Work package 6: Policy, markets and regulation

Co-investigators

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Team experience

Niall Kerr

- 2017-2020: ClimateXChange Research Fellow producing evidence reviews for the Heat and Energy Efficiency Unit in the Scottish Government
- 18 month (full and then part time) secondment to Scottish Government Heat and Energy Efficiency Team
- PhD: multidisciplinary study of the political, social and economic rationales for home energy retrofit

Ronan Bolton

- Reader in STIS Group School of Social and Political Science, UoE
- Co-I on UKERC 4, focusing on economic regulation of networks
- History and politics of electricity markets

Mark Winskel

- Senior Lecturer, STIS Group, School of Social and Political Science, UoE
- Co-I on EPSRC-ESRC ‘Heat and the City’ and ‘Innovation for Sustainable Heat’
- Co-I on UKERC 4, and Directorate and PI, ClimateXChange

Science Technology and Innovation Studies Group

- History of science and technology
- Sociology of knowledge and expertise
- Technology, society and end users
- Innovation processes and policy

Thematic areas

1. Energy, Environment and Sustainability
2. Innovation in Life Sciences (Agriculture, Food and Health)
3. Social Studies of Biology and Medicine
4. Historical Approaches to Science, Technology and Medicine
5. Social Studies of Information and Communication Technologies

Integrate Workpackage 6: Policy, Markets and Regulation

- **M6.1**: Map the evolution of the GB market for flexibility services and identify structural relationships between electricity and gas markets for system flexibility.
- **M6.2:** Identify appropriate regulatory and market arrangements for different seasonal storage options and STES in particular.
- **M6.3:** interviews with market actors and key stakeholders to identify key technological and market trends for the valuation of inter-seasonal storage.
- **M6.4:** comparative review of the role of STES in key energy system modelling and scenarios studies related to UK's low carbon heat transition
- **M6.5:** Evaluate the implications of UK and Scottish policy and regulatory frameworks for heat and storage technologies.

M6.1: Map the evolution of the GB market for flexibility services and identify structural relationships between electricity and gas markets for system flexibility

- **EMR policy instruments**: Contracts for Difference and the Capacity Market.
- Other relevant **market mechanisms** used in the energy sector

M6.2: Identify appropriate regulatory and market arrangements for different seasonal storage options and STES in particular.

- **Background document** on existing markets and regulation for ATES, BTES and PTES
- **STES:** how should the services provided to electricity and heat markets be valued
- **Map the emerging wider relationships** between electricity and heat markets

Technological Innovation Systems (functional framework)

- A set of actors, networks and institutions that are actively involved in the development, diffusion and utilisation of a new technology (Bergek et al., 2008)
- A means of understanding the prospects for development and diffusion of a new technology, such as STES

1. Knowledge development and diffusion
2. Influence on the direction of search
3. Entrepreneurial experimentation
4. Market formation
5. Legitimation
6. Resource mobilisation

Integrated energy system: multi technology interactions

Variable renewable electricity	Heat networks
Complementary	
Seasonal thermal energy storage	
Competitive	
INPUTS **Low cost electricity** Domestic scale storage (thermal, electric) Grid scale electrical storage Vehicle2Grid SES and other forms of storage Hydrogen electrolysers	**OUTPUTS** **Dispatchable thermal energy** Hydrogen Bioenergy

Ref: (Bergek et al. 2015)(Sinsel et al., 2020)

M6.3: The results will inform interviews with market actors and key stakeholders to identify key technological and market trends in relation to the valuation of seasonal storage

UK interviews

- Map the STES innovation system
- Stakeholders in energy storage, heat networks and other related technologies
- Stakeholders in overall system design: Scottish and UK Government, Ofgem and the CCC

International interviews

- Dutch innovation system: Aquifer-thermal energy storage
- Danish innovation system: Pit-thermal energy storage

M6.4: comparative review of the role of STES in key energy system modelling and scenarios studies for UK's low carbon heat transition

- What do energy scenarios indicate about seasonal storage and system benefits?
- Wider study of the role of storage: STES representation may be low (currently)
- What level of STES is optimal?
- Role for heat networks (to distribute the stored thermal energy)?
- Relationship between thermal and electrical storage (see Strbac et al . 2018)

Interviews

We will shortly be carrying out interviews with stakeholders

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References

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- Sinsel, S.R. et al., 2020. How deployment policies affect innovation in complementary technologies—evidence from the German energy transition. *Technological Forecasting and Social Change*. **161**(April),.
- Strbac, G., et al., 2018. *Analysis of Alternative UK Heat Decarbonisation Pathways For the Committee on Climate Change*. Imperial College London.