

# Multi-energy Vector Integration Innovation Opportunities

## Preliminary assessment of innovation opportunities for SMEs

The Multi-energy Vector Integration Innovation Opportunities project investigated how the constituent vectors of the energy system (i.e. electricity, heat, transport, etc) will increasingly interact to enable new services and value streams to be realised, to create a more dynamic and flexible low carbon energy system.

This included assessment of the challenges and opportunities for SMEs to exploit their skills, capabilities and assets to enable a future multi-vector energy system.

The project provided an initial understanding of where these opportunities are and how SMEs can be supported to develop their capabilities to enable them to play a more significant role in the development of multi-vector energy.

### Methodology

To provide an understanding of where the opportunities arising from increased multi-energy vector integration exists, a methodological approach was adopted which included a landscape review, stakeholder engagement activity and analysis of three multi-vector case studies.

### Conclusions

A number of cross-cutting innovation themes emerged across the multi-vector energy case studies considered.

These themes are likely to offer value to SMEs in the near-term, and could form the basis of publicly-funded innovation programmes to support multi-energy vector progression and the UK SME community in the future.

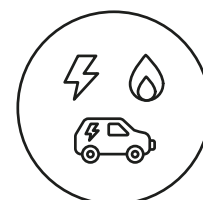
The cross-cutting themes are:

- **Novel system control approaches:** given the complexity of multi-vector energy systems there is a need for the development of control schemes which can automate decision-making and improve the system-level technical and commercial performance of multi-vector systems. In the case of multi-vector heating, the development of smart control systems can help maximise system efficiency and performance. In vehicle-to-grid systems, the

development of novel control approaches should enable the user to define the parameters in which their vehicle can be used to give confidence that when the vehicle is needed it will have sufficient charge.

- **Software development:** a range of software solutions are required to make multi-vector systems more attractive to market participants both from operational and commercial perspectives. In multi-vector heating, there is a need for the development of software solutions that enable a user to specify their demands for space heating and hot water, without the need for user intervention of the heating technologies. For vehicle-to-grid, there is a need for software development that allows the vehicle owner to connect to applications which enable innovative payment structures for the use of their vehicle in vehicle-to-grid systems.
- **Aggregation services and associated business models (for vehicle-to grid multi-vector solutions):** there is a need for aggregation services and associated business models to manage the supply of energy derived from electric vehicle batteries and to incentivise electric vehicle owners to participate in vehicle-to-grid systems.

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## Recommendations

There are a number of activities that would be of value to pursue in the near-term:

**More extensive supply chain engagement, achieved through the following:**

- detailed analysis and engagement with UK SMEs with potential service and technology offerings of relevance to multi-energy vector integration. This would provide enhanced insight into the challenges that SMEs face and the opportunity areas of most relevance to the UK SME community.
- a process of engagement with multi-energy vector end-users to provide additional insight into the technical and operational challenges experienced by these end-users. This would further inform the development of the SME opportunity space.

**It would also be valuable to:**

- build on the approach methodology developed to consider a broader range of case studies to test whether additional opportunities emerge.
- consider enhancements to the process of extracting opportunities from the identified challenges. This would include a series of workshops with SMEs to build on and enhance the findings summarised in this report.

The analysis provided some useful context relating to multi-energy vector integration that can be considered by public funding agencies when developing future innovation programmes.

The two key points are:

- increased focus on system level interventions and innovation activities (including providing support for multi-vector system demonstration activities) to help maximise the pull through of individual technologies within multi-vector solutions towards commercial reality.
- increased focus on developing and testing solutions for the non-technological challenges associated with an increasing move towards multi-vector integration, (e.g. novel business models and remuneration structures, etc).

**The full report is available in our publications section at [es.catapult.org.uk](https://es.catapult.org.uk).**

