

<b>Institution:</b> University of Edinburgh		
<b>Unit of Assessment:</b> UoA 21 Sociology		
<b>Title of case study:</b> Clean heating for low energy buildings: research-informed policy, regulation, and investment in the UK.		
<b>Period when the underpinning research was undertaken:</b> 2010 - 2020		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Janette Webb Ruth Bush	Professor of Sociology Postdoctoral Research Fellow; Stratego Officer	1986-ongoing 2014-2019
David Hawkey Margaret Tingey Faye Wade	Research Fellow Research Assistant Postdoctoral Research Fellow	2010-2018 2012-ongoing 2018-ongoing
<b>Period when the claimed impact occurred:</b> 2013 - 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<b>1. Summary of the impact</b>  <p>The 'Heat and the City' project examined governance of heat decarbonisation and energy efficiency in buildings in the UK and internationally, leading to the following impact:</p> <ol style="list-style-type: none"> <li>1) informing new <b>Scottish and UK Government heat and energy efficiency policies</b>, including creation of UK Government Heat Networks Delivery Unit and £320M Investment Programme;</li> <li>2) establishing a revised statutory definition of fuel poverty in Scotland, and influencing <b>heat regulation</b> and energy planning through Scottish Government heat network legislation and proposals for new local authority statutory powers;</li> <li>3) guiding <b>investment</b> in integrated smart local energy systems, and low carbon infrastructure, including development of UK Industrial Strategy Challenge Fund bid <i>Prospering from the Energy Revolution</i> resulting in Treasury investment of £102.5M in demonstrators.</li> </ol>		
<b>2. Underpinning research</b>  <p>Professor Janette Webb and the 'Heat and the City' team research the governance of heat decarbonisation and energy efficiency in buildings, and development of local clean energy systems. Research encompasses five externally-funded projects (2010-2020): <i>Heat and the City</i> (RCUK Energy Programme &amp; Scottish Government); <i>Reframing Energy Demand: Innovation for Sustainable Heat</i> (EPSRC grant &amp; ESRC Impact Acceleration Account ); <i>Local Engagement in UK Energy Systems</i> (RCUK Energy Programme, Energy Technologies Institute &amp; ESRC Impact Acceleration Account); <i>Stratego Enhanced Heating and Cooling Plans</i> (Intelligent Energy Europe &amp; Scottish Government); <i>Evaluating Energy Efficient Scotland Pilots</i> (Scottish Government ClimateXChange) and Local and Regional Energy Systems (UKRI/Theme 2 UK Energy Research Centre Phase 4).</p> <p>Heat and the City gathered comparative data from UK and European financial institutions, public sector bodies, trade organisations and the third sector to inform UK- and Scotland-specific energy governance. From international organisations through to Glasgow households, the scale varied between projects, utilising methods combining ethnography of policy processes and business development, expert interviews, social surveys, documentary analysis and secondary</p>		

analysis of public datasets. The research identified the following problems and solutions around three key areas of decarbonising heat and reducing energy demand in buildings:

1. The UK centralised energy system is geared towards large supply-side businesses, marginalising local clean heat business development and limiting incentives for energy saving in buildings. The solution is to *integrate local energy* e.g. through establishment of Heat Networks Delivery Unit (HNDU) (3.1, 3.2), and develop investment models that *future-proof* infrastructures (3.3).
2. Absence of heat network regulation in the UK leads first to uneven customer protection and pricing, further restricting sources of *affordable heating* for vulnerable consumers (3.1, 3.4); and second to investment risks which limit low cost capital for infrastructure. The result is 'island' heat network systems focused on short term financial payback, with limited carbon saving (3.1) In contrast, the research into regulation in Denmark, Norway, Sweden and the Netherlands (3.1, 3.5) identified: requirements on building owners to connect; consumer protection; and technical standards. The solution is *new heat network regulations* to de-risk investment, improve technical standards, and ensure fair prices and services. The lack of investment in skills and capacities for project planning and development further constrains UK progress on heat and energy efficiency (3.1, 3.2).
3. UK local authorities and partners lack *capacities* for cross-sector energy planning for cost and carbon efficient local integration of heat, power, transport and storage systems. The solutions are: investment in specialist expertise; and capacity building and locality scale demonstrators to increase knowledge about local energy system options, including access to data and support for business and supply chain innovation (3.6).

### 3. References to the research

**3.1** Hawkey, D., Webb, J., Lovell, H., McCrone, D., Tingey, M., & Winskel, M. (2015) *Sustainable Urban Energy Policy: Heat and the city* (1st ed.). Routledge (Can be supplied by HEI on request). <https://doi.org/10.4324/9781315739533>

**3.2** Webb, J., Tingey, M. and Hawkey, D. (2017) *What We Know about Local Authority Engagement in UK Energy Systems: Ambitions, Activities, Business Structures & Ways Forward*. London, UK Energy Research Centre and Loughborough, Energy Technologies Institute.  
[https://web.archive.org/web/20210114153633/http://www.sociology.ed.ac.uk/data/assets/pdf/file/0009/242478/LEUKES\\_LAEnergyEngagement.pdf](https://web.archive.org/web/20210114153633/http://www.sociology.ed.ac.uk/data/assets/pdf/file/0009/242478/LEUKES_LAEnergyEngagement.pdf)

**3.3** Bale, C. S. E., Bush, R. E., Hawkey, D. and Webb, J. (2014) Chapter 5: Valuation of passive provision for heat network investments. In: Brown, A. and Robertson, M. (ed.) *Economic evaluation of systems of infrastructure provision: concepts, approaches, methods*. Leeds: iBUILD.  
[https://web.archive.org/web/20210114154326/https://research.ncl.ac.uk/ibuild/outputs/reports/9940\\_iBuild\\_report\\_print\\_version%20WEB.pdf](https://web.archive.org/web/20210114154326/https://research.ncl.ac.uk/ibuild/outputs/reports/9940_iBuild_report_print_version%20WEB.pdf)

**3.4** Webb, J., Hawkey, D., McCrone, D., and Tingey, M. (2016) House, home and transforming energy in a cold climate, *Families, Relationships and Societies*, 5(3) (Special Issue on Families, Relationships and the Environment: Climate Change, Sustainability and Biodiversity), 411–429. DOI: [10.1332/204674316X14758447787663](https://doi.org/10.1332/204674316X14758447787663)

**3.5** Hawkey, D., Webb, J. (2014) District energy development in liberalised markets: situating UK heat network development in comparison with Dutch and Norwegian case studies. *Technology Analysis & Strategic Management*, 26(10), 1228–1241. DOI: [10.1080/09537325.2014.971001](https://doi.org/10.1080/09537325.2014.971001)

**3.6** Wade, F., Webb, J., and Creamer, E. (2019) Local Heat and Energy Efficiency Strategies: Phase 1 Pilots – Social Evaluation Report, published by the Scottish Government, 6 September 2019.

<https://web.archive.org/web/20201026111931/https://www.gov.scot/publications/local-heat-energy-efficiency-strategies-phase-1-pilots-social-evaluation/pages/5/>

#### 4. Details of the impact

Heat and the City research has transformed UK and Scottish energy governance, across three main areas:

- UK and Scottish Government **policies** for energy governance, integrating local energy planning alongside the largest public investment in UK heat networks and contributing to UK Treasury guidance.
- Scottish Government **regulation**, by contributing first to a revised statutory definition of fuel poverty, and second to heat network regulation to de-risk investment, increase standards and ensure fair prices.
- UK and Scottish Government **investment** in integrated local energy systems, particularly through capacity building, demonstrator projects and real-time evaluation research.

#### UK Policy – Heat Policy, and Future-Proofing infrastructure investment

The UK Government Department for Energy and Climate Change (now Department for Business, Energy and Industrial Strategy (BEIS)), after a successful bid led by BRE with the Heat and the City team as the academic partner, funded research on barriers to development of district heating networks; the report (5.1) integrated early findings (3.3, 3.5). This report's recommendations were partially published in the UK Government Heat Strategy 2013 (5.1) and directly led to the decision to establish a new policy unit within UK Government in 2014. It is noted on the UK Government website that *"Since its inception, HNDU has run 9 funding rounds – awarding £23 million in total – and is currently running Round 10. Over 250 unique projects have so far been supported across 150 local authorities"* (5.1). The UK Treasury used research findings (3.3) on future proofing infrastructure, specifically the concept of 'passive provision', leading to UK Treasury Supplementary Green Book guidance (5.2) for assessing investment in heat networks. A research case study of heat network investment (3.3) was included in UK Treasury Green Book supplementary advice as an exemplar for public bodies to apply (5.2).

#### Scottish Policy and Regulation – Fuel Poverty, Local Heat and Energy Efficiency Strategies and District Heating Regulation

The social survey research (3.1, 3.4) on householders in Wyndford, Glasgow, as well as comparative studies of heat as a service (3.5) contributed to a new definition of fuel poverty under the Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019. Wyndford householders lived through a major housing estate renovation and retrofit of energy efficiency and district heating. Findings formed the basis for Webb's appointment to the Scottish Government Academic Review Panel; the Panel proposed a new definition of Fuel Poverty which Scottish Government formally accepted, and included in legislation (5.3). Examining dimensions of fuel poverty, findings (3.1, 3.4) contributed to the inclusion of principles for affordable warmth and minimum income in the new policy definition. In her letter to Professor Webb, the Cabinet Secretary for Communities, Social Security and Equalities, Angela Constance, states *"Your vast experience in comparative European policy and practice for sustainable heat and energy efficiency has provided valuable input into the definition review"* (5.4).

In Scotland, proposed heat network regulation has been shaped by comparative analyses of European regulations (3.1, 3.5) which were part of the evidence base in Scottish Government proposals for new *Local Heat and Energy Efficiency Strategies (LHEES) and District Heating Regulations* (5.5). Webb and the Heat and the City team have been closely involved in policy development (2011-ongoing), including through expert and technical advisory roles to Scottish Government cross-sector Working Groups. In his letter to the 2016 Special Working Group on Regulation the Scottish Minister, Paul Wheelhouse, stated that its expertise contributed to "a

*comprehensive and insightful consultation document, which will be invaluable in informing and progressing potential legislation in this complex area” (5.6).*

The *Heat Networks (Scotland) Bill (SP Bill 64)* was introduced to Parliament on 2 March 2020. (5.7). The accompanying Policy Memorandum accepted the expert advice on the need for a heat supply license, and for regulation covering pricing, service and technical standards (5.8). Webb’s evidence relating to poor data quality on the energy performance of non-domestic buildings was cited in the Policy Memo which refers to these *“risks resulting in Heat Network Zones being less robust than they otherwise might be. This may increase the risk that their designation is challenged.[...] the Bill will place a duty, initially, on public sector building owners to undertake an assessment of the viability of their buildings to connect to a heat network”* (5.8 pp.11-12).

### **UK and Scottish Government Investment in low carbon strategies and research**

Webb and her team’s research was a component of a body of evidence that contributed to the inclusion of low carbon principles in the decision to establish an Infrastructure Commission for Scotland. Webb was appointed to the Commission as a low carbon expert, and the new commission’s remit included low carbon investment principles for a 30-year strategy, directly influenced by Heat and the City research (3.1, 3.3, 3.5): *“The Commission will provide independent, informed advice on the vision, ambition and priorities for a long-term, 30-year strategy for infrastructure in Scotland to meet our future economic growth and societal needs”* (5.9).

Webb was appointed Expert Adviser to UK Research and Innovation (UKRI) to help develop a business case to BEIS and Her Majesty’s Treasury (HMT) for investment in integrated local energy system demonstrators and designs, capacity building and research under the Industrial Strategy Challenge Investment fund (ISCF). Webb et al’s research findings (3.1, 3.2, 3.6) fed into the successful bid which secured GBP102,500,000 investment from HMT into the *Prospering from the Energy Revolution (PFER)* challenge. Webb’s contribution was in particular on the involvement of Local Authorities as key stakeholders, and she was subsequently appointed on the Challenge Advisory Board. The Deputy Challenge Director, UKRI, said *“The most important and timely work that helped secure confidence in LA’s appetite for developing activities in local energy was research developed by ETI/UKERC (Local Authority Engagement in UK Energy Systems; Webb, Tingey and Hawkey, 2017 [3.2]) which set out which areas were engaged in the agenda to what degree, and enabled the case to be made that there were a significant number of authorities ‘running hard’ to develop local energy projects.* (5.10).

Webb has been awarded an MBE for her services to energy transition in the UK in the Queen’s Honours List (2020) (5.11).

## **5. Sources to corroborate the impact** (indicative maximum of 10 references)

### **5.1 Heat Network Strategy**

- *Research into barriers to deployment of district heating networks: Research study by BRE, University of Edinburgh and the Centre for Sustainable Energy for the Department of Energy & Climate Change*, Wiltshire R., & King, M., BRE; Webb, J., University of Edinburgh; and Banks, N., CSE, March 2013, UK Government Department of Energy & Climate Change, London URN 13D/073.  
[https://web.archive.org/web/20190724143921/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/191542/Barriers\\_to\\_deployment\\_of\\_district\\_heating\\_networks\\_2204.pdf](https://web.archive.org/web/20190724143921/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191542/Barriers_to_deployment_of_district_heating_networks_2204.pdf)
- The Future of Heating: Meeting the Challenge – [UK Government Heat Strategy], Department of Energy & Climate Change, March 2013 in footnote no 55, 67, 69, 76 – 79.  
[https://web.archive.org/web/20201108140646/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/190149/16\\_04-DECC-The\\_Future\\_of\\_Heating\\_Accessible-10.pdf](https://web.archive.org/web/20201108140646/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/190149/16_04-DECC-The_Future_of_Heating_Accessible-10.pdf)

- Gov.UK website. *Heat Networks Delivery Unit (HNDU)*.  
<https://web.archive.org/web/20201030150059/https://www.gov.uk/guidance/heat-networks-delivery-unit>

**5.2** Valuing infrastructure spend: Supplementary guidance to the Green Book, UK Treasury, March 2015 in footnote no 13

<https://web.archive.org/web/20201204153314/https://www.gov.uk/government/publications/green-book-supplementary-guidance-valuing-infrastructure-spend>

**5.3** Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019.

<https://web.archive.org/web/20201204133044/https://www.legislation.gov.uk/asp/2019/10/enacted>

**5.4** Cabinet Secretary Communities, Social Security and Equalities Angela Constance Letter 14 Nov 2017.

**5.5** Local Heat and Energy Efficiency Strategies (LHEES) and District Heating Regulations.

<https://web.archive.org/web/20201204133256/https://www.gov.scot/publications/scotlands-energy-efficiency-programme-analysis-second-consultation-local-heat-energy-efficiency-strategies-regulation-district-communal-heating/pages/4/>

**5.6** Minister for Business, Innovation and Energy, Paul Wheelhouse letter 25 Jan 2017.

**5.7** Heat Networks (Scotland) Bill (SP Bill 64) as introduced in the Scottish Parliament on 2 March 2020

[https://web.archive.org/web/20200824103945/https://www.parliament.scot/S5\\_Bills/Heat%20Networks%20\(Scotland\)%20Bill/SPBILL64LCS052020.pdf](https://web.archive.org/web/20200824103945/https://www.parliament.scot/S5_Bills/Heat%20Networks%20(Scotland)%20Bill/SPBILL64LCS052020.pdf)

**5.8** Heat Networks (Scotland) Bill – Policy Memorandum; quotes Wade and Webb in footnote no 35.

[https://web.archive.org/web/20200824103929/https://www.parliament.scot/S5\\_Bills/Heat%20Networks%20\(Scotland\)%20Bill/SPBILL64PMS052020.pdf](https://web.archive.org/web/20200824103929/https://www.parliament.scot/S5_Bills/Heat%20Networks%20(Scotland)%20Bill/SPBILL64PMS052020.pdf)

**5.9** Contribution to the Infrastructure Commission for Scotland as a low carbon expert:

- Infrastructure Commission for Scotland Remit  
[https://web.archive.org/web/20210129185826/https://infrastructurecommission.scot/storage/223/Appendix\\_A.pdf](https://web.archive.org/web/20210129185826/https://infrastructurecommission.scot/storage/223/Appendix_A.pdf)
- Cabinet Secretary for Transport, Infrastructure and Connectivity Michael Matheson. Letter 13 August 2020.

**5.10** Testimonial, Deputy Challenge Director, Prospering from the Energy Revolution, UKRI.

**5.11** University of Edinburgh staff recognised in Queen's Birthday List 2020.

<https://web.archive.org/web/20210118174535/https://www.ed.ac.uk/news/2020/staff-recognised-in-queen-s-birthday-honours> (award delayed from June 2020 due to Covid19)