In cooperation with:

Smart Energy Systems ERA-Net

Presentations by existing projects with next-stage development plans

11:20 **Hierarchical Local Flexibility Markets for Harvesting Prosumers Flexibility (LoC-Flex), *Saeed Teimourzadeh, EPRA Electric Energy Co., Turkey***

Immediate feedback, comments or questions

11:30 Virtual Power Plant Clusters for Industry and District Decarbonisation,

Paul Tuohy, University of Strathclyde, Scotland UK

Immediate feedback, comments or questions

11:40 Smart Scalable Off-Grid PV/H2 System,

Cristian Beceanu, BEIA PVH2SYSTEM, Romania

Immediate feedback, comments or questions

11:50 Different Energy Vector Integration for Storage of Energy,

Vishal Kumar IITR, India

Immediate feedback, comments or questions

Project Title

Name of the project and acronym

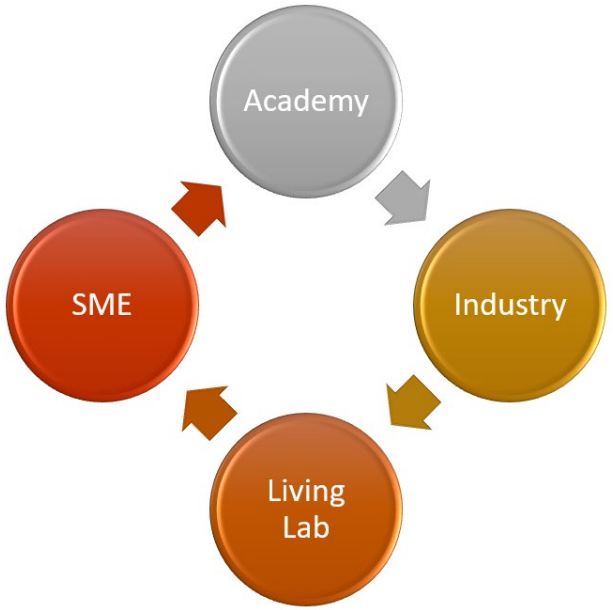
Hierarchical Local Flexibility Markets for Harvesting Prosumers Flexibility

LoC-Flex

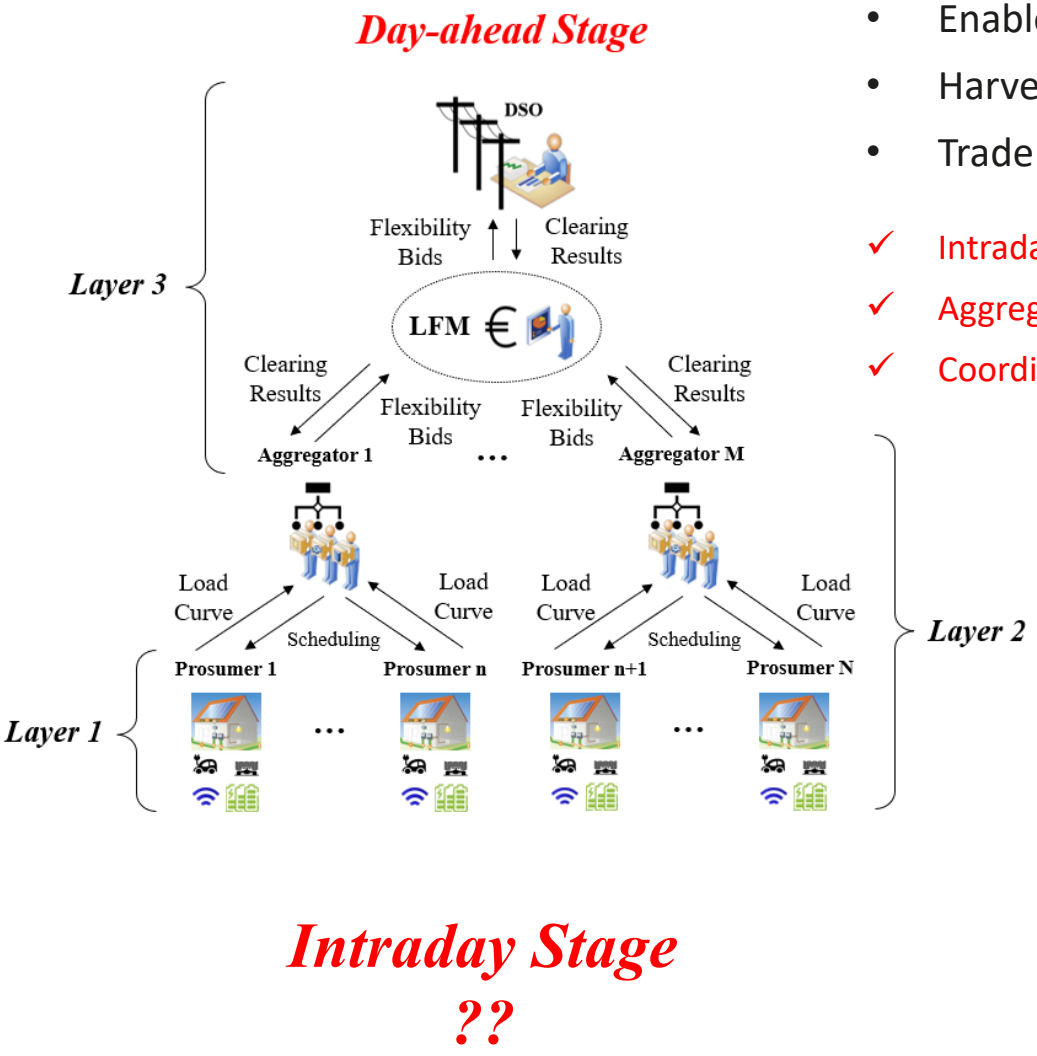
LOC-FLEX
LOCAL FLEXIBILITY MARKETS

Consortium partners

- Coordinating organisation: EPRA Electric Energy Co.
- Main contact person: Dr. Saeed Teimourzadeh
- List of consortium partners:



Challenge

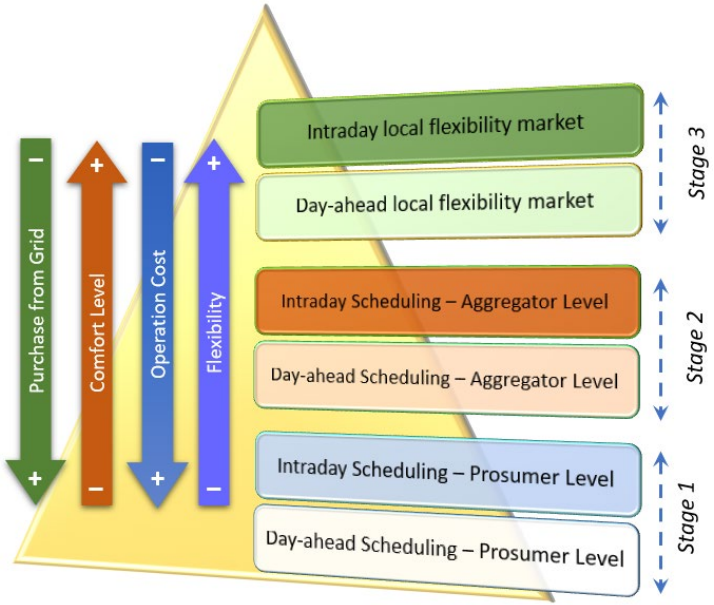


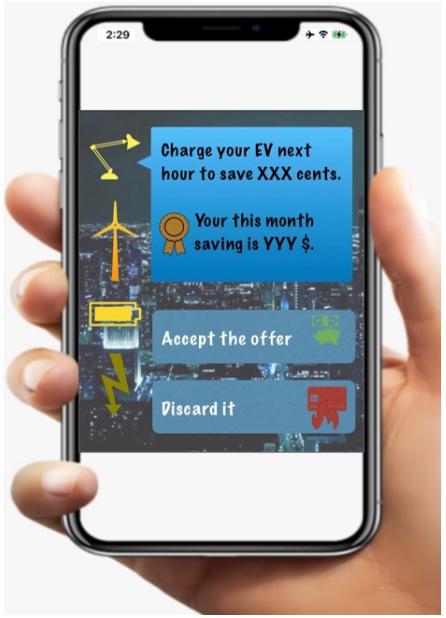
- Enable the flexibility of prosumers
- Harvest the prosumer flexibility through aggregator mechanisms
- Trade the flexibility at the local flexibility market

✓ Intraday calculation (optimization) of flexibility potential

✓ Aggregator level and DSO level settlement

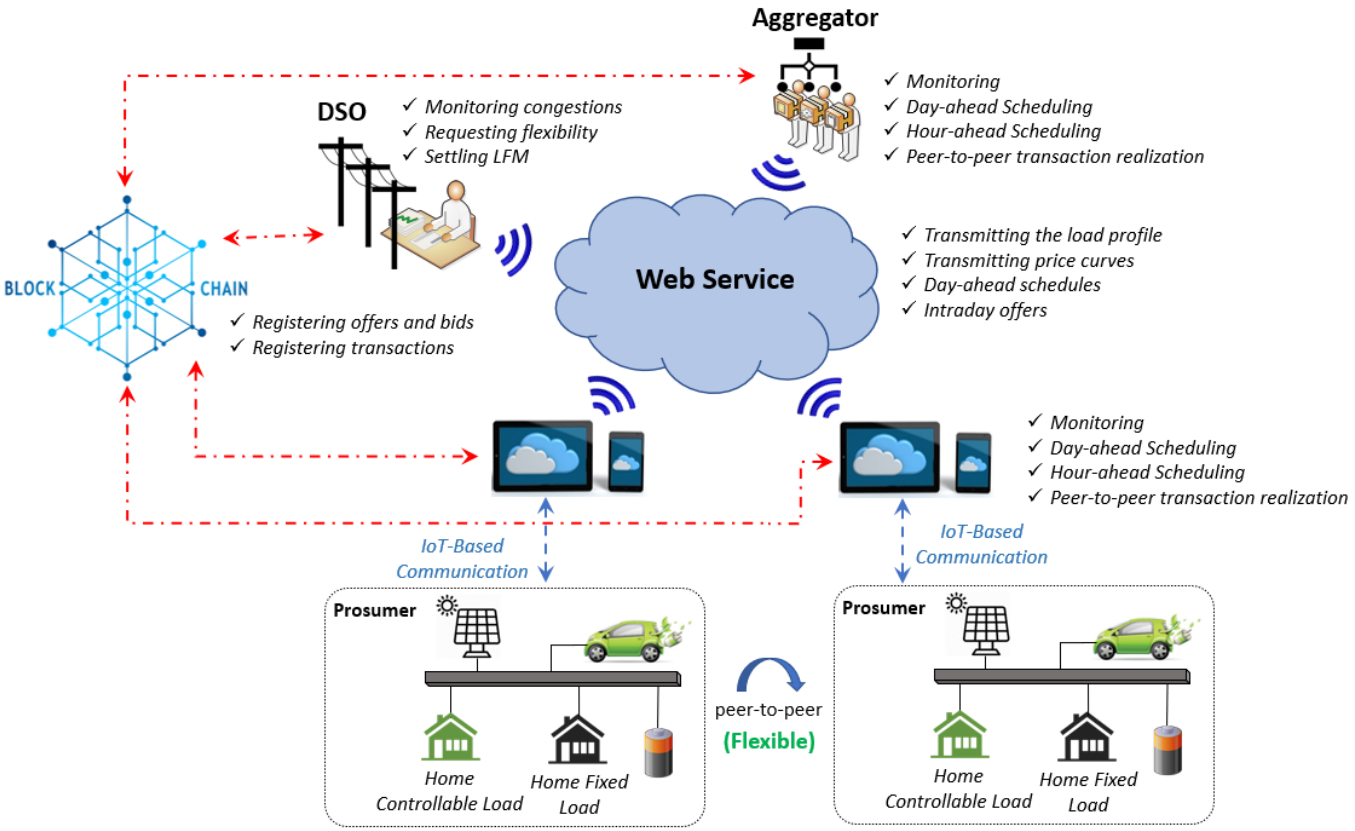
✓ Coordination with DSO for enabling the harvested flexibility

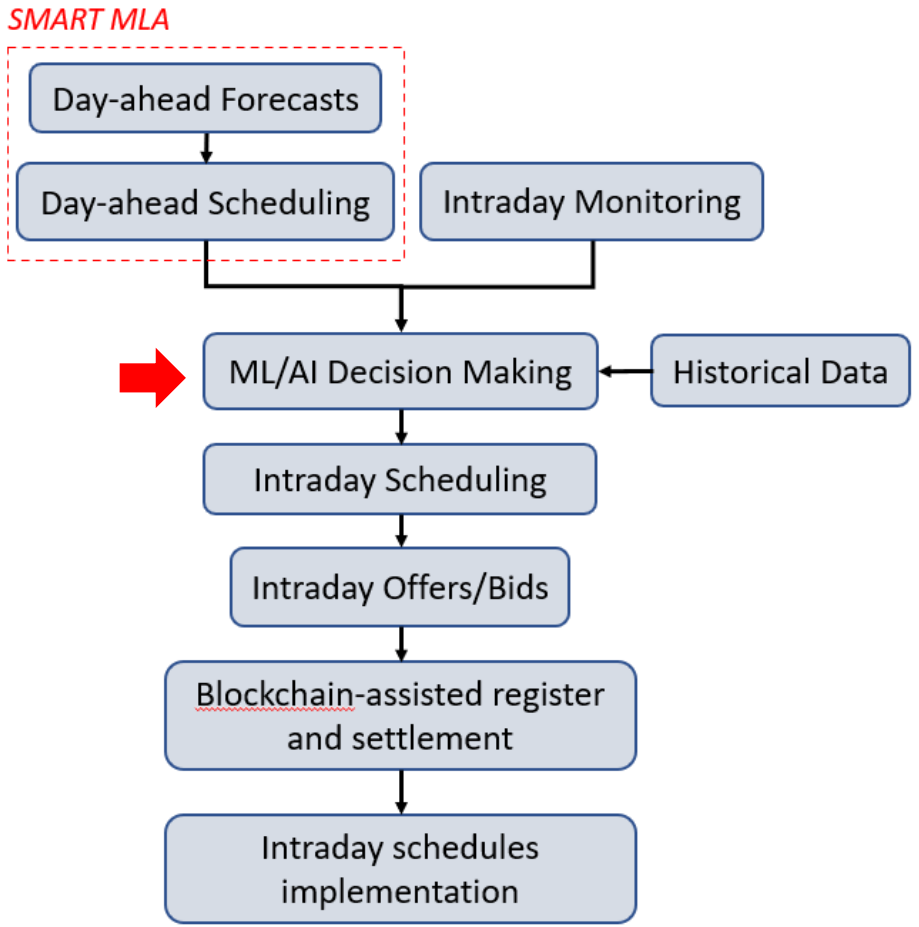




Solution

- ✓ AI-assisted optimization of prosumer behaviour and flexibility
- ✓ Peer-to-peer trade of flexibility at prosumer level
- ✓ Peer-to-peer trade of flexibility at aggregator level
- ✓ Flexibility trade and settlement for all benefits (reduced bills, deferred investments, etc.)





Our next step

#Aggregator #Demand Response #Flexibility

WE ARE LOOKING FOR …

- Partners with the following roles:
  - Experts of
    - IoT
    - Blockchain
  - Need owners
    - Aggregators
    - Distribution System Operators (DSOs)
  - Stakeholders
    - Digital system providers
  - Living Lab as testbed

WE OFFER EXPERIENCE IN…

- Developing concepts for aggregator mechanisms
- Developing optimization models and tools for modeling and analysis of local flexibility market players:
  - Community aggregators
  - Prosumers
  - DSO
- Developing user-friendly web-services

Thank you & contact information

- Thank you for your interest
- For more information contact:

Saeed Teimourzadeh
Email: saeed@epra.com.tr

Funding Partners

Smart Energy Systems ERA-Net

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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

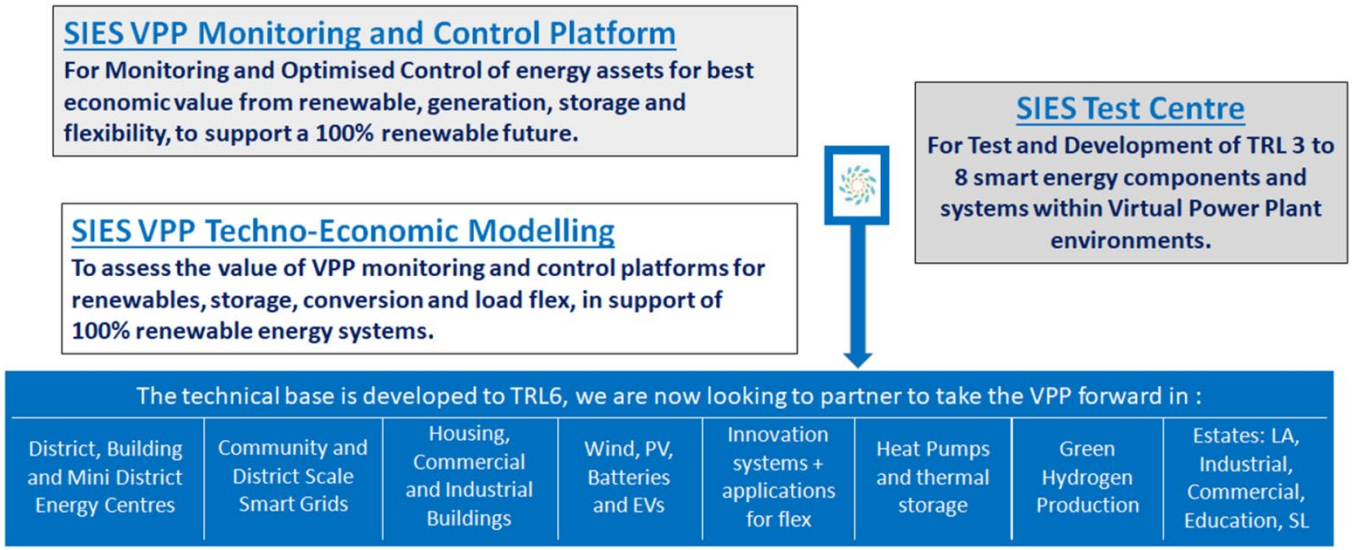
- Main contact person: Paul Tuohy (paul.tuohy@strath.ac.uk)
- Coordinating organisation: **University of Strathclyde – Electrical, Energy Systems (SCO)**
- List of consortium partners:
  Energy Technology Centre (ETC) – Industry Lead, SIES Centre (SCO)
  Power Networks Demonstration Centre (PNDC) – Networks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

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:

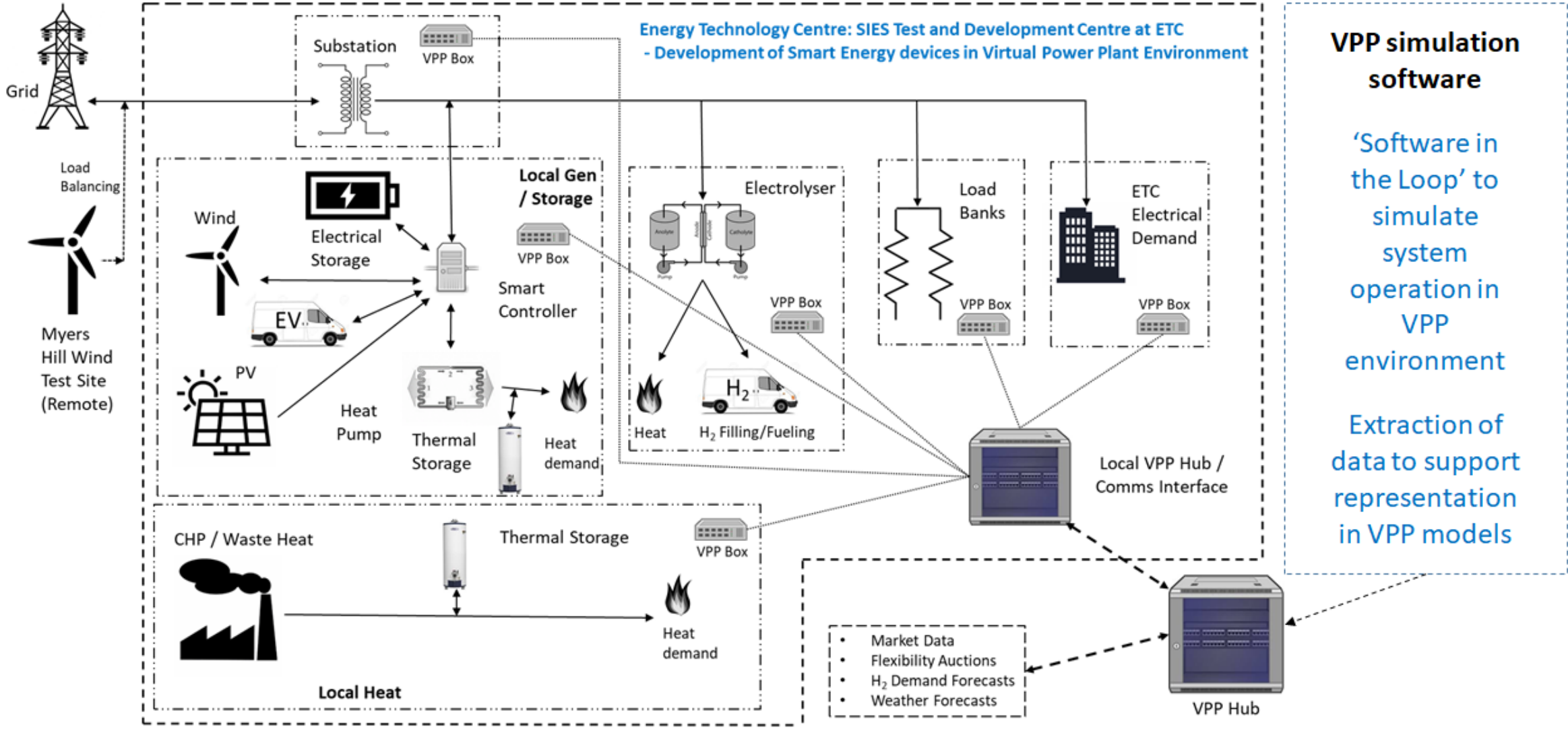
- VPP Control Platform
- VPP Value Assessment Modelling
- Test and Development Centre
- Demonstrators: Flex, Gen, Store, Heat, H2, EV, H2EV, Network



We now seek partners to deploy the SIES outcomes

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

SIES 2022: Virtual Power Plant Test Centre



VPP simulation software

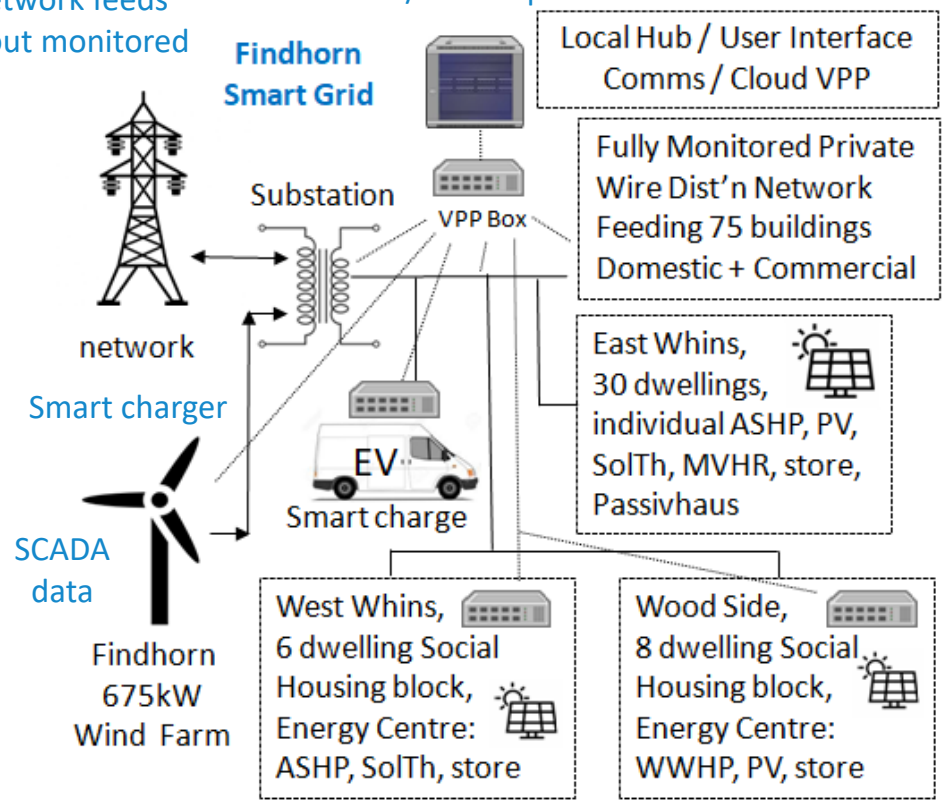
'Software in the Loop' to simulate system operation in VPP environment

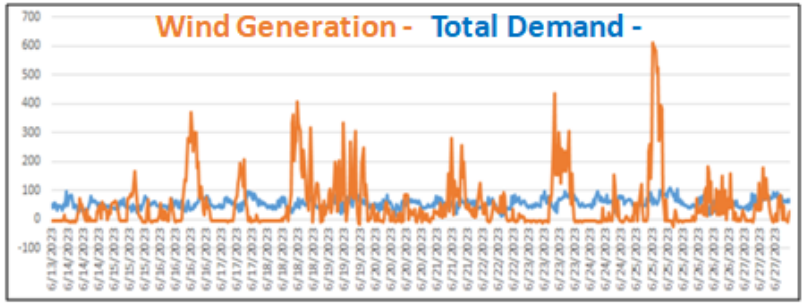
Extraction of data to support representation in VPP models

SIES 2022: VPP Demonstrations Findhorn

All substation + network feeds in/out monitored

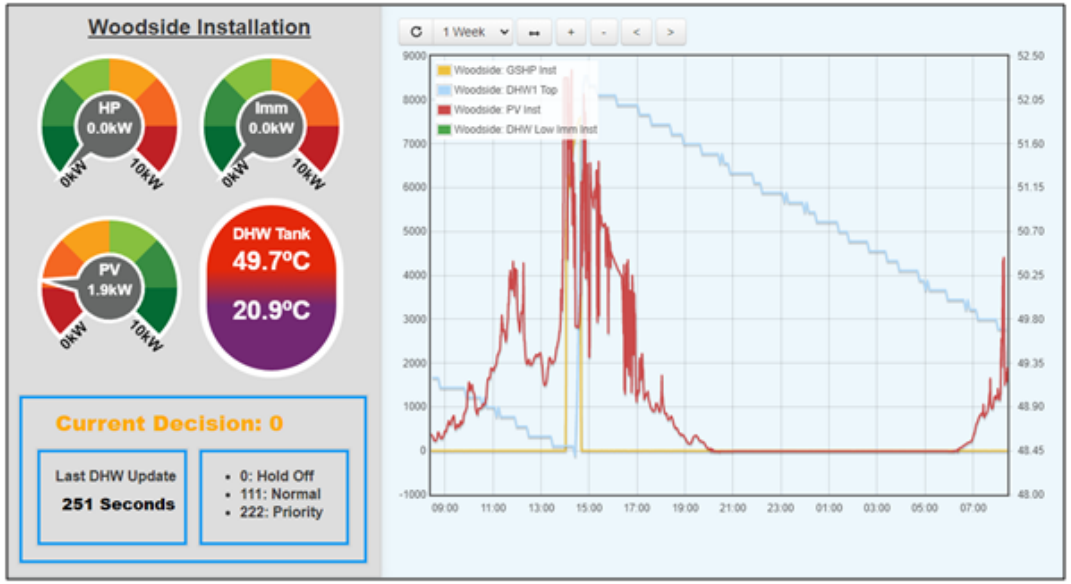
Low cost Pi/OEM data/control platform





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 by heat pump

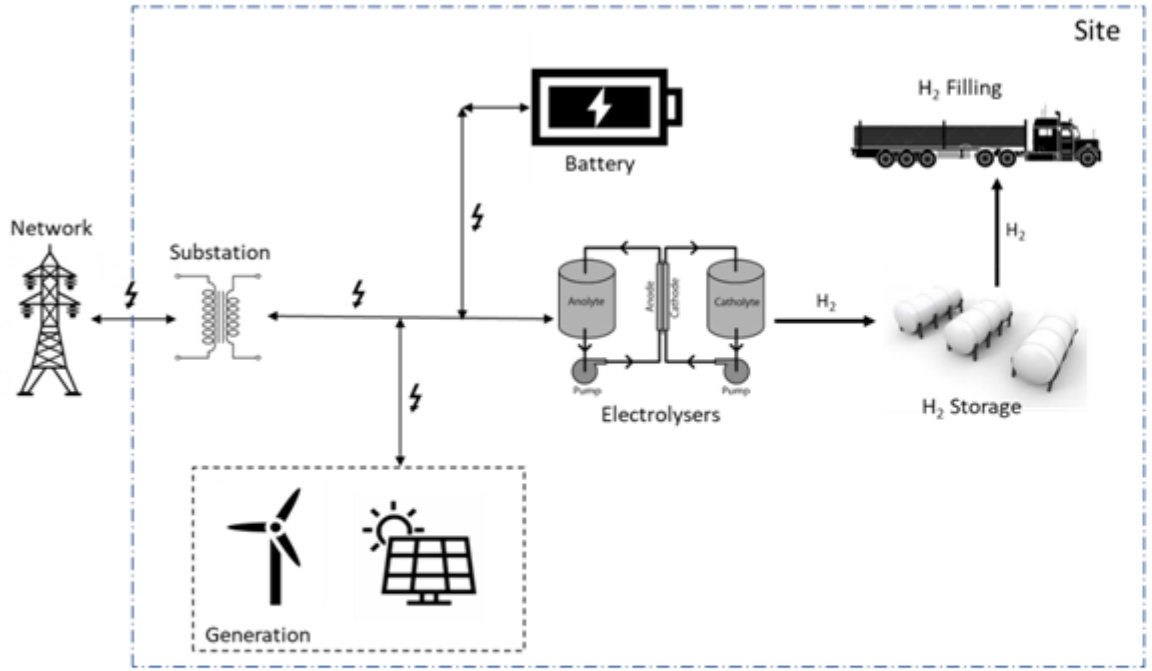


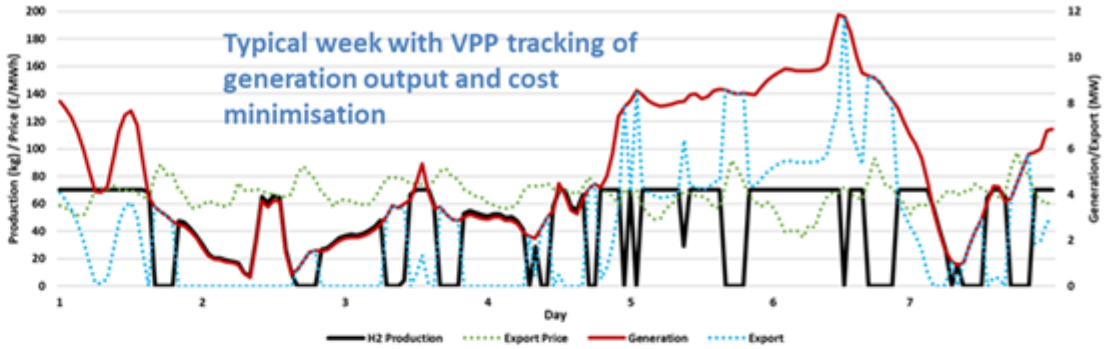
Other relevant scenario's modelled:

- 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

SIES 2022 VPP Value Assessment: Green Hydrogen Plant

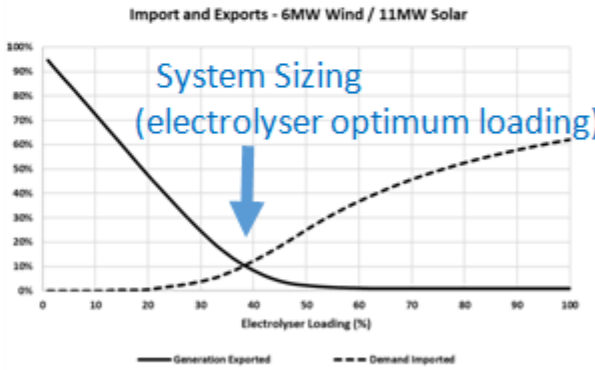
Green Hydrogen Production Plant:





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

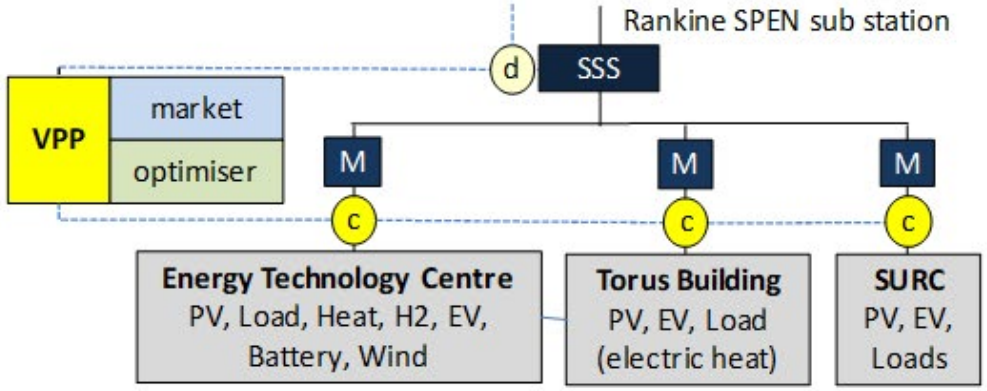
Cost Benefit of VPP



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.

SIES 2022 VPP Value Assessment: Districts

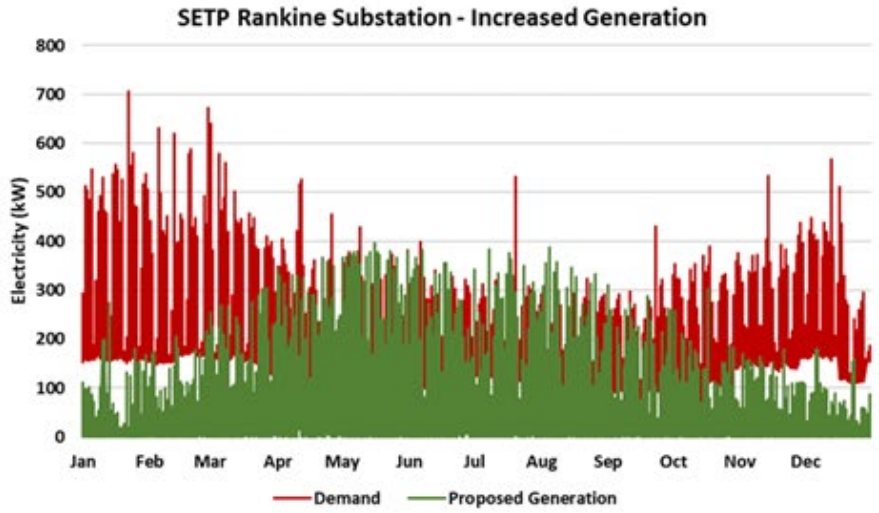


Smart Sustainable East Kilbride (SSEK) Initiative:

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

SIES 2022: Next Steps

- **Virtual Power Plants support decarbonisation and we have solutions…**

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.

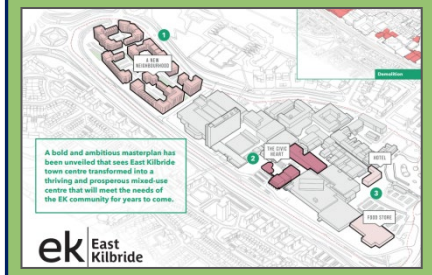
SIES VPP Techno-Economic Modelling
To assess the value of VPP monitoring and control platforms for renewables, storage, conversion and load flex, in support of 100% renewable energy systems.

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

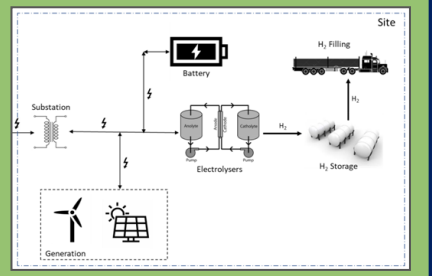
The technical base is developed to TRL6, we are now looking to partner to take the VPP forward in :

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-wins!

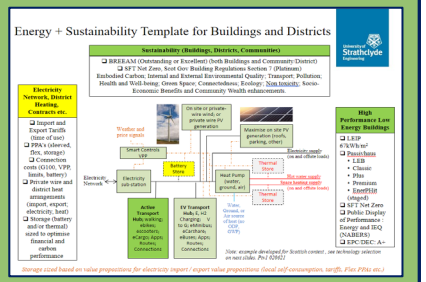


City / Town / District / Region



Industrial Plant / Operations

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



Campus / Industrial Estates

- **We seek partners to deploy the SIES VPP and SIES VPP Value Assessments**
- **We offer a Test Centre to support Industry develop 'VPP ready' solutions**

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Vishal Kumar IITR, India
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Smart Energy Systems ERA-Net

PVH2SYSTEM “Smart Scalable Off-Grid PV /H2 System”

#Hydrogen Storage #BatteryPack #HomeEnergy#Solar Trackers

PVH2SYSTEM

Name of the project and acronym

PVH2SYSTEM - Smart Scalable Off-Grid PV /H2 System

PVH2SYSTEM

Consortium partners

- Coordinating organisation: Beia Consult International
- Main contact person: George Suciu (george@beia.eu)
- List of consortium partners:

ICSI(Romania) -they want to participate, and they are eligible(experince in hydrogen production,simulating and optimizing the PV-H2 energy system)
CDER(Algeria)-it's not eligible for the CET Partnership call
MESRSI(Morroco) - it's not eligible for the CET Partnership call
HeadHunter Limited(Romania)-they don t want to participate anymore in the proposal(solar trackers for the photovoltaic panels)
MATSI(Morocco) is not eligible for the CET Partnership call(cloud platform for power management system)
PUMACY(Germany) - they don t want to participate anymore in the proposal(Hydrogen Container Storage)
FUDA(Austria)- they want to participate in the proposal,and they are eligible(analysis of the market and business potential of the project)

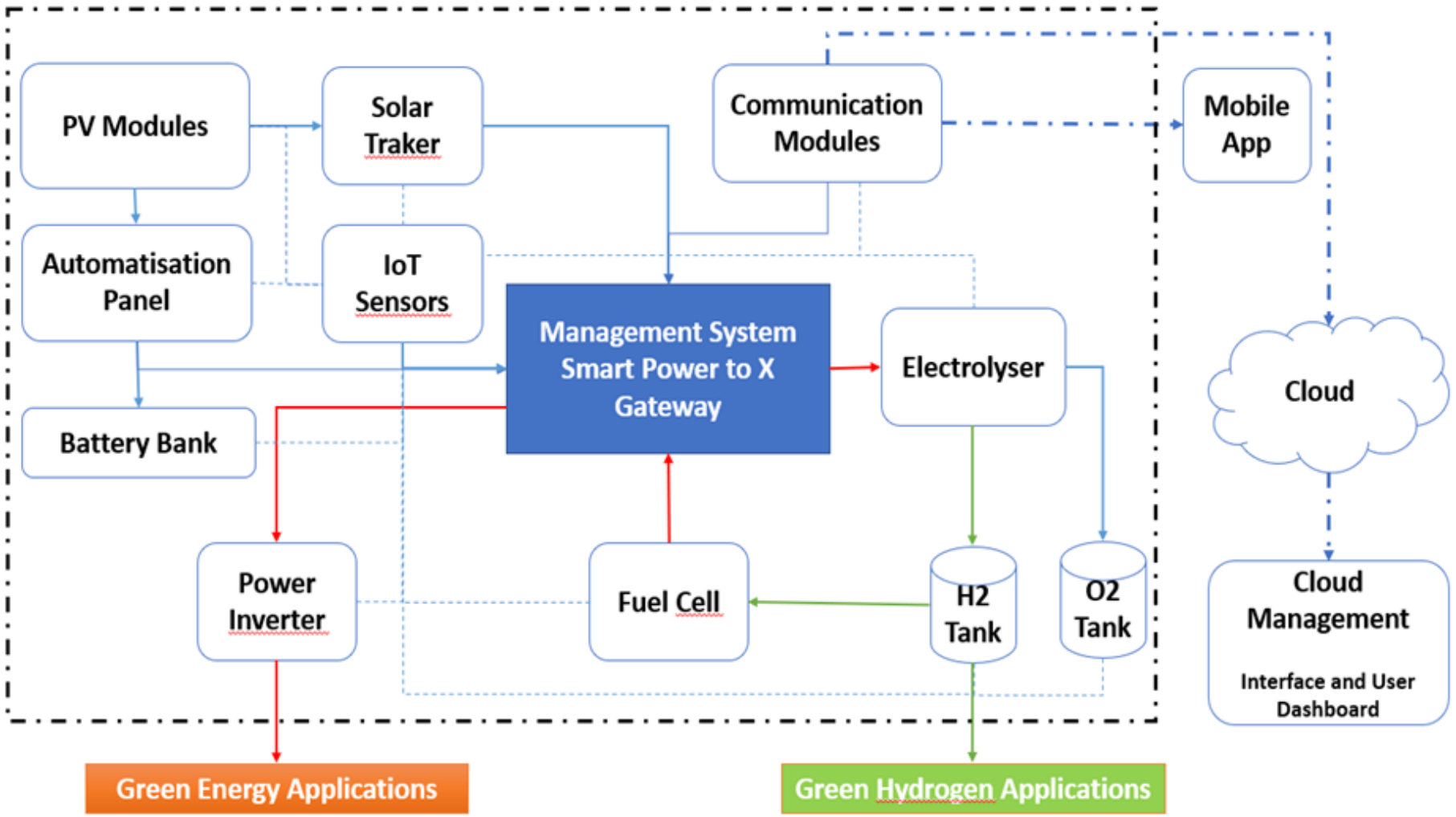
PVH2SYSTEM:Challange,Solutions,Next Steps

The project's main purpose is to develop a Smart Scalable Off-Grid PV / H2 System as a turn-key solution for an off-grid household that is more accessible and affordable than similar systems from the market. In this project, we propose an innovative energy management solution derived from PV panels, batteries, hydrogen (H2) storage, solar trackers, inverters, sensors and communication devices, electric appliances, and mobile applications for monitoring the instant produced energy and the level of the battery.

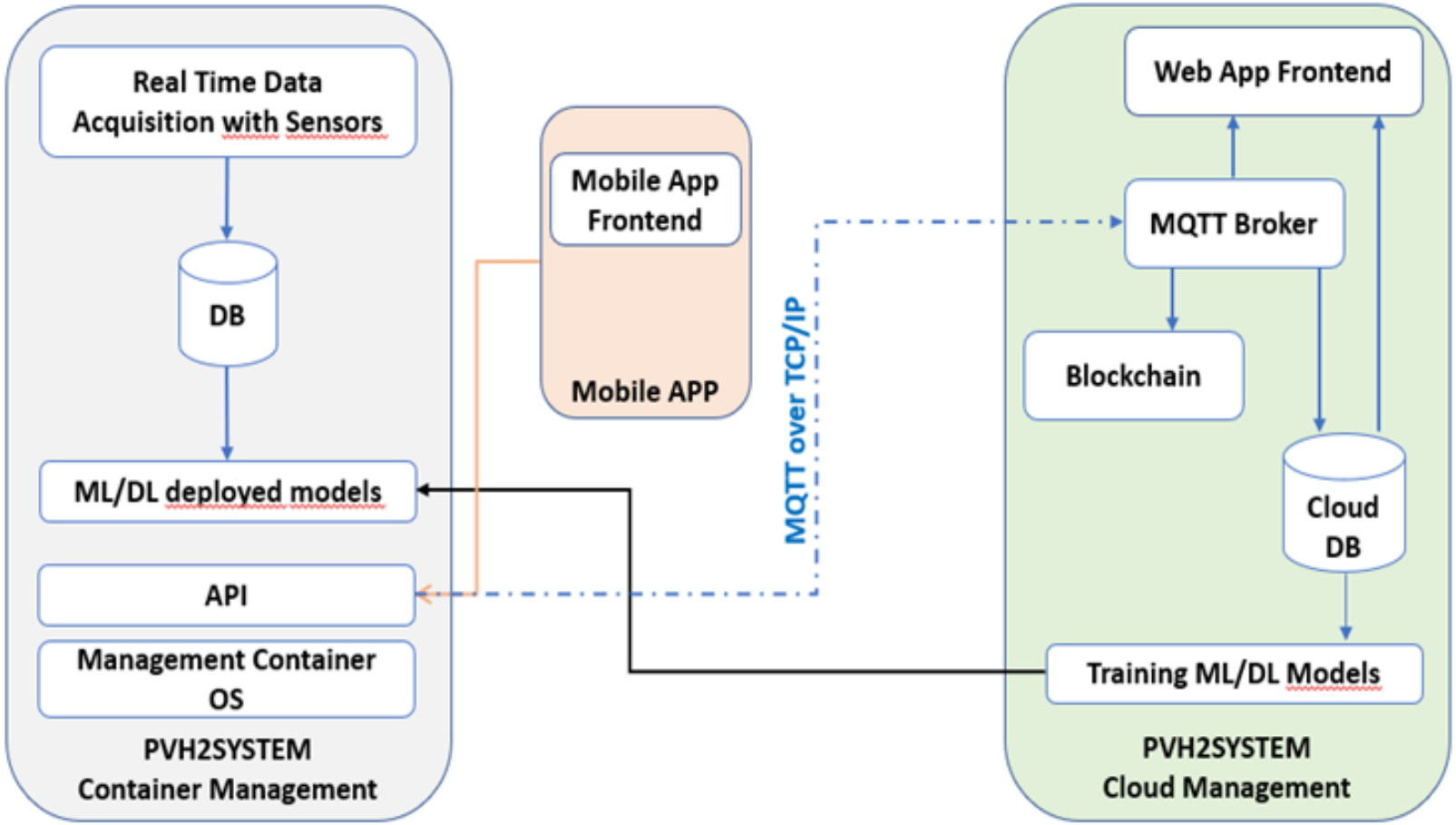
We now seek partners to develop and integrate these photovoltaic solar trackers with the hydrogen container storage and the Smart Power Management System platform to collect and process the data.

The achievement of the PVH2SYSTEM as a prototype will be TRL7, while the Proof of Concept Demo- Hydrogen Container will reach TRL 5.

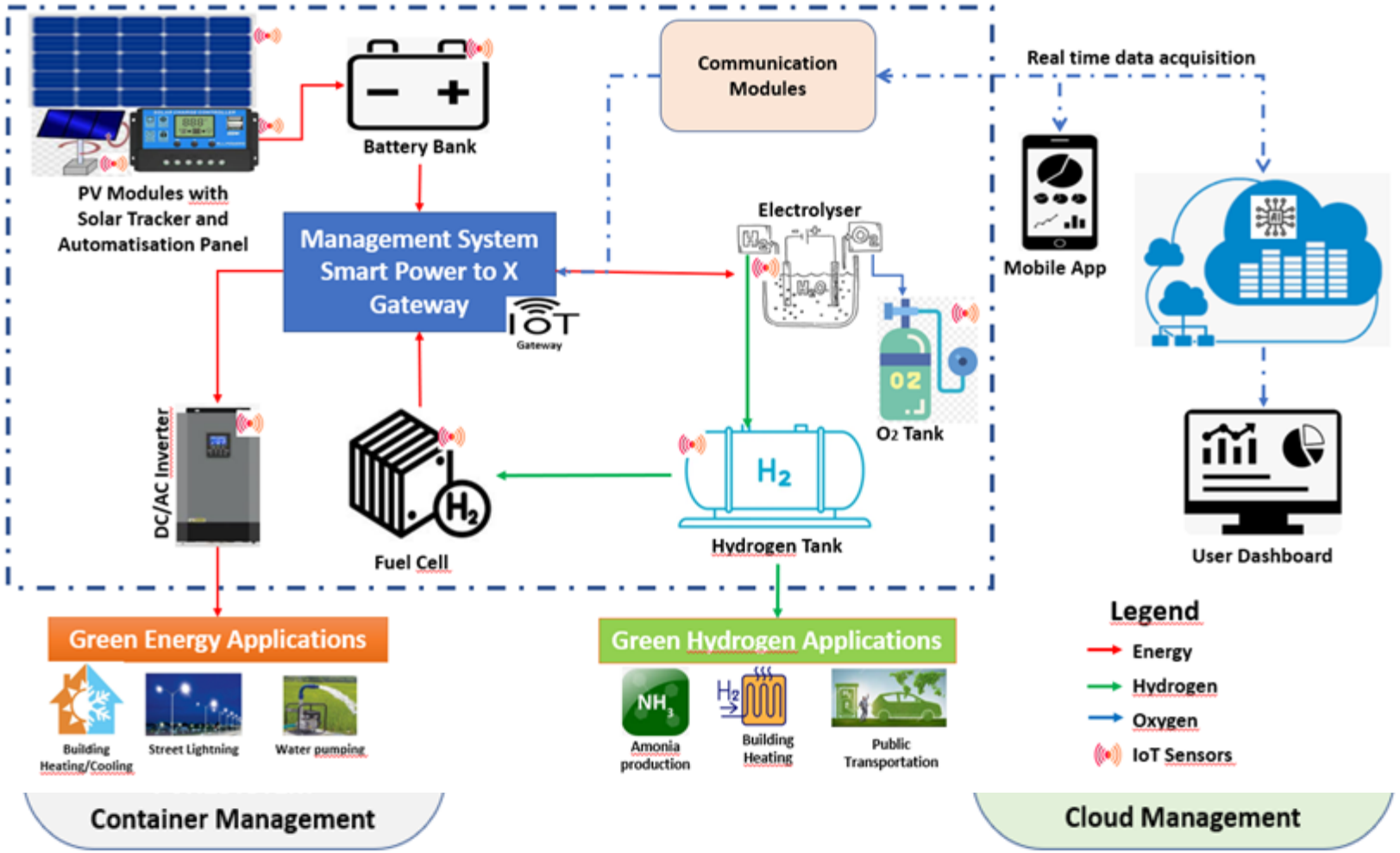
PVH2SYSTEM:Hardware Arhitecture



PVH2SYSTEM:Software Arhitecture



PVH2SYSTEM:Hardware Integration



PVH2SYSTEM:Outcomes,Next Steps

The technical base will be developed to TRL7, while Proof of Concept Demo-Container will reach TRL 5. Our next steps is to take the project proposal PVH2SYSTEM forward by:

- **Finding new partners with expertise in developing and integrating the photovoltaic system with solar trackers,designing and integrating the hydrogen container, and develop a cloud platform to manage and monitor the prototype of PVH2SYSTEM**
- **To build a new project proposal**

Thank you & contact information

- Thank you for your interest
- For more information contact:

GEORGE SUCIU,R&D and Innovation Manager

Peroni 16, Sector 4, Bucharest, 041386, ROMANIA

Absberggasse 29/1, 1100 Vienna, AUSTRIA

Rue Montoyer23/4ET 1000 Brussels & TECHNOLOGIEPARK-ZWIJNAARDE 112 BOITE AA TOREN 9052 Ghent, BELGIUM

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Phone: +4021 332 30 06

Mobile: +40 744 914 798

Fax: +4021 332 30 05

Website: www.beia.eu

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Different Energy Vector Integration for Storage of Energy

Name of the project and acronym

Different Energy Vector Integration for Storage of Energy

DEVISE

Consortium partners

- Coordinating organisation: IIT Roorkee, India
- Main contact person: Dr Vishal Kumar
- List of consortium partners: Dr Dibakar Rakshit, IIT Delhi, India
  Dr G S Sailesh Babu, DEI Agra, India
  Prof. Rajnish Kaur Calay, UiT Norway
  Prof. Luigi Crema, FBK Italy
  Prof. Thomas Olofsson, Umeå University, Sweden

Pitch for the DEVISE project

Challenges

The existing microgrids

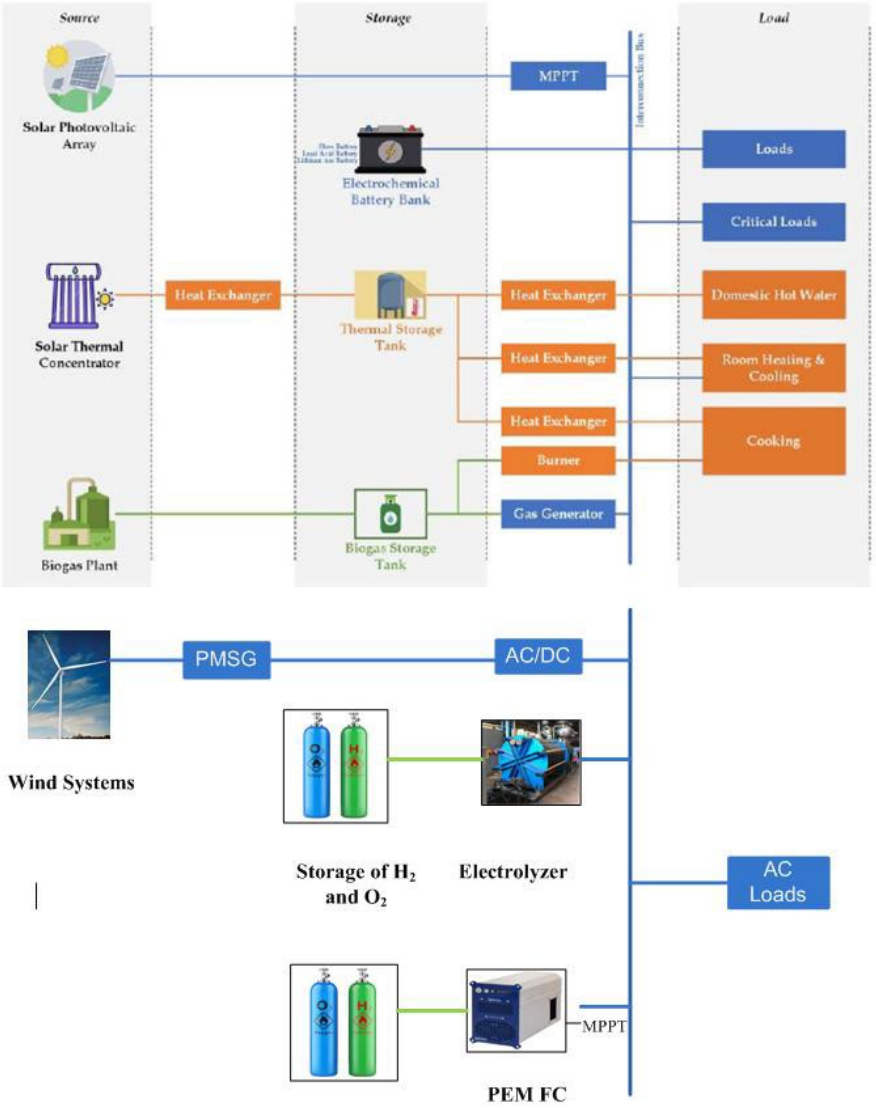
- Integrate various renewable energy sources with the grids.
- Heavily biased towards electrical energy.
- Other forms of renewable energy vectors are converted into electrical energy for integration with the grid.

The storage of energy

- Predominantly electrical
- Prevents the efficient and rational end-use of diverse energy sources, especially where the energy is available as heat and is supposed to be used in the same form.

Therefore, there is a need for the development of a more holistic definition and design of renewable energy micro grid,

- which ensures efficient integration/transformation of different forms of energy for rational end-use and storage of all forms of renewable energy to facilitate the optimal interchange of energy from one form to other

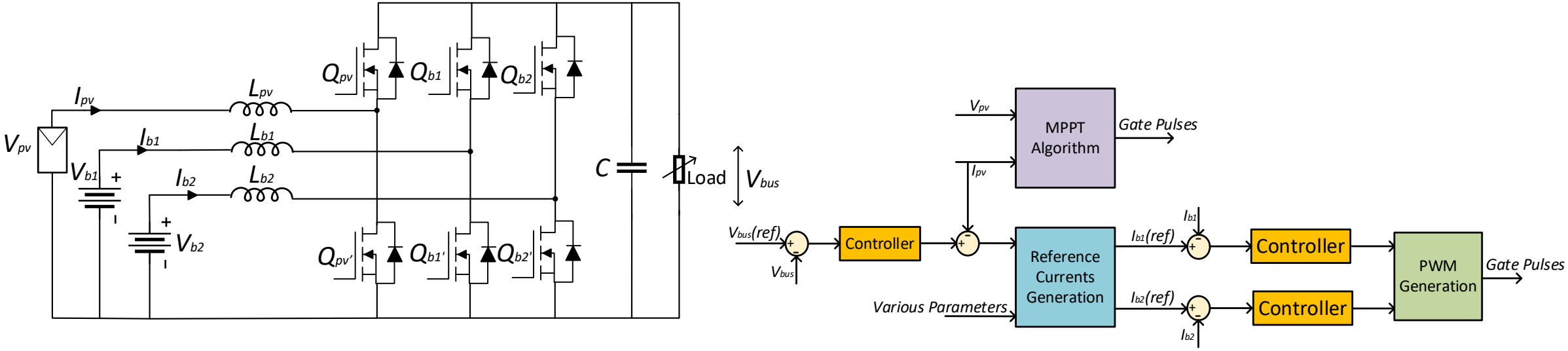


Smart Energy Systems ERA-Net

Electrical Storage System

The analysis, design, and control of the DC-DC Converters to integrate multiple batteries

- The analysis, design, and control of bi-directional DC-DC converter for charging and discharging battery on DC bus in the presence of Photovoltaic (PV) system.
- Integration of multiple types of batteries on DC bus for controlled charging and discharging with different control strategies.
- Development of different current/power sharing strategies for charging and discharging multiple batteries connected to the DC bus.
- Sharing strategies considering generation and load uncertainties.



Thermal Energy storage system

- Developed Solar thermal energy storage based on a Thermal oil Receiver-Storage-Steam generation system that will heat thermal oil directly in the Receiver and store that oil in a tank at up to 250 Deg. C
- When steam or hot air is required then it is generated from storage using an oil-to-steam / air heat exchanger

Biogas/Hydrogen storage integration to micro-grid

- Design and development of a Bio-gas storage system.
- A P2P H2-based system is under development by integrating solid-oxide reversible cellular solutions (both in electrolysis and in fuel cell mode) with a real-scale demonstrator.

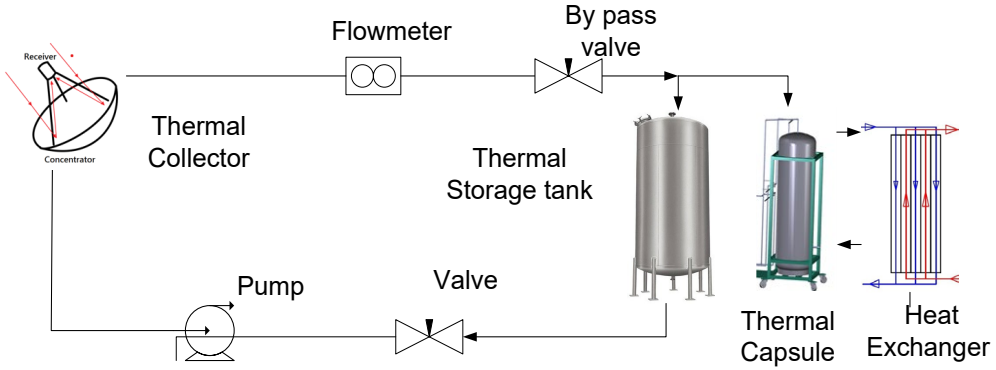


Fig: Block Diagram of Solar Thermal Energy Storage System

Our next step

Smart Energy Systems ERA-Net

Our project is looking for collaboration for the following:

- Integration of Hydrogen Fuel Cell with Electrical System.
- Real-Time Implementation of Current Sharing Techniques among Different Batteries.
- Implementation of Inner Current Controllers using MCU.
- Design and development of Portable Thermal Storage Capsules (PCM Based)
- Development of Thermal Energy Storage Material for High-Temperature Storage.
- Development of an optimal energy conversion/selection strategy with consideration of cost/reliability, and characteristic constraints of load and storage system.

Thank you & contact information

- Thank you for your interest
- For more information, contact:

Prof. Vishal Kumar

IIT Roorkee, India

Email: vishal.kumar@ee.iitr.ac.in

Phone:+91-1332-285897

Funding Partners

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Pitch presentations by new project initiatives

12:00	**Prometheus: Integrating Regional Energy Systems to Enable Sustainable Cities and Communities, *Alan Whiteside, Stonnivation, Scotland UK***
	Immediate feedback, comments or questions
12:10	Novel biobased material for thermal energy storage, *Nasko Terziev, SLU, Sweden*
	Immediate feedback, comments or questions
12:20	Thermochemical Heat Pumps: Revolutionising heat and cold storage, *Tim Rutten, ARES, Netherlands*
	Immediate feedback, comments or questions
12:30	Directional Steel Shot Drilling Enabling Geothermal Everywhere, *Diederik Wawoe, Canopus Drilling Solutions, Netherlands*
	Immediate feedback, comments or questions
…	
13:00	Closing of the event

Co-funded by the European Union

Smart Energy Systems ERA-Net

Prometheus: Regional Energy Systems as an Enabling Technology

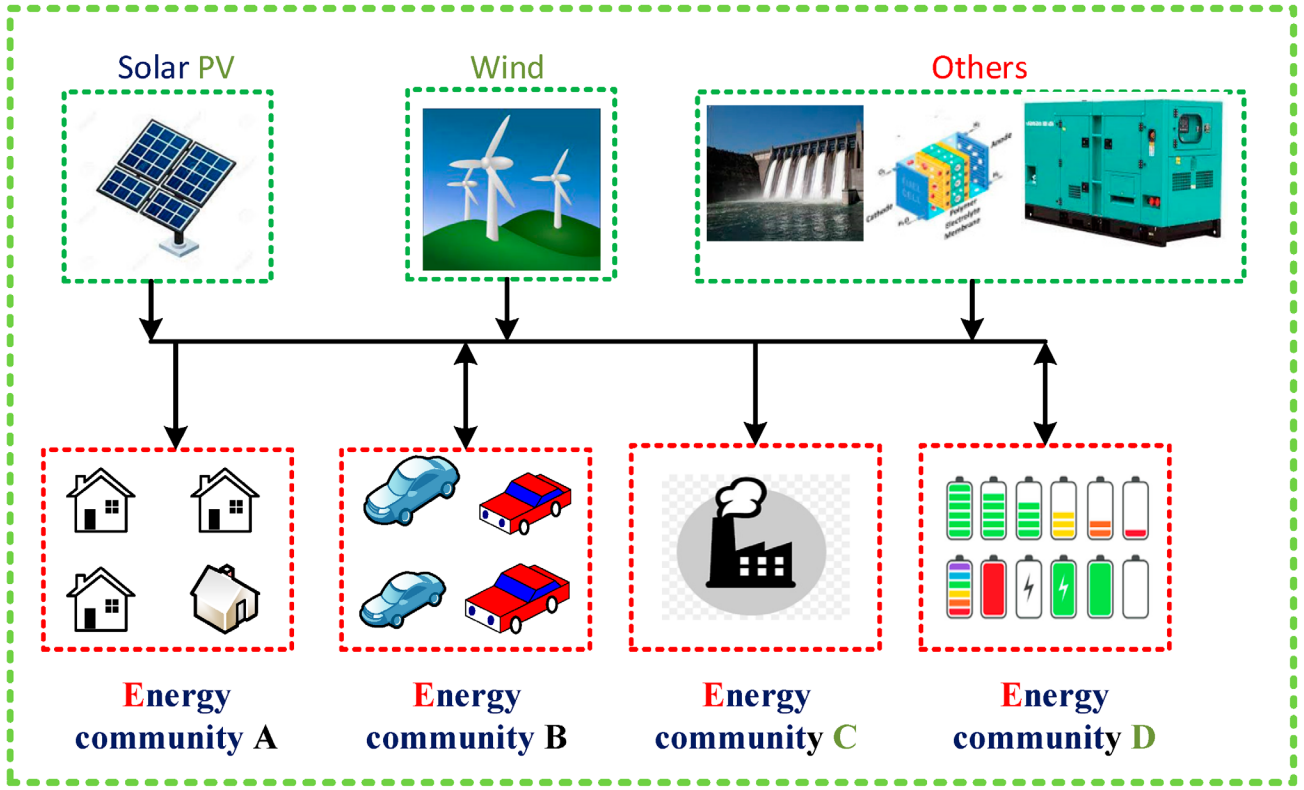
CET Partnership matchmaking

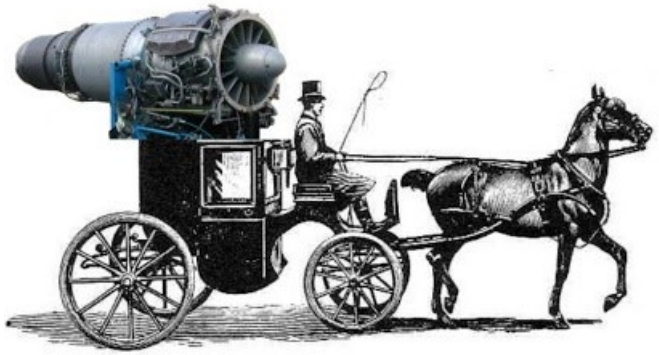
4th of October 2023

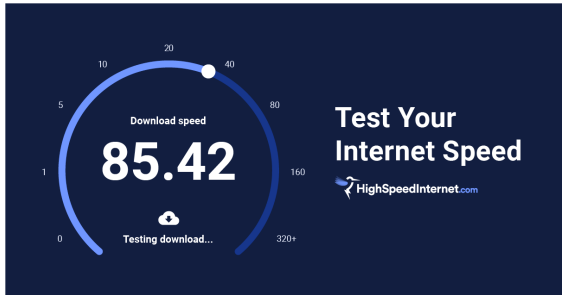
Stonnivation

Alan Whiteside
Innovation Director
alan@stonnivation.com

Challenge: To Disconnect Regional Energy Systems from Decarbonisation







Solution: Applying Wellbeing Economics to Regional Energy Systems

Scottish Logos

Past – Business Case

Present – Business Case and ESG

Future – Wellbeing Economics

Impact Assessment by evaluating Societal, Environmental and Economical Impact