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PROSPERING FROM THE ENERGY REVOLUTION

INSIGHT BRIEF 3

# Smart local energy systems Skills and capabilities

Insights from UKRI-funded innovation projects  
October 2022



**“Net zero provides a once in a generation opportunity to level up the country, create new green jobs, and put the UK at the forefront of growing global markets in green technologies.”**

UK Government Department for Business,  
Energy and Industrial Strategy  
Net Zero Strategy: Build Back Greener, October 2021

This is the third of three insight briefs on findings from the UKRI-funded smart local energy system projects.

The reports cover:

1. Finance and investment
2. Policy and regulatory barriers
3. Skills and capabilities

All three will be available in the Prospering from the Energy Revolution section of the UKRI website.

## **2 Smart local energy systems: Skills and capabilities**



The Greater Manchester Local Energy Market project used a citizens' jury to look at roles and responsibilities in a smart local energy system.



# Introduction

The Prospering from the Energy Revolution programme set out to demonstrate the viability, impact, and future prospects of integrated, place-based approaches to energy in the United Kingdom.

In such an approach, smart local energy systems bring together energy assets, demand and infrastructure in a local area and connect them, creating new jobs and opportunities for investors, consumers, networks and the wider energy system<sup>1</sup>.

Funded by UK Research and Innovation and delivered by Innovate UK, over £104m has been awarded to the programme, with match-funding taking this up to £170m in total.

This funding supported three demonstrator projects, 10 detailed design projects and a host of other initiatives<sup>2</sup> to explore the feasibility of integrated place-based energy approaches, understand the opportunities they present, and demonstrate the value they can offer in practice.

See the portfolio  
of projects



# Introduction

## Local approach, national value

To meet the targets set out in the Climate Change Committee's Sixth Carbon Budget<sup>3</sup>, research from PwC<sup>4</sup> finds, a place-based approach could bring better returns for lower costs than blanket, national-level policy.

Projects and wider research likewise show how integrated, place-based energy approaches can create jobs, crowd in private investment, stimulate economic growth and support the UK Government's levelling-up agenda by designing and delivering energy systems at the local level, tailored to local needs.

The Prospering from the Energy Revolution programme has demonstrated many of the skills and capabilities needed for place-based energy approaches, and created a substantial legacy in the form of jobs, partnerships, tools and best practice that future projects can build from.

This report is based on extensive engagement with partners in Prospering from the Energy Revolution programme. It identifies successes in knowledge and capacity building, skills barriers that remain, and practical recommendations to fully unlock the value of integrated, place-based energy approaches.

## KEY POINTS

1

**The skills needed for integrated local energy systems are diverse and the opportunities for clean growth and jobs are extensive.**

2

**A network of knowledge, tools and partnerships now exists to support integrated local energy approaches.**

3

**Skills gaps are still significant, in both direct and 'softer', broader skills like project management.**

4

**Long-term policy clarity on skills development is a key part of enabling integrated local energy approaches.**

## What is a smart local energy system?

A smart local energy system brings together energy generation, storage, demand and infrastructure and **connects them in a smart way, at a local level such as a town, city or region.**



This allows for a more tailored, dynamic, local approach to the energy transition, recognising that different places and communities have different needs and ambitions.

The different elements of an integrated local energy system can vary, depending on local needs and opportunities, building stock, network infrastructure and so on.

Typically, this will include some element of renewable generation and storage, transport and electric vehicles, and heat and energy efficiency.

These elements are then brought together physically through cables and wires and digitally through software, artificial intelligence and digital energy platforms.

Evidence is growing that such systems can offer value financially, socially and economically to policymakers, investors, consumers, society, the economy and the wider energy system.

Energy can be better optimised across local areas, reflecting local and public need and stimulating regional economic growth, while reducing network reinforcement and system costs that can in turn be passed on to consumers.

Projects and research from the Prospering from the Energy Revolution programme have demonstrated the skills and capabilities needed to realise this value in practice.

# Learning and legacy

## A variety of skills and capabilities are needed to enable integrated local energy systems

**The skills, capabilities and relationships required to achieve** integrated, place-based energy systems **are diverse**. They are required at many levels, from local and national government, to citizens and tradespeople, to project managers who can coordinate and translate among diverse stakeholder groups.

Research by Chichyan and Bird (2022)<sup>5</sup> shows that at a project level, key skill and capability areas can be broken down into key themes.

Adapting the themes slightly to reflect findings from the projects in the Prospering from the Energy Revolution programme, they are:

- managerial
- technical
- policy
- legal and regulation
- physical and trades
- soft skills

See box 3 and Figure 1 on next page for more on these..

## Relationships are just as important as skills

Because smart local energy systems need buy-in from a number of different stakeholders across society and the energy system, **building meaningful and constructive relationships early in the process is crucial**.

Projects across the portfolio, including **GIRONA** in Northern Ireland, cited that where relationships were built early – particularly among senior project and organisation members – projects were easier to navigate and subsequently led to better outcomes.

This is especially true of **the relationship between project partners and distribution network operators (DNOs)**. Because DNOs have the extensive technical and system expertise and physical capacity to provide connections, securing buy-in from them will be critical in every case.

### BOX 1.

#### KEY ROLE: COORDINATOR



A person with broad knowledge and experience of the energy system and project management skills, capable of bringing together and managing diverse stakeholders and translating their expertise and need.

### BOX 2.

#### SYSTEM OPTIMISER

To better support the relationship between energy networks, local authorities and other stakeholders, some networks have begun to develop of a **system optimiser** role to help share knowledge and coordinate stakeholders.



### BOX 3.

#### FIVE KEY SKILLS AREAS

##### **Managerial and coordination skills**

Integrated local energy systems draw on diverse disciplines and stakeholders. This requires project management built on broad expertise, understanding of the energy system and the ability to effectively manage a wide range of people.

##### **Technical and analysis skills**

These systems rely on smart technology and integration. Technical skills needed include developing software and hardware, analysing system performance and optimisation, and building infrastructure and design.

##### **Policy, legal and regulation skills**

Expertise in these areas is critical. Projects must work with complex codes and regulations across energy, buildings, transport, consumer rights, data protection and financial conduct - and the contracts needed to piece these together.

##### **Physical and trades skills**

Systems require assessors to understand building and energy needs, skilled and knowledgeable tradespeople to install and maintain equipment - and network engineers to provide connections and integrate with the wider network.

##### **Soft skills**

Underpinning all these are soft skills such as relationship-building, convening and communication. Public and citizen engagement is particularly critical, given that the technologies involved are often new and require users to adapt their behaviours and perspectives.



Figure 1. Skills required for integrated local energy systems.

## Citizen engagement is critical to enabling integrated, place-based energy approaches

Compared to a one-size-fits-all, place-agnostic approach, local net zero and energy approaches allow for more direct citizen engagement and input.

In turn, systems can then better reflect citizen needs, improving local buy-in and more widely supporting a 'just transition' to new ways of managing energy.

With new technologies and systems involved in integrated local energy approaches, and the need for people to opt in or adapt behaviours to make systems effective, **citizen engagement and trust is critical to ensuring that people are educated and included in the process.**

Support from community energy organisations in particular can be extremely valuable, given their links to local communities and their experience with inclusive engagement. Across projects in the Prospering from the Energy Revolution programme, citizen engagement has been an important area of activity.

**ReFLEX** – the demonstrator project in Orkney – conducted extensive and ongoing engagement with local people, particularly around their electric vehicle offering.

Because the offering included different options for leasing and buying vehicles and connecting to the grid, the offering quickly became complex.

**Creating relationships with local community organisations and building on the experience of academic partners** was a key to making this work.

### GMLEM Citizens' Jury

As part of the Greater Manchester Local Energy Market project, community energy partner Carbon Co-op conducted a **citizen's jury** of local people<sup>6</sup>.

The session brought together twelve demographically representative people over six days to deliberate on who should own and operate the Greater Manchester local energy market, and what role Greater Manchester Combined Authority should play going forward.

At the end of the session, participants were then asked to give recommendations from a set of potential models and structures for the GMLEM.

This allowed citizens to learn about place-based energy approaches more generally, and to help shape the design to local need.

### GreenSCIES "Critical Friends"

In the GreenSCIES detailed design project in London, citizens and civic society were engaged throughout.

A steering group of local community representatives, citizens and organisations met regularly to review project progress and provide feedback and input on key themes and ideas. The partners in the GreenSCIES project have said that this **ongoing, iterative engagement is crucial to ensuring that communities can shape projects** as they progress.

#### BOX 4.

#### LOCAL AREA ENERGY PLANNING

The Prospering from the Energy Revolution programme has also supported a number of wider **local area energy planning** initiatives, including guides and resources to help local authorities improve their skills and capabilities in this area.

Using data and modelling, local area energy planning allows local authorities to identify and plan the most effective route to net zero energy in a locality or region.



## Prospering from the Energy Revolution has created a substantial legacy of skills and capabilities

A total of **430 full time equivalent jobs** have been created and supported by the Prospering from the Energy Revolution programme so far.

The programme has also created a substantial legacy in the form of **knowledge sharing, tools, partnerships and examples of best practice**.

This ranges from higher-level initiatives such as those driven by the Energy Systems Catapult, to very practical legacy within the project partners themselves.

### Milford Haven: Energy Kingdom “Virtual Room”

To help demystify integrated local energy systems, the Milford Haven: Energy Kingdom project created a ‘virtual room’.

This is an interactive website which allows people to explore the local energy system and better understand its purpose, business case, impact and component parts.

### A Centre for Excellence

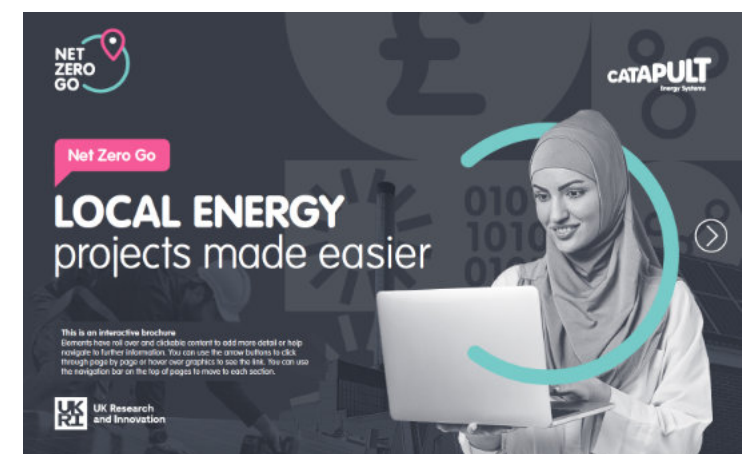
As a key output from the **GreenSCIES** project in London, the project partners and London South Bank University have begun the creation of a smart local energy systems **Centre for Excellence**, which aspires to accelerate the development of integrated local energy systems across the UK through consultancy and training.

Supported by partners from across the portfolio, the Centre for Excellence aims to provide practical advice to those aiming to build integrated local energy systems (predominantly local authorities).

This includes advice on developing business models, business plans and community engagement strategies, and on the wealth of knowledge, resources and insights created by the Prospering from the Energy Revolution programme.

### Net Zero Go

The **Net Zero Go**<sup>8</sup> tool is a digital platform that helps local authorities develop place-based approaches to net zero, supporting them with planning, procurement, resource allocation and local knowledge. It has been developed by the Energy Systems Catapult in partnership with UK Research and Innovation, Innovate UK, BEIS, EnergyREV, UK100, local authorities, Cornwall Insight and other partners.



Using the Net Zero Go tool, local authorities can overcome some of the significant barriers around knowledge and expertise that often keep them from realising integrated, place-based energy systems, and support the development of business cases to help mobilise finance and make those systems a reality.

## Partnerships and knowledge sharing

Beyond these practical tools and initiatives, project partners highlight that the programme has **demonstrably improved skills and capabilities**.

It has allowed for innovation and experimentation, where partners could work together to share learnings, successes and barriers.

This has been supported by a vast amount of reporting and knowledge from the projects themselves, and also from partners working on research and insights.

The **EnergyREV** consortium – the academic arm of the Prospering from the Energy Revolution programme – has produced rigorous evidence on integrated, place-based energy approaches in the UK, in the form of policy briefings and peer-reviewed, evidence-based articles in academic journals<sup>9</sup>.

The programme has also given partners in projects the ability to go on and collaborate on future initiatives. The **Zero Carbon Rugeley** project team report that, because of relationships developed within the programme, they have been able to work together to develop a £1.2m bid to explore “Net Zero Neighbourhoods” within the West Midlands Combined Authority.

## Data and digitalisation have an especially important role to play

**Integrated local energy systems require both lots of data, and people with the skills to understand and use that data effectively.**

This is critical to planning local energy systems, optimising energy use, monitoring targets and progress, and enabling full value from smart local energy systems overall.

This need and the key skills required has been highlighted in work by the Energy Data<sup>10</sup> and Energy Digitalisation<sup>11</sup> Taskforces, which were funded as part of the programme.

In addition, **Energy Data Best Practice**<sup>12</sup> guidance has been developed by Innovate UK, Ofgem and BEIS as part of the Modernising Energy Digitalisation (MED) collaboration.

This guidance sets out eleven principles of data management best practice for the energy industry. The guidance was developed by the Energy Systems Catapult with the energy industry, learning from best practice across multiple industries

Ofgem has since regulated to require energy networks to comply with the guidance and the included presumed open data principal.

## Digital legacy

Building on this need, Prospering from the Energy Revolution partners have aimed to develop skills and capabilities in this space.

Through the Local Energy Data Innovation project<sup>13</sup>, Regen identified how open energy data could be better used to support energy planning, management and consumer decisions.

This work then informed the **Modernising Energy Data Applications (MEDApps)**<sup>14</sup> competition, funded by Innovate UK, Ofgem and BEIS as part of the Prospering from the Energy Revolution programme.

MEDApps allocated £750,000 in total to support the development of new applications of energy data, with the purpose of “facilitating progress towards net zero while improving people’s lives”.

Projects within the MEDApps programme identified remaining data gaps, examples of best practice, and ways to best unlock the value of data for local energy systems going forward<sup>15</sup>.

Despite these valuable lessons and legacy, **key barriers remain to mobilising the skills required for integrated, place-based energy systems**.

# Gaps and barriers

## Skills gaps remain across the board, particularly within local authorities

Given the breadth and diversity of skills required to deliver integrated local energy systems, there are **gaps in almost every key area.**

While projects varied in the specific skills needs and barriers, most identified the main gaps as follows:

- Fitters and installers
- Project managers with whole systems expertise (the “coordinator” role) (see Box 2)
- Data and digital experts
- Technical and energy market specialists
- People with deep knowledge of relevant policy and regulation

Addressing these gaps can help to fully unlock the value smart local energy systems have to offer.

UK Government has committed to the development of green jobs and close partnerships with local areas to develop necessary skills in the 2021 Net Zero Strategy<sup>16</sup>.

The Green Jobs Delivery Group<sup>17</sup>, which brings together government, industry leaders, education and trade unionists and aims to support up to 480,000 green jobs by 2030, has made strong inroads in this process.

However, evidence shows that a clear pipeline (including training, resourcing and upskilling initiatives) to get the workforce net zero-ready would help to fully unlock the skills required.

## Local authorities

The skills gap has been particularly acute within some local authorities.

Local authorities have a central role to play in most integrated local energy systems, with responsibility for planning and delivery, many buildings under their care, and remits covering housing, transport, heat, infrastructure, and finance.

They also have a democratic mandate for local issues and close access to citizens and communities to bring them into the fold.

National government has recognised the important role for national/local partnerships in the Net Zero Strategy<sup>18</sup>. Discussions to make this happen are also under way as part of the Local Net Zero Forum.

Yet most local authorities lack the full spectrum of skills required for place-based energy approaches. They also lack clarity on their expected role within the net zero energy transition, making it difficult to mobilise resources.

**Clarifying the role local authorities are expected to play and supporting them to develop smart local energy skills can help to unlock wider value on offer.**

## BOX 5. POINT PEOPLE

The GreenSCIES project struggled to make progress working with individual local authority departments.

To overcome this, the local authority appointed a “GreenSCIES officer” to oversee the project from start to finish: someone with strong energy system expertise to liaise with relevant council departments and actors.

The GreenSCIES project found this to be of great benefit, and note that securing this “point person” helped the project to move forward more fluidly.

The projects surveyed for this study have noted that key gaps within local authorities include:

- Technical and energy market expertise
- Legal and policy knowledge
- Data provision and capacity for sophisticated digital planning
- Access to greater finance and investment
- Overarching energy project management expertise

Many of these problems are compounded by the **diverse nature of integrated local energy systems themselves**.

Integrated systems can span multiple local authority departments including planning, energy, environment, transport, housing and others, and in some cases multiple local authorities. This can make navigating the process difficult.

## Long-term certainty to mobilise skills and investment

One key reason for the persistence of skills gaps and barriers is the lack of clear longer-term detail on net zero energy policies, particularly at a local level.

Prior initiatives such as the Feed-in Tariff and the Green Homes Grant provided incentives for industry to train and upskill their workforces. There are also clear policy targets for certain parts of smart local energy systems, such as the aim to have 600,000 heat pumps installed per year by 2028<sup>19</sup>.

However, some tradespeople note that bad experience with the Green Homes Grant, and shorter-term policy thinking, have made them reluctant to invest in new skills without longer-term assurances.

This is especially true of energy efficiency and retrofit. Local remit over these areas, and over transitioning workers from gas to things like hydrogen and clean heating, is also currently unclear.

**Greater clarity on long-term ambition and the role of local actors in delivering skills and energy can spark the market to invest in those skills and meet our net zero ambitions.**

Providing certainty can stimulate investment in both necessary skills and integrated place-based energy projects, allowing for a better demonstration of the value of these approaches, which in turn can stimulate greater interest, value, jobs, growth and investment (see Figure 2).

## Aligning ambitions

Strong relationships between partners are crucial to the success of integrated local energy systems.

While projects noted that early and strong relationships were critical to projects going well, most cited that **better alignment on incentives and ambitions between different stakeholders would help to enable more effective smart local energy collaborations**.

In addition to clarity on pipeline and resource, there is a need for **greater commitment to and alignment on place-based priorities**.

The recent RIIO-ED2 draft determinations outline a desire to facilitate local energy governance approaches and support greater social and environmental value<sup>20</sup>. The BEIS Local Net Zero Forum<sup>21</sup> is also a positive step in this direction.



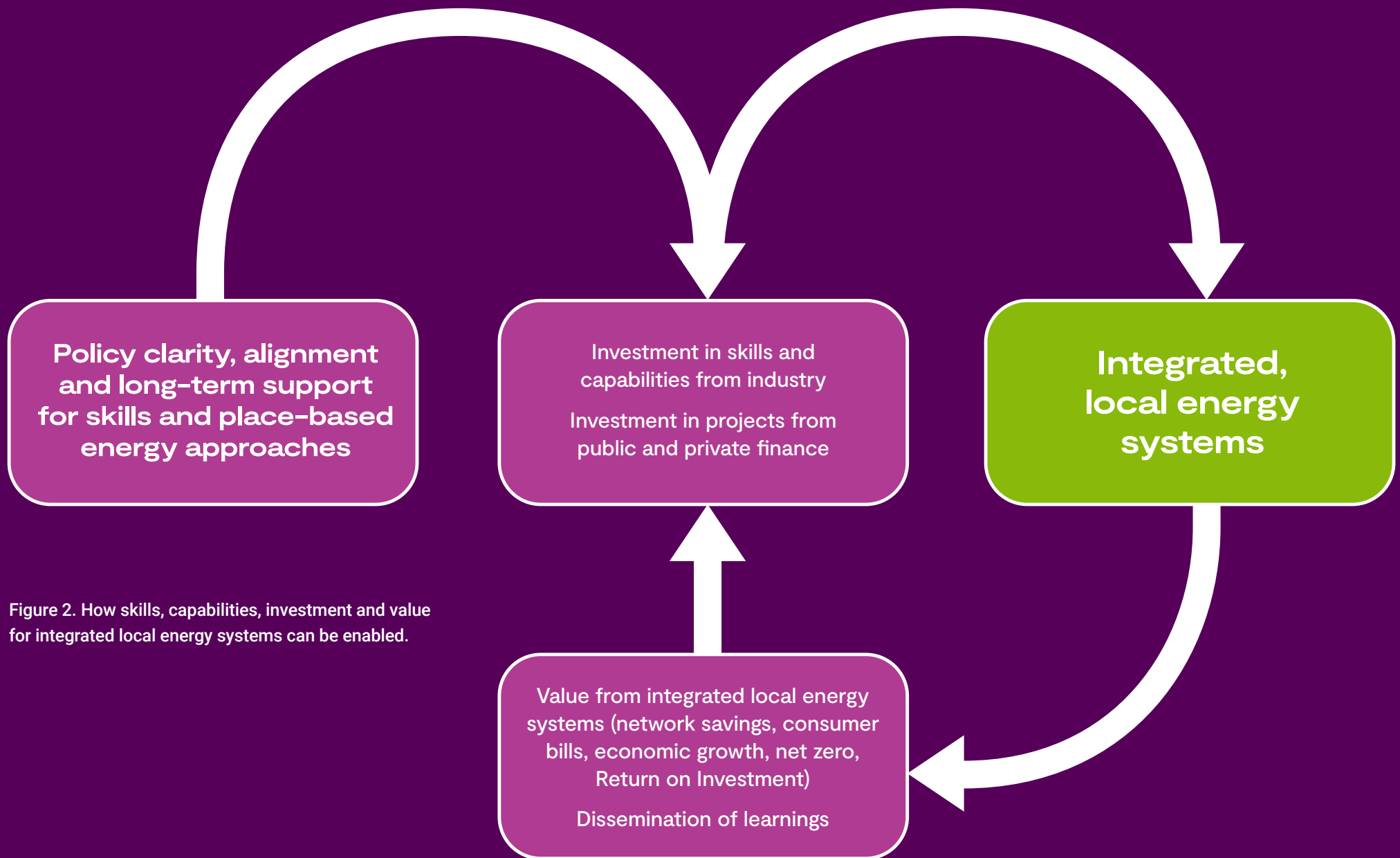


Figure 2. How skills, capabilities, investment and value for integrated local energy systems can be enabled.

## Key roles require dedicated training and support

Beyond specific skills that industry can mobilise, successfully implementing a smart, integrated local energy system requires someone to function as a coordinating and translating project manager.

This person needs to be someone with broad knowledge across whole system components and with the ability and capacity to bring diverse stakeholders together. At present, these types of individuals are in short supply.

Effectively enabling this role across local authorities at scale will require better clarity on local authority responsibility for local energy systems, alongside **dedicated training either for local authority officers or new entrants from an energy project management background.**

It will also require funding for local authorities to recruit and train this role. Local Net Zero Hubs<sup>22</sup> are one potential way to develop and share learnings in this space.

## Data and digitalisation

With its central role in smart local energy systems, key gaps remain in data and digitalisation in the energy sector.

The Energy Data Taskforce outlines that it is difficult to get the right combination of “data, energy, and engineering talent”<sup>23</sup>. This gap is prevalent in each part of the energy sector, including within local authorities.

Ofgem have adopted and encouraged the Energy Data Best Practice Guidance, while networks are increasingly opening their data for better sharing and planning.

Yet there is still a **clear need for more targeted development of the skills required to plan, analyse, monitor and optimise smart local energy systems**, and to do this consistently across different places.

Developing these skills and the relevant workforce will require some national direction (i.e. creating appropriate training pathways for energy data specialists) with an understanding of local need (i.e. ensuring people can learn these skills and put them into practice in every region and local authority).



Data is core to building and running a smart local energy system  
Picture: Solo Energy

# What next?

The Prospering from the Energy Revolution programme has gone some way to demonstrating the skills gaps and requirements for integrated, place-based energy systems. Evidence from the programme shows that progress in four key areas can help to realise the wider value that such systems have to offer:

## 1 Long-term clarity on specific net zero ambitions and support is crucial

Evidence shows that long-term clarity on targets and support for the delivery of net zero initiatives can stimulate industry to invest in skills, training and development of the workforce required to make smart local energy systems a wider reality.

Providing this certainty from local and national governments, with particular reference to retrofit and energy efficiency, could help to unlock skills and investment for the future.

## 2 Clarity on the role of 'local' in delivering energy and wider net zero targets

In addition to clarity on net zero targets and delivery, project experience suggests that greater clarity on the role and responsibility of local areas in delivering net zero energy can provide certainty to both investors and industry.

This in turn can allow for greater investment at the local level in skills and capabilities, from local authorities and from industry, supporting the development of integrated local energy approaches and creating local economic value.

## 3 Facilitation of better working relationships between stakeholders can help build a more solid foundation

Relationships and alignment of incentives between stakeholders are crucial to enabling integrated local energy systems.

BEIS Local Net Zero Hubs and the Local Net Zero Forum in England are playing an important role here, and some DNOs are leading on working together with local authorities to share knowledge and develop local energy plans.

Building on this to align incentives and more consistently encourage collaboration can help build the foundation for smart local energy systems to thrive.

## 4 Supporting specialised skills, particularly around data and coordination, can fully unlock the value on offer

Smart local energy systems require bringing together people with diverse skills, particularly in project management, data and digitalisation.

Experience from the programme strongly suggests that providing dedicated training for these roles, within local authorities especially, can help to unlock smart local energy systems and develop skills needed for a net zero-ready workforce.

## Notes

- 1 Energy Systems Catapult, Smart Local Energy Systems, 2022
- 2 For full project and portfolio details, please visit: [www.ukri.org/publications/smart-local-energy-systems-the-energy-revolution-takes-shape/](https://www.ukri.org/publications/smart-local-energy-systems-the-energy-revolution-takes-shape/)
- 3 The Climate Change Committee, The Sixth Carbon Budget, December 2020
- 4 PWC, UKRI, Accelerating Net Zero Delivery, March 2022
- 5 Skills for Smart Local Energy Systems: Integrated case study briefing
- 6 Carbon Co-op, The Greater Manchester Local Energy Market Citizens' Jury Report, 2022
- 7 <https://milford-haven-energy-kingdom.virtual-engage.com/>
- 8 Energy Systems Catapult, Net Zero Go – the new climate platform turning local council ambition into action, March 2022
- 9 Energy REV
- 10 Energy Data Taskforce
- 11 Delivering a Digitalised Energy System
- 12 Ofgem - Decision on Data Best Practice Guidance and Digitalisation Strategy and Action Plan Guidance
- 13 Regen - The smart energy journey
- 14 Launch of the Modernising Energy Data Applications (MEDApps) competition
- 15 Modernising Energy Data Applications: Learnings and recommendations
- 16 UK Government Net Zero Strategy: Build Back Greener, 2021
- 17 <https://www.gov.uk/government/news/green-jobs-delivery-steps-up-a-gear>
- 18 UK Government Net Zero Strategy: Build Back Greener, 2021
- 19 Energy Security Bill factsheet: Low-carbon heat scheme
- 20 Ofgem, RIIO-ED2 Draft Determinations, June 2022
- 21 Local government and the path to net zero: government response to the Select Committee report
- 22 WPI Economics, Delivering Net Zero, 2021
- 23 Energy Data Taskforce (2021) A Strategy for a Modern, Digitalised Energy System (p. 8)

## 16 Smart local energy systems: Skills and capabilities

Trades are just one area of skills needed for smart local energy systems  
Picture: Project LEO, Sustainable Kirtlington







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For new energy concepts, engaging with consumers is vital

Picture: Colin Keldie, courtesy Solo Energy

