EnergyREV

Decarbonisation of heat: How smart local energy systems can contribute

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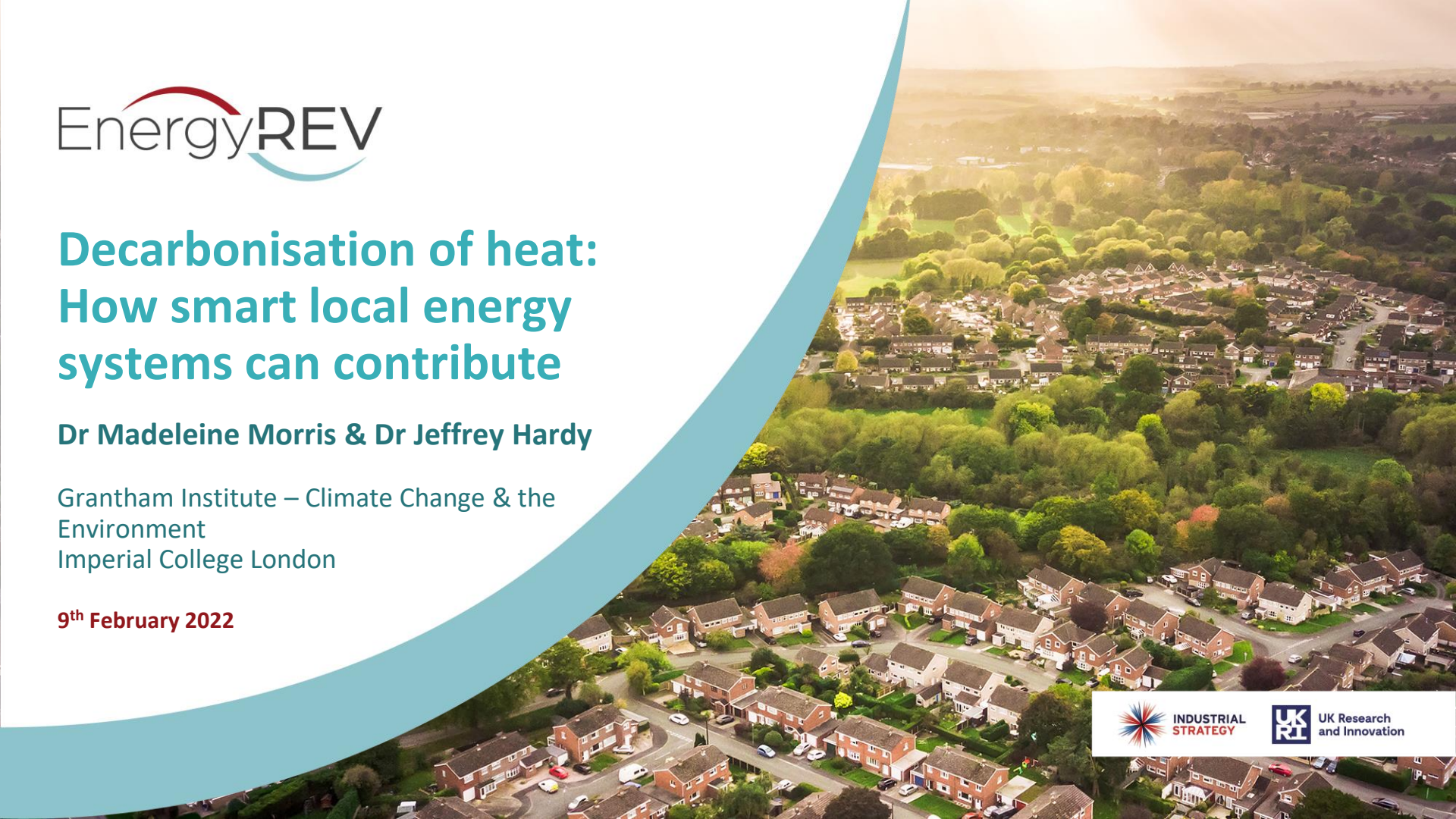
9th February 2022



INDUSTRIAL STRATEGY

UK Research and Innovation

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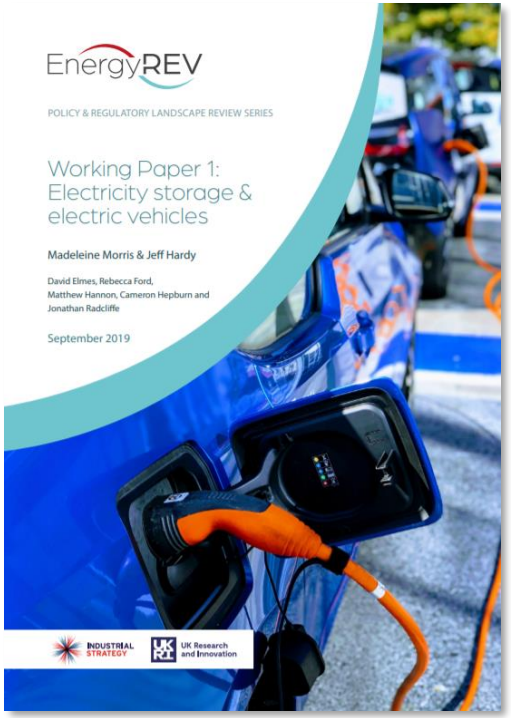
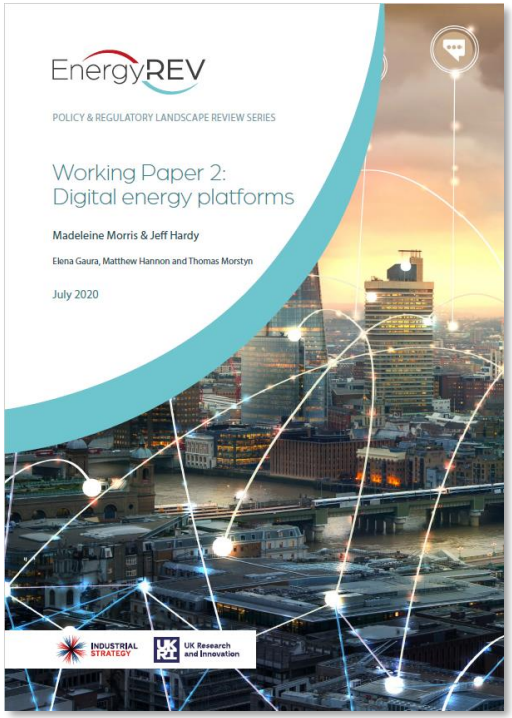
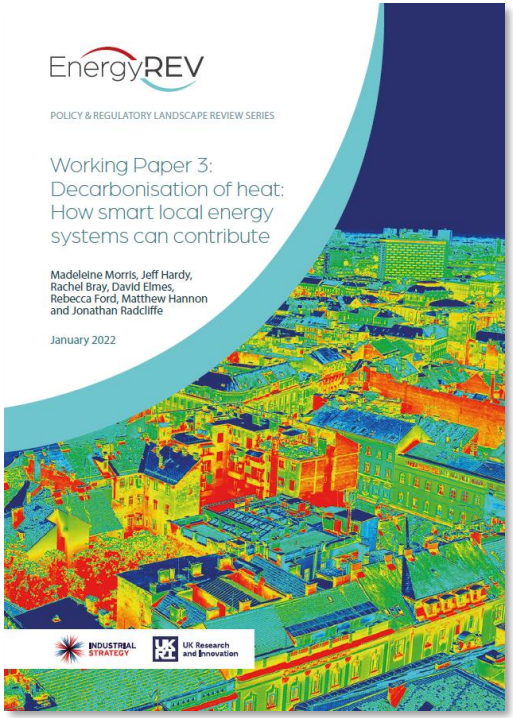
Overarching research question:

Do we have the appropriate policy, institutional and regulatory framework to realise the technical, economic and societal potential of Smart, Local Energy Systems?

Policy & regulatory landscape review series







energyrev.org.uk/outputs

Why heat?

- Heating accounts for 37% of UK carbon emissions.
- 76% of UK buildings are heated by gas and just 8% of heat is from renewable resources.
- 60% of existing homes are rated <EPC band C – UK homes lose heat up to three times faster than in other European countries.
- Compared to electricity and transport, heat has seen less decarbonisation progress and is siloed as a separate 'heat problem'.
- The societal impacts and interactions of heat make decarbonisation much more than a technical challenge - without significant changes, transition is likely to exacerbate societal inequalities
- Decarbonisation of heat is a systemic & wicked problem

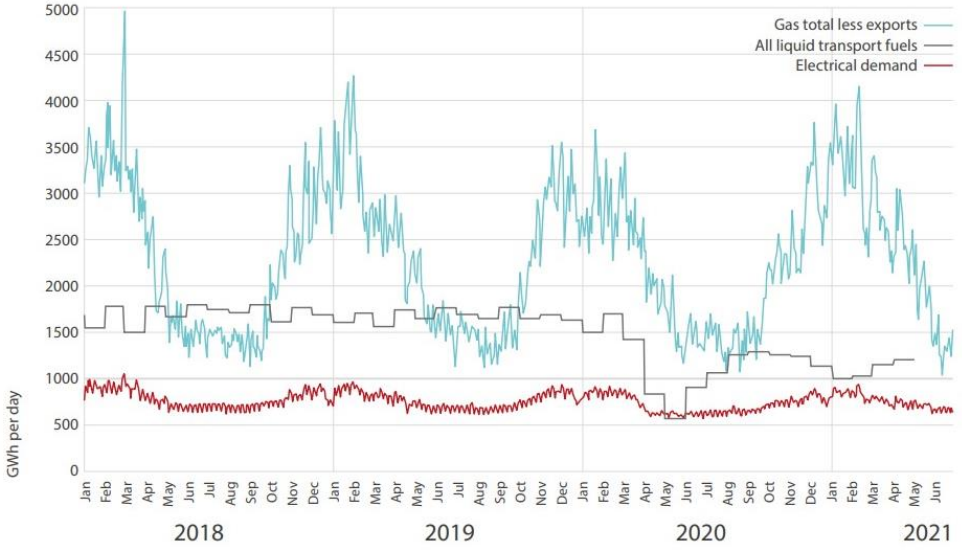


Figure 2: Multi-vector energy diagram for Great Britain between January 2018 and July 2021. Redrawn from graph by Dr Grant Wilson, University of Birmingham. Underlying data from National Grid, Elexon and BEIS.

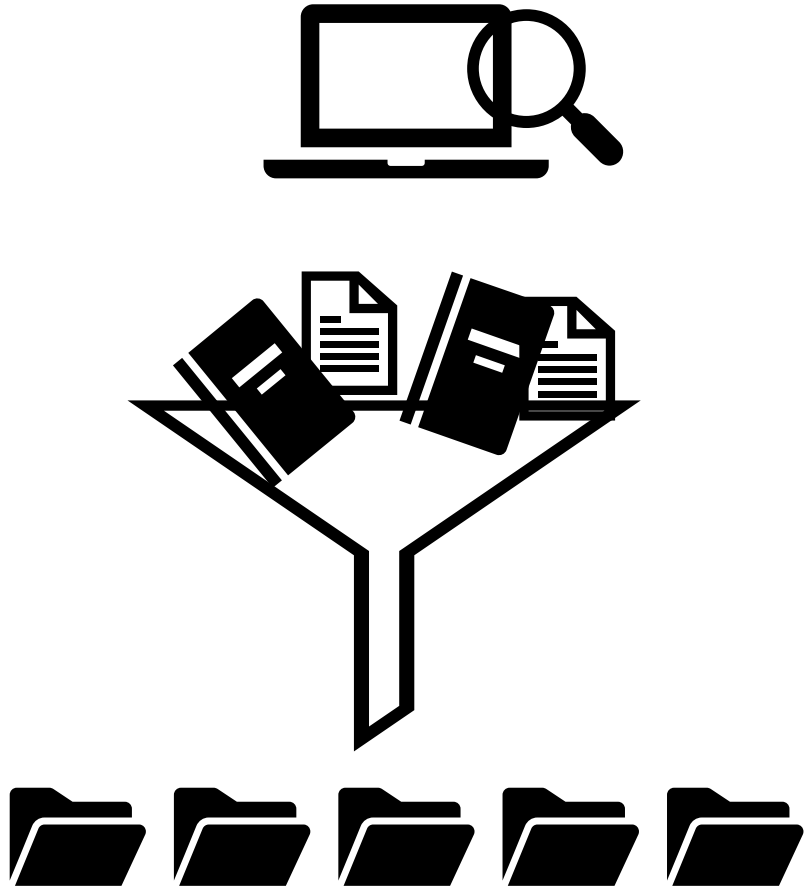
Why a smart and local approach?

- Heat is inherently **local** - it is generated close to demand in homes, businesses, schools, communities, etc.
- To date, government has (mostly) approached heat decarbonisation as a siloed national issue with top-down strategies.
- Heat will need to be (but isn't currently) **smart** to manage short-term and inter-seasonal variation of demand, especially in a more electricity driven future.
- It is also a system challenge to integrate variable output renewables, electric vehicles and decarbonised heat - unlocking demand-side flexibility is key.
- Our review sought to understand policy, regulation and market structures in the UK, and use the evidence to identify gaps and barriers to the emergence and success of SLES

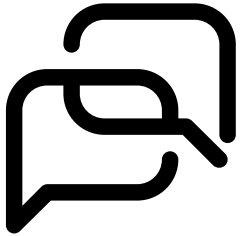
Systematic review & emerging themes

- Rigorous systematic search & review process
- Inductive ‘coding’ of information & thematic analysis
- Focus on cross-cutting barriers
- Evidence showing how smart local energy systems could help to address these barriers

Plenty of smart *or* local, but little smart *and* local

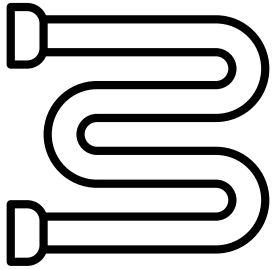


Cross-cutting barriers to heat decarbonisation

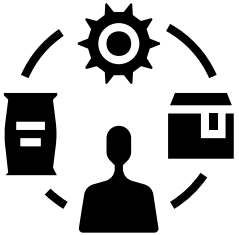


Information, engagement and behaviour

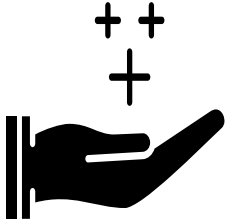
Strategy, policy and regulation



Infrastructure

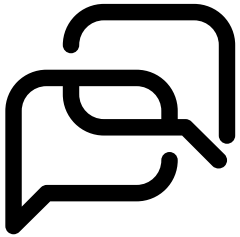


Supply chain and skills



Distribution of costs and impacts

Cross-cutting barriers to heat decarbonisation



Information, engagement and behaviour

- Behaviour change will be needed
- But public awareness, trust, and acceptability of zero carbon heat are low
- We don't know how to engage with people on heat

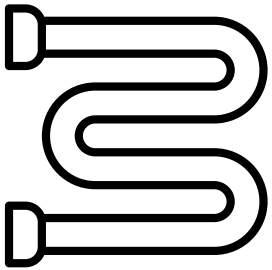
Alternative methods of inducing rapid change need to be considered

Strategy, policy and regulation

- Long-term strategy has been lacking
- Policies have been fragmented and stop-start
- Heat has been considered separate from the rest of the energy system

Consumers at risk, thermally inefficient building stock, high reliance on gas

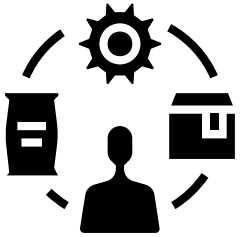
Cross-cutting barriers to heat decarbonisation



Infrastructure

- How can existing infrastructure be repurposed?
- How much of the same infrastructure will be needed? And where?
- How can issues with existing infrastructure be overcome?

Answering these questions without long-term strategy risks technology 'lock-in', and higher costs.



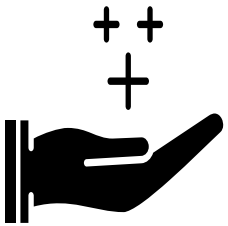
Supply chain and skills

- The UK doesn't have the capacity to deliver – we need to reskill & build supply chains
- Business model innovation could help to mitigate consumer risk and hesitation

A lack of clear direction means businesses have been unable to invest in training, skills, capabilities and partnerships

Current licensing arrangements stifle innovation

Cross-cutting barriers to heat decarbonisation



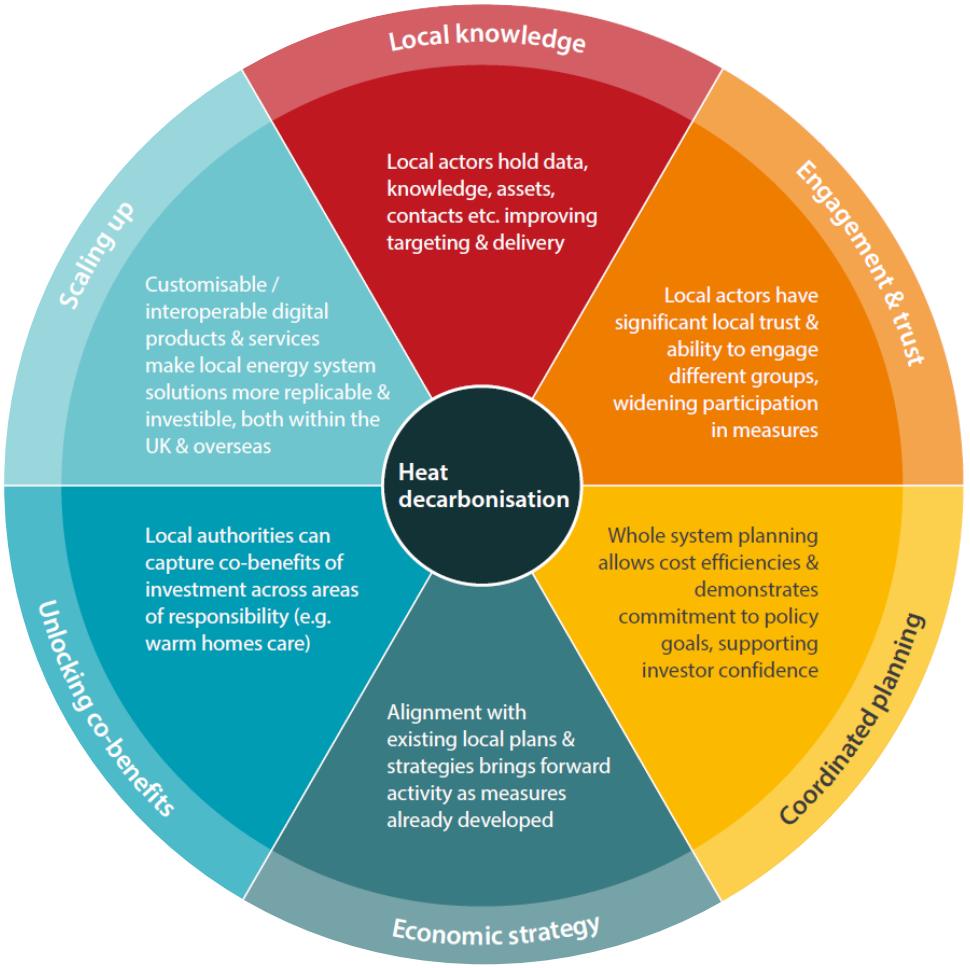
Distribution of costs and impacts

- Uncertainty about how costs should be distributed
- Relative price of electricity is inflated, & gas prices do not reflect externalities
- Needs to be more consideration of co-impacts of poorly insulated homes (e.g. health & economic)

Without redistribution of costs, decarbonisation of heat will be slow and will likely exacerbate fuel poverty

The ‘SLES prism’

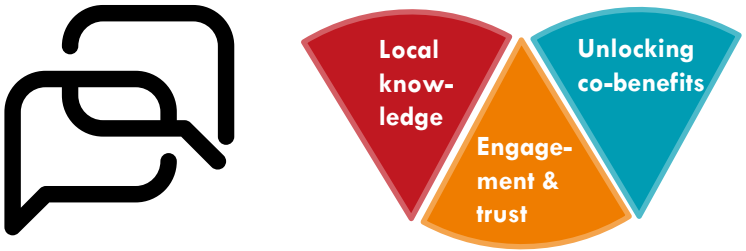
- First introduced in ‘Post-pandemic recovery: How SLES can contribute
- Six key elements of SLES approach that could enhance outcomes of recovery measures
- Used here as a framework to explore how a SLES approach could overcome the cross-cutting barriers



[SLES = smart local energy systems]

How SLES can overcome the barriers

Information, engagement and behaviour



- Draw on knowledge of trusted local actors for effective engagement
- Smart business models could avoid need for some behavioural changes
- Putting local co-benefits at heart of plans could be more acceptable for citizens

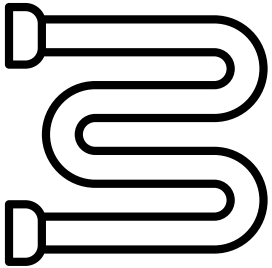
Strategy, policy and regulation

- Opportunity & desire to align net zero strategies with local requirements & statutory duties
- Smart & place-based approaches cheaper than national plans

[SLES = smart local energy systems]

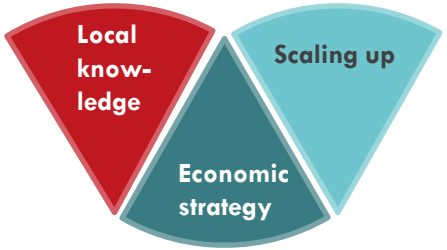
How SLES can overcome the barriers

Infrastructure



- Local plans can account for local resources, challenges & capabilities across heat, transport, power, & energy storage
- Support & inform national decisions on what to do with old infrastructure & where to put new infrastructure

Supply chain & skills

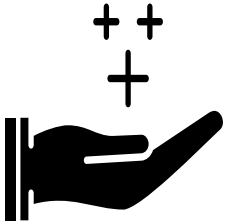


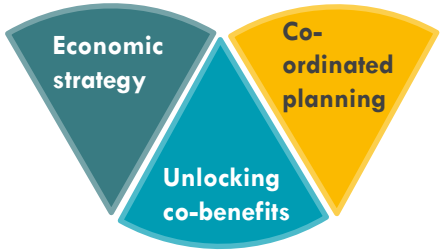
- Takes advantage of local/regional assets, opportunities, & needs
- Local leaders best placed to align work of central government with local action
- Local authorities can leverage purchasing power

[SLES = smart local energy systems]

How SLES can overcome the barriers

Distribution of costs and impacts





- Lower overall cost savings
- Local actors ideally placed to

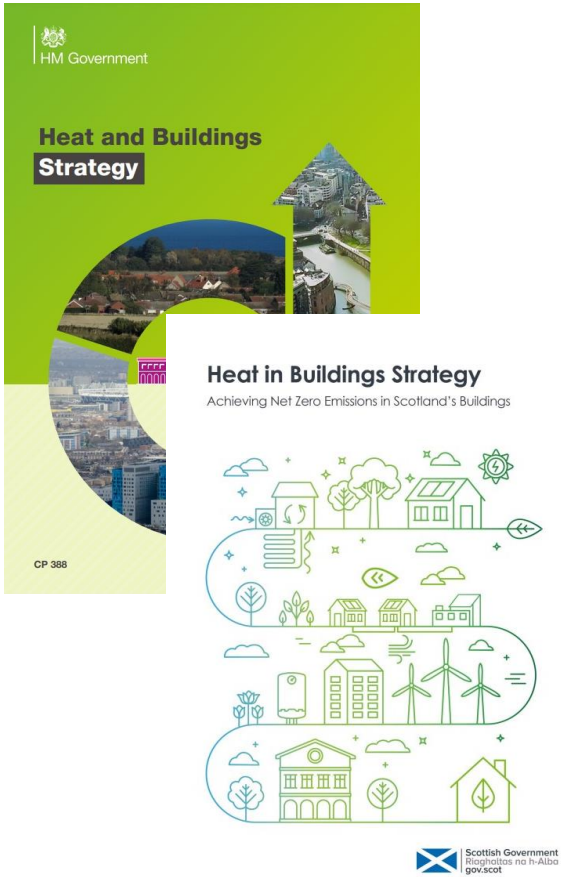
1. Identify which benefits are most urgently needed

2. Capture multiple benefits through smarter planning

[SLES = smart local energy systems]

Missed SLES opportunity by government?

- **Information, engagement and behaviours**: No major announcements (UK); National Public Energy Agency to be launched in Scotland.
- **Strategy, policy and regulation**: Recognition of role of local authorities, but no additional duties (UK); Statutory duty for all local authorities to develop Local Heat and Energy Efficiency Plans (Scotland). New home standards being developed & fossil fuel bans 'signalled'.
- **Infrastructure**: Support for heat networks (both). Decisions on hydrogen for heating 2026 (UK).
- **Supply chain and skills**: Supply chain & skills action plans coming in 2022 (both).
- **Distribution of costs and impacts**: Focus on innovation and supply chain to drive down costs + boiler replacement grants (UK). Interest free loans for heat and energy efficiency (Scotland). Decision on shifting policy costs from electricity to gas in 2022.



Recommendations

Central government

- Provide certainty through long-term strategies
- Take key decisions ASAP
- Ensure LAs have resources & capabilities commensurate with net zero ambitions
- Bring heat network regulation under Ofgem's remit
- Review cost distributions of societal & environmental impacts

Local government

Devolve powers and responsibilities to local government:

- Energy efficiency of buildings
- Engage with businesses & consumers
- Work with network & system operators
- Dispersion of grant funding
- Coordination of skills & training

Ofgem

- Enable regional/local business model innovation through regulatory sandbox model

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