EnergyREV

DEVELOPING AN ORGANISING FRAMEWORK

How do we create successful smart local energy systems?

WORKSHEETS

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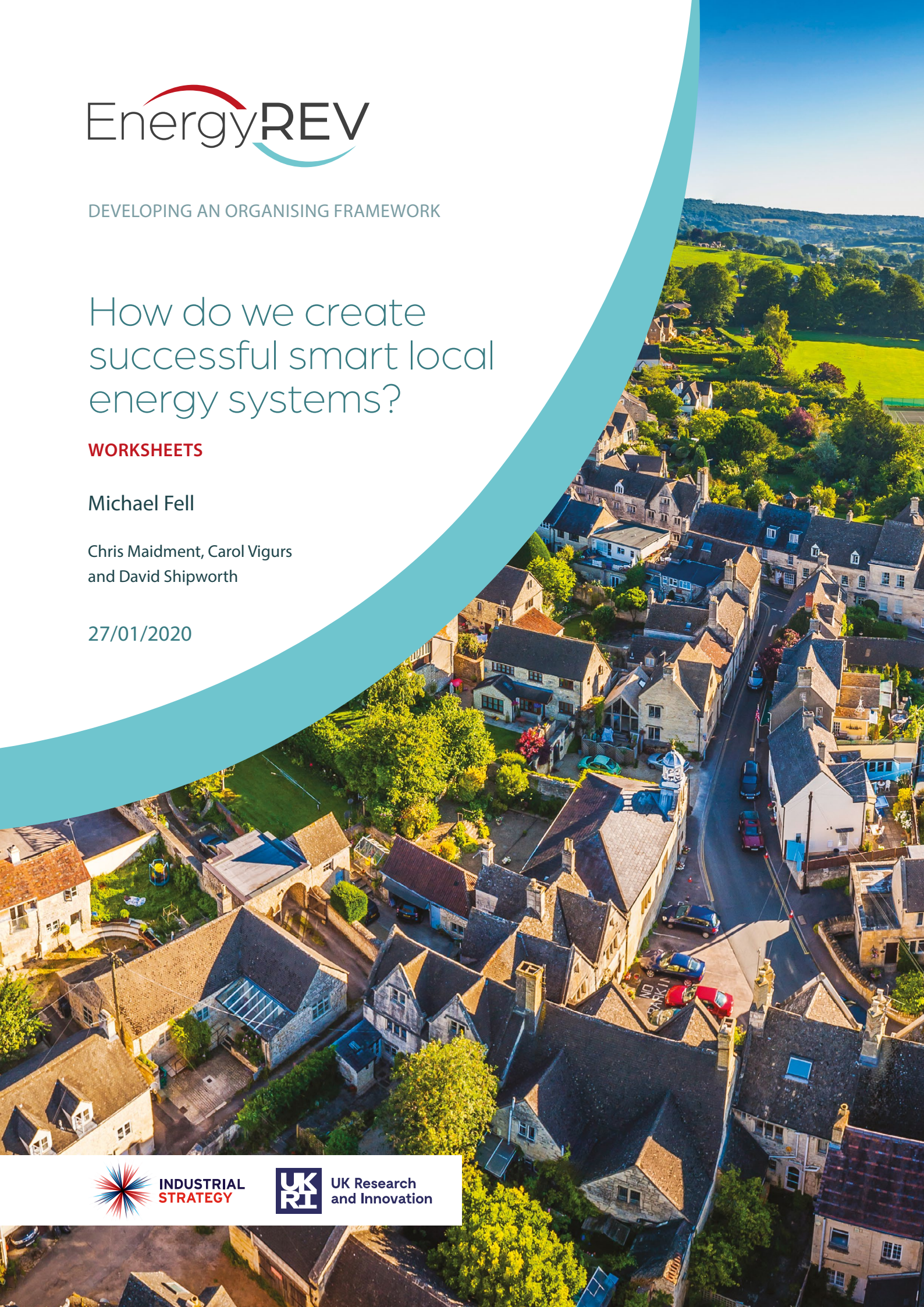
27/01/2020



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Worksheets

How to use these worksheets

Are you putting together plans for a smart local energy system (SLES), or even developing one at the moment? Are you wondering about the role your business or organisation could play in such a system? Or are you a local or national policymaker considering how changes to the policy or regulatory landscape could support the emergence of successful SLES? If so, our simple set of discussion worksheets will help you ensure you are thinking through a range of important issues.

The worksheets set out, for each of the challenge areas, the necessary conditions for SLES to come about; necessary conditions for good outcomes to result; key assumptions that need to be tested; and key risks to watch out for. Under each challenge area, we have provided space for you to reflect on the following points:

- What is your role, and/or that of your organisation, in relation to creating these conditions or mitigating these risks?
- What activities are you undertaking in support of this?
- Or why do you disagree that this is an important consideration for you?

You may wish to take into account some of important contextual factors which will vary from locality to locality:

- Local energy resource capacity – physical, including terrain type.
- Local skills base.
- Existing communities of interest and prior experience, community cohesion.
- Demographic factors, including economic, employment, etc.
- Infrastructure – energy i.e. capacity, but also broadband, transport, building stock, etc.
- Local governance – type, approach, capacity.

Suggestions for how to use these materials include:

- Thinking through, and noting down, your responses for yourself.
- Printing out the worksheets to use as a handout and discussion prompt in a project meeting.
- Blowing up the tables into a larger format and using them in a workshop, and inviting participants to add notes with their own suggestions.

We hope you find these worksheets useful. If you have any feedback on using the infromation or how they could be improved, please email Michael Fell, michael.fell@ucl.ac.uk.

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Digital layer	
Challenge area: Data	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	High penetration of sensing/Internet-of-Things leads to substantial new data collection. Products and services are developed which support SLES operation (e.g. tariffs, peer-to-peer trading, improving energy efficiency, maintenance, diagnosis, warranties, distributed control and better technology assessment).
Necessary conditions for good outcomes	New products and services create economic value through savings for consumers and revenues for business. Social value is created as community services lead to health and/or wellbeing improvements.
Main assumptions	Necessary data collection is socially acceptable and appropriately regulated. Organisations perceive the results as valuable enough to justify the additional costs of data collection, and to develop products which are then taken up. Processes are in place to ensure sufficient data quality and interoperability. Savings are passed on to users, and services are offered to, and accessed by, those who most need them.
Risks	Data security and privacy concerns.

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People and organisations layer	
Challenge area: Users	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Local domestic and non-domestic users participate in SLES (as users, but also project/service design if they wish), and understand, support and in some cases champion the value of SLES to community.
Necessary conditions for good outcomes	Users interact with SLES in a way that both supports system operation and benefits themselves. Reduced and flexible demand leads to better local balancing, contributing to reduction of carbon emissions and network costs, and lower bills.
Main assumptions	There is (or can be) appetite amongst users to get involved in SLES planning, and developers have the skills and incentives to accommodate this. Products/services allow users to support SLES operation and their own needs.
Risks	Design of SLES/processes omits interests of certain groups, meaning they miss out on benefits, and reducing support for SLES with the potential for resistance campaigns. This may include lack of access to generation, storage or flexibility technologies.

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People and organisations layer	
Challenge area: Skills	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Workers with skills relevant to design, operation and maintenance of SLES have been trained and are present locally. There is also sufficient supply of those with general skills (e.g. communications, facilitation, project management).
Necessary conditions for good outcomes	Operating and maintaining SLES provides reliable, local high-value employment and training opportunities, reducing unemployment and increasing earnings.
Main assumptions	SLES are known about, and people know what skills are needed and have confidence they will be valued on an ongoing basis. Training is known about and accessibly priced. SLES create significant new work opportunities, especially locally.
Risks	Prioritising employment of local people but with wrong skills negatively affects SLES performance. If SLES do not happen locally or elsewhere, certain skills may not be needed.

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People and organisations layer	
Challenge area: Business and finance	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Organisations collaborate to conceive and design SLES, which passes feasibility study. Affordable finance is available to organisations seeking to develop SLES solutions.
Necessary conditions for good outcomes	Organisations involved in SLES sustain and grow revenues, and new businesses are created, including those with legal structures that benefit employees and other stakeholders. Local employment is increased.
Main assumptions	Innovative routes to financing exist that are consistent with local needs, and there is policy (and other) certainty regarding future of SLES. Evidence of previous success is accessible and persuasive. Organisations are aware of SLES opportunities and willing to collaborate with each other.
Risks	Optimal outcomes for SLES may be suboptimal for individual elements.

Service layer	
Challenge area: Heating and cooling	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Organisations develop heating/cooling-related products and services that are taken up by users and support SLES operation, such as through storage and demand flexibility/reduction.
Necessary conditions for good outcomes	Investment returns support sustainable industry growth, as low-carbon heating/cooling competes successfully. Net zero targets increasingly prompt greater household/commercial spend on energy demand reduction, reducing carbon emissions and improving comfort and health.
Main assumptions	Broad awareness of importance of heating/cooling in low-carbon transition, and organisations are aware of the different solutions available. Low-carbon products/service options are attractive to users and easy to access and use (balancing automation and user involvement). Regulation allows innovation while protecting users.
Risks	Regulation either stifles innovation, or allows diffusion which outpaces the ability of energy system infrastructure to adapt. Certain users are unable to access new products/services and miss out on benefits. Inescapable service contracts charge users too much or allow poor quality service.

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Service layer	
Challenge area: Mobility	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Increased penetration of electric vehicles supports effective local grid balancing, aided by products/services such as local flexibility tariffs and markets. And/or increased reliance on active transport reduces local energy demand, making it easier to cover local demand from local generation (while reducing capacity to provide flexibility services).
Necessary conditions for good outcomes	Mobility-related carbon emissions are reduced as internal combustion vehicles decrease, which also leads to reductions in air pollution and related health improvements. These are also supported by increased use of active transport. Lower mobility costs increase disposable income.
Main assumptions	EV charging infrastructure is broadly interoperable. Participating in smart charging and/or vehicle-to-grid (V2G) services provides acceptable levels of vehicle reliability, consistent with user adoption.
Risks	Electrification of transport does not address congestion or road safety, and displaces active transport, so reducing health and wellbeing benefits. However, limited storage capacity provided by EVs constrains local flexibility potential. Savings/income only accrue to those who are able to access EVs.

Service layer	
Challenge area: Ecosystems	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Land use change (e.g. for solar farms) provides an opportunity to improve degraded landscapes, manage for pollinators, increased biodiversity, etc.
Necessary conditions for good outcomes	Enhanced ecosystem services and natural capital. This includes improved agricultural productivity, and health improvements through access to attractive environments and reduced pollutants.
Main assumptions	Environmental betterment principles are applied in planning and development.
Risks	Energy system changes lead to increase in new/different material outflows with unknown impacts. Unsustainable resource use associated with extraction, processing, manufacture, transport, construction, end-of-life disposal. Land use change without environmental betterment leads to habitat loss, carbon release.

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Whole system layer	
Challenge area: Technology and system interactions	**What is your role in relation to creating these conditions or mitigating risks?** **What activities are you undertaking in support of this?** **Or why do you disagree that this is an important consideration for you?**
Necessary conditions for SLES	Widely adopted smart/energy technologies reliably interoperate within and across SLES, unlocking local and multi-vector flexibility.
Necessary conditions for good outcomes	Markets and other control strategies harmonise with those in distinct or higher/lower nested SLES, reducing new infrastructure requirements, operating costs, and bills.
Main assumptions	Smart/energy technology is accessible/desirable, with sufficient operable lifespan. Regulation supports component and system interoperability. Investors invest in systems rather than (just) individual components, and responsibility for system design/operation is clear. Investment and societal priorities align with optimal SLES outcomes. Regulation, incentives and market design ensure outcomes are better for individual SLES if they do not conflict with each other.
Risks	Interoperability challenges mean individually effective technologies cannot be integrated and provide benefits, or disrupt the system. Less 'influential' SLES areas are negatively impacted. Savings in overall system costs lead to rebound effects which increase energy use.

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General assumptions

- That benefits of local approaches outweigh those of larger scale approaches.
- That there is widespread access to basic enabling technology, for example, smartphone, broadband.
- There is increased adoption of renewable energy and energy storage technologies.
- Lessons on (un)successful SLES are effectively shared.

Key contextual factors

- Local energy resource capacity – physical, including terrain type.
- Local skills base.
- Existing communities of interest and prior experience, cohesive community.
- Demographic factors, including economic, employment.
- Infrastructure – energy i.e. capacity, but also broadband, transport, building stock etc.
- Local governance – type, approach, capacity.

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Want to know more?

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Sign up to receive our newsletter and keep up to date with our research, or get in touch directly by emailing info@energyrev.org.uk

About EnergyREV

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

EnergyREV is funded by UK Research and Innovation, grant number EP/S031863/1

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