

# Solar powered Sustainable refuelling hub #2

Invest Net Zero Cheshire

IKIGAI



CATAPULT  
Energy Systems



**Project reference number:** 020

**Project name:** Solar-powered Sustainable Refuelling Hub #2

**Project type:** The development and construction of a sustainable refuelling hub (with one or any combination of EV charging, bio-CNG/LNG refuelling and hydrogen refuelling infrastructure) located at the intersection between the M56-M53 to serve local and transitory HGV, LGV, corporate fleet and public demand, combined with an adjacent private wire (up to 60MW) solar PV plant. **See also the Solar PV Portfolio.**

**Project maturity:** Early feasibility / conceptual stage.

**Key strategic drivers:**

- Shared EV charging and refuelling infrastructure provision facilitate conversion of local HGVs, LGVs, buses and fleets based on the optimal vehicle technology choice and servicing of high frequency transitory demand visiting Ellesmere Port and the surrounding industrial area (quantified as part of stakeholder engagement in this Invest Net Zero Cheshire project).
- Shared infrastructure supports conversion of local SME fleets over time (in circumstances where SMEs could not otherwise justify installation of captive infrastructure).
- Combining multiple fuels attracts and retains whole business anchor customers and cross subsidises, together with retail park revenues, hydrogen refuelling infrastructure as demand ramps up over time.
- Sustainable refuelling hub site benefits from a reduction in non-commodity costs associated with private wire supply of adjacent solar (and an import/export grid connection for security of supply, which may also provide an opportunity to collocate with a battery energy storage system (“**BESS**”) to provide flexibility services to the electricity grid).

**Locations:** Intersection between the M56-M53 motorways (multiple suitable sites have been identified for both the sustainable refuelling hub and the solar PV plant in the vicinity of this location. Details of the “Wervin” site are available in the **Solar PV Portfolio** overview and under NDA.

**Proposed phases:**

1. 2022-2023: Development and construction of the solar PV plant, private wire, import/export electricity grid connection and sustainable refuelling hub (together with, subject to further due diligence, any front of the meter/hybrid BESS).
2. There is sufficient suitable land available close to the proposed site to support expansion of the solar PV capacity if required (connected to the electricity grid along a cable route running east M53/south M56) to facilitate installation of a sustainable refuelling hub collocated electrolyser to incorporate green hydrogen refuelling capacity to meet future HGV transport demand over time.

## Total estimated carbon savings p.a.\*

Vehicle Fuel	Estimated Emissions Impact Range
EV	100% to 55% (depending on source of electricity)
H2	98% (green hydrogen) to +10%
CNG	100% (biomethane) to -2% (natural gas)
LNG	100% (biomethane) to +5% (natural gas)

\*Emissions savings based on a well-to-wheel lifecycle emissions basis compared with diesel emissions at kgCO<sub>2</sub>e/100 km.

## Estimated project costs:

The following is provided as a guide but will be subject to the specific sustainable hub scale and solutions chosen by delivery partners (taking into account in particular further fuel demand due diligence in respect local and transitory vehicles).

*Chargepoint and refuelling infrastructure (estimates based on desktop study):*

Range	100kg/day	1200kg/day
H2	£1.1m	£4.6m
Range	500 kg/day	10000 kg/day
CNG	£0.26m	£1.1m
LNG	£0.10m	£0.5m
Charger	Per charger	Per charger
Fast (22kW)	£8,000	£16,500

*Solar PV plant, grid connection and private wire:*

- **See [Solar PV Portfolio](#)** overview for the “Wervin” site. To fulfil the electricity requirements for large EV rapid charger hub (and any electrolysis system), upgrades to local electrical substations and new transformers will be required. It is therefore proposed to package the solar PV development (and any collocated BESS) with the sustainable refuelling hub to optimise costs.
- Initial engagement with SP Energy Networks has been carried out in this regard, however, a more detailed study is required to estimate costs once the exact site locations for the solar PV plant and the sustainable refuelling hub have been confirmed.

*Gas network connection:* Connection to the gas network will incur additional costs and is dependent on the proximity of the take-off from the network. Each proposed site is within 850m of the Local Transmission System (LTS) gas network which offers an attractive option for connection to the gas distribution network.

## Inputs:

**Hydrogen** (local sources):

- Green hydrogen production by an industrial stakeholder in Runcorn or turquoise hydrogen production near Ellesmere Port (in either case, to be tankered to the site).
- Installation of an electrolyser collocated with the sustainable refuelling hub (connected to the private wire solar).

**Biomethane:** This will be supplied via connection to the gas grid or, via tanker if connection point is not available. RTFCs/Green Gas Certificates would be used to guarantee renewability on a mass-balancing basis.

**Electricity:** Demand would be met by private wire to the adjacent solar PV plant private wire when available, with security of supply guaranteed via an import/export connection to the local 33kv network. A solar PV plant collocated BESS may also be able to provide back-up power (in addition to its primary economic purpose of providing ancillary services to the grid).

### Technology, construction and operation:

To be determined with co-developer/funders after further due diligence.

### Revenue streams:

- Retail offer rental
- EV charging bay rental to chargepoint technology providers / power sales (model to be confirmed following further technology due diligence and consideration of site specific EV demand/utilisation risk).
- Biomethane and hydrogen sales:
  - CNG: Vary with station capacity. Typically, 82-95 p/kg CNG before VAT. Biomethane is expected to cost around 10 p/kg more than fossil fuel based natural gas from the grid.
  - LNG: Vary with station capacity. Typically, 90-100 p/kg LNG before VAT. Bio-LNG is expected to cost around 10 p/kg more than fossil fuel based natural gas from the grid.
  - Hydrogen: approx. £10-£15 per kg (though hydrogen for transport applications not widely deployed – further due diligence with OEMs and logistics companies seeking to switch to hydrogen/hybrid HGVs will be required).
- Power purchase revenues from export of any surplus solar power to the grid.
- In respect of any BESS: ancillary services revenue pursuant to an aggregator contract (Ikigai is in the process of undertaking further due diligence on this aspect of the Project with SP Energy Networks).
- In respect of any electrolyser: the production facility will be entitled to 'Development Fuel' Renewable Transport Fuel Certificates for hydrogen (under current RTFO regulation renewable generation has to be co-located with electrolyser).

**Professional advisors to date:** Ikigai (bankability); Atkins (hydrogen and biomethane refuelling technical); Energy Systems Catapult (Whole Systems Modelling) and EA technology (electrical technical).

### Opportunity:

- Retail partners for collocation with the sustainable refuelling hub

- Specialist EV forecourt / refuelling hub co-developers
- Technology partners
- Local suppliers/distributors of biomethane to provide sleeving arrangements
- Investors with an appetite to replicate this model at other sites in Cheshire and Warrington.

# **Invest Net Zero Cheshire**

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