



Local Engagement in UK Energy Systems

A Pilot Study of Current Activities and Future Impact

by Energy Technologies Institute and
The University of Edinburgh



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A Pilot Study of Current Activities and Future Impact

“This pilot research provides the first systematic overview of local authority related activity and its potential impacts.”

Future energy provision in the UK could change in many ways, with one pathway being a much more distributed system. Although local authorities (LAs) are not the sole actors in such developments, they are critical contributors and catalysts. UK policy recognises the value of localised energy provision and services as a component of an affordable, secure, low carbon system¹, but clear and direct policy support remains underdeveloped. In addition, there has been limited analysis until now of the scale and scope of local authority engagement in energy systems and its implications. This pilot research provides the first systematic overview of such local activity and its potential impacts.

Findings show that almost one third (30%) of the UK's 434 local authorities are actively planning, and investing in, energy productivity and provision. Most of this activity is on a limited scale with only 9% of UK authorities showing evidence of significant numbers of energy project investments. Considering just one aspect of local energy provisions (combined heat and power) and extrapolating from current local authority engagement to the whole UK would produce a considerable relative increase in localised heat and electricity provision. While this would correspond to less than 10% of electricity generating capacity or heat demand, its significance may lie in contributing efficient flexibility to the wider energy system.

Larger scale contributions from localised energy are likely to require clear direction from central governments, and access to long-term secure and affordable finance. Such policy measures are likely to be cost effective means to reduced energy demand in buildings, energy storage, more distributed production, better

¹ UK Government DECC (2011) The Carbon Plan;

“This pilot study identified and compiled the best available data to provide a robust assessment of the current engagement, and trajectory, of every UK local authority in energy systems.”

waste heat recovery, and development of urban heat networks, as well as contributing to infrastructure for electrification of transport. Increased capacity would enable local authorities to interact more effectively with energy network operators and developers to co-ordinate regional infrastructure planning, demand side response and investment in a low carbon and renewable energy system.

This pilot study identified and compiled the best available data to provide a robust assessment of the current engagement, and trajectory, of every UK local authority in energy systems.

In total the project database comprises 360 variables, drawn from a combination of original data gathering and synthesis of 37 datasets, which measure engagement in relation to the two critical indicators of strategic planning and investment. Each authority has been scored against evidence of strategic planning and development of energy projects, and assigned to one of four categories – energy leaders, running hard, at the starting blocks, yet to join the race.

Our categorisation system has allowed us to examine the relationship between local authority engagement and other local factors (ranging from regional location to local political commitments). Correlation of such factors with engagement (e.g. larger authorities tend to be more engaged) opens up promising lines of further research to explore underlying mechanisms.

We have also begun to quantify the potential impacts of increasing levels of engagement across the UK, and have examined the energy leaders' activities in relation to forms, pathways and extent of local engagement in energy productivity, demand management and supply. We have assessed how this might change and over what future period.

Pilot study rationale

Our approach to mapping engagement

The range of local energy services consumed is large, and various production-side technologies may be deployed. Hence there is considerable scope for a wide array of system changes to be incorporated into this exercise, with varying degrees of data quality and resolution to rely on. The categorisation, quantification and scenario activities can all be expanded beyond the limitations of a pilot project. Our approach is to maintain a narrow focus as we build tools for converting data into local authority categories, business-as-usual projections and scenario analysis. With this architecture in place we will be able to give an initial indication of the potential scale of energy system impacts, and to extend the data sources to other aspects of energy systems in subsequent research. Mapping present engagement is crucial for accurate assessment of the potential value of increasing the scope and pace of local engagement and to an understanding of governance, financing and institutional changes required for significantly increased local contributions to the energy system.

UK energy and governance context

By virtue of statutory powers and duties, Local Authorities have significant influence over energy use in residential, public and commercial buildings and transport, and over production of energy from waste, and renewable and low carbon energy sources. While most have carbon and energy management plans, constrained finances, and removal of performance frameworks for English authorities, are likely to damage capacity to implement these in the immediate term. The UK Committee on Climate Change (2012) Report recommends that government should act to strengthen Local Authority capacity and accelerate investment by providing funding for energy management, and introducing a statutory duty requiring not only development, but implementation, of low-carbon plans.

Characterising local authority engagement

“9% can be classified as energy leaders, 21% as running hard, 47% as at the starting blocks and 23% as yet to join the race”

1. Local authority engagement can be characterised on a continuum from energy leaders in local low carbon systems to running hard - capacity for strategic planning and some energy developments - to starters - beginning to engage and develop locally - to yet to join - authorities with little externally visible engagement.

2. Critical benchmark indicators, (i) strategic energy planning and (ii) investment, have been developed. The investment indicator uses 15 variables ranging from energy infrastructure to efficiency projects.

3. Assessing all 434 UK local authorities against these indicators, 9% can be classified as energy leaders, 21% as running hard, 47% as at the starting blocks and 23% as yet to join the race.

4. The characteristics of energy leaders indicate multiple routes into engagement, including economic regeneration, housing upgrades and affordable warmth, energy productivity, avoided costs of alternatives and environmental protection.

5. Energy leaders are concentrated in particular parts of the UK, notably London, Scotland, and Yorkshire and Humber.

6. Energy leaders tend to be metropolitan and larger authorities.

Characterising local authority engagement (continued)

7. Almost half of authorities at the starting blocks have some investment in place or have made energy and carbon plans, suggesting that activity could be scaled up and accelerated through clearer mandates from government and straightforward, reliable access to low cost, long-term finance.

Figure One

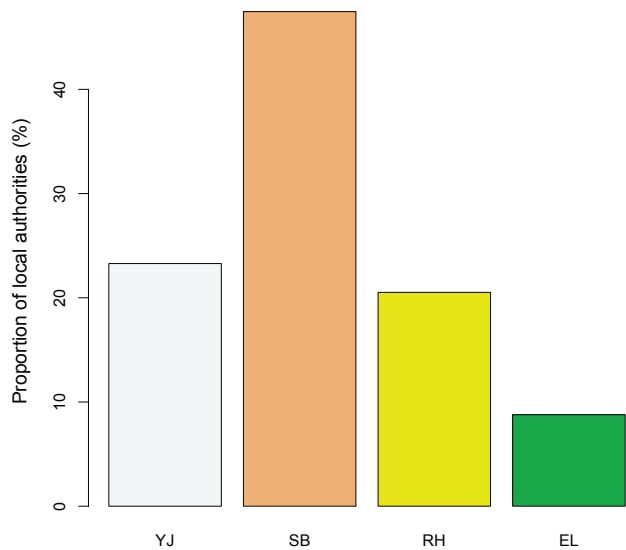


Figure 1. Proportion of UK local authorities in each category of engagement in energy system development (YJ=yet to join, SB=starting blocks, RH=running hard, EL=energy leaders).

Figure Two

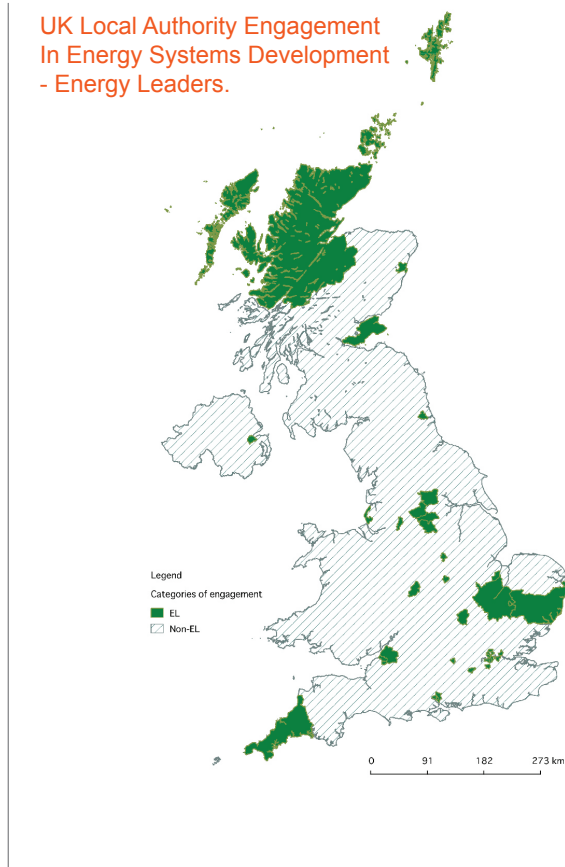


Figure 2. UK Energy leaders in local energy systems development (EL=energy leaders, Non-EL=all other categories of engagement).
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Initial exploration of energy leaders shows:

- 79% have completed a Carbon Trust carbon management programme.
- 50% are actively involved in the RC-UK Heat and the City District Energy Network.
- 34% have joined the EU Covenant of Mayors committing to development and implementation of sustainable energy action plans.
- 32% were successful in drawing funds under the Community Energy Programme to develop district heating.

All energy leaders show evidence of multiple activities in energy developments. Ranging from 3-9 projects, leading authorities are using up to seven different investment streams including: European Regional Development Funds (ERDF 2007-2013), European Local Energy Assistance (ELENA), Low Carbon Infrastructure Fund (LCIF) and TSB Future Cities Demonstrator Funds.

Implications of local authority engagement

“Levelling up could more than double the UK’s installed capacity of renewables”

1. Preliminary exploration of the relationship between local authority engagement and levels of low carbon technology deployment (not restricted to local authorities’ own deployment) shows strong association with non-industrial Combined Heat and Power (CHP). Relationships between engagement and small (under 10MW) renewable electricity generation appears marginally significant. Further research will allow more robust assessment of the relationship between renewables and engagement, and will explore mechanisms relating engagement to technology deployment.
2. “Levelling up” deployment of non-industrial CHP across all areas to the levels of the most engaged authorities would imply significant acceleration in deployment rates. The limited pilot research modelling suggests that the impact of this is small (under 10%) in terms of the UK energy production. A parallel extrapolation for small renewables suggests levelling up could more than double the UK’s installed capacity of renewables (though local constraints may limit this estimate). Further research will embed these impacts in broader system modelling (allowing for system-wide effects, particularly balancing, to be considered). This will provide a more dynamic view of the impacts of engagement at local level.
3. Multiple models of energy leadership include acting as enabler for other public, private and community system developers to invest in localised energy, direct energy provision for housing and/or public estate, provision through joint ventures with private utilities, or using planning powers to deliver low carbon business zones or infrastructure for renewable energy industrial development. Our engagement categories were found to correlate with aggregate installed capacity of low carbon local technologies. The association was marginally significant for small scale renewables (under 10MW), and highly significant for CHP^{3,4}

Implications of local authority engagement (continued)

“Aberdeen Council created a non-profit enterprise to design, develop, own and operate urban heat networks”

4. Many leaders have multiple models of engagement in place simultaneously. Cities such as Birmingham have long term private contracts for local heat, cooling and power supply, as well as direct development of heat network connections for social housing and the public estate, and public-private partnerships for Green Deal retrofit. Aberdeen Council created a non-profit enterprise to design, develop, own and operate urban heat networks, but also has public-private partnerships for hydrogen economy demonstrator projects. Cornwall council set up Community Energy Plus as a social enterprise to manage cross-sector initiatives, but also has a revolving green loan fund and a long-term private contract with an energy from waste business.
5. The type and scale of energy projects invested in are equally diverse, ranging from single building retrofit to entire housing estates, and from energy storage, to hydrogen-powered buses, to combined heat and power, heat networks, energy from waste, solar PV, wind turbines and local or regional green investment funds.
6. Activity remains small scale, relative to current UK energy consumption, but the dispersal of activity and range of projects is indicative of much greater potential. Much activity is consciously framed as “demonstration”, signalling intentions that its impacts will extend beyond project boundaries.
7. Local authorities have very limited capacity for strategic energy management, because they have few statutory powers or duties, and no dedicated budget, for energy provision. Energy management is thus found in different functions within organisational structures, depending on where initiatives emerge. Energy strategy may have a direct line to the Office of the Chief Executive and Leader of Council, or may be part of the Planning, Property Services, Housing, Environment or Urban Development and Regeneration functions. Its location may change, as local priorities evolve, and as opportunities for energy to play a strategic economic role become apparent.

Ten Measures for Scaling Up Local Engagement in Energy Systems

“A range of factors influence the degree of local authority engagement with energy”

This pilot research, together with findings from our related RC-UK funded research, suggests a range of factors influence the degree of local authority engagement with energy, and the extent to which engaged authorities are able to effect change. UK central and devolved government have a wide range of options which they could use to facilitate local engagement by accelerating investment, creating straightforward pathways for scaling up and avoiding piecemeal projects that are hard to consolidate. The following measures interact with what we have found the active local authorities to be doing. Further research will provide an opportunity to assess their potential impact and to identify the gaps in current policies and programmes.

1. A local authority statutory duty to develop and implement area-wide low-carbon plans over a set timescale. Do energy leaders' experiences in developing “Low Carbon Zones” offer lessons for wider low carbon planning? What can be learned from other statutory requirements to develop plans? For example, responses to the Home Energy Conservation Act were variable, but a small number of authorities used the requirement of a 30% energy saving from social housing to implement affordable warmth strategies and to achieve significant local investment in distributed energy provision.
 2. A central energy efficiency fund dedicated to investment in localised energy provisions and services, offering low interest, long-term loans, and reducing investment risk by supporting a portfolio of projects. How have local actors engaged with such funds (e.g. the NHS Carbon and Energy Fund or the Scottish Central Energy Efficiency Fund), and how can these funds be used to maximize impact beyond the public estate? What strengths and weaknesses do local actors find with funding models, such as the Green Investment Bank and the Scottish
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Ten Measures for Scaling Up Local Engagement in Energy Systems (continued)

Renewable Energy Investment Fund, which emulate commercial lending?

3. Targeted funding for business model development and financial planning would address the problem of moving from technical and economic feasibility study to procurement. DECC's Heat Network Delivery Unit, for example, targets funding for technical and financial feasibility with some support for business planning – how do local authorities use this funding, and how does it shape the structure of local energy plans?
 4. Devolution of powers to local government to raise a higher proportion of income for localised energy from local taxes and revenues. Do the energy components of current English “City Deals” offer a model for more devolution of powers?
 5. The EU Energy Efficiency Directive provides the opportunity for UK and Scottish Governments to create a strong legal framework for locating all new power stations closer to urban heat loads, and requiring operation in combined heat and power mode. How do engaged local actors see their role in shaping opportunities to use such heat?
 6. Simplified access to electricity markets for gross power sales and/or balancing services. Participation in electricity markets is challenging for small generators, and the consequent low price typically received for electricity sales tends to reduce financial viability of schemes. To what extent do local actors see current innovations in market access arrangements (License Light, EMR's capacity mechanism) as improving their revenues? How do local actors perceive the benefits of active market engagement versus less onerous mechanisms such as Power Purchase Agreements?
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“Our pilot work identified striking regional effects with high levels of engagement in London, Scotland and Yorkshire and the Humber”

7. Regional energy agencies responsible for strategy development and implementation in partnership with other bodies. Our pilot work identified striking regional effects at NUTS level 1 with high levels of engagement in London, Scotland and Yorkshire and the Humber – to what extent can this be attributed to current/former development agencies, and what do local actors value most about regional support?
 8. Mandatory local planning for low carbon heat, establishing local authority powers and resources to map heat demand, analyse technical options, and plan areas suitable for heat networks. What use do energy leaders and other local authorities make of nationally constructed heat maps?
 9. Greater local discretion over incentives to support area-wide low carbon visions. Some energy leaders expressed concerns that incentives for individual solutions may lock out higher impact collective solutions and suggested greater local influence over schemes including the Renewable Heat Incentive and the Allowable Solutions Framework. Would local powers to shape incentives be feasible and what impact would it have on local planning and projects?
 10. Regulation of district energy is often presented in the UK as stifling local initiative, yet Scandinavian district energy systems developed under strong, yet distinct, regulatory models (Norway, for example, operates a licensing regime designed to support a liberalised market). What forms of regulation could build confidence and govern risk without unduly restricting responsiveness of projects to local conditions?
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Drivers for local authorities categorised as energy leaders and running hard

Political

- Local Councillors and political leaders active in climate change mitigation, and environmental and community improvement
- Greater autonomy in energy provision treated as strategic advantage
- Political capital from investment in local energy
- Requirement to comply with national housing quality standards or other statutory and legislative frameworks
- Greater capacity to influence government policy for local resources and inward investment

Economic & Financial

- Economic growth and jobs
- Inward investment appeal of a 'clean energy location'
- Retaining existing local industries and jobs by guaranteeing long term energy prices
- Grant funding or low cost loans - EU, UK or devolved government
- Avoided costs of CRC or waste to landfill taxes
- Improved council revenues from housing stock
- Improved durability of housing stock
- Reducing council energy bills by localising supply and improving energy performance of buildings

Social

- Affordable warmth
- Improved quality of life in the locality/place-making
- Reduced debt for low income households
- Improved public health from reduced traffic pollution
- Community engagement and social capital

Three different approaches to engagement



Kirklees – tackling energy efficiency in domestic sector and working with partners in the Yorkshire Region

Targeting hard-to-treat properties as part of £14.9m programme in the Yorkshire region: the BIG Energy Upgrade. 'Whole house' approaches used to address energy efficiency and fuel poverty with measures including insulation, boiler upgrades and behaviour change with estimated lifetime carbon savings of 200,000tCO₂. Measures monitored to better understand energy usage and behaviour change. Leading project and working in partnership with other local authorities, registered social landlords, University of Sheffield and Yorkshire Energy Services.

Builds on Kirklees' work on improving home energy efficiency under Kirklees Warm Zone (from 2007-2010) which offered free home insulation to all residents: over 51,000 homes were insulated. Kirklees Council was awarded the Ashden Award for Sustainable Energy in 2009 and the Warm Zone model influenced the design of the Scottish Government's Home Insulation Scheme.

Focussing on energy efficiency, domestic sector, whole community approach, fuel poverty, regional partnerships, developing local supply chains and stimulating economic growth.



Bristol - working with local communities for maximum impact of city-wide carbon reduction ambitions

BRITE: Bristol Retrofitting – Innovative Technologies for Everyone. Will save around 59GWh of energy per year; generate 77GWh of renewable energy per year; and, mobilise investment in the region of £140m. ELENA funded programme with links to Green Deal activities in the city. It will achieve this



through combining domestic energy efficiency measures (over 6,000 homes); renewable energy generating technologies in homes and public buildings (including solar PV, over 7,000); district heating networks; establishing council owned ESCo; and working with communities on energy initiatives (such as Bristol Switch and Save), in and around Bristol.

Focussing on energy efficiency, housing retrofitting, fuel poverty, reducing public sector and consumers energy bills, energy security, carbon reduction, local economic growth including jobs creation and investments in Bristol region, profit maximisation for reinvestment in clean and efficient energy projects in and around West of England. Orientated towards working with community groups.

Cornwall – making the most of location and opportunity for carbon reduction and renewable energy provision

Acknowledges local contributions to achieving carbon emissions targets and in response has developed Green Cornwall programme for local carbon and energy management. Aiming for council estate operations to be carbon neutral by 2025. Recognised for good leadership in energy and part of European project Leadership for Energy Action and Planning.

Working as part of the Cornwall Sustainable Energy Partnership and investing in local community energy projects (such as WREN Wadebridge Renewable Energy Network) and local investment funds.

“Focusing on carbon reduction, reducing energy demand, renewable energy generation, working with and supporting communities on energy including domestic energy efficiency and supporting low carbon regional economy.
Business models: investing in own operations and local communities.

Seven Factors Supporting Leadership

1. Political commitment from Leader or Deputy Leader of Council, and/or Chief Executive.
 2. Legislation – in Aberdeen the UK Home Energy Conservation Act (1995) resulted in a key appointment which led to considerable investment in housing retrofit, CHP and heat networks.
 3. A component of grant funding – the UK Community Energy Programme (DEFRA 2002-07), managed by EST with Carbon Trust, provided funding for up to 40% of capital expenditure for CHP and heat networks and was instrumental in many projects developed by energy leaders from Highland and Shetland Isles in the North of Scotland to Southampton and Woking in the South of England.
 4. Other support funding such as Cambridgeshire's low carbon investment fund (Mobilising Local Energy Investment – MLEI), feed in tariffs for solar PV, Renewables Obligation Certificates for electricity, or energy company obligation funding for community energy saving and district heating.
 5. Carbon or energy taxes such as waste to landfill, or the CRC.
 6. Local pressures such as social deprivation, risks to jobs from further loss of industry, high energy bills and shrinking local authority budgets.
 7. Local resources such as wind, solar, marine, geothermal or waste heat.
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Data Collection and Categorisation

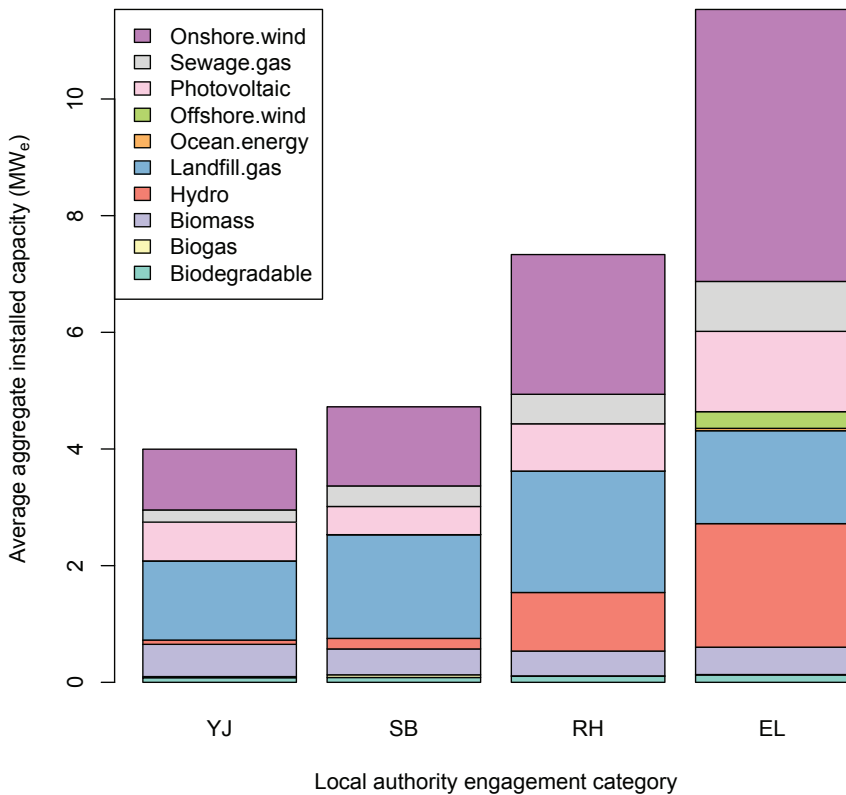
1. Available data sources have been reviewed and data collected for all 434 UK local authorities. Individual organisations were contacted, publically available data have been downloaded from online sources and every UK local authority website has been visited to obtain evidence of energy and carbon plans and other relevant policies.
 2. 360 variables have been created as indicators of current engagement. Variables have been assigned into one of 18 groups.
 3. A central database framework has been designed to store and display each variable value for every local authority. This database has been populated with the variables and values from each data source for all 434 UK local authorities (some variables are applicable only to subsets of authorities).
 4. A simplified scoring system categorises each authority according to discriminating factors (i) evidence of strategic energy planning and management (ii) evidence of investment in energy projects/energy production. Energy and carbon management plans are used to indicate strategic energy planning. These plans ensure reporting on internal energy management, which is an important step in progress with energy developments.
 5. Successive iterations of scoring and categorising methods have ensured a robust assessment of level of engagement for all local authorities.
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Data Collection and Categorisation (continued)

Variable Groupings

1. Identifier variables
 2. Energy development demonstrator/pilot
 3. Energy developments - planned
 4. Energy developments - actual
 5. Renewables & CHP registration
 6. Energy investment/funding programme
 7. Energy opportunities project
 8. Adaptation pilot
 9. Housing energy efficiency
 10. Carbon reduction regulation
 11. Regulatory compliance
 12. Collective energy management
 13. Energy &/or carbon management
 14. Energy &/ or carbon policies
 15. District Energy network engagement
 16. Energy infrastructure policies
 17. Energy &/or carbon support programme
 18. Political commitment to action on energy/carbon reduction
 19. District Energy network engagement
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Renewable electricity (under 10 MW)



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