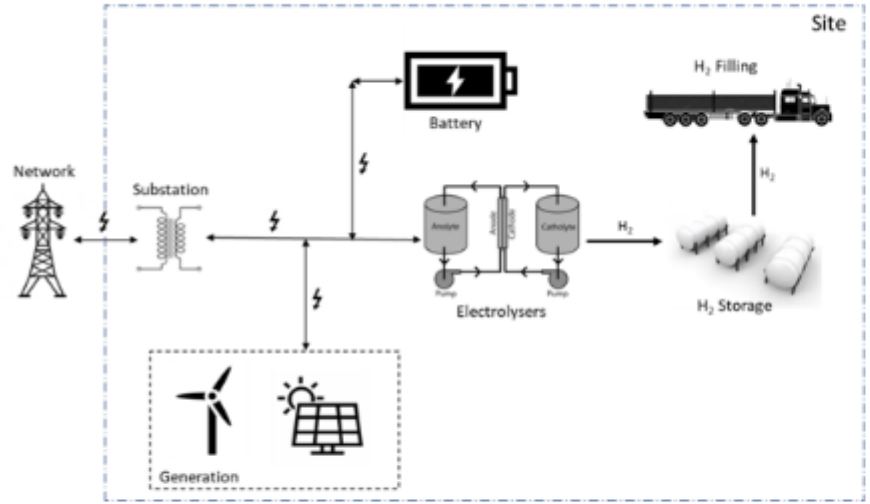
Smart Energy Systems ERA-Net

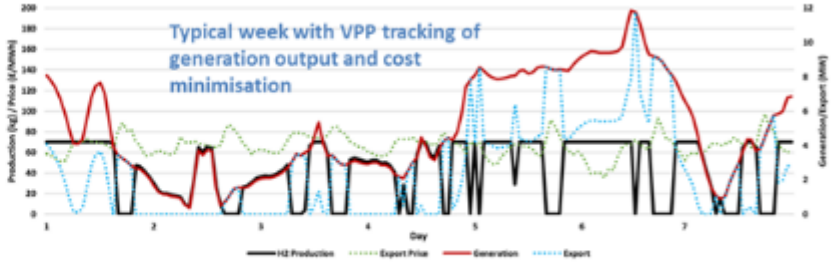
http://sies-project.com/project.html

SMART INTEGRATED ENERGY SYSTEMS

SIES 2022 VPP Value Assessment: Green Hydrogen Plant

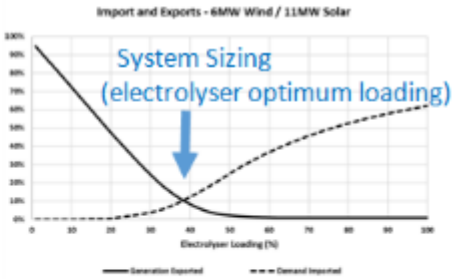
Green Hydrogen Production Plant:





No.	Operational Controls	Operational Annual Electricity Net Cost
1	Fixed Order	£409,237
5	VPP (Opt72)	£131,956

Cost Benefit of VPP

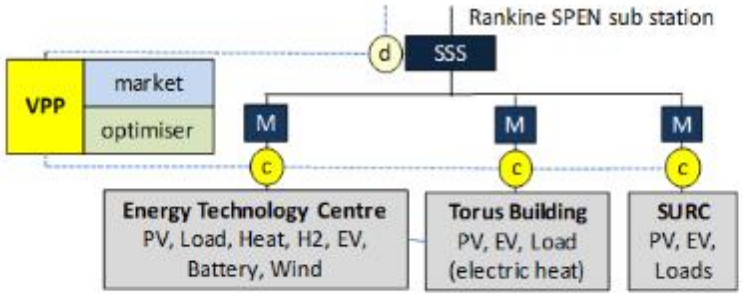


Other relevant scenario's modelled:

- Green Hydrogen production and Electricity Generation (CCGT, Fuel Cell)
- Electrification via Renewables plus Battery and/or Hydrogen for Industry Operations and Transport Fleets etc.

http://sies-project.com/project.html

SIES 2022 VPP Value Assessment: Districts

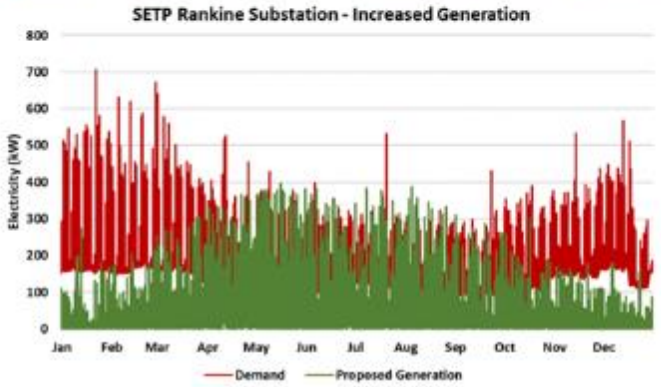


Smart Sustainable East Kilbride (SSEK) Initiative:

The opportunity exists to develop an exemplar local non-domestic multi-customer smart local network with renewable electrification of heat and transport, storage, flexibility and VPP controls to support local value optimisation and DSO and TSO services. ETC will be the lead organisation providing expertise and facilities for development and demonstration of emerging technologies including advanced control algorithms.

Model results:

- 500kW PV (available roof space) plus 250kW turbine
- VPP plus battery required to limit exports and increase self-consumption



Scope for greater wind or wind PPA

http://sies-project.com/project.html

SIES 2022: Next Challenges

- SIES 2022 future challenges:
  - The advanced VPP technology is at TRL6 now to take the journey to TRL 9
  - Commercial processes need to be developed piloted, streamlined and de-risked with secure costs and guaranteed benefits to all participants.
  - All aspects of technical and commercial delivery and operational supply chain need to be developed and processes streamlined and mainstreamed so they can be successfully adopted by need owners as 'business as usual'.
  - VPP and VPP Value Assessment to be embedded in the delivery process.
  - New Flex Asset types emerging with Potential for VPP integration need support in journey from TRL 3 to 9.
    - e.g. Hydrogen, Flow Battery, Compression and Liquifaction Technologies, PCM, HiTemp Storage, Ground Storage, Fuel Cells, Hybrid Transport Systems…

- **We seek partners to jointly address these challenges.**
- **We offer our knowledge base, the SIES VPP and SIES VPP Value Assessment software, SIES Test Centre, and Links to many need-owners and supply chain actors.**

http://sies-project.com/project.html

SIES 2022: Next Challenges

- SIES 2022 future challenges: TRL6 to TRL9

SIES VPP Monitoring and Control Platform
For Monitoring and Optimised Control of energy assets for best economic value from renewable, generation, storage and flexibility, to support a 100% renewable future.

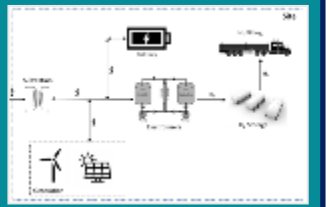
SIES VPP Techno-Economic Modelling
To assess the value of VPP monitoring and control platforms for renewables, storage, conversion and load flex, in support of 100% renewable energy systems.

SIES Test Centre
For Test and Development of TRL 3 to 8 smart energy components and systems within Virtual Power Plant environments.

The technical base is developed to TRL6, we are now looking to partner to take the VPP forward in :

District, Building and Mini District Energy Centres	Community and District Scale Smart Grids	Housing, Commercial and Industrial Buildings	Wind, PV, Batteries and EVs	Innovation systems + applications for flex	Heat Pumps and thermal storage	Green Hydrogen Production	Estates: LA, Industrial, Commercial, Education, SL

We are working to take forward – and open for more win-win



City / Town / District / Region

Industrial Plant / Operations

Housing / Mini-districts / HP+EV / Retrofits…

Campus / Industrial Estates

- **We seek partners to jointly address these challenges.**
- **We offer our knowledge base, the SIES VPP and SIES VPP Value Assessment software, SIES Test Centre, and Links to many need-owners and supply chain actors.**

http://sies-project.com/project.html

SMART INTEGRATED ENERGY SYSTEMS

SIES 2022: Outcomes and Next Steps in Detail

SIES VPP Monitoring and Control Platform and Applications

Monitoring and Optimised Control of energy assets for best value from generation, storage and flexibility, and to support a 100% renewable future.

Asset types: Wind; PV, Solar Thermal, Heat Networks, Heat Pumps, Thermal Storage, Battery Storage, EVs, Green Hydrogen, Industrial.
Markets: Self-Consume, Efficiency, Import&Export Flex Tariff, Pw, PPA, DNO, TSO
Algorithms: Market, Generation and Demand Forecasts, Model Based Predictions, Local and Global Optimisation for Cost and Renewable %.
Software: Research and deployment versions, Python, cloud and local server.
Hardware: Multiple hardware platforms have been integrated. Flexible.
Demo Sites: Windfarms, Energy Test Facility (ETC), Distribution Network, District Smart Grid, District Heat / Energy Centres, Housing, Hydrogen Plant.

SIES Virtual Power Plant Techno-Economic Modelling

Assess value of VPP for renewables, storage, conversion and load flex, in support of 100% renewable energy systems.

Concept scoping and system optimisation. Virtual Prototyping and Test Environment. Model Predictive Controls Optimisations. Digital Twin. Uncertainty analysis. Python.

SIES Test Centre ETC/UoS

Development (TRL3-8) of smart energy components and systems within Virtual Power Plant environments.

Actual + simulated operation within future renewable Smart Grid environment with a range of assets under VPP Control. Extraction of characteristics to allow incorporation in Virtual Power Plant modelling and control.

Hardware + instrumentation for: combustion, compression, heat, generation, thermal and battery storage, heat pumps, chp, rolling road, chemical, hydrogen, CO2.

The technical base is developed to TRL6, we are now looking to partner to take the VPP forward in :

District, Building and Mini District Energy Centres	Community and District Scale Smart Grids	Housing, Commercial and Industrial Buildings	Wind, PV, Batteries and EVs	Innovation systems + applications for flex	Heat Pumps and thermal storage	Green Hydrogen Production	Estates: LA, Industrial, Commercial, Education, SL

http://sies-project.com/project.html

Funding Partners

Smart Energy Systems ERA-Net

This initiative has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements no. 646039, 775970 and 883973.

TRI 1 – New projects starting this autumn

Project	Title / topic	Coordinator
RESILIENT	<u>Resilient Energy System Infrastructure Layouts for Industry, E-Fuels and Network Transitions</u> Development of a new tool for resilient infrastructure planning with: • new stochastic optimisation capabilities • management of uncertainties including the cost of fuels and technologies, hydrogen availability, network expansion delays, hydrogen and carbon dioxide, value chain restructuring in industry, imports of e-fuels and secondary materials, renewables build-out and social acceptance	TU Berlin
Man0EUvRE	<u>Energy System Modelling for Transition to a net-Zero 2050 for EU via REPowerEU</u> Combination of tools • advancing R&I on stochastic modelling, methodology and hardware technology • providing feedbacks to REPowerEU plan and to next generation NECPs, putting national modelling into European scenarios and transition goals	SINTEF ENERGY AS
CoPRESS	<u>Cooperative Platform for Renewable Energy Storage Systems</u> • Application of the concept of “energy cells” • Empowerment of electricity consumers to choose how their DERs interact with the grid, enabling a new consumer role • Focus on relaxing the trade-off between customization of solutions to individual circumstances and their scalability • Increase of the cooperation among heterogeneous energy resources through enhanced power management systems and interoperable microservices	CSEM

TRI 1 talks with ManoEUvre project

MANOEUVRE

Welcome to Siri Mathisen

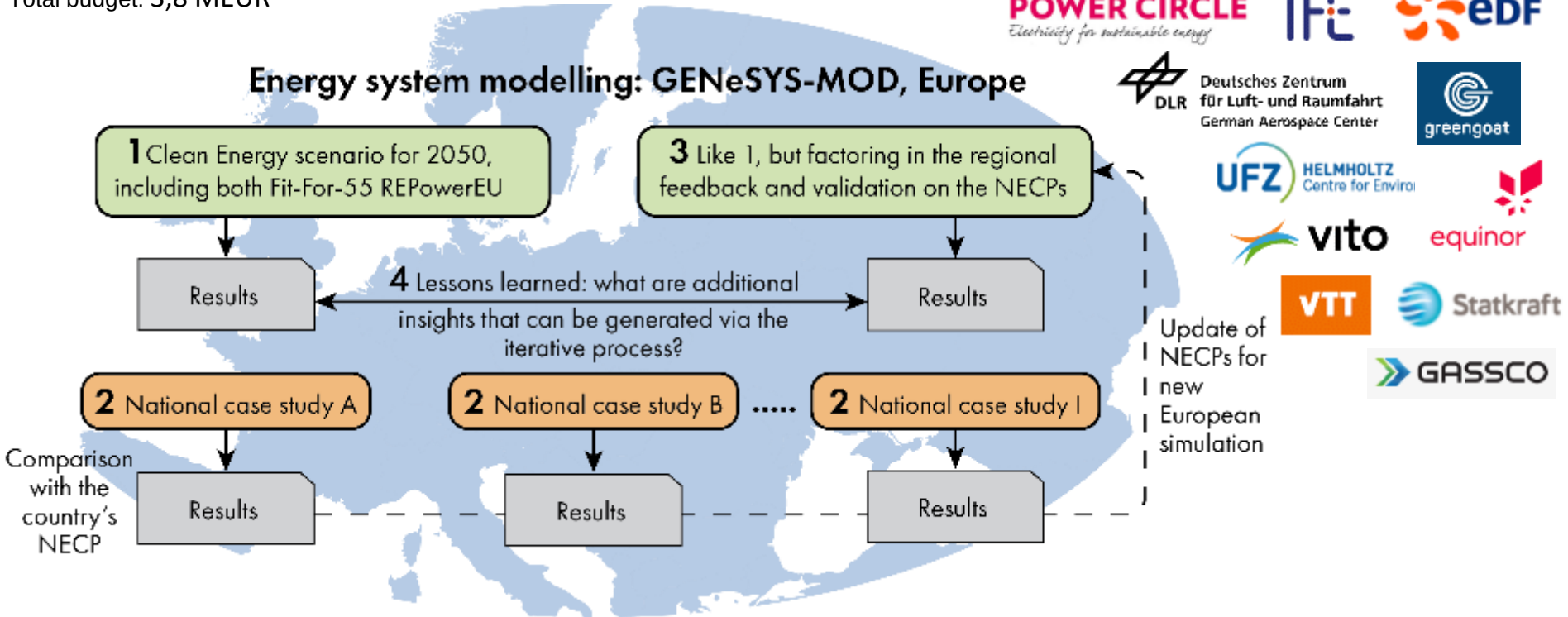
MANOEUVRE

Energy System Modelling for Transition to a net-Zero 2050 for EU via REPowerEU

CETP 25.10.23, Teams

MANOEUVRE

Type of project: Clean Energy Transition Partnership
Duration: 2023-2026 (36 months)
Total budget: 3,8 MEUR



MANOEUVRE

Objectives

Improve and coordinate energy system modelling across Europe

Provide open scientific evidence and research-based results that facilitate emissions reductions for a clean energy transition (CET)

- Robust pathways for the European energy system
- Feedback and advice to the National Energy and Climate Plans
- Toolbox for conducting energy transition studies at both European and national level
- Consistent energy system modelling datasets and scenario projections
- Coordination between national energy plans and EU-wide transition goals.

Challenges and knowledge needs

- Knowledge that will support the shortest route to REPowerEU goals and short cost-effective transition alternatives to Fit for 55.
- Provide better models, understanding and data for the next generation of NECPs
- Enable the availability of proven tools for system planning, operation, performance, resilience, and sustainability evaluation
- Provide figures for benefit of transnational collaboration.
- Man0EUvRE integrates several stochastic models across sectors and nations.

TRI 1 Wrap up

- New projects will have the potential to leverage the up-to-date information through the CETPartnership knowledge management platform
- For example, Man0EUvRE project can consider, in their energy system modelling datasets and scenario projections, the VPP models developed by SIES2022
- TRI 1 will help the selected projects in their interaction with stakeholders and need-owners to adapt their outputs and deliverables to maximise impact and real applications of project results
- TRI 1 will foster knowledge exchange opportunities among TRI 1 2022 projects and 2023 projects of different TRIs (including CM 2023-02 with TRI 2 and Mission Innovation GPFM)

Challenge 2: Enhanced zero emission Power Technologies

Rachele Nocera and Francesco Basile (MUR)

TRI 2. Enhanced zero emission Power Technologies

TRI 2’s Mission is to develop a pool of zero-emission power technologies and solutions based on Renewable Energy Sources as the backbone of the future energy system, being able to deliver carbon-neutral electricity accessible to all and to contribute to the resilience of the system

Co-funded by the European Union

Joint Call 2022 project portfolio

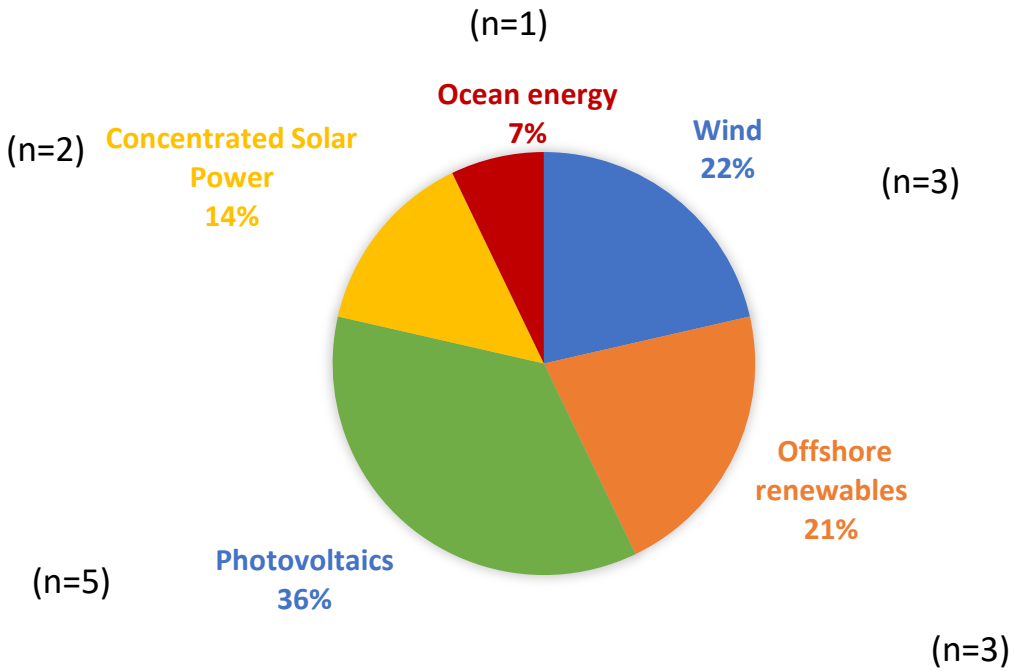
Call Module	Project Id	Acronyme	Funding request
CM 2.1	Cetp-2022-00371	SEASNAKE+	2.213.103,00
CM 2.1	Cetp-2022-00018	HYBRID WIND	2.499.175,13
CM 2.1	Cetp-2022-00127	WECHULL+	2.550.297,00
CM 2.1	Cetp-2022-00394	WaMTec	1.304.200,34
			8.566.775,47

Call Module	Project Id	Acronyme	FUNDING REQUEST
CM 2.2	Cetp-2022-00377	WIND-DIGIPOWER	1.112.976,00
CM 2.2	Cetp-2022-00085	NextGen	2.313.672,00
CM 2.2	Cetp-2022-00360	NORD STORM	1.574.638,63
CM 2.2	Cetp-2022-00297	EPoBoC	1.350.505,00
CM 2.2	Cetp-2022-00102	Sunflower	1.163.323,90
CM 2.2	Cetp-2022-00345	MORE	1.463.400,00
CM 2.2	Cetp-2022-00336	SPOT-IT	1.787.898,91
CM 2.2	Cetp-2022-00036	ACT-FAST	601.216,91
CM 2.2	Cetp-2022-00131	DETECTIVE	778.747,00
CM 2.2	Cetp-2022-00382	SMARTMOORING	1.067.029,50
			13.213.407,85

Participating Funding Organisations
Belgium/Flanders
Denmark/IFD
Estonia
Finland
France/ANR
France/PdLoire
Germany
Germany/NRW
Germany/Saxony
Iceland
Ireland
Italy/MiMIT
Italy/MUR
The Netherlands/NWO
The Netherlands/RVO
Norway
Poland
Spain/AEI
Spain/CDTI
Sweden
Türkiye

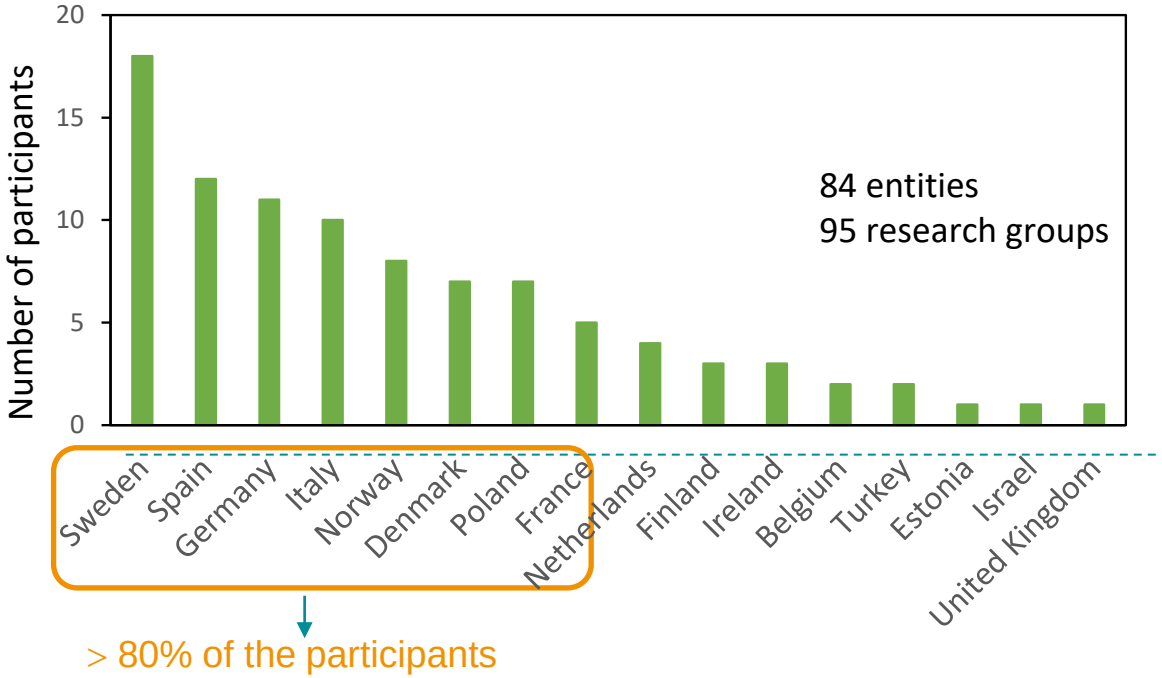
Joint Call 2022 project portfolio: thematic areas covered

TRI2 thematic areas



Co-funded by the European Union

Joint Call 2022 project portfolio: Number of participants per country



*Data includes self-funded projects (1 entity/country for United Kingdom, Germany, Spain, and Norway and 2 entities/country for Sweden).

TRI2 project pitches

ACT-FAST

ANNUAL CONFERENCE

24-25th October 2023

Sustainable Antimony Chalcogenide Thin-Film TAndem Solar Technology (ACT-FAST)

Dr. Nicolae Spalatu

Laboratory for Thin Film Energy Materials: Department of Materials and Environmental Technology

TalTech, Tallinn, Estonia.

THE CHALLENGE

EU 2050 goal: net-zero emissions

Renewable energy – critically important

PV – renewable, sustainable energy

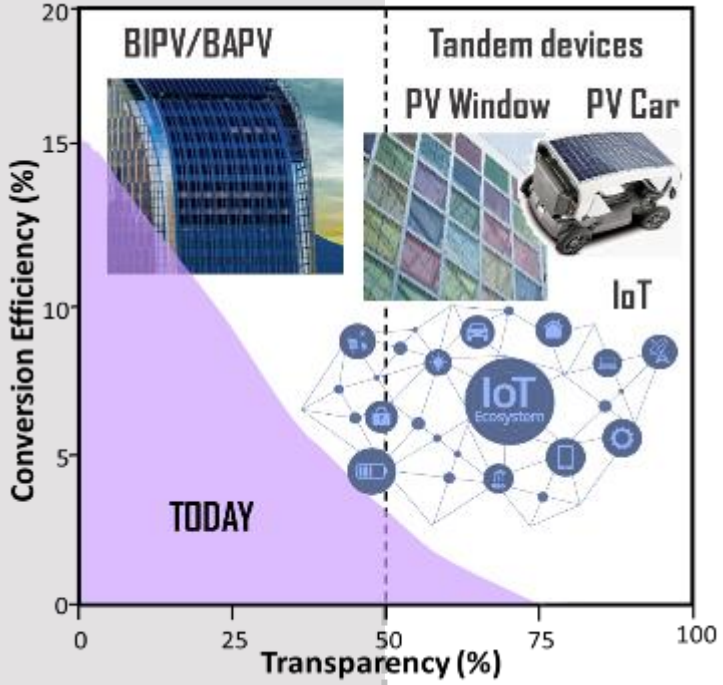
5-10 TW needed by 2030

30 TW by 2050

How to increase the proportion of power generated by PV?

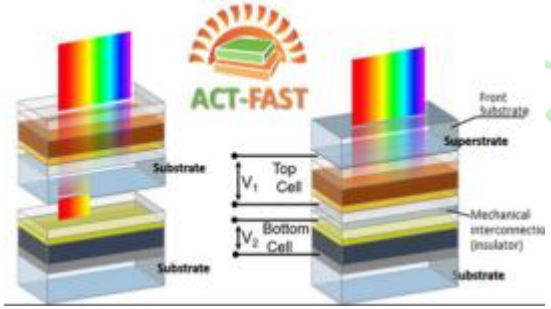
The key drivers behind PV technologies:

- *Cost per watt from module production*
- *High performance & durability*



THE CONCEPT

Optically Tuneable All Thin film Tandem Solar Cells



Expected results:

Increased performance PCE ≥ 25% Higher

Durability ≥ 20 years,

Lower Costs < 0.20 €/Wp

ACT-FAST AIM: **to develop high efficiency thin film tandem solar cells**, based on emerging earth abundant antimony chalcogenides, using novel and low-cost techniques, low environmental impact materials, scalable depositions processes.

Exploit the key benefits: i) low fabrication temperatures, ii) high stability, iii) low environmental impact, iv) low carbon footprint, and v) high versatility, to deliver on the vast potential of high efficiency thin film tandem devices**. This will yield a technology compatible with a future upscaling for mass deployment.**

DETECTIVE

DETECTIVE

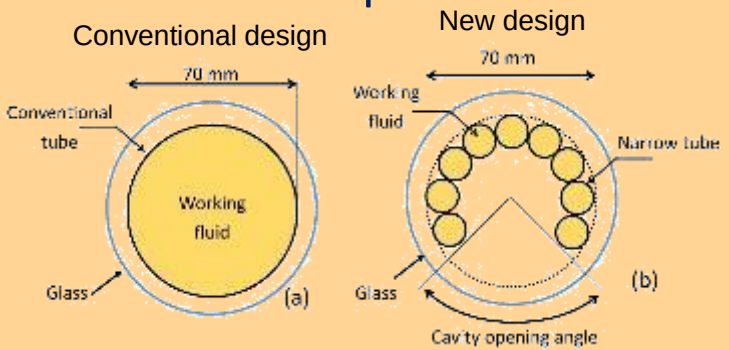
DEvelopment of a novel TubE-bundle-CaviTy lInear receiVEr for CSP applications

Project consortium

1. Challenge

Enhance the current efficiency of linear absorbers (PTC) used in CSP plants

2. Concept idea



Liner cavity concept with multi tubes to be adapted to conventional CSP systems → identify and test the optimum design

3. Expected outcomes

After 36 months from Dec 1st '23:

- **Higher efficiency**
- **Reduced footprint**
- **Go-to-market strategy with lower CAPEX**

→ **Larger market for PTCs**

- **Support / exchange of ideas + help in dissemination from the CETP Community**

cet Partnership

EPoBoC

Jan Benick (Fraunhofer ISE)
jan.benick@ise.fraunhofer.de

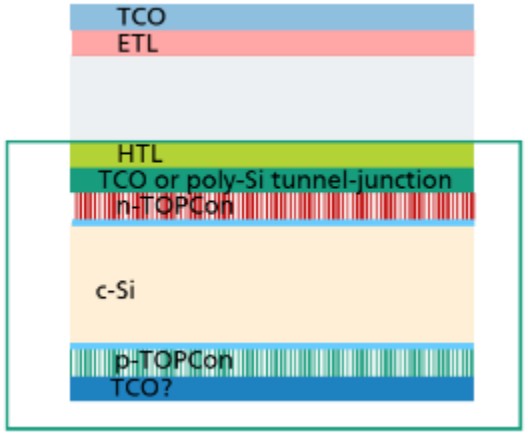
Consortium

- Fraunhofer ISE (coordinator), Freiburg, Germany
- ECM Greentech (formerly SEMCO Smartec), Castries, France
- ECM Greentech, Grenoble, France
- CEA, Paris, France
- Universiteit Twente, Enschede, Netherlands

Co-funded by the European Union

Project

- Increase of solar cell conversion efficiency, resource saving
- Specific optimization of Si bottom solar cell for Perovskite/Si tandem solar cell. (CO_2 low Si wafer, In-free, lean process chain)
  - TOPCon^2, cast mono Si, In-free TCO or Si tunnel diode
- High-efficiency, easy to fabricate and resource saving Perovskite/Si tandem solar cell.
- Transnational, effective collaboration with leading European industrial and research partners.



Project Acronym
HYBRID WIND

Project Title
Hybrid wind turbine condition monitoring system for different weather conditions

Marcin Luczak, Gdańsk University of Technology
marcin.luczak@pg.edu.pl

Hybrid Wind TRI2

- **PL:** Gdansk University of Technology, EDF-R, Gdansk University, Institute of Fluid Flow Machinery Polish Academy of Sciences
- **DK:** Technical University of Denmark, Rambøll
- **DE:** German Aerospace Center, Bachmann Monitoring GmbH
- **BE:** KU Leuven, Siemens Digital Industries Software
- **Challenge:** is the turbine broken, frozen or both?
- **Method:** Apply hybrid method for damage detection and monitoring: experimental/numerical, lab/field
- **Result:** Optimised O&M, lowering LCOE, improved LCA

MORE

Next Generation Marine Materials for Resilient Offshore Renewable Energy Devices

Peter Petrov
RISE Research Institutes of Sweden
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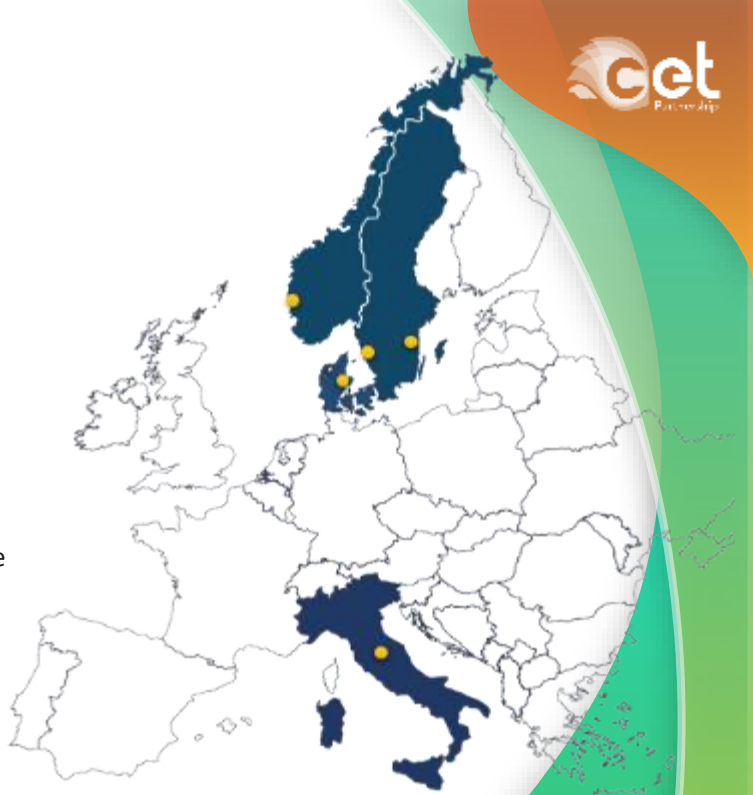
Project Concept

The main objective of MORE is to develop, demonstrate and validate full transferability, harmonization and reproducibility of multi-degradation results validated at laboratory level (TRL4), through subcomponent level by accelerated multi-degradation pilot testing (TRL5, TRL6), to potential demonstration in a relevant industrial environment for the user cases (TRL7).

MORE will demonstrate a multi-degradation validation pathway for materials and subcomponents to be used as a case study in the offshore renewable energy sector. While innovative offshore renewable energy device technologies are gaining popularity, operating them in harsh marine environment is a complex and challenging process that jeopardizes the deployment of these very important technologies for future generations .



WAVEPISTON

Seal ENGINEERING

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SINTEF

SERVI GROUP

NTNU

GCE | NODE |

CorPower Ocean™

VGA

Co-funded by the European Union

Outcomes

- **The development and validation in relevant environment of breakthrough innovative solutions for increasing the overall efficiency and reliability of renewable power production at system level.**
- ***Minimize the environmental impact:***
  - Critical Raw Materials (CRM) free products
  - Contribute to social acceptance of renewable deployment by developing smaller equipment
  - Reduced breakdowns and maintenance of devices
  - Minimize the carbon footprint of the systems by developing a novel methodology and test platform for accelerated multi-degradation testing of critical components
- **Accelerate time to market**
- **Reduce the development time and cost of renewable energy technologies**

The MORE project will develop an **alternative path, focusing on maximizing the performance of key components** and subsystems at early development stages through an **improved material selection methodology**.

Demonstrating the NextGeneration of direct drive generators for wind power

Liselotte Ulvgård
Hagnesia Wind AB
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Background & Goals

- Challenge: Competitive and competitive wind power
- Solution: Novel extremely compact & efficient drivetrain
- Project: NextGen

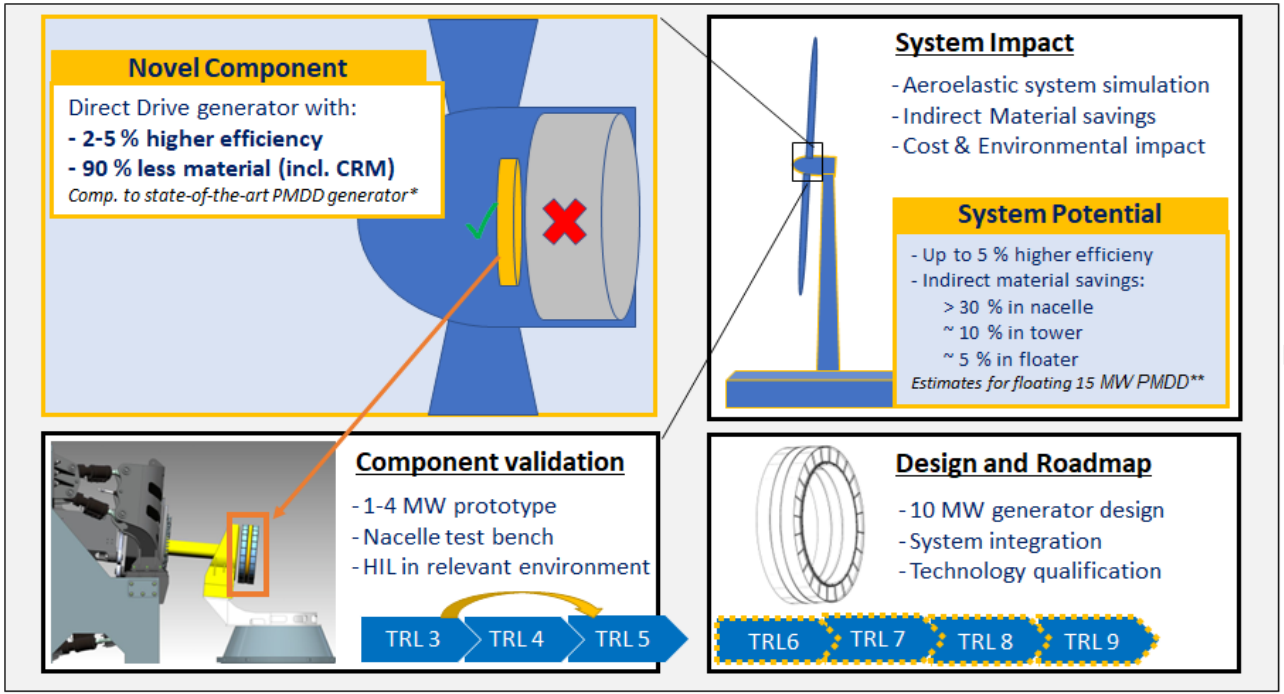
Demonstrating the NextGeneration of Direct Drive Generators for Wind Energy

Project goals:
- **Design** and evaluate a 10 MW generator
- **Validate** the technology by testing a MW-sized prototype (TRL5).
- **Understand** the potential system impact & accelerate time to market.

Partners

Hagnesia Wind AB Sweden	Fraunhofer Institute for Wind Energy Systems (IWES) Germany	Danmarks Tekniske Universitet (DTU) Denmark

Project Content & CETP value



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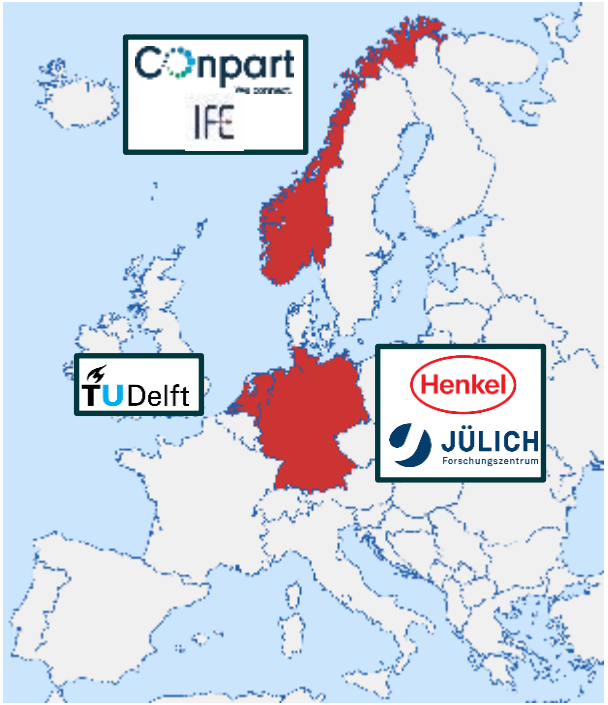
NORD STORM

Novel paths towards next generation heterojunction solar cell and module

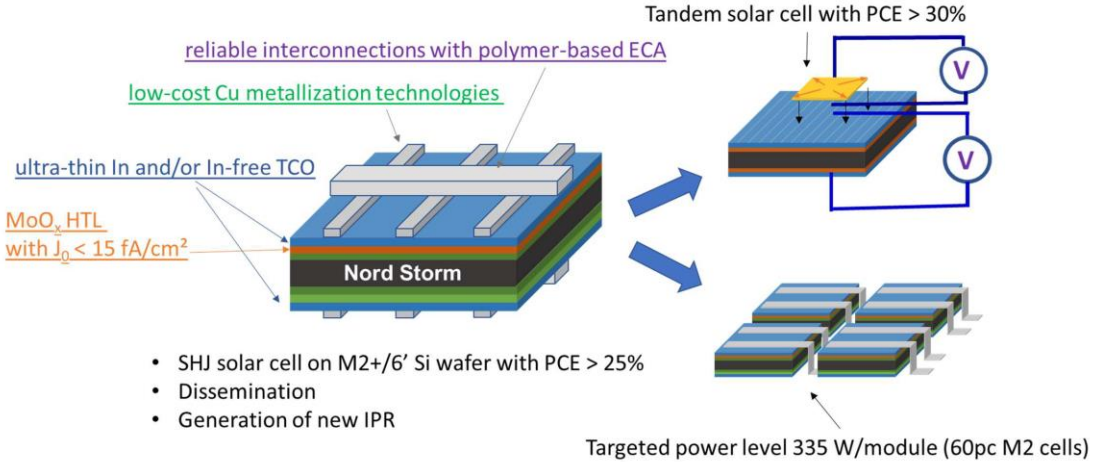
Karsten Bittkau (Forschungszentrum Jülich)
k.bittkau@fz-juelich.de

NORD STORM: Overview of the project



- Development of next generation silicon heterojunction (SHJ) solar cell and module technology
  - Newly designed hole transport layer
  - Indium-free transparent conductive oxide layer
  - Cu metallization
  - Polymer-based interconnection with much less Ag consumption

NORD STORM: Concept and targets



- Low-cost technologies for cells and modules demonstrated
- Power conversion efficiency (PCE) > 25%
- Tandem solar cell with perovskite with PCE > 30%
- Output module power 335 W (60pc cells)

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SEASNAKE+

Industrial upscale of surface protection system & fiber optic-based condition monitoring for the SEASNAKE MVC (Medium Voltage Cables)

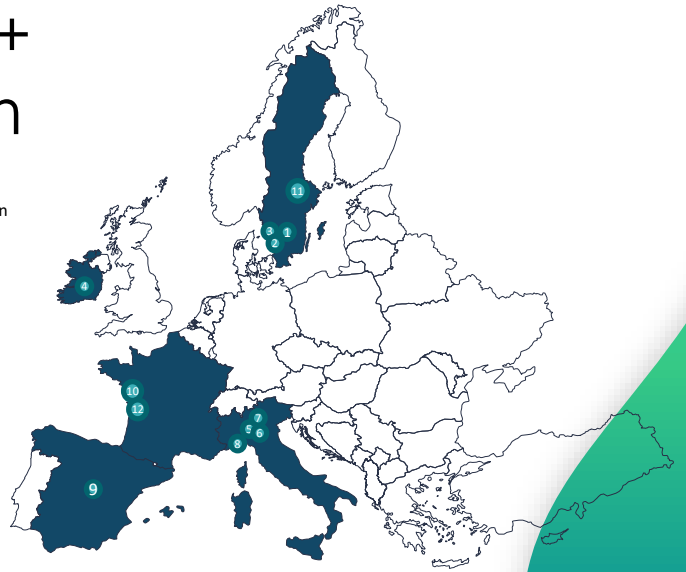
Emiliano Pinori (RISE – Research institutes of Sweden)
Emiliano.Pinori@ri.se

SEASNAKE+: Consortium and Objective

- SEASNAKE+ focus on enhancing the reliability of dynamic marine cables MVC, thanks to surface protection and fiber optic condition's monitoring system to be included in manufacturing process of the cable.

SEASNAKE+ consortium

1# RISE Research Institutes of Sweden
2# I-Tech
3# Chalmers University
4# Wave Venture
5# Geico
6# Green Sailor
7# KeelCrab
8# CNR
9# University of Alcala
10# University Gustave Eiffel
11# NKT
12# D-ICE



SEASNAKE+ IMPACT

- SEASNAKE+ will reduce of LCoE and the environmental impact of the marine cables. Demonstrate reliability of SEASNAKE+ cables in real environmental conditions and in different locations and applications increasing the market dimension. This will be achieved also trough through de-risking strategies, e.g., digital modelling approaches.

- From the CET Partnership we expect fruitful collaboration with the other projects and collaboration in dissemination of results during common CETP events to increase awareness of final users on the SEASNAKE+ innovations and shorter market uptake.

SMARTMOORING

Smart mooring for safe and efficient ocean energy production

Åsa Claesson
RISE Research Institutes of Sweden
asa.claesson@ri.se

Challenge, concept, and consortium

Motivation / challenge

- Many moored energy systems can benefit from real time data mapping of load, shape, mechanical state, and temperature inside and along the mooring components.
- This information can be used for data-driven optimization of design and performance of the energy systems.

Concept

- In-component fiber optic sensing.
- Two use cases: Tidal system (Minesto) and Wave energy system (CorPower Ocean).

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CALSENS

Université Gustave Eiffel

CorPower Ocean™

Minesto

Co-funded by the European Union

Expected results and expectations on CETP

Expected results

- Higher energy yield of OE converters, by enabling real-time in-operation optimization and data-driven design of mooring components,
- Safer operations, reduced maintenance costs, and potential for predictive maintenance procedures, and
- Contribute to the development and commercialization of important and innovative enabling technologies, and to their implementation in ocean energy.

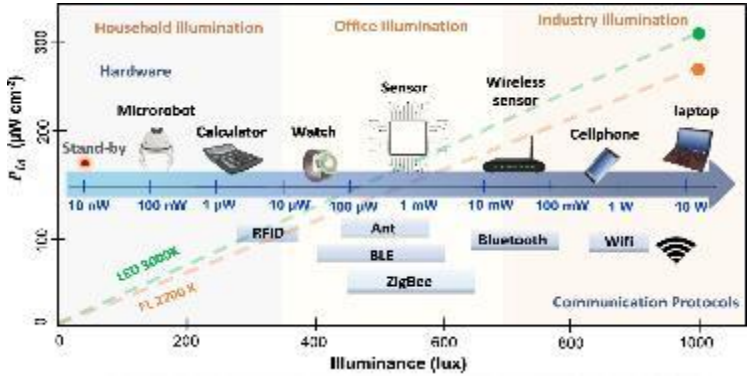
Expectations from CETP

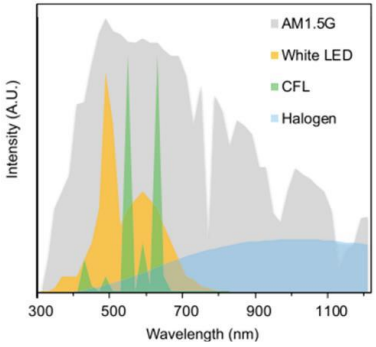
- CETP Knowledge community, facilitating cross-project dialogue where relevant
- Efficient reporting and administration incl streamlined national procedures
- Contribute to visibility of project and project results

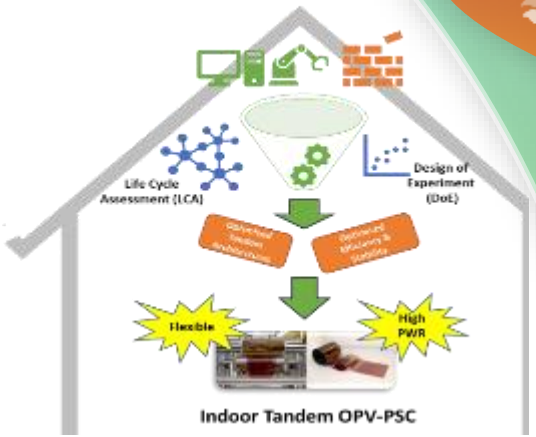
“Stable printed perovskite/organic tandem solar cells and modules for indoor & IoT” SPOT-IT

Prof. Francesca Brunetti
CHOSE, Center for hybrid and organic solar energy, Università degli Studi di Roma Tor Vergata, Rome (Italy)
Francesca.brunetti@uniroma2.it

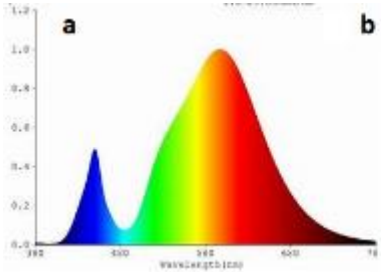
SPOT-IT project

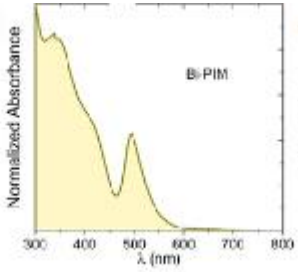


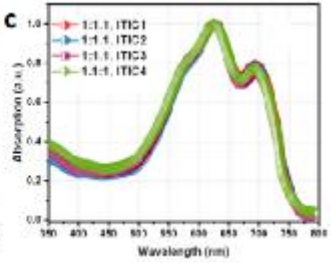


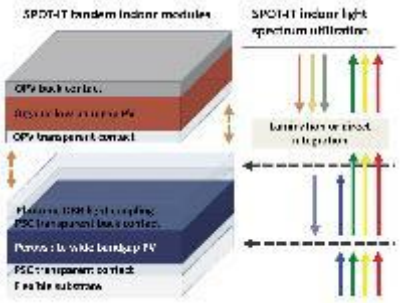


The SPOT-IT project aims at developing stable and efficient tandem perovskite/organic solar cells and modules optimized for IoT indoor applications.









N.Flores Diaz, Chem rev. 2023, Li, B et al.. InfoMat 2021, 3, 445–459.

Co-funded by the European Union

The consortium

Italy

- Coordination of the project
- Perovskite Solar cells printing
- Scaling up
- Tandem integration
- Indoor characterization

University of Turin

- Materials sysntesis
- Design of experiments
- Life cycle assesment

Finland

- Perovskite Materials
- Perovskite solar cells
- Indoor characterization
- Indoor characterization
- Solar cells printing

Denmark

- OPV printing
- Scaling up
- Tandem
- Devices printing
- Scaling up
- Printing system optimization

Spain

- Perovskite Materials
- Perovskite solar cells
- Characterization

Sunflower
–
Sustainable near-net-shape fabrication of low environmental impact receiver materials

Alexander Füssel, Fraunhofer Institute for Ceramic Technologies and Systems IKTS
Alexander.Fuessel@IKTS.Fraunhofer.de

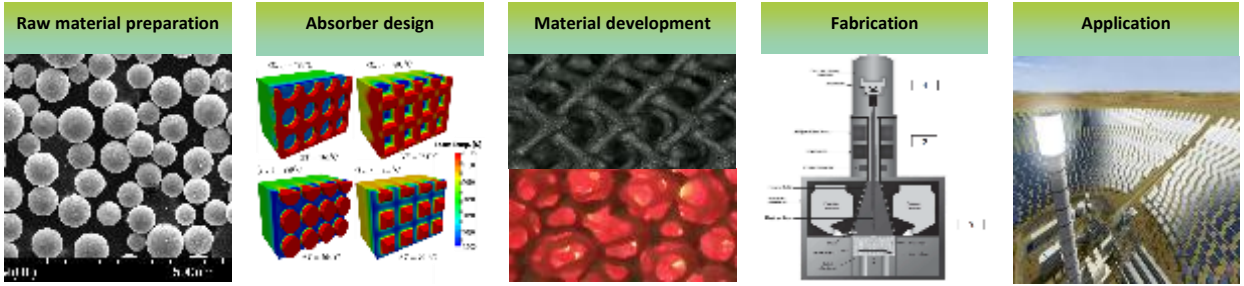
SUNFLOWER

- Project consortium with 7 partners from 4 European countries

Denmark	Germany	Poland	Spain
Aalborg CSP A/S.	ESK-SIC GmbH	AMAZEMET Sp. z o. o. [Ltd.]	CIEMAT-PSA
	Fraunhofer IFAM		Fundación CENER
	Fraunhofer IKTS		

- Addressed challenge
  - Making available cheap and durable high-temperature absorber materials for CSP-OVR with low environmental impact
- Concept idea
  - Integrated absorber improvement by adjusted design, raw material preparation, fabrication, experimental and numerical assessment.

SUNFLOWER



- Expected results
  - Increased efficiency of absorber structures with higher durability (two temperature levels FeCrAl and SiC)
  - Reduced preparation costs and lower environmental impact
  - Strengthening of CSP as competitive part of clean energy source
- Expectations from the CETP
  - Networking with partners for CSP
  - Alternative applications for high-temperature materials

WaMTec

From Wafer to Module: Cost-Effective High-Efficiency Silicon Technologies

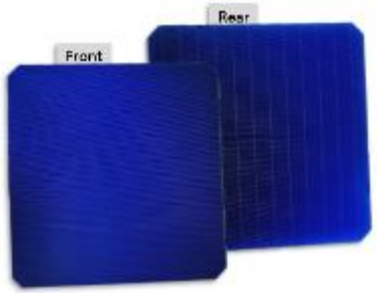
Marc Hofmann (Fraunhofer Institute Solar Energy Systems, Freiburg, Germany)
marc.hofmann@ise.fraunhofer.de

Project WaMTec

- Consortium (from South to North)
  - Turkey: GUNAM, Smart Solar
  - Germany: Fraunhofer ISE, Schmid
  - Ireland: Nines Photovoltaics
  - Norway: NorSun

- Project topic: From Wafer to Module: Cost-Effective High-Efficiency Silicon Technologies
  - High-quality large p-type silicon wafers
  - High-efficiency TOPCoRE solar cells
  - Improved solar modules and outdoor tests

Project WaMTec



- Expected results
  - Increased quality and lowered cost of p-type Si wafers
  - Increased TOPCoRE solar cell efficiency to 25.5%
  - Improved light management in solar modules
  - Proof of technology by outdoor test in Turkey and Germany
  - ~10% lower solar cell production cost
- CETP's support would be highly appreciated concerning reporting and administrative questions since it is the first CETP round.

WECHULL+

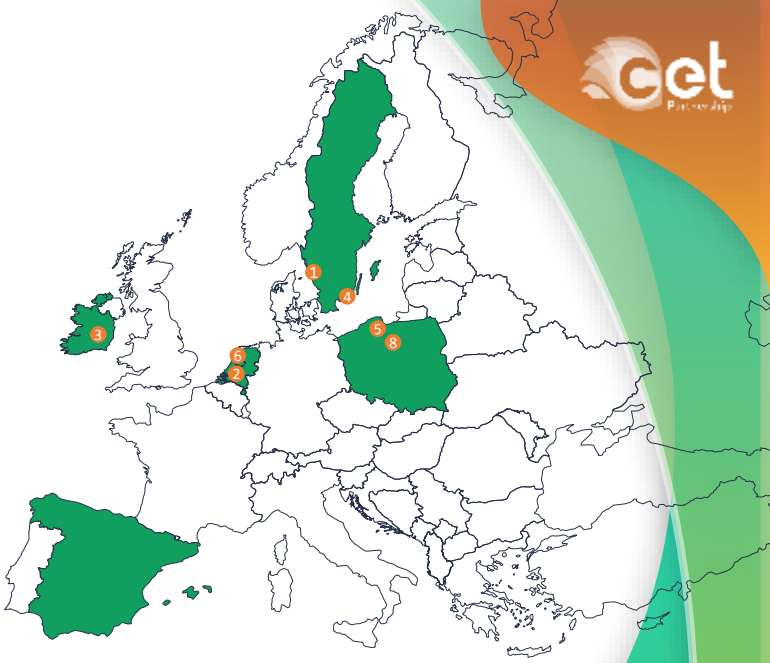
Sustainable Concrete Material Leading to Improved Substructures for Offshore Renewable Energy Technologies

Pierre Ingmarsson
RISE Research Institutes of Sweden
pierre.ingmarsson@ri.se

Project Concept

The main objective of WECHULL+ is to demonstrate (TRL4-6) a new, sustainable, circular and reliable concrete material suitable for floating substructures in the offshore renewable energy sector; to model, test and validate it in the real ocean environment.

The traditionally used steel is expensive and prone to corrosion in the harsh marine environment. Composites price are even higher than steel, are fossil-fuel based, their manufacturing is characterized with high environmental impacts and they still lack data on long-term performance in sea water.



RISE · Gdansk University of Technology · Ocean Harvesting · PLOCAN Plataforma Oceánica de Canarias · TU Delft · Pekabex · Carnegie Clean Energy · Solarduck · Norwegian University of Science and Technology · DNV·GL · NREL National Renewable Energy Laboratory

Co-funded by the European Union

Outcomes and Expectations

Overall outcomes of the WECHULL+ project

- Minimised environmental impact and increased availability
  - Cement replacement >70%
  - Demonstrate reliability exceeding 100MPa in compressive strenght
  - Reach TRL 6 by sample, material modelling and 1:5 and 1:3 scape prototypes in real environment

- Increase economioc viability by reduing the LCOE by at least 25%
  - Demonstrate >75% of the CAPEX and total witgh reduction by 25%
  - Demonstrate manufacturing time below <5 days
  - Reduce OPEX by more then >20% due to reduced maintenance

- Inudstralisation and scale up of local production processes
  - Sourcing of local material with local manufacturers
  - Demonstrate quality of local manufacturing and assess the local materials

Expectations from the CETP

- Facilitate networking and synergies between projects
- Foster discussions and support process development to align and simplify financier's national processes
- Status review on projects
- Support and facilitate potential dissemination activities in Europe

Co-funded by the European Union

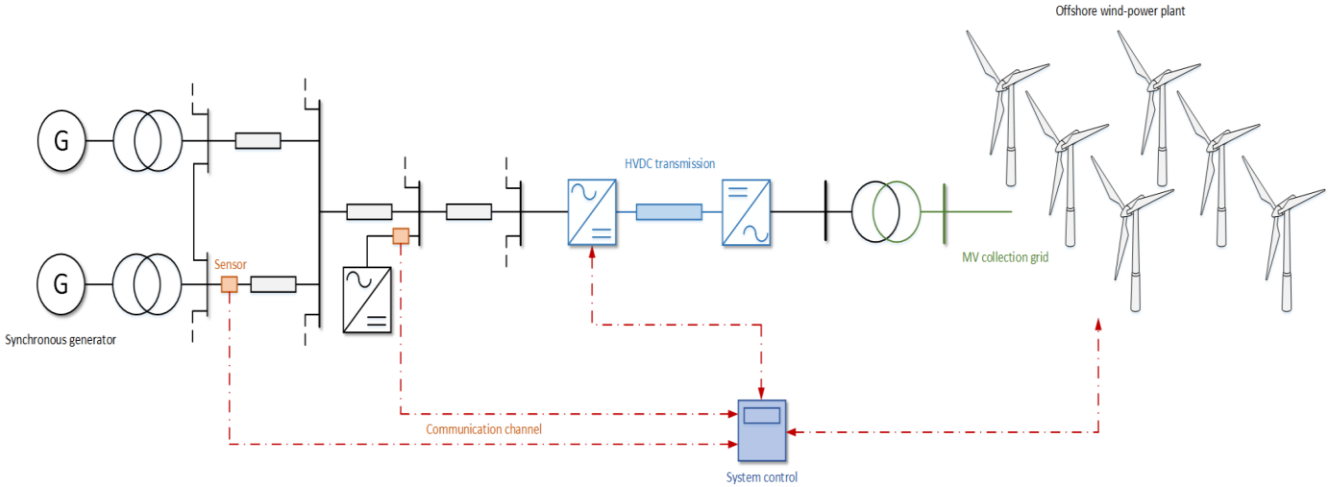
WIND-DIGIPOWER
Large-scale wind integration for the future digital power grid using innovative power electronics control and communication-based estimations

Presenter: Paolo Mattavelli, University of Padova
paolo.mattavelli@unipd.it
Coordinator: Massimo Bongiorno, Chalmers University of Technology

EUROPEAN PARTNERSHIP

Main project goals

- Evaluate different configuration of OWPP and energy storage requirements
- Identify sensing, identification and communication techniques
- Develop innovative converter control



Main project goals

- To verify the proposed solutions in suitable application scenarios