

# **SIF - Terraced Street Decarbonisation**

## **PWP7 D2 – Supply chain engagement**

### **PWP7 D2**

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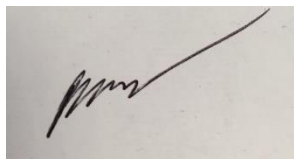
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# Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
<b>2</b>	<b>PV System</b>	<b>7</b>
<b>3</b>	<b>Heating system</b>	<b>8</b>
<b>4</b>	<b>EV charging</b>	<b>10</b>
<b>5</b>	<b>Home energy management system</b>	<b>12</b>
<b>6</b>	<b>Community energy management system</b>	<b>14</b>
<b>7</b>	<b>Conclusions and recommendations</b>	<b>15</b>

## Table of Tables

<b>Table 2-1</b>	<b>List of PV system providers and contact details</b>	<b>7</b>
<b>Table 3-1</b>	<b>List of suitable heating system providers and contact details</b>	<b>8</b>
<b>Table 4-1</b>	<b>List of EV charging providers and contact details</b>	<b>10</b>
<b>Table 5-1</b>	<b>List of HEMS providers and contact details</b>	<b>12</b>
<b>Table 6-1</b>	<b>List of CEMS providers and contact details</b>	<b>14</b>

## Table of Figures

<b>Figure 1-1</b>	<b>System schematic outline</b>	<b>6</b>
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## Glossary

Term	Definition
BH	Buro Happold
CEMS	Community energy management system
COTS	Commercially off the shelf
DNO	Distribution network operator
ENWL	Electricity North West Limited
EV	Electric vehicle
HEMS	Home energy management system
PV	Photovoltaic
SIF	Strategic Innovation Fund

# 1 Introduction

Part of the complexity of the system design approach described in the functional specification document is the integration of multiple systems to deliver the overall system package. However preliminary investigations under the Discovery phase have concluded that the main system subcomponents are all available as commercially off the shelf (COTS) items. The innovation will be in the interfacing of these and ensuring a standardised approach is taken to avoid (where possible) exclusive arrangements with single providers.

Main system components have been identified as follows:

- Home Energy Management System (HEMS) – a system operating within homes that can optimise home system operations, take instruction from the external Community Energy Management System (CEMS) and provide feedback and monitoring to the CEMS
- Community Energy Management system (CEMS) the aggregating and management platform that integrates the operating solution – this in itself can comprise its own subsystems and is not necessarily an individual system but can be a functionality built into the integration of multiple systems based on a functional specification
- Smart metering – metering using smart meters to be able to accurately bill consumers
- Billing system – energy supplier provided solution for energy billing and aggregating services into a single consumer bill
- Solar PV – solar panels with associated equipment for connection into the DNO network
- Ground source heat array including ground source heat pumps
- Internal home wet system e.g. hot water tanks and radiators
- Internal home energy storage (batteries and thermal batteries)
- Fabric efficiency measures – to improve energy efficiency
- Building monitoring systems – to evaluate accurate thermal performance of buildings

The system is a modular design whereby assets can be included where possible and space provision allows. The system elements for the project are shown below in Figure 1-1.

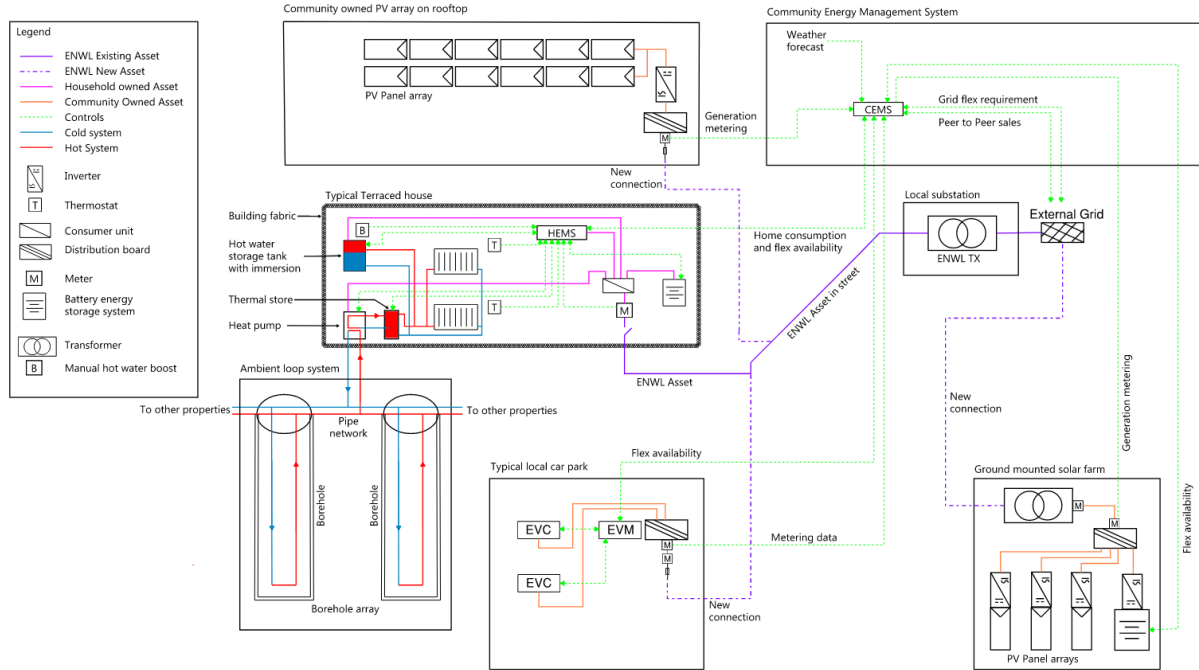


Figure 1-1 System schematic outline

## 2 PV System

There are two types of PV systems that can be integrated in the scheme, rooftop mounted PV schemes and ground mounted solar farms. RV Energy would be responsible for the procurement of the ground mounted systems. Consequently, Buro Happold have approached several rooftop PV system installation contractors and their contact details are outlined in this section.

### 2.1 List of Companies contacted

Table 2-1 lists the companies contacted who can install the required PV system in the project boundary. This includes the communal solar panels, inverter, feeder pillar, as well as the individual batteries within each property where appropriate.

**Table 2-1 List of PV system providers and contact details**

Technology provided	Company name	Email	Phone number	Website	Received response
Whole PV system	Hyndburn Energy	info@hyndburnenergy.co.uk	07811254499	<a href="https://www.hyndburnenergy.co.uk/">https://www.hyndburnenergy.co.uk/</a>	Y
	Beech Electrical Ltd	gary@beechelectrical.co.uk	07958356205	<a href="https://beechelectrical.co.uk/">https://beechelectrical.co.uk/</a>	Y
	All Around Air Source	mollie@allaroundairsources.co.uk	07713058075	<a href="https://allaroundairsources.co.uk/">https://allaroundairsources.co.uk/</a>	Y
	The Energy Experts	david@the-energy-experts.co.uk	03303530364	<a href="http://www.the-energy-experts.co.uk">www.the-energy-experts.co.uk</a>	Y
	Evergreen Energy	sivvy.mikitsey@evergreenenergy.co.uk	07957 516746	<a href="https://www.evergreenenergy.co.uk/">https://www.evergreenenergy.co.uk/</a>	Y
Battery	Tesla (Steve Duckworth installer)	georgia@steve-duckworth-electrical.co.uk	0161 260 1704	<a href="https://www.tesla.com/en_gb/powerwall">https://www.tesla.com/en_gb/powerwall</a>	Y

### 2.2 Summary of engagement and requirements for Alpha phase

There are many PV installers that can install PV and battery systems throughout the project boundary, and these include SME's up to large national companies. There could be the opportunity to collect schemes together to achieve reduced install rates through economies of scale, however this should be discussed with the installers.

For the Alpha stage of the project, the following actions are recommended for both technical capability but also to inform the financial viability of the schemes:

- Greater investigation into the capabilities of PV on rooftops
- More quotations and with greater accuracy (by providing the installers with more detail)
- Site evaluation to assess shading, cabling routes, available space for infrastructure, rooftop structural integrity
- Request a tender proposal
- Compare quotations based on equipment warranties and specifications e.g., panel ratings, battery sizes and efficiencies

### 3 Heating system

The heating system comprises the elements of the heat network both inside the house and in the public domain. These are separated into the following:

- Ambient loop & heat pumps including Boreholes drilled, pipework installed, heat pump installed
- Hot water storage
- Thermal battery

#### 3.1 List of Companies contacted

Table 3-1 lists the companies contacted who can install the required heating system. For items such as domestic pipework and radiator replacements, local tradespeople can be used of which there are too many to list at this stage.

**Table 3-1 List of suitable heating system providers and contact details**

Technology provided	Company name	Email	Phone number	Website	Received response
Ambient loop and heat pumps	Kensa	joseph.hill@kensaengineering.com	07949323 846	kensaheatpumps.com	Y
	Thermal Earth	info@thermalearth.co.uk	01269 833100	thermalearth.co.uk	
	Dimplex	gdhv.contracting@glendimplex.com	+353(0)18 52 3400	dimplex.co.uk/professional/heat-pumps/ambient-temperature-network	
Hot water storage	Mixergy	james.hoople@mixergy.co.uk	07946 310032	mixergy.co.uk	Y
	Oso hot water	sales.uk@oso-hotwater.co.uk	01914820 800	osohotwater.co.uk	
	Daikin	customercentre@daikin.co.uk	01932 879271	www.daikin.co.uk	Y
Thermal battery	Sunamp	info@sunamp.com	01875 610001	sunamp.com	Y

#### 3.2 Summary of engagement and requirements for Alpha phase

There are several installers of ambient loop systems, and although Kensa are due to be a project partner, it would be diligent to obtain like for like quotes from alternative installers/suppliers.

There is a vast array of hot water cylinder providers, and these can be chosen depending on the network setup chosen for each dwelling/project. All suppliers listed have tanks suitable for heat pump integration and can also accept an immersion heater.

There aren't many providers in this list for thermal batteries due to the niche market as most thermal battery companies are tailored towards the large scale commercial and industrial areas.

For the alpha stage of the project, the following actions are recommended:



- Greater contact with thermal battery manufacturers to establish appetite for smaller scale systems
- Evaluate existing system to determine which equipment can remain e.g., could the hot water cylinder remain and would any radiators/pipes need to be replaced
- More quotations and with greater accuracy (by providing the installers with more detail)
- Site evaluation to assess available space for infrastructure within homes
- Site evaluation to assess borehole heat capacity and road gradient for in-street boreholes
- Request a tender proposal from suppliers for the scheme

## 4 EV charging

It is envisaged that the EV charging systems will be located close to the decarbonised terrace streets to allow the residents to access low-cost charging systems for electric vehicles.

The electric vehicle charging system is split into the following elements:

- Electric vehicle charger
- Electric vehicle charge management

For the EV charging, we focussed around 7-50 kW chargers that could be utilised either at the kerbside or within designated parking areas.

### 4.1 List of Companies contacted

Table 4-1 lists the companies contacted who can install the required EV charging system including both the chargers and their potential management systems.

**Table 4-1 List of EV charging providers and contact details**

Technology provided	Company name	Email	Phone number	Website	Received response
EV charging	Ubitricity	David.Bagwell@ubitricity.com		<a href="https://ubitricity.com/en/">https://ubitricity.com/en/</a>	Y
	ChargePoint	hamees.ahmed@chargepoint.com	02039704653	<a href="https://www.chargepoint.com/en-gb/">https://www.chargepoint.com/en-gb/</a>	Y
	InstaVolt	sales@instavolt.co.uk	01256305900	<a href="https://instavolt.co.uk/">https://instavolt.co.uk/</a>	Y
	PodPoint	Sheran.Guy@pod-point.com	07931519732	<a href="https://pod-point.com/solutions/business/commercial-charging">https://pod-point.com/solutions/business/commercial-charging</a>	
EV management	Monta	support@monta.com	07480 537115	<a href="https://monta.com/uk/">https://monta.com/uk/</a>	
	Driivz	contactus@driivz.com	07919211216	<a href="https://driivz.com/">https://driivz.com/</a>	Y

### 4.2 Summary of engagement and requirements for Alpha phase

Generally, EV chargers are available from a wide array of manufacturers and most of these can also provide EV charge management software or connectivity. There are several charger operational scenarios that include own and operate through to leasehold and these should be investigated in greater detail in the next phase.

The EV chargers and charge management software can be purchased directly or operated through a third-party supplier depending on size of installation. For example, it may be more cost effective to have a third party operate a single charger rather than purchase the functionality and have the responsibility of operational costs.

There are many EV charger installers that can install third party EV chargers, and these are not listed above but should be engaged at the later phases of the project.

For the Alpha stage of the project, the following actions are recommended:

- Evaluate existing EV charging maps to determine where existing chargers are in each area to avoid duplication
- To better quantify the infrastructure required, perform a charging demand assessment by using surveys and open-source data to quantify how many EVs are in each area and how far and frequently they are driven. Then, use this acquired information to estimate the future demand based on predicted uptake
- Establish ownership and operation scenarios for the projects to present the impacts of each
- More quotations and with greater accuracy (by providing the installers with more detail)
- Site evaluation to assess available space for infrastructure and trenching requirements
- Engage with stakeholders for locations that may not be council-owned
- Request a tender proposal
- Compare quotations based on equipment warranties and specifications e.g., charger ratings, data management, and efficiencies

## 5 Home Energy Management System

The Home Energy Management System (HEMS) is required to monitor and control the system elements within the house. The system should be able to:

- Monitor – Heat pumps, thermal stores, community energy management system, incoming electrical supply
- Control – Heat pumps, battery storage, thermal store, hot water immersion
- Communicate with – Community energy management system, consumer app, external fault-finding system

The system being proposed is relatively novel that has functionality above that which can currently be offered by the market. The suppliers contacted were all confident that the system could be created with relative ease from their existing systems, however nothing was available off the shelf for roll out and so would require some development.

### 5.1 List of Companies contacted

Table 5-1 lists the companies contacted who can install the home energy management system (HEMS). Note that there aren't many providers in this list at this stage due to the niche market.

**Table 5-1 List of HEMS providers and contact details**

Company name	Email	Phone number	Website	Received response
GridDuck	gregor@gridduck.com	+44 7740023578	<a href="https://www.gridduck.com/">https://www.gridduck.com/</a>	Y
PassivUK	Matthew.osborn@passivuk.com		<a href="http://www.passivuk.com">www.passivuk.com</a>	Y
Enphase	support_uk@enphaseenergy.com	01908 828 928	<a href="http://enphase.com">enphase.com</a>	Y
EON	Online contact only	n/a	<a href="http://www.eonenergy.com/energy-management.html">www.eonenergy.com/energy-management.html</a>	N
Heatio	hello@heatio.co.uk	0151 540 3998	<a href="http://www.heatio.co.uk">www.heatio.co.uk</a>	Y

Since this initial consultation, we have been in further discussions with University of Salford for potential testing at their facilities during Alpha stage who have indicated they have a number of potential HEMs providers they have worked with to also include and whose systems have been tested for communications to ASHPs. Further discussions are also proposed with the Energy Systems Catapult and others.

### 5.2 Summary of engagement and requirements for Alpha phase

There are many home energy management companies that can offer the product that is required however the solution is not available off the shelf. The suppliers range from large scale OEM's to more local manufacturers and all can provide the required solution, however there will be greater costs involved for the larger OEM's that could make them unviable.

For the Alpha stage of the project, the following actions are recommended:

- Evaluate the compatibility with all other infrastructure
- More quotations and with greater accuracy (by providing more detail such as how many meters are required)
- Site evaluation to assess available space for metering
- Engage with stakeholders for locations that may not be council-owned
- Request a tender proposal

- Compare quotations based on equipment warranties and specifications e.g., metering frequency, accuracy, data management, and user interface

## 6 Community Energy Management System (CEMS)

The Community Energy Management System (CEMS) needs to incorporate many functionalities including:

- Incoming signals from the grid to see flexibility requirements and availability.
- Incoming signals from the community assets and control of their operation including:
  - Home Energy management systems
  - EV charge management systems
  - Renewable generation assets including rooftop & ground mounted PV systems and battery storage systems
- Peer to peer electricity purchase, ledger and billing facilities
- Incoming signals from weather reports to predict solar PV energy generation

### 6.1 List of Companies contacted,

This section lists the companies contacted who can install the community energy management system (CEMS) in Table 6-1. Note that there aren't many providers in this list at this stage due to the niche market.

**Table 6-1 List of CEMS providers and contact details**

Company name	Email	Phone number	Website	Received response
GridDuck	gregor@gridduck.com	07740023578	<a href="https://www.gridduck.com/">https://www.gridduck.com/</a>	Y
Urban Chain	s.taheri@urbanchain.co.uk	01613071311	<a href="https://www.urbanchain.co.uk/">https://www.urbanchain.co.uk/</a>	Y
Kraken flex	Tom.allen@krakenflex.com		<a href="https://www.krakenflex.com/">https://www.krakenflex.com/</a>	Y

Others are being identified and will be explored further in Alpha phase.

### 6.2 Summary of engagement and requirements for Alpha phase

The requirements of the CEMS means there are limited companies able to fulfil the requirements however integrators are available that can be used to develop the necessary interfaces to existing systems. The companies that were contacted can all provide the functionality of the system, however the costs for the platforms should be investigated further to ensure adequate comparisons are drawn up.

For the alpha stage of the project, the following actions are recommended:

- Evaluate the compatibility with all other infrastructure
- More quotations and with greater accuracy (by providing more detail such as how many meters are required)
- Site evaluation to assess available space for metering
- Engage with stakeholders for locations that may not be council-owned
- Request a tender proposal from
- Compare quotations based on equipment warranties and specifications e.g., metering frequency, accuracy, data management, and user interface

## 7 Conclusions and recommendations

### 7.1 Conclusions of supplier engagement

The conclusions of the discovery phase supply chain engagement are:

- There are many PV installers that can install PV and battery systems throughout the project boundary and these include SME's up to large national companies. There could be the opportunity to collect schemes together to achieve reduced install rates through economies of scale, however this should be discussed with the installers.
- There are several installers of ambient loop systems, and although Kensa are due to be a project partner, it would be diligent to explore the needs and requirements of other providers in firming up the business model and architecture.
- There is a vast array of hot water cylinder providers, and these can be chosen depending on the network setup chosen for each dwelling/project. All suppliers listed have tanks suitable for heat pump integration and can also accept an immersion heater.
- There aren't many providers in this list for thermal batteries due to the niche market as most thermal battery companies are tailored towards the large scale commercial and industrial areas however there are providers such as Sunamp available which can be used viably and whose product has been tested.
- Generally, EV chargers are available from a wide array of manufacturers and most of these can also provide EV charge management software or connectivity. There are several charger operational scenarios that include own and operate through to leasehold and these should be investigated in greater detail in the next phase.
- The EV chargers and charge management software can be purchased directly or operated through a third-party supplier depending on size of installation. For example, it may be more cost effective to have a third party operate a single charger rather than purchase the functionality and have the responsibility of operational costs.
- There are many EV charger installers that can install third party EV chargers, and these are not listed above but should be engaged at the later phases of the project.
- There are many home energy management companies that can offer the product that is required however the solution is not available off the shelf. The suppliers range from large scale OEM's to more local manufacturers and all can provide the required solution, however there will be greater costs involved for the larger OEM's that could make them unviable. Communication and interface testing will be a critical part of further stages.
- The requirements of the community energy management system mean there are limited companies able to fulfil the requirements. The companies that were contacted can all provide the functionality of the system, however the costs for the platforms should be investigated further to ensure adequate comparisons are drawn up. There are a number of options regards system integration and the initial process should be to work with selected partners on their specific interface requirements ie Kensa Utilities, Urban Chain and ENWL

## 7.2 Summary of requirements for Alpha phase

The requirements of the Alpha phase for the project are:

- Evaluate system to system compatibility where required, either through bench testing or in place testing in a building
- Further stakeholder engagement to ensure proposed equipment locations are feasible
- Retrieve and compare more detailed quotations
- Request tender proposals to give better certainty around the techno economics of the system
- Perform surveys where required
- Site evaluations



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