



ITES

Part of the **UK-India** Net Zero
Innovation Virtual Centre

Impact Report: Year 1 (2022/23)



Innovating for Transport and Energy Systems (ITES)

April 2023



Department for
Science, Innovation
& Technology



Innovate
UK



CATAPULT
Energy Systems

Contents

- 1 Overview3
- 2 Key project activities8
 - 2.1 ITES governance8
 - 2.2 Stakeholder engagement..... 10
 - 2.2.1 India stakeholders..... 10
 - 2.2.2 UK stakeholders..... 11
 - 2.2.3 Key stakeholder engagement activities 12
 - 2.2.4 Stakeholder engagement feedback 12
 - 2.2.5 Research and knowledge exchange..... 14
- 3 What’s been achieved so far?..... 16
 - 3.1 Project phase completion 16
 - 3.2 Year 1 impact summary 16
 - 3.3 Project partner feedback 18
- 4 What’s next for ITES? 19
- 5 Summary – scale up and sustainability 21
 - 5.1 Opportunities for realisation of project achievements 21
 - 5.2 Project sustainability 21
- Licence / disclaimer 23

DISCLAIMER

This document has been prepared by Energy Systems Catapult Limited. For full copyright, legal information and defined terms, please refer to the "Licence / Disclaimer" section at the back of this document.

All information is given in good faith based upon the latest information available to Energy Systems Catapult Limited. No warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon the Energy Systems Catapult Limited or any of its subsidiary or associated companies.

1 Overview



Transport and energy decarbonisation are huge challenges worldwide. A large majority of global greenhouse gas (GHG) emissions are due to energy, with over 20% of all emissions attributed to transport. The task of transport decarbonisation is also one of Net Zero's most complex. The multiple ways we move goods and people around, the vast infrastructure that stitches it all together, and the numerous other interconnected factors involved in enabling populations and businesses to switch to more sustainable forms of mobility, demonstrate that decarbonising transport – and the energy systems powering it – is an ambition that cannot be realised alone.

The [Innovating for Clear Air](#) (IfCA) project demonstrated an innovative, collaborative approach to addressing environmental challenges related to climate change. These challenges range from air quality issues, to the need to support the electric vehicle transition and the uptake of clean energy generation.

The deep engagement carried out through IfCA has also created lasting partnerships between Indian and UK organisations. Building on this international approach, Energy Systems Catapult (ESC), along with the Indian Institute of Science (IISc), has developed the [Innovating for Transport and Energy Systems](#) (ITES) initiative. ITES will focus on enabling sustainable transport systems by carrying out joint applied research into clean transport challenges, and enable the demonstration, support and scaleup of new sustainable solutions. ITES will take a whole systems approach to challenges, considering all aspects – from consumer acceptance to business models, policy to supporting infrastructure.

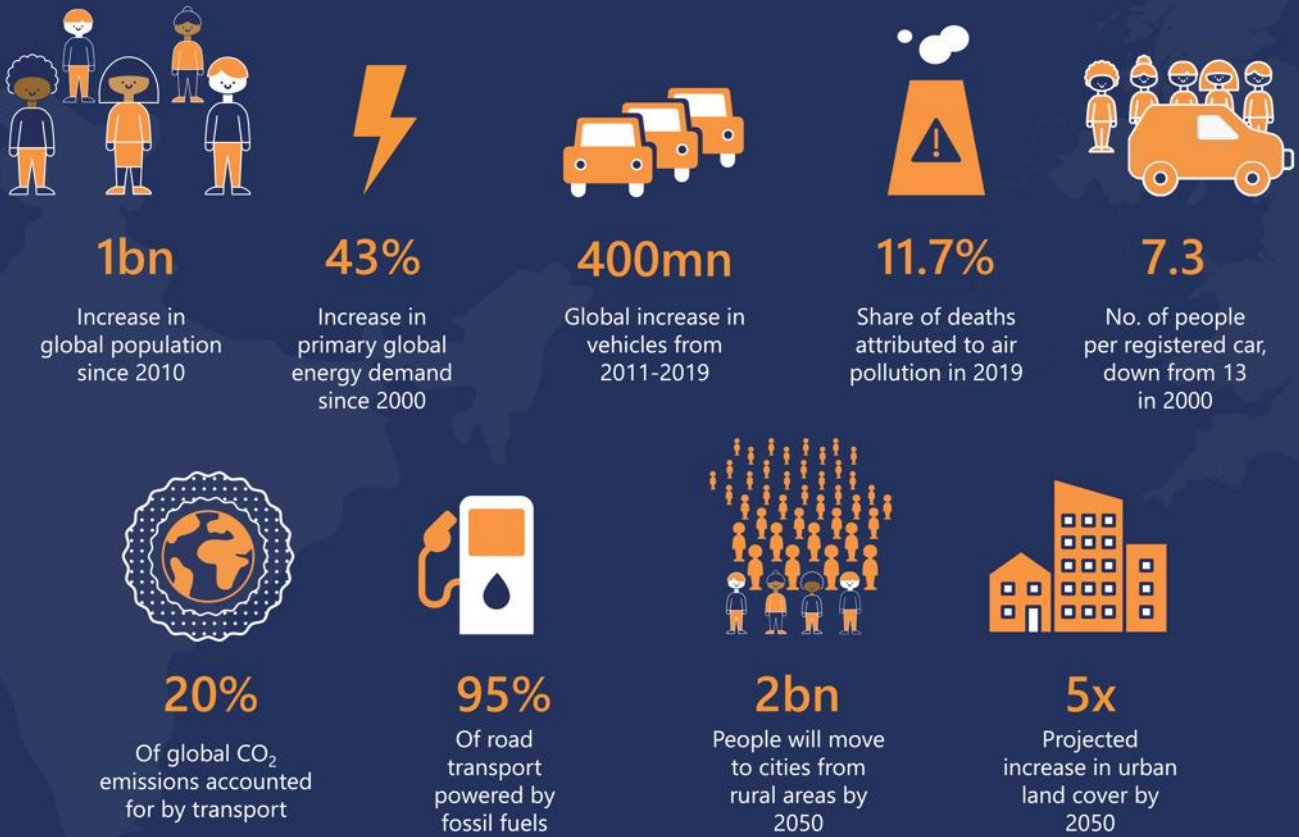


Figure 1: Global transport challenges

ITES is funded by Innovate UK (IUK) and the UK Department for Science, Innovation and Technology (DSIT), and is itself part of a wider initiative called the UK-India Net Zero Innovation Virtual Centre (the Centre). The Centre aims to form a unique coalition of UK and Indian innovation policymakers, R&D companies, start-ups, hubs and places, investors and research groups. It will initially focus on three key areas: (i) decarbonising manufacturing processes; (ii) decarbonising transport (ITES) and (iii) hydrogen systems.

Currently the most mature pillar of the three, ITES will adopt a practical and market-led approach that aims to:

- Phase 1. Identify (market-led) priority challenges
- Phase 2. Deliver innovation sprints to source, originate and validate solutions
- Phase 3. Develop practical outcomes in the form of solutions and tools, and
- Phase 4. Replicate those outcomes to scale for market success.



Figure 2: ITES high-level programme process

In Year 1 (September 2022 – March 2023), the challenge identification phase was completed. Additional activities consisted of establishing ITES governance, building partnerships, and developing a pipeline of projects.

Year 2 (April 2023 – March 2024) sees knowledge exchange, project delivery and supporting innovators and researchers become key areas of focus. Additionally, ITES is planning to attract sponsorship to ensure project sustainability beyond the current scope of government funding. ITES aims to become the go-to organisation for UK clean energy innovators interested in India, supporting at least 50 UK innovators before the end of Year 3 (April 2024 – March 2025).

Key impacts achieved to date include:

- **Stakeholder network developed:** Building a network of SMEs in the UK and India through in-depth stakeholder engagement activities;
- **ITES engagement strategy:** Developing a dissemination strategy to increase visibility and knowledge of ITES identification of, and engagement with, over 600 relevant stakeholders in the UK and over 450 in India;
- **Stakeholder engagement:** Delivering workshops to build collaborative relationships with these stakeholders;
- **SME engagement:** Launching and planning support for the first innovator 'challenge call', targeted at engaging UK SMEs delivering high-priority clean energy and transport innovations;

- **First pilot project in planning:** Selecting the UK innovator Entrust Microgrid for a pilot project, which aims to address a specific technical challenge related to the charging of electric vehicles from solar-generated electricity;
- **Knowledge sharing:** Preparation and delivery of knowledge-sharing events, such as a [workshop on clean air zones](#), and for specific research collaborations and sessions, building on pilot projects that demonstrate whole system tools and processes for better decision making;
- **Challenge and proposal 'blueprints':** Developing a process for identifying industry challenges and developing project proposals;
- **Extensive mapping activities:** Supporting deeper understanding of the business challenges in India, which will inform future ITES activities.



ITES impact: Stakeholder engagement



Direct engagement with **300+** stakeholders under ITES



44 potential sponsors identified in India and the UK



Stakeholders identified in **23** of 28 Indian states



988 organisations identified



Indian orgs identified:

- 60 government / public sector
- 34 academic / research
- 109 corporate investor
- 77 energy sector
- 13 finance
- 25 hydrogen
- 300+ private organisation

01010
10101
01010



2 Key project activities

The ITES initiative hopes to achieve impact via the process, or programme 'flow', outlined in Figure 3:

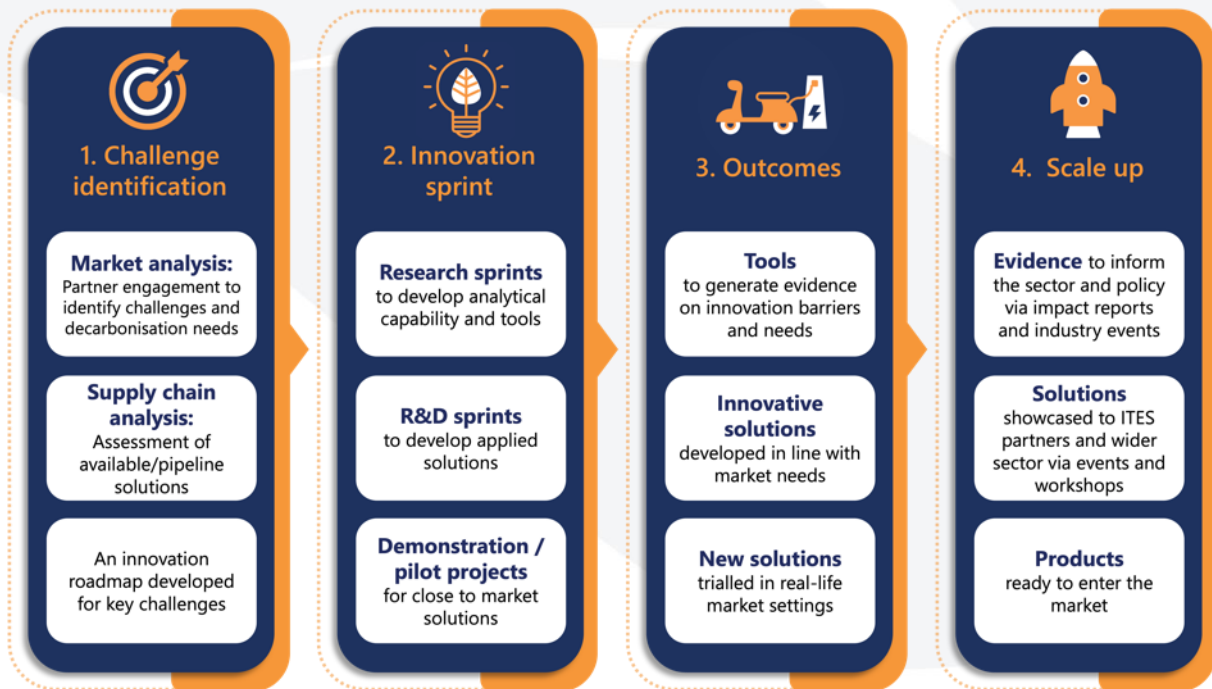


Figure 3: ITES programme flow

Year 1 focused primarily on the challenge identification phase, with activities delivering key work packages, covering:

- ITES governance;
- Stakeholder engagement & knowledge exchange;
- SME support & pilot projects; and
- Research.

2.1 ITES governance

For the ITES governance structure, ESC has suggested the creation of an Advisory Group to advise on ITES activities, and support independence and the inclusion of different stakeholder views. Core members of this group include ESC, IISc and UK government representatives. Other organisations will join as the initiative progresses.

Branding: A brand name and logo has been developed for the ITES initiative (Figure 4).

Sponsor offering: ESC has developed core value propositions and different sponsorship / engagement models that ITES could offer to different stakeholders and potential sponsors (Figure 4).



Figure 4: ITES brand name, logo and sponsorship models

2.2 Stakeholder engagement

2.2.1 India stakeholders

Table 1 summarises types and numbers of stakeholders identified in India. To build on these findings, activities will move onto engagement to explore potential involvement with ITES.

Category	Organisation type	Characteristics	Involvement
Third sector	Philanthropic agencies offering funding in similar areas	Mostly philanthropic agencies operating in India. Providing funding in sustainability space/ support to EVs in the past	Potential sponsors / supporters of ITES activities
	Bi-lateral agencies, development organisations from countries outside India	Funders of sustainable development projects. Provided by floating RFPs in already identified areas of work.	
	Trade associations	Represent member organisations and run thematic activities	Support ITES outreach and events
	Civil society organisations	Working in EV space, fetching funds from developed countries.	Operate in similar space – need to ensure no overlap with ITES
Public / government	Ministries /departments, Institutes owned by the central/state governments active in the EV space	Policymakers, programme implementation agencies, certification, specification and standards, research.	Support ITES if activities align
Academic & research orgs	IITs, R&D institutions active in EV space	Active in EV and Hydrogen space	Could offer valuable information on pot. partnerships, project opportunities and technical/ knowledge partnerships
Private	OEMs EV and EVSE	Various activities in relevant technical sectors	Possible partners or sponsors for mutually beneficial project ideas
	OEMs of AC DC EV chargers, CPOs, eMSPs		
	Battery manufacturers		

Category	Organisation type	Characteristics	Involvement
Corporate / investors	Individuals, VCs Corporates active in EVs	May support ITES in areas of mutual interest	Sponsor ITES activities
Energy sector stakeholders	Ministry of Power, CEA, SERCs, DISCOMs, SNAs	Various energy sector activities	Joint studies (e.g., impact of EV on electricity grid / DISCOM business)
Green hydrogen manufacturing	Some corporate groups have announced plans for solar / hybrid power and green hydrogen manufacturing	Emerging area: Government promoting the sector and corporate groups are increasingly entering the business	Partners or sponsors for mutually beneficial project ideas
Hydrogen vehicle	Major car manufacturers and corporate groups	Emerging area: Gov promoting the sector in view of zero emission mobility solutions	Potential for collaborative work (in the future)

Table 1: Indian stakeholders

2.2.2 UK stakeholders

In Year 1, ITES identified and defined highly relevant UK stakeholders who may be motivated to support the ITES project, summarised in Figure 5.

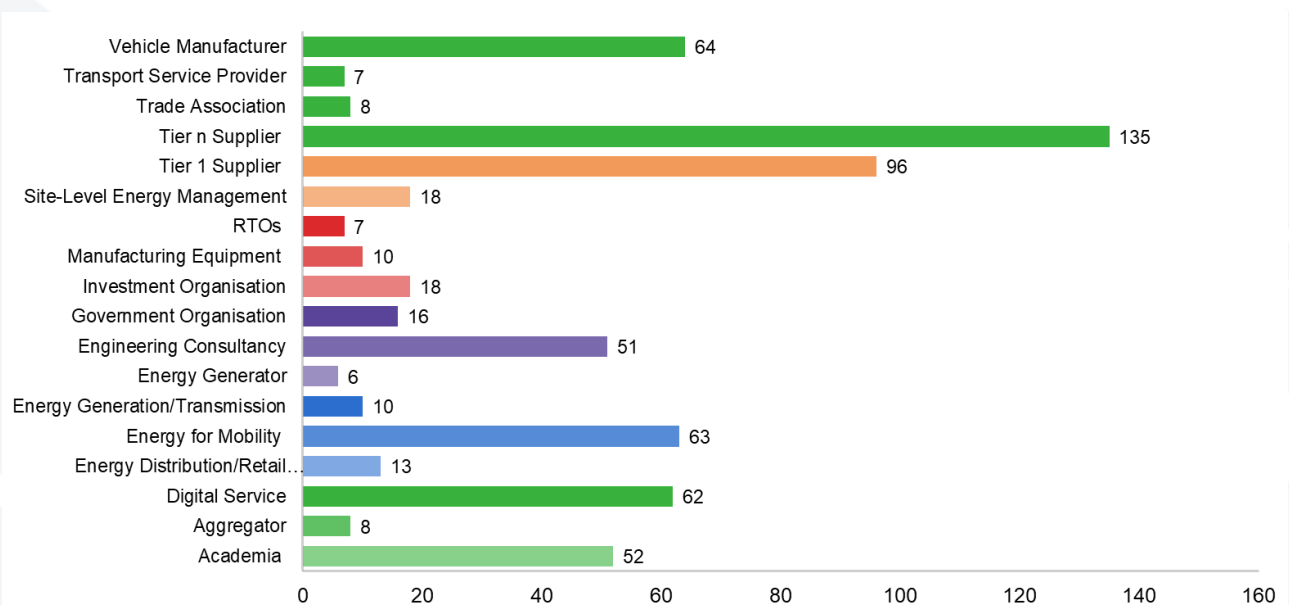


Figure 5: UK stakeholders categorised by organisation type

2.2.3 Key stakeholder engagement activities

Below is a timeline of the key stakeholder engagement activities completed during Year 1.

<p>DECEMBER 2022</p>	<ul style="list-style-type: none"> • ESC and IISc: Pre-soft launch industry engagement event introducing stakeholders to ITES / seeking feedback on plans. Insights gathered to inform future activities. • IISc: Hosted Sir Robin Grimes, Chief Scientific Advisor. Visit included high-ranking stakeholders from IISc, garnering support for ITES.
<p>JANUARY 2023</p>	<ul style="list-style-type: none"> • High-level Indian government delegation to UK, visiting science, research and innovation centres. • ESC engaged with delegation at the Manufacturing Technology Centre (MTC).
<p>MARCH 2023</p>	<ul style="list-style-type: none"> • ESC: Held two soft launch events – in Delhi and Bengaluru – to build ITES awareness and seek feedback on proposed activities / focus areas. • ESC: Held SME engagement event at IISc to understand Indian innovator challenges, introduce ITES, and explore their interest in UK innovator collaboration. Valuable insights gathered to inform future approaches.

Figure 6: Key stakeholder engagement activities

2.2.4 Stakeholder engagement feedback

The key stakeholder engagement activities discussed in Section 2.2.3 yielded the following key pieces of feedback:

Stakeholder perceptions of ITES: At the end of the workshop in December 2022, stakeholders were asked to provide three words that best described their understanding of the ITES initiative, which can be seen in Figure 7.



Figure 7: ITES attributes according to stakeholders

Highest-value ITES offering according to SMEs: During the SME engagement workshop in March 2023, when the SMEs were asked how best ITES could support their business, responses revealed four high-value areas:

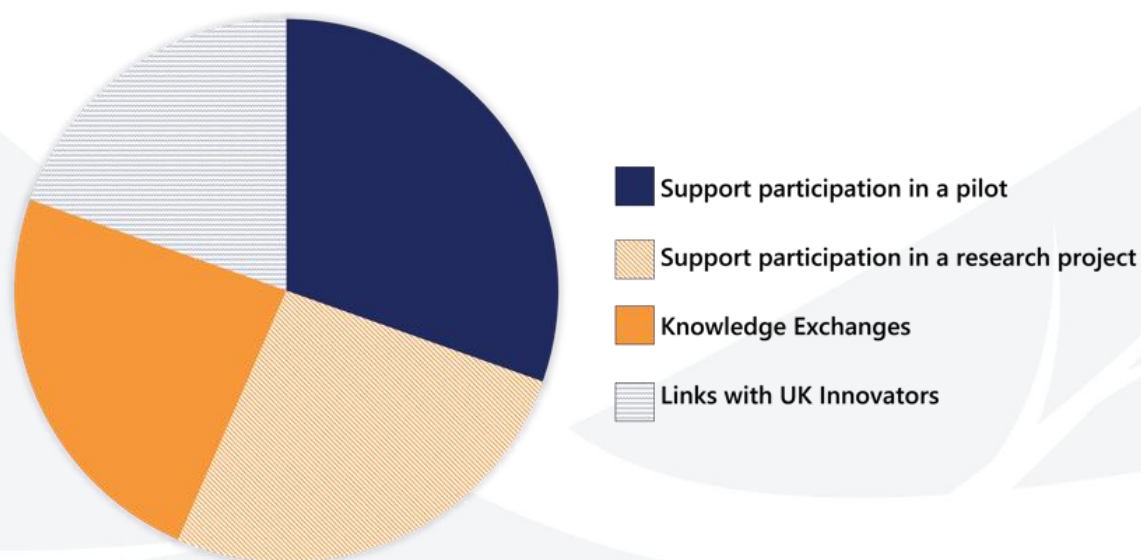


Figure 8: SME views on how ITES can best support them

There was a strong appetite for pilot participation, showing the potential interest in interacting with ITES in a real-world space.

2.2.5 Research and knowledge exchange

A whole systems approach was developed to define the areas where innovation is needed to decarbonise the transport sector in India. The methodology was followed to identify the focus areas for ITES and define a pipeline of projects (Figure 9).



Figure 9: Whole system assessment to identify key innovation areas for transport decarbonisation

Firstly, system-level areas that would need to be considered were identified. These included transport users – both consumers and fleets – technology, infrastructure, and grid integration. Electricity, hydrogen and other zero emission energy vectors were also considered, along with their respective infrastructure requirements. A review of India’s net zero challenge areas was also conducted to understand the wider policy context and ambition.

Based on these inputs, transport decarbonisation challenges and opportunities for innovation were defined. Figure 10 provides an overview of the number of challenges that have been identified for each transport sector, and each thematic area.

The findings of an in-depth literature review were validated with stakeholders during the soft launch events in March 2023, and additional challenges and opportunities were captured.

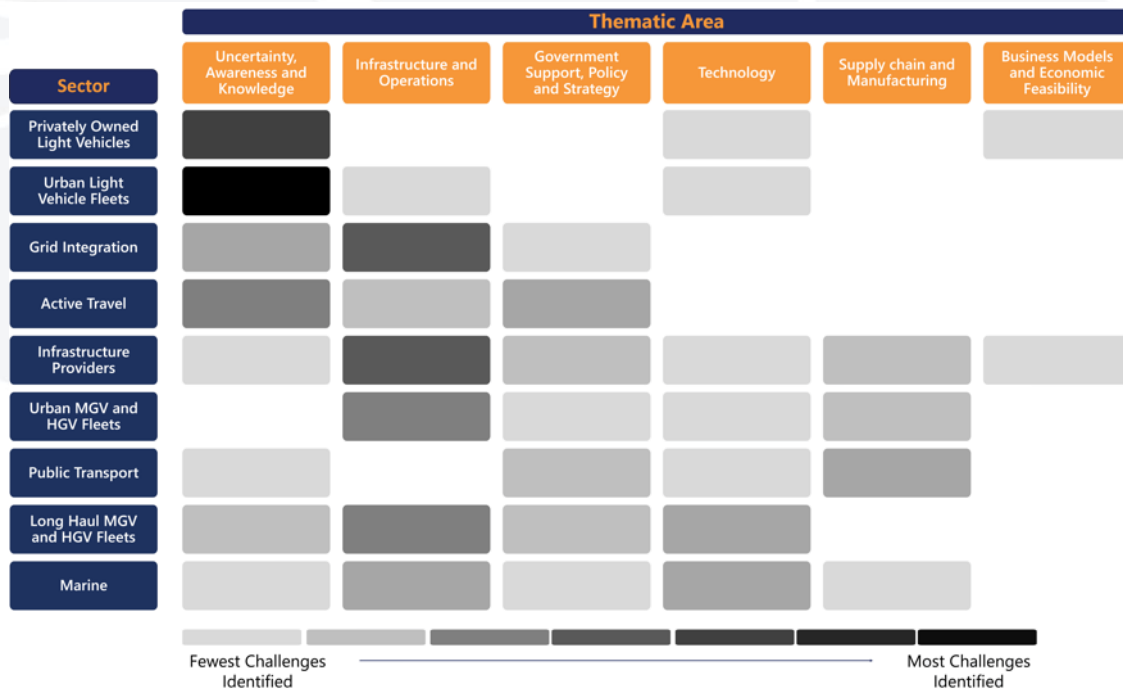


Figure 10: Number of identified challenges per transport sector and thematic area

The literature review outputs, along with the information collected during the soft launch events, were also captured in a database, which were then synthesised to create a pipeline of projects for ITES.

3 What's been achieved so far?



3.1 Project phase completion

Through the key project activities in discussed in Section 2; the **challenge identification** phase of the overall ITES project has been successfully completed, covering:

- Market analysis;
- Supply chain analysis; and
- An innovation roadmap developed for key challenges.

3.2 Year 1 impact summary

Key ITES result:	Current status:
Improved business and research relationships between UK and India organisations	In total almost 1,000 relevant organisations have been identified in the UK and India. Value propositions to inform how stakeholders can get involved with ITES are also being developed, and it is hoped that these will help to attract interest. ESC has also so far directly engaged with 300+ stakeholders in India as part of ITES activities.
Scale up UK innovators	The first challenge call was launched and the UK SME Entrust Microgrid has been selected. To ensure a good community of UK innovators is both available and aware of ITES for future pilots, ESC is also planning an engagement campaign to begin in Year 2.
Development of practical solutions to solve business challenges	The work to date has extensively mapped some of the business challenges in India, which will inform ITES activities going forwards. Furthermore, a process for identifying industry challenges and developing project proposals has been developed. This will support future ITES

Key ITES result:	Current status:
	activities and ensure a robust methodology is followed. This is reflected in the first pilot project, which looks to address a specific technical challenge related to the charging of electric vehicles from solar generated electricity.
Collaboration, relationships and best practice sharing are improved across the sector	Challenge mapping has been undertaken to understand the space, and stakeholder engagement and workshops have been created to build collaborative relationships. There has been planning towards knowledge sharing events, such as a planned workshop on clean air / innovation zones.
Increased capacity for informed decision making in the sector	Planning has been completed for specific research collaborations and workshops, which will build on the kick off pilot projects aiming to deliver whole system tools and processes for decision making.
The centre becomes the go-to organisation for UK clean transport and energy SMEs to explore the Indian market	At present, ITES is building a network of SMEs in the UK and India through in-depth stakeholder engagement activities and developing a dissemination strategy to increase visibility and knowledge of ITES.

Table 2: Year 1 impact summary

3.3 Project partner feedback

The most significant opportunity for project feedback to date has been through the soft-launch events in March 2023. Feedback voiced on the day was overwhelmingly positive and, to capture responses more formally, a survey form was sent to all attendees of the events. A sample of feedback is included below.

"I liked the involvement of experts from academics, research, and industry, [which] ensures a common platform to address the critical needs to achieve Net Zero across all sectors."



"I liked the presentations, which spoke about the quantum of challenges in the decarbonisation ecosystem. It provided validation to my own perception of EV fleets."



*"The workshop was well organised and moderated
– excellent audience too."*



4 What's next for ITES?

Challenge Identification work was completed in Year 1 but will be annually reviewed to support the identification of new challenge areas and capture additional project ideas. Innovation sprints, addressing high priority or high impact areas, are now underway.

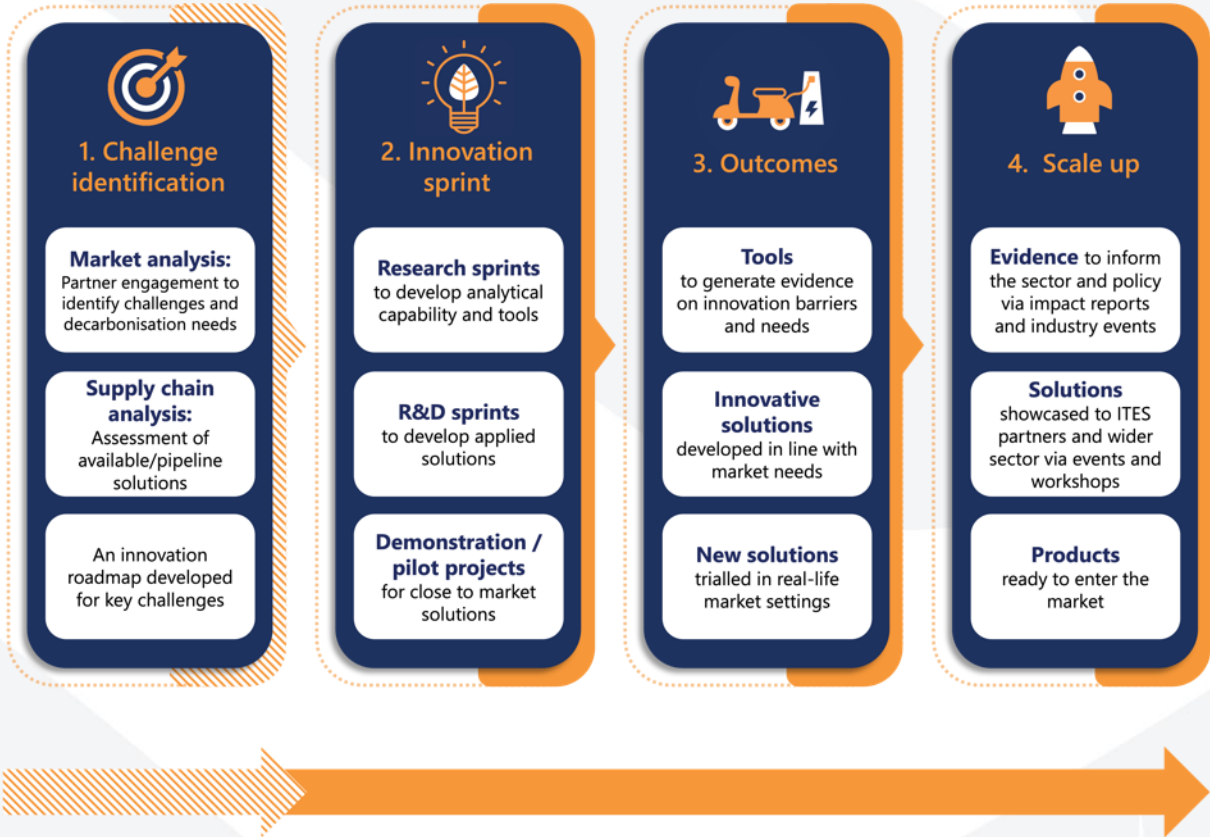


Figure 11: Future progress against ITES programme flow

Areas for initial ITES focus are shown in Figure 12. Sectors where decarbonisation activities are at an earlier stage have been classed as low priority for the next year. At present, high priority areas to address within transport decarbonisation include privately-owned light vehicles, light vehicle fleets and addressing the challenges faced by grid infrastructure providers. Sector priorities will be reviewed annually to consider increased market need, or changes in policy ambition, for example.

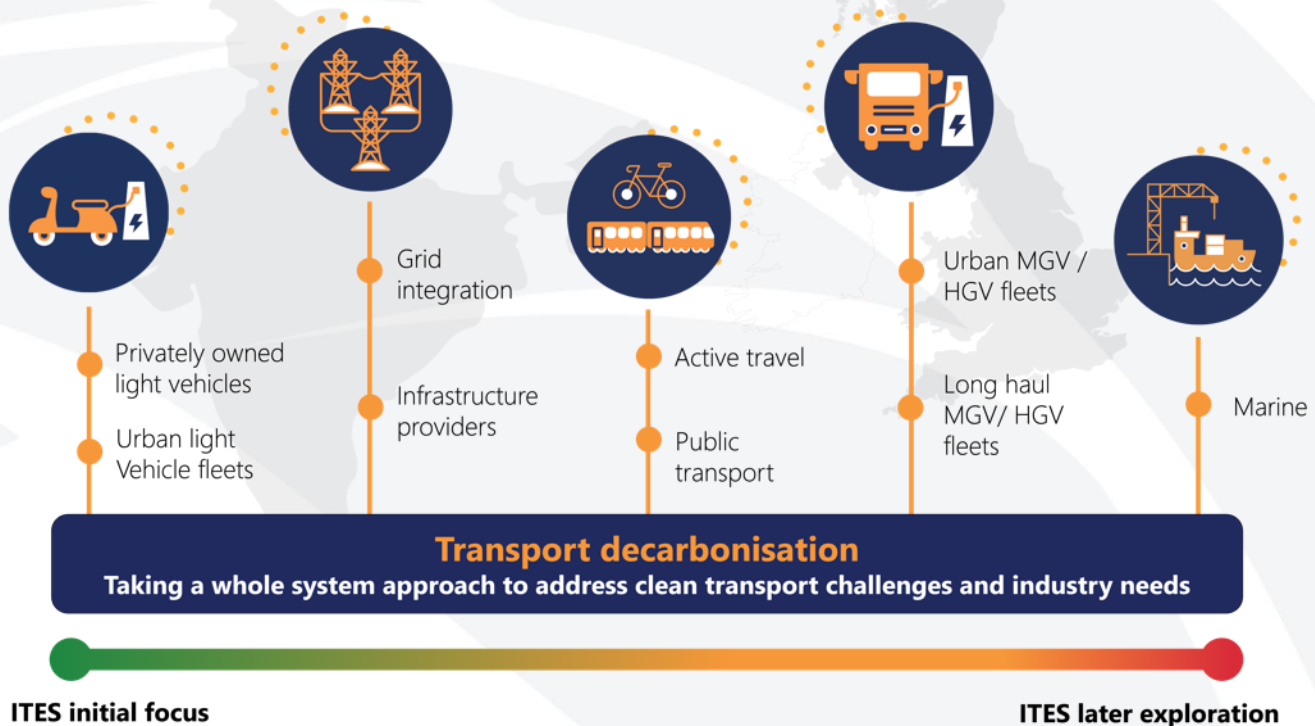


Figure 12: ITES initial focus and later exploration areas

The high priority projects identified will be explored with stakeholders in India. Further to these activities, ESC will also consider how the Catapult network and UK based Research and Technology Organisations (RTOs) can support India in achieving its decarbonisation targets, and will articulate the benefits of similar structures in India.

For pilot projects a project scope document will be produced by ESC. It will outline scope and intended outcomes of the pilot, the outputs, the type of SMEs that will be needed to support the pilot project, and any additional partners that would be required to support pilot delivery.

Following the scoping of pilot projects, ESC will select suitable SME pilot participants. SMEs can be selected via two different routes: either through a continuous open call process, or by setting up a new challenge call. Applications will be assessed for their credibility and suitability, with the aim of creating a large network or 'pool' of SMEs that can be matched to ITES opportunities as they arise. A rolling open call was announced early in Year 2, accompanied by dissemination events including webinars and social media promotion. ITES will provide support to UK SMEs at a number of different levels – from providing general support with providing training resources, through to assignment of a dedicated ESC incubation manager for acceleration support.

5 Summary – scale up and sustainability



5.1 Opportunities for realisation of project achievements

Through ITES activities, ESC is looking to create a channel for innovators to enter the Indian market, test their solutions there, and then replicate outcomes to scale for market success. Entrust Microgrid is the first SME going through this process, and if the pilot demonstrates the suitability of their solution in India, there is a large market available to be potentially exploited. It is anticipated that, during ITES activities, numerous opportunities for 'spin-off' work will arise for the ESC and other Catapults as relationships deepen with organisations in India. The results from these activities will hopefully support the identification of opportunities and could inform the expansion of the three focus areas under the UK-India Net Zero Innovation Virtual Centre.

5.2 Project sustainability

To ensure overall sustainability, ITES hopes to secure funding beyond the current scope of UK government support by attracting sponsorship from different stakeholders for activities. The following steps form part of this approach:

- Step 1: Stakeholder mapping;
- Step 2: Development of value propositions for the most relevant stakeholder segments;
- Step 3: Development of sponsorship models for the most relevant stakeholder segments;
- Step 4: Engagement with stakeholders to drive ITES sponsorship.

Step 1 has been undertaken for both India and the UK.

Steps 2 and 3 are underway, and step 4 will be a focus for Year 2.

In its first year, ITES has successfully completed the first project phase and established a base to move forwards. This has primarily consisted of establishing project governance mechanisms, identifying relevant stakeholders in the UK and India, and developing engagement and sponsorship models so that these stakeholders can be appropriately utilised within the initiative. The workshops and events held so far to obtain stakeholder feedback and support understanding of business challenges and

the innovation landscape for transport decarbonisation in India have been met with positive feedback from participants.

Over the next 12 months, future activities will include further open calls for SMEs, with the intention of creating a large network of innovators that can be matched to ITES opportunities as they arise.

Boosted by the trajectory provided by Year 1 activities, ITES is now well positioned to deliver continuous progress in Year 2, through the innovation sprint stage, to the creation of beneficial outcomes and scaleup opportunities. By harnessing the relationships and rich insights already developed, the programme seeks to bring critical clean technologies to market, deliver SME success stories and – through tackling initial priority challenges – help move the UK and India towards cleaner roads, railways, seas and cities.

We look forward to reporting on that progress in Year 2.

For more information, please contact us at:

ites@es.catapult.org.uk

Licence / disclaimer

Energy Systems Catapult (ESC) Limited Licence for Impact Report: Year 1 (2022/23) – Innovating for Transport and Energy Systems (ITES).

ESC is making this report available under the following conditions. This is intended to make the Information contained in this report available on a similar basis as under the Open Government Licence, but it is not Crown Copyright: it is owned by ESC. Under such licence, ESC is able to make the Information available under the terms of this licence. You are encouraged to Use and re-Use the Information that is available under this ESC licence freely and flexibly, with only a few conditions.

Using information under this ESC licence

Use by You of the Information indicates your acceptance of the terms and conditions below. ESC grants You a licence to Use the Information subject to the conditions below.

You are free to:

- copy, publish, distribute and transmit the Information;
- adapt the Information;
- exploit the Information commercially and non-commercially, for example, by combining it with other information, or by including it in your own product or application.

You must, where You do any of the above:

- acknowledge the source of the Information by including the following acknowledgement:
"Information taken from **Impact Report: Year 1 (2022/23) – Innovating for Transport and Energy Systems (ITES)**, by Energy Systems Catapult";
- provide a copy of, or a link to, this licence;
- state that the Information contains copyright information licensed under this ESC Licence;
- acquire and maintain all necessary licences from any third party needed to Use the Information.

These are important conditions of this licence and if You fail to comply with them the rights granted to You under this licence, or any similar licence granted by ESC, will end automatically.

Exemptions

This licence only covers the Information and does not cover:

- personal data in the Information;
- trademarks of ESC; and

- any other intellectual property rights, including patents, trademarks, and design rights.

Non-endorsement

This licence does not grant You any right to Use the Information in a way that suggests any official status or that ESC endorses You or your Use of the Information.

Non-warranty and liability

The Information is made available for Use without charge. In downloading the Information, You accept the basis on which ESC makes it available. The Information is licensed 'as is' and ESC excludes all representations, warranties, obligations and liabilities in relation to the Information to the maximum extent permitted by law.

ESC is not liable for any errors or omissions in the Information and shall not be liable for any loss, injury or damage of any kind caused by its Use. This exclusion of liability includes, but is not limited to, any direct, indirect, special, incidental, consequential, punitive, or exemplary damages in each case such as loss of revenue, data, anticipated profits, and lost business. ESC does not guarantee the continued supply of the Information.

Governing law

This licence and any dispute or claim arising out of or in connection with it (including any noncontractual claims or disputes) shall be governed by and construed in accordance with the laws of England and Wales and the parties irrevocably submit to the non-exclusive jurisdiction of the English courts.

Definitions

In this licence, the terms below have the following meanings: 'Information' means information protected by copyright or by database right (for example, literary and artistic works, content, data and source code) offered for Use under the terms of this licence. 'ESC' means Energy Systems Catapult Limited, a company incorporated and registered in England and Wales with company number 8705784 whose registered office is at Cannon House, 7th Floor, The Priory Queensway, Birmingham, B4 6BS. 'Use' means doing any act which is restricted by copyright or database right, whether in the original medium or in any other medium, and includes without limitation distributing, copying, adapting, modifying as may be technically necessary to use it in a different mode or format. 'You' means the natural or legal person, or body of persons corporate or incorporate, acquiring rights under this licence.



ITES

Part of the **UK-India** Net Zero
Innovation Virtual Centre

**For more information,
please contact us at:**

**Innovating for Transport
and Energy Systems (ITES)**

ites@es.catapult.org.uk

Energy Systems Catapult

7th Floor, Cannon House

18 Priory Queensway

Birmingham

B4 6BS

es.catapult.org.uk

© 2023 Energy Systems Catapult