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

Name of the project and acronym

Smart Integrated Energy Systems by 2022

SIES2022

Consortium partners

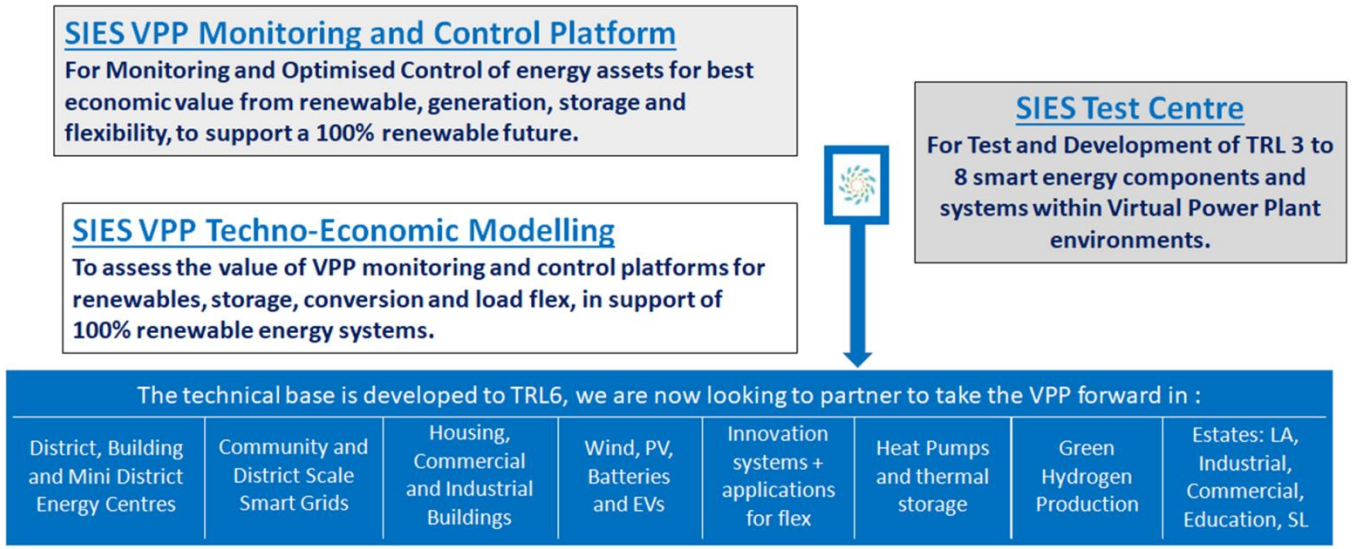
- Main contact person: Paul Tuohy (paul.tuohy@strath.ac.uk)
- Coordinating organisation: **University of Strathclyde – Electrical, Energy Systems (SCO)**
- List of consortium partners:
  Energy Technology Centre (ETC) – Industry Lead, SIES Centre (SCO)
  Power Networks Demonstration Centre (PNDC) – Networks (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:

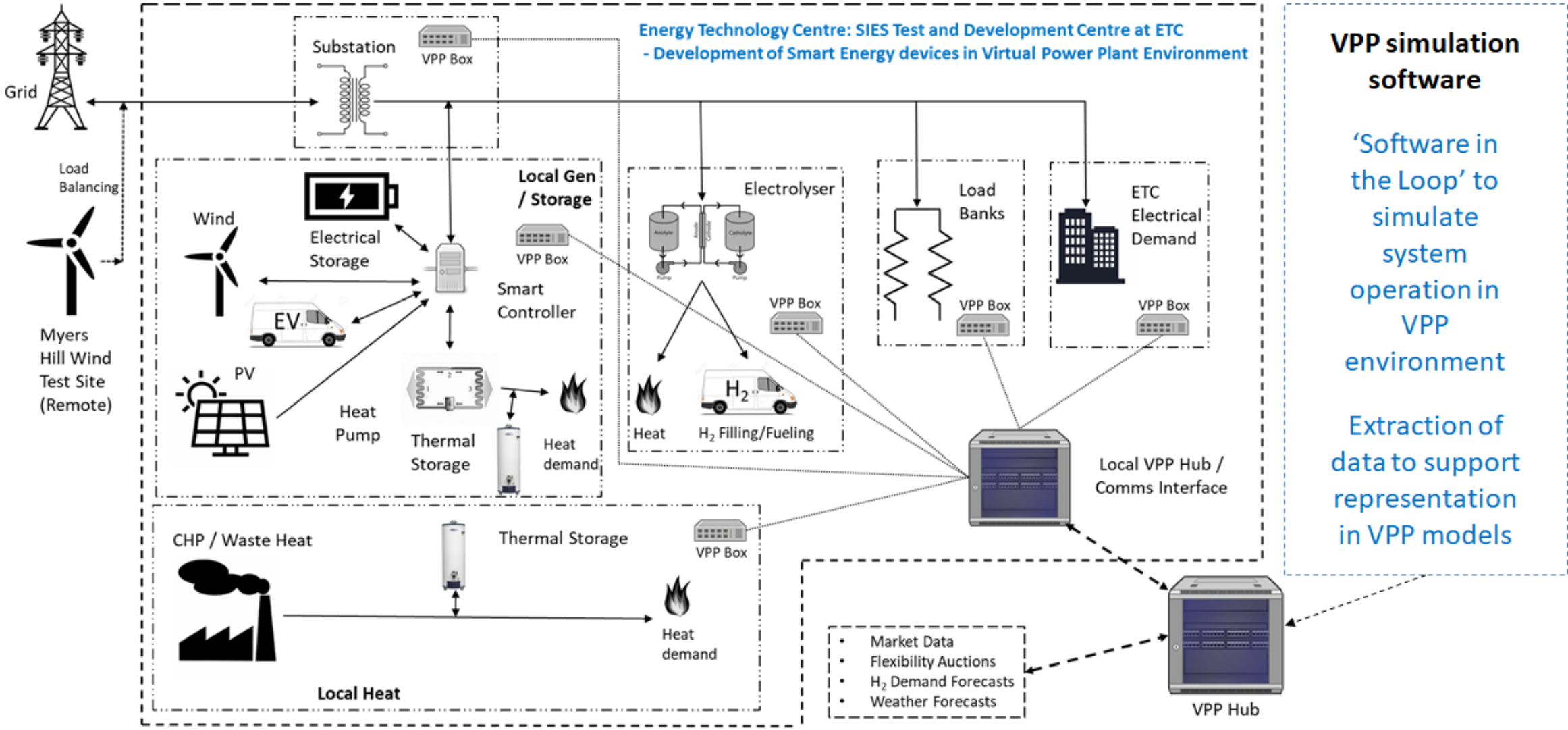
- VPP Control Platform
- VPP Value Assessment Modelling
- Test and Development Centre
- Demonstrators: Flex, Gen, Store, Heat, H2, EV, H2EV, Network



We now seek partners to deploy the SIES outcomes

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

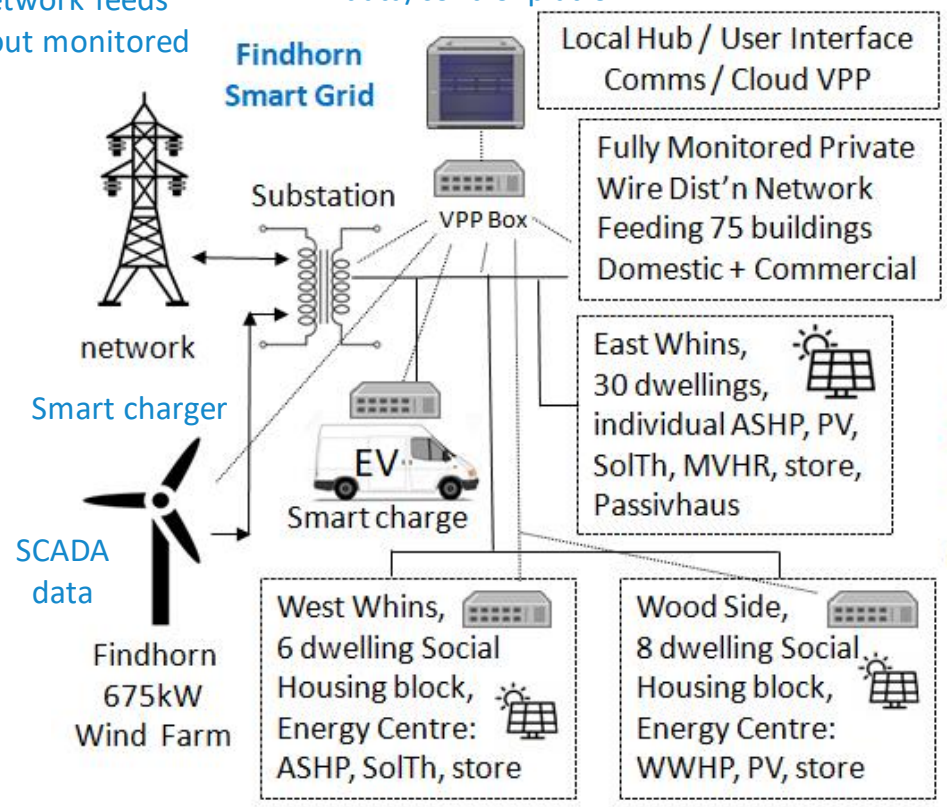
SIES 2022: Virtual Power Plant Test Centre

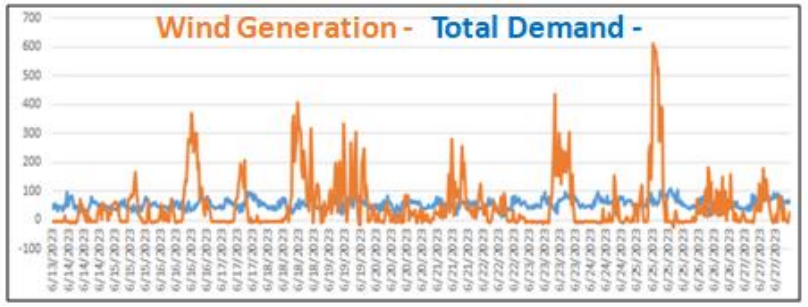


SIES 2022: VPP Demonstrations Findhorn

All substation + network feeds in/out monitored

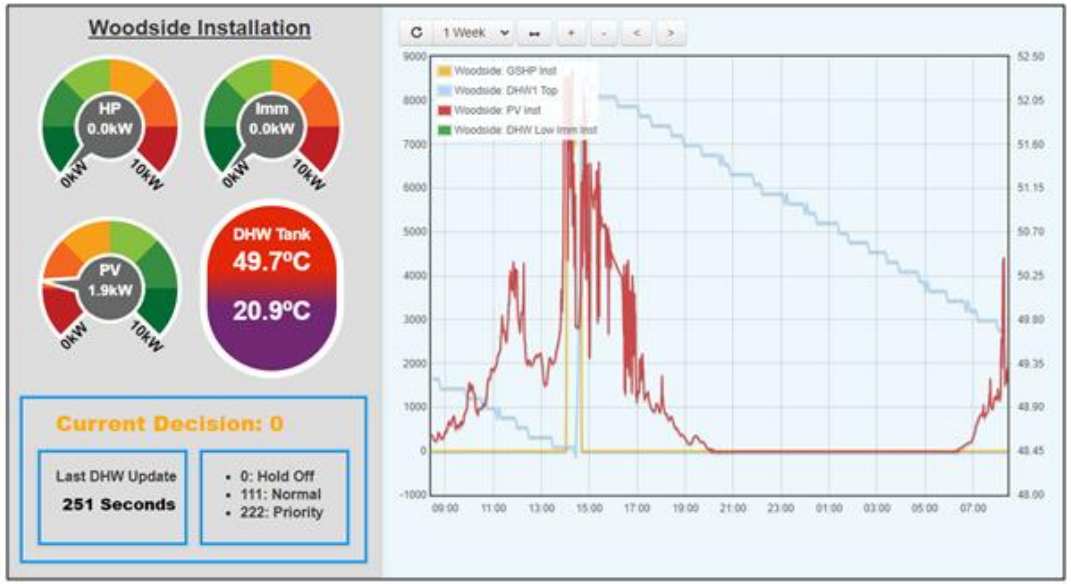
Low cost Pi/OEM data/control platform





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

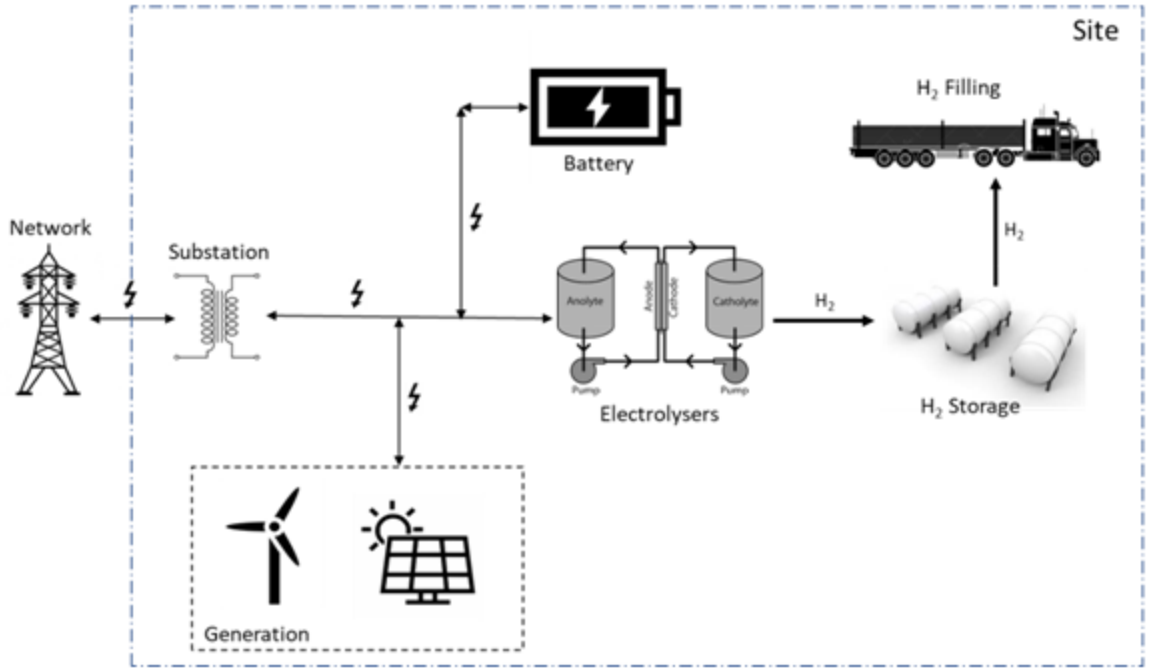


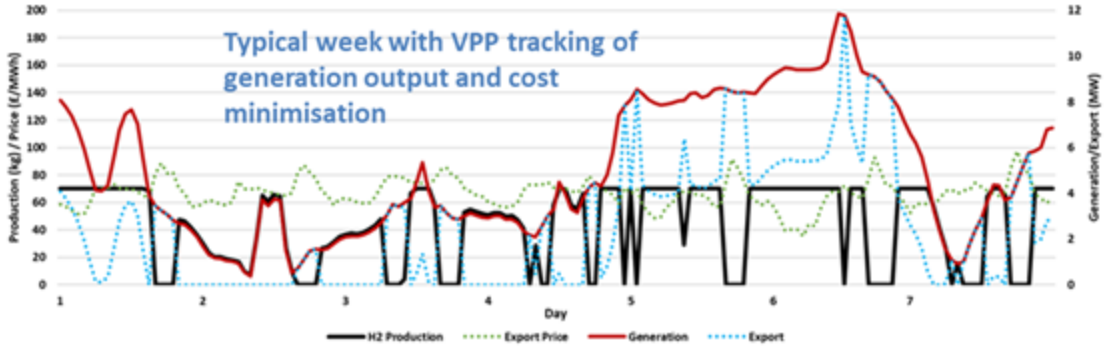
Other relevant scenario's modelled:

- 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

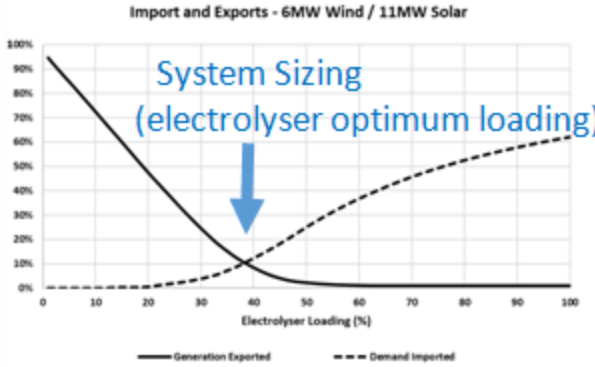
Green Hydrogen Production Plant:





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

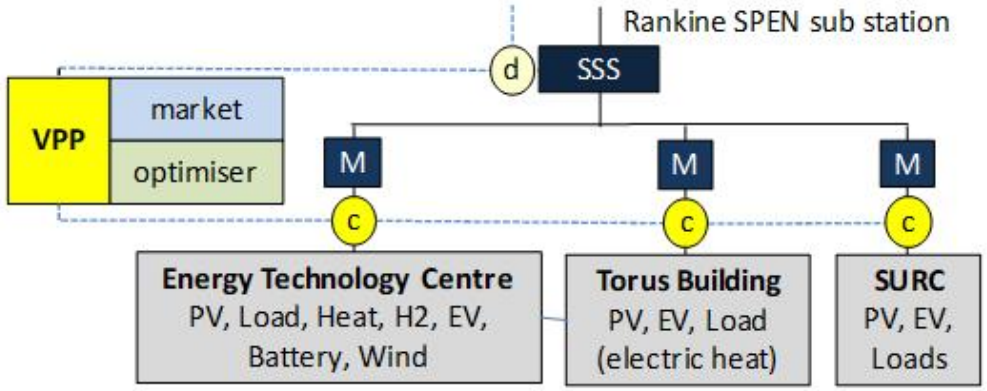
Cost Benefit of VPP



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

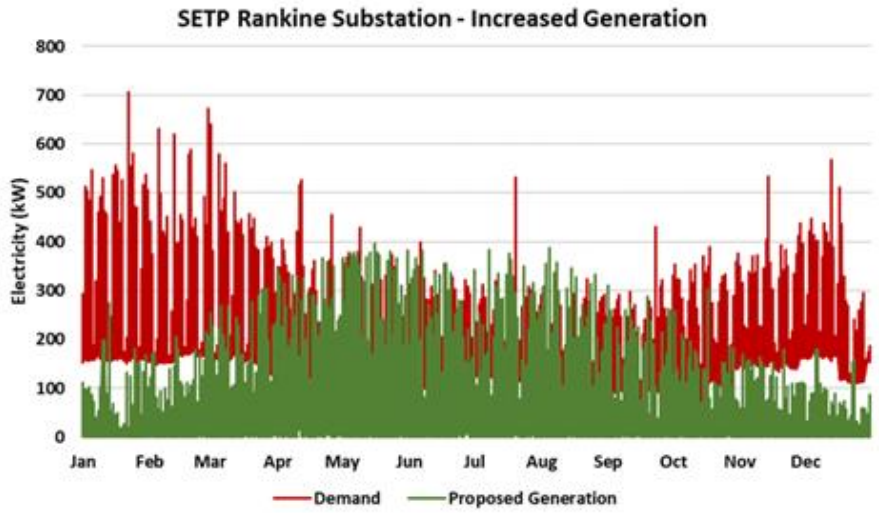


Smart Sustainable East Kilbride (SSEK) Initiative:

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.

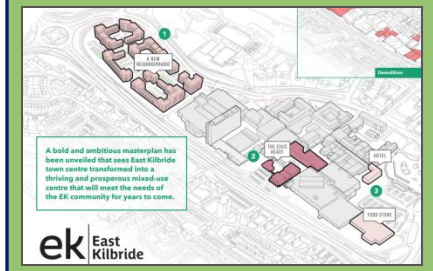
SIES VPP Techno-Economic Modelling
To assess the value of VPP monitoring and control platforms for renewables, storage, conversion and load flex, in support of 100% renewable energy systems.

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

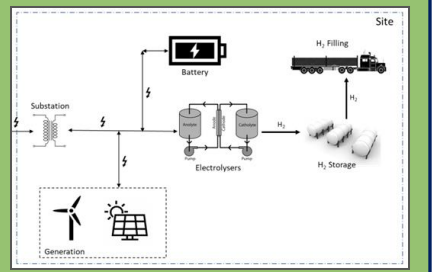
The technical base is developed to TRL6, we are now looking to partner to take the VPP forward in :

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!

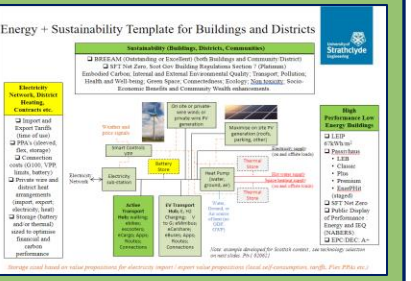


City / Town / District / Region



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**

Funding Partners

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