BRIEFING

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Beyond the pilots: current local energy systems in the UK

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The smart local energy systems (SLES) approach to the energy transition often seems like a radical departure from the present day UK energy system. Much research activity focuses on experimental pilot and demonstration projects, whose focus on multi-vector energy systems at local scale contrasts with the national scale and separation of the heat, power and mobility energy vectors characteristic of the mainstream energy system.

Nevertheless, outside of the world of time-limited and grant-funded pilots, there are local energy systems in operation all around the country on a 'business as usual' basis. This briefing summarises the findings from research with the operators of 29 local energy systems across the UK.

There is a wide range of local energy systems in operation. There are district heat networks, solar PV-powered microgrids, CHP networks and other technologies, sometimes combined into a local multi-vector system. Some operate on a campus or industrial estate, some across city centres, some in housing developments. Sometimes the operator owns the whole network and provides an 'end-to-end' generation-distribution-retail service; sometimes the system is more fragmented.

While this level of diversity precludes us from offering a menu of a small number of 'standard' business models to be taken forward, we can present seven points to inform the next steps in SLES for energy policymakers and practitioners.

1. Better support is necessary for the considerable demand for greater local energy integration

Despite the challenges involved, all of the systems we studied have achieved some degree of local vertical integration of different parts of the energy value chain – generation, distribution, retail and demand-side services. Many of them have also integrated horizontally, combining energy activities across multiple vectors and types of services such as provision of power, heating and mobility. Strikingly, almost all of them were planning to expand the scale and/or scope of their operations in the future (see Figure 1). Many were also keen to increase the smartness and energy efficiency of their operations.

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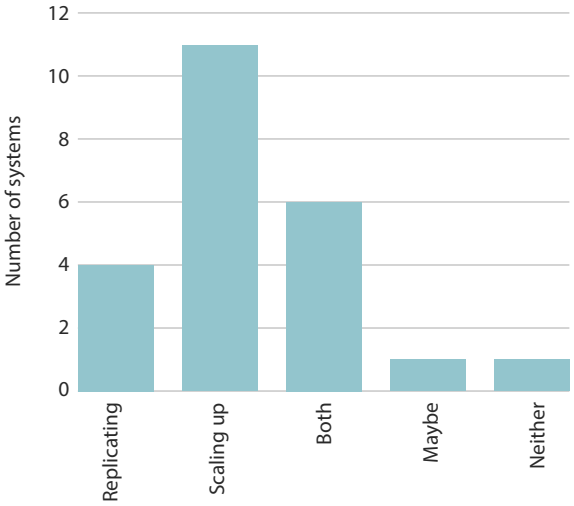
Therefore, our research indicates that there is considerable pent-up demand for more local energy systems. Existing systems are present despite a difficult regulatory and market environment; there might be many more of them if the environment was more supportive. Previous EnergyREV research has highlighted the value that can be created through more and more integrated local energy action (Tingey and Webb, 2020). Therefore, policy should support todays local energy system operators in their ambitions to improve and do more, and facilitate the creation of new local energy systems.

Figure 1: Local energy system operators are keen to expand



2. Recognise the range of things – beyond price – that customers value about local energy systems

Where residential customers had a say in the running of their system – often in various forms of community organisation – they tended to be very supportive of decarbonisation. Business customers of other systems were also interested in buying green energy, and connecting to local renewables helped provide traceability of that energy and guard against 'greenwashing'. These findings should encourage local energy system operators to pursue the decarbonisation of their system and to be confident about promoting their green credentials to customers – whether business or residential.

3. Support organisations outside of the energy sector to play a role in local energy systems

A great range of organisations, beyond the 'usual suspects' in the core energy sector, are running local energy systems today: in particular, organisations with responsibility for many kinds of physical premises or estates. This diversity of operators is a strength, as it brings different perspectives, customer bases, experience and skills into the local energy sector. We recommend that policymakers and practitioners should cast their nets wide when consulting, and when seeking partners to play a part in the future development of SLES.

4. Allow for the 'local' in local energy to be interpreted at a wide range of scales

We found local energy systems running at a wide range of scales: from some serving the operator, or just a handful of houses or businesses, to others supplying thousands of customers. Our findings therefore broadly support those of other EnergyREV researchers, who have noted the "wild" variation in scales of 'local' energy projects (Ford et al., 2021) and the "elasticity" of the term 'local' in SLES demonstration projects (Walker et al., 2021). We conclude that policy and practice should build on this diversity of scales, and avoid trying to impose any 'one size fits all' definition of the scale of a local energy system.

5. Support organisations to manage complex systems and maximise the economic resilience benefits from multiple revenue streams

Most system operators reported more than one source of revenue and more than one source of finance. This is a contrast with the much wider sample of local energy businesses analysed in Fuentes-González et al (2021), that tended to rely on a single source of revenue. Diversifying revenue can help in building economic resilience (particularly in today's volatile energy world).

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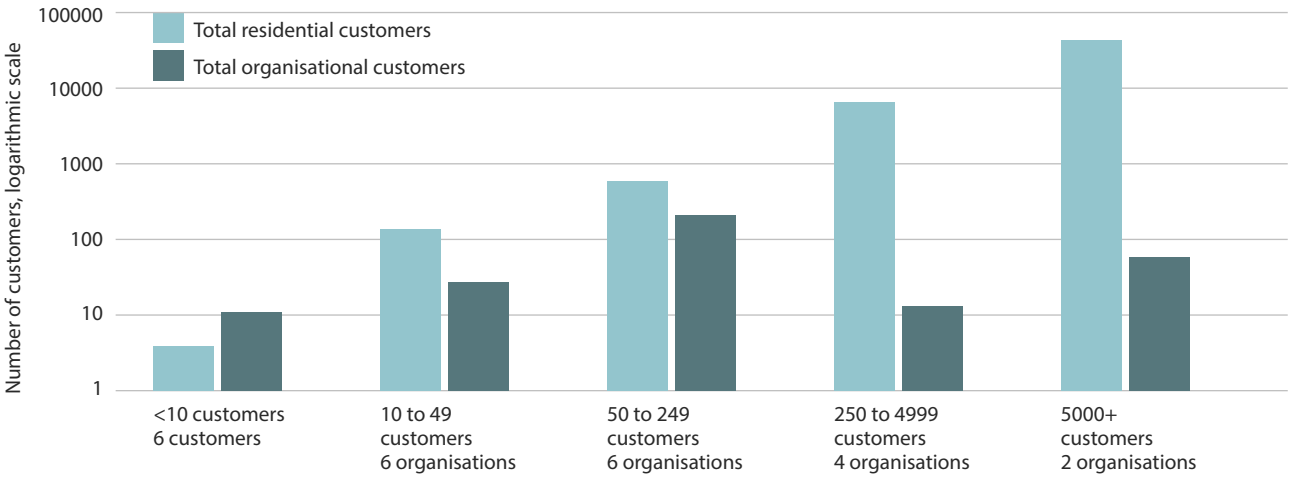
Figure 2: Local energy systems come in a huge range of sizes. Note that this chart uses a logarithmic scale, to allow very different system sizes to be displayed legibly on the same chart.



Total number of customers served systems in our study, grouped according to size of system

But diversified systems can be complex to run, and operating organisations – particularly smaller organisations – might need support in accessing or developing the necessary management skills. Providing such support could help realise the benefits of a diversity of operators and scales of operation noted above.

6. Help provide a wide range of SLES-relevant skills and training opportunities, across the country

Many of the system operators we spoke to relied on national specialist contractors for key aspects of system maintenance – alongside local contractors for less specialist work. We also note how, in addition to core energy engineering skills, our interviewees spoke of the need for specialist skills in ICT, data management, and financial and business planning; this supports the findings of other EnergyREV researchers on the wide range of skills needed for SLES operation (Chitchayan and Bird, 2021).

We therefore suggest that more training and skills development opportunities relevant to SLES should be available across the UK, to improve the functioning of SLES and maximise the inclusive economic development benefits to localities.

7. Encourage life cycle sustainability thinking, and use policy and regulation to help system operators address circular economy issues.

With some notable exceptions, we found an under-reporting of issues around waste: both in relation to system operation and, in particular, end-of-life disposal of system components.

This is perhaps not surprising – arguably the end-of-life destination of their components raises wider questions about the move to a more 'circular economy' that are beyond the scope of a single system operator today to fully answer. Instead, these are issues that policymakers and SLES development programmes may be best placed to tackle. While the energy sector is understandably focussed on the urgency of decarbonisation, the world faces multiple ecological and resource crises, and regulation and policy should encourage the adoption of circular economy approaches to sustainable resource use.

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About EnergyREV

EnergyREV was established in 2018 (December) under the UK's Industrial Strategy Challenge Fund Prospering from the Energy Revolution programme. It brings together a team of over 50 people across 22 UK universities to help drive forward research and innovation in Smart Local Energy Systems.

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