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Laggards and leaders among UK local authorities

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Title Page

Title

Governance institutions and prospects for local energy innovation: laggards and leaders among UK local authorities

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Abstract

UK Local Authorities are increasingly declaring 'climate emergencies' and pledging 100% clean energy and carbon neutrality ambitions for their locality, despite lack of powers over energy systems. Our research investigates current Local Authority engagement in clean energy, and considers prospects for meso-scale innovation. The analysis centres on Local Authority energy plans and investments across the four UK countries and English regions. Local Authorities are allocated to one of four categories of engagement from energy 'laggards' through to 'leaders'. Findings reveal that, despite lack of direct powers, a high proportion of Local Authorities have developed sustainable energy plans and projects, but only a minority manage to combine these into a more strategic local energy programme. There was proportionately greater activity in Scotland and considerable variation was found across English regions. We conclude that variation in levels of engagement relates to divisions of responsibilities between different levels of government. The capacity for Local Authority-mediated social innovation to support development of a clean UK energy system is discussed. Implications for policy include the need for a statutory power, and commensurate resources, for Local Authorities to ensure a more comprehensive and systematic contribution to clean energy innovation.

Keywords

Local government; municipal energy; decentralised energy; energy efficiency; energy planning; mapping

Highlights

- This paper investigates UK Local Authorities' clean energy initiatives and considers implications for policy to scale up local government-led social innovation.
- A high proportion of Local Authorities had developed sustainable energy plans and projects, but only a minority combined these into a more strategic local energy programme.
- Proportionately greater activity was found in Scotland than in England, Wales and Northern Ireland.
- Considerable variation was found across English regions and local government structures.
- Divergent pathways are emerging within the UK, signalling differentiation of local energy innovation trajectories.

Revised Manuscript

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UK Local Authorities are increasingly declaring 'climate emergencies' and pledging 100% clean energy and carbon neutrality ambitions for their locality, despite lack of powers over energy systems. Our research investigates current Local Authority engagement in clean energy, and considers prospects for meso-scale innovation. The analysis allocates Local Authorities to one of four categories of engagement, from energy 'laggards' through to 'leaders', based on their energy plans and investments. Findings reveal that, despite lack of direct powers, a high proportion of Local Authorities have developed sustainable energy plans and projects, but only a minority manage to combine these into a more strategic local programme. There was proportionately greater activity in Scotland and considerable variation was found across English regions. We conclude that variation in levels of engagement relates to authority size and divisions of responsibilities between different levels of government. The capacity for Local Authority-mediated social innovation to support development of a clean UK energy system is discussed. Implications for policy include the need for a statutory power, and commensurate resources, for Local Authorities, to ensure a more comprehensive and systematic contribution to clean energy innovation.

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1 Introduction

As democratic bodies responsible for local political priorities and services for the long term, Local Authorities (LAs) can contribute significantly to area-scale, user-led social innovation in energy systems. In the UK, both the independent government adviser on climate change and UK Parliament's Science and Technology Committee have argued that LAs are critical contributors to the meso-scale innovations necessitated by legislated carbon budgets (Committee on Climate Change, 2012; House of Commons Science and Technology Committee, 2019). Their statutory powers over land use planning and development, transport and welfare, as well as local knowledge and expertise in infrastructure procurement and project management provide the framework for cross sector action. Their responsibilities for local schools, museums and other public buildings, land and social housing also make them key to retrofit of building stock for a low energy system. Recently over ninety of the UK's 408 LAs have stated their intention to lead meso-scale innovation through pledges to achieve 100% clean energy in their area by 2050 (UK100, 2019), whilst around half (205) have declared a 'climate emergency' (Climate Emergency Network, 2019).

In the UK unitary system of government, such pledges are however surprising. Unlike some of their European counterparts, UK LAs have no direct energy mandate (Creamer et al., 2018; Eckersley, 2018; Hall et al., 2016; Hawkey et al., 2016), and their scope for discretionary action is constrained by limited tax raising powers, and declining budgets which are largely determined by central government (Morris et al., 2017; O'Brien and Pike, 2018). In addition, UK LAs have had no significant role in energy supply for the last century. Municipal energy effectively ended with early 20th century nationalisation and centralisation; privatisation followed in the 1980s and 1990s. Climate protection legislation is however resulting in renewed policy interest in locality-scale innovation to reduce the total costs of radical transformation of the energy system (Lloyd, 2018; Ofgem, 2017). This has opened up debate about local and non-state 'leader' and 'pioneer' climate actors (Wurzel et al., 2019a) and questions about potential for re-scaling governance to support LA leadership on decentralised energy systems (Kern, 2019; Kuzemko, 2019). Relatively little is known however about current LA energy initiatives. Our paper addresses this evidence gap, using an institutional perspective to analyse LA action across UK nations and regions, and to consider the implications for meso-scale social innovation in energy. A population survey of UK LAs is developed from secondary analysis of published data about energy plans and investments.

LAs are allocated to one of four categories of engagement with energy from 'laggards' through to 'leaders'. Our analysis indicates differentiation of local energy strategies across the UK, which are associated with the size of LA and the degree of institutional and policy support for local energy across national and regional governments.

Section 2 outlines the UK multilevel government institutions which create the context for local clean energy innovations. Section 3 describes methodology. Section 4 presents results from comparative analysis. In Section 5 we discuss limitations of current institutional arrangements for scaling up action on energy across LAs, and explore the impacts of devolution. Section 6 concludes with policy implications for meso-scale social innovation in energy and suggests areas for further research.

2 UK multi-level governance and local authority energy innovation

The institutional distribution of powers, resources and responsibilities across scales of government is critical to agency and capacities to enact change in contemporary societies (Mahoney and Thelen, 2012). It shapes the legitimacy of local governments as energy system actors, their capacities for policy development and implementation, and the scope for decentralised provision (Bulkeley and Kern, 2006; Eckersley, 2018; Emelianoff, 2014; Hawkey, 2015; Kelly and Pollitt, 2014).

2.1 Legal, political and financial capacities of UK devolved governments and local authorities

The UK institutional system of governance centralises power through the legislative sovereignty of the Westminster Parliament, and limits local discretion over energy systems (Eckersley, 2016). Devolution of powers since the millennium to establish a Scottish Parliament, and Welsh and Northern Ireland Assemblies, and combined, or regional, mayoral authorities in parts of England, does not fundamentally change this unitary structure: the UK parliament retains the power to repeal or amend all devolution, and key powers over most areas of taxation, employment, welfare and finance have been retained at UK level. This includes energy market regulation and taxes in England, Scotland and Wales. LAs are in turn constituted primarily as subordinate agents of central governments, rather than as civic bodies pursuing local priorities in a representative democracy (Ladner et al., 2015a; Newman, 2014). Their powers are created by statutes which specify their "boundaries, duties... and modes of operation... They can be abolished... restructured and reorganised at Parliament's will" (Wilson and Game, 2011, p. 33). There is no statutory requirement for LAs to engage in local energy provision. Although local government policy is devolved to each of the

governments in Wales, Northern Ireland and Scotland, these have also maintained central control over LAs. The restricted powers and resources of the devolved national governments nevertheless make them more dependent on local collaboration to develop and implement policy than in England, where relations have been more adversarial (Nutley et al., 2012).

Local government is also a mix of single and two-tier authorities with differential powers, which are likely to influence capacity for energy planning and development. The main UK local government functions, summarised in Table 1, are either carried out by single tier 'unitary' LAs, or shared between two tier 'upper' and 'lower' LAs.

*Table 1 here: Local Authority statutory responsibilities and the UK local government structure**

* adapted from Tingey et al., (2016); also see Slack and Côté (2014).

There are further variations in responsibilities of single tier unitary authorities (all Scottish, Welsh and Northern Irish LAs and some English LAs): Northern Irish unitary authorities are not responsible for housing or education services, unlike those elsewhere; in Scotland four city-region Strategic Development Planning Authorities and cross sector community planning are added to governance structures; in England, metropolitan district unitary LAs are clustered in city-regions, with special purpose entities for transport and waste. In the rest of England, the two tier LA system provides 'strategic' functions via upper tier county councils which cover multiple lower tier district boroughs. Across England LAs also increasingly work through new Combined Authority structures to coordinate economic development and area-based strategic planning.

Neoliberal governance reforms over the last thirty to forty years have reinforced centralised control over LAs through reduced public service budgets and prioritisation of markets as efficient means to solve societal problems (Crouch, 2011; Miller, 2008; Rose and Miller, 2010). The number of LAs has been reduced (there are currently 408 LAs: 343 in England, 32 in Scotland, 22 in Wales, 11 in Northern Ireland, for a population of 66 million), making central intervention even more feasible "in a way that would simply be technically impossible in the much smaller-scale local government systems of other European countries" (Wilson and Game, 2011, p. 24). Notional discretion has been created through general powers of 'well-being', introduced in 2000 in England and Wales, and in 2003 in Scotland. A 'general power of

competence' to undertake any lawful activity was also introduced in England in 2011, in 2015 in Northern Ireland and remains a proposal in Wales (Bowyer, 2018). Exemptions with an impact on capacity for local energy development are: raising taxes; changing the political structure; and trading in services which are statutory requirements (Sandford, 2014). In the absence of greater local political autonomy over strategy and finances, analysts conclude that such competences represent "austerity localism": the delegation of decisions about which local services are reduced or withdrawn (Blanco et al., 2014). The result is "a perceptible reduction in local discretion, in the ability of local councils to either decide for themselves or to finance effectively services they would wish to provide for their local communities" (Wilson and Game, 2011, p. 24). This is likely to make LA-led energy innovations increasingly dependent on 'breaking the rules' of centralised governance and control, requiring considerable local capacity for improvisation by politicians and officials, who need to position energy initiatives as responsive, if not central, to a market-led economic development agenda (see e.g. Wurzel et al., 2019b).

UK devolution processes have potentially created new windows of opportunity for improvised interpretations of institutional rules. Varying degrees of discretion over strategic and operational responsibilities have been conferred on governments in Scotland, Wales and Northern Ireland, and now on combined mayoral authorities in some English regions. Although local or regional energy innovation is likely to be challenging to coordinate, it is not ruled out. The complex reshaping of UK governance institutions is ongoing, suggesting potential for uneven, differential and opportunistic energy developments, perhaps supported by new policies of devolved governments, if these make clean energy into a political-economic opportunity, and influenced by policy divergence resulting from different political control in different UK countries.

2.2 The scope for UK LA engagement in energy

European surveys of cities' energy and climate change activity show that bigger cities with more resources are much more likely to develop climate plans (Heidrich et al., 2016; Recklein et al., 2018, 2015, 2014) or energy and climate initiatives (Castán Broto and Bulkeley, 2013). They have suggested that, in the UK, central government legislation has been particularly relevant in facilitating local climate plans (Recklein et al., 2018, 2015; Heidrich et al., 2016).

Very few studies have however considered the scope for devolved Scottish, Welsh, Northern Irish governments, and English regions, to create differentially supportive frameworks for

local energy innovation. Research is limited, but suggests that divergence is occurring. In their study of climate plans in 30 UK cities, Heidrich et al. (2013) found local policies were most developed in Scotland. This was attributed in part to the catalysing effect of Scottish Government climate legislation. Renewable electricity has also been central to economic development policy in a Scottish cross-party political consensus; Government cultivated the expertise of large energy businesses, economic development agencies and trade associations as well as local planning authorities, resulting in proportionately higher rates of renewables' deployment than elsewhere in the UK (Cowell et al., 2017a; 2017b). Although Cowell et al. (2017a) conclude that both Scottish and Welsh Governments have worked to "align local decision-makers with national objectives" (p. 494), in Wales energy has been less closely tied to economic policy and there was a lack of consistent cross-party support. In Northern Ireland, despite energy policy being devolved, there was a greater focus on agriculture in economic policy (Cowell et al., 2017b). A more sectarian policy process, breakdown in power sharing, a public inquiry into suspected fraud in operation of the Renewable Heat Incentive, and very weak local government with almost no political discretion (Ladner et al., 2015b, p. 78) has created a challenging environment for local governments to innovate constructively in energy. In England, despite LA expectations (Roelich et al., 2018), Conservative-led government, and 'austerity localism', have weakened rather than strengthened energy and climate change policies (Eckersley, 2018). Emissions and adaptation reporting were abolished in 2010, and reorganisation of regional economic development policy resulted in weaker requirements for sustainable development, low carbon investment or social welfare (Britton and Woodman, 2014; Hampton and Fawcett, 2019; Hodson and Marvin, 2013).

Beyond questions about impacts of devolution, few studies have attempted to combine analysis of local energy and climate plans with appraisal of material progress (Castán Broto, 2017; Recklein et al., 2018), though case studies illustrate the challenges of moving from planning to implementation (Bale et al., 2012; Bush et al., 2016; Roelich et al., 2018). We therefore focus on both energy plans and projects, and investigate activity across UK nations and regions, taking into account the differential roles and responsibilities of LAs (see Table 1). This enables us to analyse the capacities of UK LAs to break the rules of centralised political control and liberalised markets through social innovation in local energy systems. The limited scope for LA discretionary activity suggests that any initiatives will be tailored to areas of existing responsibility, such as housing and the corporate estate. As discussed above, research also suggests there is likely to be differential activity across the UK, with greater activity

where there has been a more supportive political-policy framework, including at devolved national scale.

3 Methodology

Our 2015 comparative analysis of UK LA energy initiatives assessed activity using two indicators: evidence of a local Energy and Carbon Plan/Strategy, and evidence of material investment in energy projects. We use these indicators in a typology of local authority engagement in energy, reflecting a continuum from least to most active (laggards to leaders) (Table 2).

*Table 2 here: Categories of Local Authority engagement with energy**

* adapted from Tingey et al. (2016).

The least active LAs (*yet to join*) have no publicly recorded energy planning or material projects; those who had begun to make progress (*at the starting blocks*) have usually developed action plans, but implementation is aspirational or at early options appraisal stage possibly with small investments; next are authorities (*running hard*) with some investment in energy activities and evidence of strategic planning to mobilise further investment; finally we have those currently at the leading edge (*energy leaders*) in low carbon energy among UK LAs, with evidence of a programme of initiatives and investments.

There were 434 local authorities at the time of data collection. Local Energy and Carbon Plans were collected from 311 LA websites, and varied in scope from council estate to whole area. All generally included baseline CO₂ emissions data, reduction targets and progress reporting. A new database was also compiled from 29 datasets published by the European Commission, UK and devolved Governments, and their agencies.

The datasets cover multiple forms of energy project activity (see data availability section); duplicate entries of the same project were removed from the database. Twenty-one datasets contained information on grants and loans which LAs use for financing energy initiatives. Eight datasets contained information on operational projects concerned both with supply of heat and electricity, and demand reduction. Two thirds of datasets recorded a single area of activity such as the Green Deal Pioneer Places Fund (energy demand management) and UK Government Combined Heat and Power (CHP) Focus (energy supply). The remainder covered

multiple areas, including: European Commission funding (e.g. Intelligent Energy Europe, Interreg IVC and IVB, and Horizon 2020) focused on energy demand management, transport, knowledge exchange and capacity building, and Green Investment Bank finance used for demand management, energy supply and waste to energy projects. The CHP Focus dataset contained the largest number of LA energy projects with 88 entries. Northern Ireland's ERDF (2007-2013) dataset contained the fewest, with two projects.

Reliance on publicly available data meant that some energy projects were likely to be missing, leading to under-estimation of activity. For example, data on energy saving projects funded through Salix Finance, which provides interest free public sector loans, are missing, because published data only lists LAs accessing the fund, rather than disaggregated data on the energy projects implemented. We were also unable to obtain a dedicated dataset on waste to energy projects, though some were included in the Green Investment Bank dataset, DECC Renewable Energy Planning Database, and Defra Community Energy Programme dataset. Grant and loan data do not capture energy projects only funded by Council internal budgets or Public Works Loan Board (PWLB); the latter does not publish disaggregated data by type of project. Case studies also indicate the importance of PWLB finance for some energy investments (Bolton and Hannon, 2016 p. 1738-1739; Webb et al., 2017, p. 21) suggesting this could be an important data gap. However, research on use of PWLB for energy investment is lacking.

The operational datasets also had limitations. For example, it was not possible to identify the total capital investment in every project, or the specific measures in all energy efficiency projects and inclusion in the CHP Focus dataset was voluntary. We also excluded more diffuse and dispersed activities such as facilitating engagement of other actors through planning and development processes, because of absence of records. The category system of energy 'laggards' to 'leaders' (see Table 2) hence remains tentative due to data reliability issues and lack of comprehensive data disaggregated to local scale (cf Tingey et al., 2016; Webb et al., 2016).

4 Results

Using the two indicators of engagement, we categorised the UK's 434 LAs into one of four groups (from least to most active) according to the presence/absence of a local Energy and Carbon Plan, and the number of energy projects¹ (Figure 1). We used this to examine patterns across each of the UK's countries and different local government scales and structures.

Figure 1 here: Proportion of Local Authorities in each category of energy engagement

Single column size

4.1 UK Local Government energy and carbon planning and projects

The analysis revealed widely established LA ambition, but small scale and uneven material investment. The majority of LAs were active to some extent, with 82% (357) having local Energy and Carbon Plans and/or investments in energy projects. Only a minority (13% or 55) appeared to have combined these into a programme of local energy provisions (categorised as *energy leaders*); this group of 55 LAs covers about 25% of the UK population. In addition, the scale of projects was limited. For example, quantitative data on combined heat and power (CHP) schemes across 40 LAs showed that these supplied 1% or less of local heat demand. Energy plans were more common than projects: 72% of LAs (311) had a published plan, compared to 48% (208) that had one or more projects. In total 458 energy projects were identified across those 208 LAs; just over half (113) had one project, relatively few had developed three or more projects and only seven authorities had eight or more projects (Birmingham, Bristol, Greater London, Kirklees, Newcastle, Western Isles and Working). Local authorities with more projects were also more likely to have a published plan and the relationship between plans and investments was statistically significant ($\chi^2=13.87$, $df=2$, $p=0.0009$); this was influenced heavily by the large number of English LAs (368 of the 434 LAs are in England).

Three quarters of projects (Figure 2) concerned heat and energy efficiency of (primarily domestic) buildings, including council-owned housing and council corporate estates. Activity centred on Combined Heat and Power (CHP) (29% of projects, or 131) and heat networks (15% of projects, or 67); a range of building energy efficiency projects were also identified (27% of projects, or 125). Overall this indicates that LA energy initiatives are most likely to emerge where they align with established responsibilities and capacities.

Access to full investment data was limited, with only partial data available for about 40% (182) of projects. Identifiable investment varied from as little as £4,000 from Intelligent Energy Europe grant towards behaviour change for energy efficient transport (Hounslow, London), to over £63 million from the UK Green Investment Bank as partial financing for an energy from waste facility in Derby (in the East Midlands). This waste management contract between City and County councils had a total investment value of almost £200 million.² Given the limited capital investment data, it is difficult to draw generalisable conclusions.

The more complex projects were mainly developed by the most engaged authorities, as Figure 2 displays. For example, heat networks require coordination of multiple parties to assemble heat source, network infrastructure, heat supply contracts to multiple buildings and capital. Heat networks were a component of 18% of *energy leaders'* projects (48 of 265 projects), 11% of *runners'* (16 of 141 projects) and 6% of *starters'* (3 of 52 projects). Easier to install technologies, such as solar PV or biomass boilers, were more evenly distributed across categories. Although CHP comprised about half of projects among authorities defined as starting to engage, these were mainly straightforward: 23 of the 27 *starter* authorities' CHP projects were in leisure centres.

Figure 2 here: Technologies used in Local Authority energy projects

Single column size

4.1.1 Explaining why LAs focus on particular types of energy initiatives: energy as niche activity

Results demonstrate that some LAs have developed clean energy in niche areas, but lack resources to shape meso-scale planning and innovation. Their activities map onto existing responsibilities, expertise and experience (Table 1, Section 2.1). Considerable activity has centred on improving domestic energy efficiency, with housing teams remaining key institutions in many local governments despite some sale or transfer of housing stock. Housing standards and fuel poverty remain a political priority (Morris et al., 2017). In addition, CHP and energy efficiency measures are well established means for improving local authority estates.

Progress has generally correlated with central government policies and support. The UK Home Energy Conservation Act 1995 (HECA) mandated LAs to improve energy efficiency of social housing (Jones et al., 2000; McEvoy et al., 2001) and catalysed development of district heating (Webb, 2015). LAs have received significant public funding for domestic energy efficiency upgrades, including the Energy Supplier Obligation funded by a levy on energy bills (Mallaburn and Eyre, 2013). The relatively short lived Green Deal Pioneer Places retrofit programme (Rosenow and Eyre, 2016) included some direct funding to LAs in England and Wales (40 initiatives are captured in our data). Small scale renewable electricity generation and district heating have also followed from supportive central and devolved government policies, targets and legislation designed either to guarantee long-term revenues (Rydin et al., 2013) or to provide capital subsidies for infrastructure (Hawkey et al., 2016).

As estate owners, LAs have expertise in corporate asset management, which has been a site of energy performance improvements (Allman et al., 2004; Fleming and Webber, 2004; Webb et al., 2017). The Carbon Management Programme, run by Carbon Trust was originally funded by UK government, and stimulated extensive development of public estate energy and climate plans. Interest free loans for public sector energy efficiency have been available since 2004 from Salix Finance, a UK Government funding provider. Since 2010 action has been reinforced by the Carbon Reduction Commitment energy efficiency scheme, requiring large energy users to purchase emissions allowances; around a third of LAs were enrolled in 2015-16 (Environment Agency, 2016), but the scheme closed in 2019, without clarity over replacement.

Limited action on LA area-wide energy strategies is associated with limited policy or financial support (see e.g. Bale et al., 2012; Eckersley, 2018; Hawkey et al., 2016). For example only 34 of the 47 UK LAs signed up to the EU Covenant of Mayors for Climate and Energy have developed and submitted the required area-wide cross sector Sustainable Energy (and Climate) Action Plan (Covenant of Mayors, 2019). This reinforces the overall picture of a LA sector obliged to be opportunistic rather than strategic with respect to local energy.

Overall LAs perceive policy support for local energy initiatives as unreliable, because of UK government scaling back unpredictably across multiple policy areas (Webb et al., 2017). Frequent changes to district heating policy had in the past “undermined the development of schemes seeking to tackle fuel poverty and disincentivised long-term planning” (Bush et al., 2016, p. 94); the UK Green Deal energy efficiency programme was abandoned in 2015 (Rosenow and Eyre, 2016) and energy supplier obligation funding has been halved since 2018. All of these changes result in delay, and ultimately smaller energy projects, with less material impact (Lemon et al., 2015).

4.2 Local Engagement in Energy across the UK’s countries, regions and local government structure

Local energy activity nevertheless varied across the UK’s devolved governments: Scotland had the highest proportion of *energy leaders* (Figures 3 and 4), followed by England, Wales and finally Northern Ireland.

*Figure 3 here: Local Authority engagement with energy across the UK**

Sources: Contains Ordnance Survey data 2012; 2014; National Statistics data 2013; NISRA data 2013; NRS data 2013; GADM 2015. Crown copyright and database right. Map created using QGIS (QGIS Development Team, 2019).

1.5 or double column size

Figure 4 here: Variation in Local Authority engagement in energy across UK nations (left) and English regions (right)*

*Scotland, Wales and Northern Ireland included for comparison in the regional bar chart

Double column size

All 32 Scottish LAs had published an energy plan, compared with about 40% of Welsh LAs (9), and 10% of Northern Irish LAs (3). There was also variation in the *types* of energy projects between countries.³ English and Scottish LAs (368 and 45 projects respectively) engaged across the range of energy technologies shown in Figure 2. Northern Irish LAs (24 projects) focussed predominately on onsite CHP (mostly in leisure centres) and onshore wind. Welsh LAs (21 projects) focussed on CHP and energy efficiency. Relatively complex projects, such as heat networks, comprised the largest proportion of Scottish LA projects (13 projects, or about 30%), around twice the UK wide proportion (67 projects, or about 15% of UK projects). Orkney in Scotland also had three marine energy supply chain projects, enabled by proximity to the sector and test sites.

On the other hand, only English LAs had secured funding through the European Local ENergy Assistance (ELENA), and the EU Intelligent Energy Europe Mobilising Local Energy Investment (MLEI) schemes (Bristol, Manchester, Greater London Authority, Cambridgeshire and Oxford), designed to stimulate investment in local low carbon energy schemes, perhaps suggesting the greater pressure on English LAs to pursue market solutions. These projects were concerned with developing an investment 'pipeline' for local energy systems. Funding provided technical support, legal and financial expertise, hence building capacity through dedicated project teams. Recipients were in turn expected to leverage over £50m additional investment for low carbon projects in Bristol, Manchester and London, £15m in Cambridgeshire, and £20m in Oxford.

Delving into the complex structure of UK local government also revealed differential engagement according to type of authority. Wales, Scotland and Northern Ireland have single tier unitary authorities. In England there is a mix of single tier unitary and two-tier county/district authorities (see Table 1, Section 2.1). As Figure 5 shows, first the highest proportion of *energy leaders* were in the English single tier authorities: these are unitary, London and metropolitan district authorities. Second among the two-tier authorities, greater levels of activity were observed in the top tier county councils than in the lower tier district boroughs.

*Figure 5 here: Variation in Local Authority engagement in energy across the local government structures in England**

* Scotland, Wales and Northern Ireland included for comparison

Single column size

4.2.1 Explaining variation in LA engagement across UK nations: climate legislation enhances LA capacities in Scotland

The emerging picture of differential local engagement with energy is not simply a product of smaller scale leading to more straightforward coordination between local and national governments: there is also variation in activity between Scotland, Wales and Northern Ireland. In line with Heidrich et al. (2013) findings that Scottish energy and climate planning were more advanced than in the rest of the UK, it seems likely that a more supportive policy environment in Scotland has enabled a greater proportion of LAs to engage with energy innovation. Welsh and Northern Irish LAs are less active; in Wales policies coordinated by UK Government which cover England and Wales may lack responsiveness to the Welsh context.

Scottish Government have incorporated decentralised energy into climate, energy and economic strategies. The Scottish Climate Change Act (2009) requires Government to establish five yearly carbon budgets, creating a route for Scottish Government to advance energy policies, including local energy as a prominent feature of Energy Strategy (Scottish Government, 2017a). The legislation also directly requires all public bodies to act in the way best calculated to contribute to emissions reduction targets; this stipulation is absent in other parts of the UK. Legislation has created a path for local energy action; minimally it provided a legal capacity for creation of plans in every Scottish LA. More generally it points to features of Cowell et al.'s (2017b) assessment of the "active cultivation" of renewable energy in Scotland.

By contrast Wales and Northern Ireland lack independent climate change legislation. The Welsh Commitment to Address Climate Change 2006 includes all LAs in a voluntary target of 3% annual CO₂ emissions reduction, but this has not stimulated significant energy initiatives. More restricted local government provision in Northern Ireland (Ladner et al., 2015a) also correlates with proportionally lower levels of municipal engagement in energy.

4.2.2 Explaining regional variation in England

Examination of variation among English LAs also revealed regional differences, with proportionally higher levels of energy action in Greater London, Yorkshire and the Humber, and the North East (Figure 4, right chart). In those regions over half of local councils were classified either as *runners* or *energy leaders*. The higher level of engagement in London is likely to derive from both the unique Greater London Authority (GLA) governance structures which work to coordinate activity across district councils, and London's position as global city and financial capital with high land values (Hodson et al., 2013). The GLA has the most established form of regional devolution, with wide ranging strategic powers and responsibilities covering transport, spatial planning, housing, economic development, environment, climate change, energy, waste, culture, public health, policing and fire services (Slack and Côté, 2014). With respect to energy, the GLA's London Plan (Greater London Authority, 2016a) is a catalyst for district energy, and whilst the zero carbon homes policy was scrapped elsewhere in England, the GLA retained it (Greater London Authority, 2016b). It has also coordinated programmes (using European funding) for public estate energy retrofit and district heating development.⁴

Activity in other English regions was highly variable. An explanation for greater engagement across Yorkshire and the North East is the legacy of Regional Development Agencies prior to restructuring under the 'localism agenda' (Britton and Woodman, 2014; Hodson and Marvin, 2013; Smith, 2007). There were also regions where a few LAs were particularly active, including Bath & North East Somerset, Bristol, Cornwall and South Gloucestershire (South West); Cheshire West & Chester, Manchester, Oldham and Sefton (North West); Birmingham Stoke and Worcestershire (West Midlands); or Derby, Leicester and Nottingham (East Midlands). The wider region in these cases had proportionally fewer *energy leaders*. This group spans urban (i.e. Manchester) and rural (i.e. Cornwall), unitary (i.e. Leicester) and two tier (i.e. Worcestershire), suggesting that higher levels of engagement are not only attributable to regional economic policy, but are the result of local circumstances including

historical context, political-economy (Reckein et al., 2015), and political commitment to a local energy programme.

4.2.3 Explaining interactions between local government structures and engagement in energy: scale, opportunity and resourcing

In England, lower tier LAs (district boroughs) had the lowest proportion of *energy leaders*, whilst upper tier (county councils) and all types of single tier LAs had the highest proportion. From these results we conclude that LA engagement is not solely attributable to the institutional relationship between national or regional and local government, but is connected to scale and resources, particularly of larger cities (see also Reckein et al., 2018, 2015). However, our finding that County Councils are also particularly active suggests large rural or mixed urban and rural areas may have been overlooked in studies focussing on cities. In England both unitary LAs *and* County Councils tend to have larger estates, budgets and responsibility across local services, enabling greater capacity for energy initiatives, whilst metropolitan districts are concentrated in larger cities with high population density. All of these LAs have more to gain from cost saving on corporate energy bills, as well as larger resources to mobilise around local energy. In Cambridgeshire for example, the county council has built a 12MW solar farm on council land, securing an income from renewable electricity, and has used energy performance contracting to improve energy efficiency and install onsite renewables across the schools estate (Cambridgeshire County Council, 2018). Local authority size and associated opportunities and resources are hence likely factors in the lower levels of engagement in Northern Ireland and in district councils in England, all of whom have fewer responsibilities, and resources (for elaboration see Tingey et al., 2016). Though data on the size of LA energy teams is lacking, local officials acknowledge that urban authorities have greater potential to commit more staff to energy management.⁵ Notable examples are Nottingham, Bristol and Islington which have sizeable in-house energy teams. Nottingham and Bristol have also established licensed municipal energy companies. However, counter examples include Birmingham and Newcastle – both major UK cities (Birmingham is the biggest UK city outside London), with wide reaching energy ambitions (see e.g. Energy Capital, 2018; Newcastle City Council, 2017), though very few energy officers.

5 Discussion

This research sheds new light on overall patterns of social innovation in energy among UK Local Authorities, adding insights to case study literature. Forms of LA action need to be interpreted in relation to institutional structures and relationships which govern the distribution of powers and resources. At UK level, the large proportion of LAs with energy and

carbon plans substantiates the effectiveness of programmes designed to support such developments. The plans exemplify the ambitions of LAs to contribute to energy innovation. Lack of local statutory powers and resources for energy, and the absence of consistently supportive policy frameworks for implementation, result however in plans having limited material impacts. UK energy policy support mechanisms and incentives have been instrumental in opening up opportunities, but have not been designed to create systematic capacities for LAs to shape innovation at meso-scale. Frequent changes have channelled most activity into one-off limited initiatives.

Action is thus uneven and small scale; the focus on combined heat and power, district heating and energy efficiency aligns with key LA competences in corporate estate management and social housing. The strained finances of local government and the lack of formal duties to act on energy obstruct the scaling up of energy innovation. There are however examples of creative approaches to financing, including co-financing of renewable electricity with community and individual investors (see e.g. Brauholtz-Speight et al., 2018); using capital budgets; prudential borrowing;⁶ infrastructure banks, including Green Investment Bank (now Green Investment Group) and European Investment Bank; and private sector finance. Systematic meso-scale progress, and the ability to prioritise such investments would however require certainty about LA access to low cost, long term infrastructure finance. This is likely to require greater decentralisation of powers, and reform of energy market regulation to support decentralised renewable energy systems. The British regulator, the Office for Gas and Electricity Markets, is exploring 'non-traditional business models' (Ofgem, 2015) and regulatory reforms through bounded experiments (Ofgem, 2017, 2018). These investigations are however at an early stage (Ofgem, 2019), with uncertain consequences for LA-led innovation.

At UK level, prospects for meso-scale energy innovation are situated within a broader policy focus on re-energising regional economies (under the UK Government's Clean Growth and Industrial Strategies), with scope, but no necessity, for low carbon innovation. UK Government strategies are again uneven, espousing the importance of 'local areas' and places, but leaving ambiguity about the role of LAs (UK Government, 2017, p. 118). The Clean Growth Strategy 2017 for example has limited direct policies for energy efficiency, zero carbon housing, and clean heat and transport, which are areas most likely to require LA involvement (Eyre and Killip, 2019). New socio-technical innovation funding is provided by the UK

Industrial Strategy Challenge Fund: the *Prospering from the Energy Revolution* Challenge (2019-2022) is funding four ‘smart’ local energy systems demonstrators for integrating heat, power and transport (Innovate UK, 2018) and local authorities have a role in each of these. Material impacts on meso-scale innovation are as yet unknown, and systematic LA opportunities remain limited.

5.1 Ongoing devolution processes and social innovation in energy at meso-scale

Within the overall constraints of the UK’s centralised system of political institutions, evolving UK devolution processes create potential for energy policies, regulation and support programmes which differentially ‘unlock’ LA powers to shape meso-scale social innovation. The remainder of this section sketches processes in each country, paying particular attention first to the prospect of institutional powers which could embed energy within local government functions and structures, and second to policy support. All signal possible change, most clearly in Scotland, but a large gap remains between local powers and policies in European countries and those in the UK.

5.2 England: no new local energy powers but some devolution to cities and regions

In England there are no proposals to introduce new local energy statutory powers or duties; hence there are few direct prospects for institutional embedding of energy within LA functions. The UK Government is however engaged in a degree of governance reform in England, primarily through creating regional combined authority structures, incentivised through ‘City Region Deals’ with more localised control of budgets in specified areas such as housing and transport. These could facilitate regional scale energy planning, embedding *low carbon* investments, and directing new income streams to support a local energy programme. The primary goal is, however, economic growth, not decarbonisation of energy. UK Government describes City Deals as “a major shift in the powers and levers available to local leaders and businesses to drive growth” (UK Government, 2012, p. 1), with retention of local business tax revenues, as well as tax incremental financing for property developments (National Audit Office, 2017; 2015; O’Brien and Pike, 2018; Slack and Côté, 2014). The first regional devolution settlement was Greater Manchester Combined Authority, which has also set targets to achieve carbon neutral status by 2040. The first tranche of City Deals also included five LAs which had received ‘pioneer cities’ funding for district heating (Ambrose et al., 2015). In addition five local ‘Energy Hubs’ have been established with £9 million funding for an initial two years to pilot regional energy strategies and to identify opportunities for scaling up through shared project delivery. These temporary structures aim to coordinate

opportunities for large groups of LAs and Local Enterprise Partnerships (LEPs). The Greater South East Energy Hub for example covers 149 LAs and eleven LEPs (Kuzemko et al., 2019). Local Enterprise Partnerships themselves are relatively new structures, combining multiple LAs and businesses, introduced as part of regional devolution settlements. Whilst the Hubs could in principle create change through upscaling local energy initiatives, they have an uncertain future and very small budgets.

Arguably the policy development with most direct significance is however in heat networks. The UK Government established funding for district heating planning through the (England and Wales) Heat Networks Delivery Unit in 2013. To date 140 LAs have accessed funding and expertise to bring forward 200 potential projects (Department for Business, Energy and Industrial Strategy, 2018). The £320m Heat Networks Investment Project (HNIP), announced in 2016, provides the financial foundations (Department for Business, Energy and Industrial Strategy and Triple Point Heat Networks Investment Management, 2018). This decentralised energy fund far exceeds previous programmes, with potentially significant deployment of low carbon heat network infrastructure in England and Wales, sponsored by LAs. This sets up the opportunity to provide a more consistency policy framework for district heating development, overcoming previously 'stop-start' programmes which have undermined progress (Bush et al., 2016; Hawkey et al., 2016).

Despite such programmes, partial regional devolution in England has not yet opened up systematic routes for LAs to shape local energy. In practice low carbon objectives have not been widely integrated in City Region Deals (Scott, 2012); only in Leeds and Nottingham was 'low carbon growth' made central, suggesting limited probability of energy innovation. Strategic powers for energy development at regional scale may yet emerge (Ministry of Housing, Communities and Local Government, 2018) to effect wider change, but Combined Authorities have not been established consistently or democratically, and there are concerns about how they will integrate with the already complex system of local government in England (National Audit Office, 2017).

5.3 Scotland: a national strategy for energy with a funded LA statutory role

A clearer picture about the contribution of LAs to national clean energy commitments is emerging in Scottish policies, which treat "a smarter model of local energy provision" as critical to carbon targets (Scottish Government, 2018a; 2017a). In 2015 energy efficiency was declared a National Infrastructure Priority, and LAs are expected to play a core role in a 20

year Programme for energy performance upgrades in all existing buildings and high standards in new buildings (Scottish Government, 2018a). The Programme includes LA-led pilot projects, and there are specific proposals for a statutory mandate for LAs to devise whole area heat and energy efficiency strategies and implementation plans (Scottish Government, 2017b). There is also a small support programme for district heating through the Heat Network Partnership, a collaboration of government agencies, and low interest loans and grants.⁷ Scottish policies also engage with societal change, including democratisation, social justice, accountability and public representation. Plans to establish a publicly owned energy company and a National Infrastructure Bank to drive change are also in process (Ernst & Young, 2018; Scottish Government, 2018b), whilst the latest Programme for Government reinforces the centrality of zero carbon energy and energy efficiency to Scottish economic development strategy (Scottish Government, 2019).

In Scotland greater coordination and collaboration between national and local government on longer term energy planning, with some commitment to additional local resources, is likely to result in continuing divergence in patterns of local energy innovation between Scotland and England. Material changes are uncertain, but there are opportunities, assuming a constructive policy exchange, for policy learning. For example, a small amount of UK government funding (£1.2 million) has been awarded to six English area-based demonstration projects over six months in 2019 (West of England, Manchester, Cornwall, Oxfordshire, London and Sussex) to test models for an energy efficiency retrofit market for home owners. They aim to build on pilots in the Energy Efficient Scotland programme, and to provide lessons for wide scale development.

5.4 Wales and Northern Ireland

There are no proposals to introduce statutory LA energy responsibilities in Wales or Northern Ireland. The Environment (Wales) Act 2016 does however place statutory duties on ministers, and has the same carbon emissions target as UK legislation. This development, as well as new energy competencies⁸, local energy programmes including public estate retrofit (Green Growth Wales programme), and exploration of support for local renewable energy ownership (Welsh Government, 2018) could catalyse municipal energy innovation.

In Northern Ireland initial steps are still to be taken. Ireland's unified energy system has potential to create substantive opportunities for local innovation, perhaps via a Distribution Service Provider model (Britton et al., 2018). Discussion about climate change legislation

(Committee on Climate Change, 2016) could also accelerate LA action. Larger LA estates following restructure of LAs (from 26 to 11) could similarly open up a new pathway for a government supported energy efficiency programme, however the suspension of Northern Ireland's elected Assembly, is an overarching limiting factor to coordinated action.

6 Conclusions and Policy Implications

The institutional systems perspective on UK governance of meso-scale social innovation in energy highlights the impact of lack of a statutory remit and dedicated funding for LA energy initiatives, in a policy environment without a clear trajectory for decentralised energy.

Ingenuity is required to situate energy provision and services as a cost effective contribution to council 'non-energy' services. Decision-making structures and work programmes have to be assembled through negotiation with public and community bodies, consultants, utilities, energy efficiency supply chains and investors. In a period of retrenchment in public services, the (already limited) capacity for such initiatives is further constrained. Transaction costs for municipal energy investment are higher than in countries where there is established municipal provision (Poyry Energy, 2009), while stalled projects disrupt development of a strategic programme.

The institutional perspective demonstrates that LA capacities for energy innovation and governance are interwoven with institutional dynamics and inter-relations of policy and market regulation on the one hand, and centralised statutory control over LAs on the other. In the UK case, these have combined to 'lock-in' a pattern of fragmented and small scale municipal energy provision. Rather than enabling significant municipal energy services, current structures are hindering the potential for LA action to catalyse systematic change. Nevertheless the perspective simultaneously implies the possibilities of 'breaking the rules'. Widespread Energy and Carbon plans signal the political commitment of local government, and pockets of higher levels of engagement indicate scope for wider innovation. LA competences in management of housing and corporate estate lead to convergence around projects concerned with decentralised infrastructures for heat and energy efficiency. Both are critical to UK goals for a decarbonised energy system, and are difficult areas of UK government policy. This highlights questions about what LAs can do for the UK energy system, rather than more commonly framed questions about what energy can do for local government goals. Full consideration by UK government of the local contribution to energy innovation would itself represent significant social innovation, breaking away from existing rules and norms of centralised governance.

Further research could first attempt to address specific data gaps identified in this study, particularly around forms of finance for LA energy initiatives, including disaggregated data on use of Salix Finance and the Public Works Loan Board. Second, ongoing devolution processes across the UK provide a ‘natural experiment’ to understand more about the trajectories of local energy activity over time, and to evaluate the effectiveness of government policies under development, such as the Local Energy Hub model in England, and Local Heat and Energy Efficiency Strategies approach in Scotland. Finally, this study emphasises the need to understand more about governance processes involved in scaling up innovation across local authorities (Kern, 2019), in particular the conditions needed to open up opportunities for laggards and followers (Torney, 2019) in local energy governance. This includes both the role of local energy leaders in scaling up processes (Wurzel et al., 2019a) and the overall potential of local authorities to contribute to the re-scaling of energy systems (Kuzemko, 2019; Lloyd, 2018).

6.1 Policy Implications

Diverging pathways to reshaping the energy system are emerging in the UK’s devolved governance institutions. Capitalising on the potential for LAs to scale up user-led innovation will however require further changes. Clarity over the energy policy framework in the UK Clean Growth and Industrial Strategies, and devolved national government plans is a necessary first step. Whilst the UK has met its carbon targets so far, there are critical decision points for carbon budgets and major emissions reductions from buildings (Committee on Climate Change, 2017). Such decisions need to encompass the responsibilities of LAs and ensure adequate resources are available. Stable policy measures with clear timetables and multi-year funding would aid LAs to channel resources and avoid frustrations arising from repeated need for improvisation in local energy developments.

Given the limitations of existing institutional relationships for scaling up and replicating local energy, the main pathway for institutional change in the UK context is through new statutory energy powers and duties with associated resources. The Government’s own adviser, the Committee on Climate Change (2012, p. 9), recommended a statutory duty for LAs to “develop and implement low-carbon plans” which has been further reinforced by a review of government policy on clean growth: “The Government should introduce a statutory duty on local authorities in England and Wales, by Green Week 2020, to develop emissions reduction plans in line with the national targets set by the Climate Change Act 2008” (House of

Commons Science and Technology Committee, 2019 p. 105). This should also be used to establish principles for coordination between national and local energy system planning and development. To avoid the risk of such a duty becoming a ‘box ticking’ exercise, and causing LAs to look for the lowest cost route to compliance, new resources and tools would be essential. New legal, political and financial capacities would resource LAs to assess local energy options and finance, and create clarity on their role and responsibilities. This would overcome uncertainties, drive structural change and create a coherent problem-owner for local clean energy planning and implementation. It would re-orient energy market regulation toward local and regional scales. The resourcefulness and innovativeness of local officers would be enhanced through supportive policy, resources and markets, strengthening the institutional governance capacities of LAs and enabling meso-scale contributions to a coherent social, economic and political process for energy system transformation.

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Data Availability

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Notes

¹ As described in Section 3, the secondary data used in compiling our database do not capture all local activity on energy; for example some LAs in the least active group, could have worked on internally funded energy efficiency, or worked with community enterprises to develop low carbon generation.

² This site is operated under a long term contract (see www.rrsderbyshire.net) and was financed through the GIB, Germany's Bayerische Landesbank and Japan's Sumitomo Mitsui Banking Corporation (see <http://greeninvestmentgroup.com/news-and-insights/2014/uk-green-investment-bank-investment-in-new-green-power-plant-in-derby/>).

³ The distribution of projects was roughly proportional to the number of LAs in each country. Across the UK: in England – 80% of all LAs and 83% of all projects; in Scotland – 7% all LAs, 10% all projects; Wales – 5% all LAs, 5% all projects; and Northern Ireland – 7% all LAs, 5% all projects.

⁴ These include the RE:NEW, RE:FIT, DEPDU and DEEP programmes (see <https://www.london.gov.uk/what-we-do/environment/energy>) and the London Energy Efficiency, and the Mayor's Energy Efficiency Fund (<https://www.london.gov.uk/press-releases/mayoral/mayors-500m-energy-fund-9>).

⁵ For example, this has been raised at UK District Energy Vanguard Network practitioner workshops, see <https://heatandthecity.org.uk/project/vanguards-network/>.

⁶ The UK Public Works Loan Board provides long term borrowing according to the prudential code (see <https://www.dmo.gov.uk/responsibilities/local-authority-lending-pwlb/>).

⁷ Associated support has been delivered through a programme for Enhanced Heating and Cooling Plans, a District Heating Strategy support programme, a network of district heating practitioners, and funding through a dedicated District Heating Loans Fund as well as Low Carbon Infrastructure Transition Programme funding. See <http://www.districtheatingscotland.com/> for an overview.

⁸ Planning consent for infrastructure up to 350MW, Wales Act 2017.