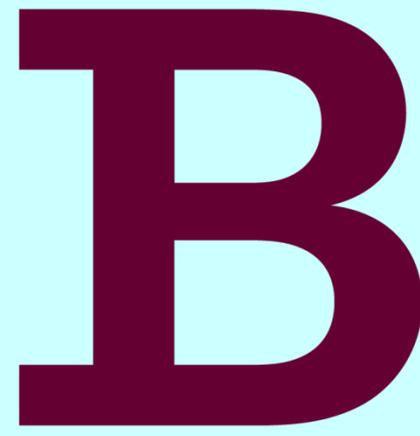


Energy storage
national roadmap

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Dr Jonathan Radcliffe

j.radcliffe@bham.ac.uk

Rationale

The system value of energy storage (and other flexibility options) is expected to increase.

Current market framework does not allow all the value to be accessed.

UK has growing capability in the field which could be exploited globally.

Credible pathways showing how technologies could develop to meet system needs will allow policy makers and regulators to put in place innovation (RDD&D) support and market pull mechanisms.

Need to know

- Cost
- Performance characteristics
- Role

of energy storage technologies

Why a roadmap?

The roadmap will describe how the research agenda links into the wider community in the public and private sectors, across the innovation process, and for the whole energy system:

- i. We will work both to inform policy-makers of the implications of advances in research, and to understand the issues that research needs to address.
- ii. The technology innovation process is not linear, and energy storage research has a role to play in: basic research to develop new technologies which could deliver step-change performance/cost; improving existing technology; understanding how technologies perform at the demonstration level; and in the manufacturing of those technologies.
- iii. Energy storage technologies could play a vital role in transport, energy, and built environment sectors, using and providing power and heat.

Roadmap objectives

To develop the first integrated national roadmap for energy storage with the wider community

Set the UK agenda for energy storage research

Aims

- Inform research agenda
- Develop a shared vision for energy storage innovation in the UK.

Scope

- A high-level roadmap of how energy storage could fit into future energy system pathways in the UK and globally;
- Detailed research needs for materials, storage devices and technologies, manufacturing development, integration, and systems analysis.

Context

Energy Research Partnership (2011)

“The energy storage stakeholder community, covering all elements of research, development, demonstration and deployment, should establish a Strategic Roadmap for Energy Storage in the UK to introduce a coherent approach across the sector.”

LCICG Strategic Framework (2014)

‘It is essential that the manufacturing and application of energy storage technologies advances in partnership with the fundamental scientific research. **An energy storage roadmap is required to support these activities, identify specific areas of focus based on UK strengths, and highlight goals and objectives for corresponding programmes.** This would also help to provide insight and perspective on the role of storage in the future of the UK energy grid.

Context

European Association for Storage of Energy (EASE) / European Energy Research Alliance (EERA)

‘Joint Recommendations for a European Energy Storage Technology Development Roadmap towards 2030’ (2013)

<http://www.ease-storage.eu/launch-ease-eera-energy-storage-technology-development-roadmap-towards-2030-new.html>

IEA Energy Storage Roadmap

‘Technology Roadmap: Energy Storage’ (2014)

<http://www.iea.org/publications/freepublications/publication/technology-roadmap-energy-storage-.html>

Approach

Research: studying where UK research can take the technologies in terms of cost and performance with existing funding profiles, and how further resource could be used for maximum benefit.

Energy systems need: considering timing of the energy system transition, when variable renewables will drive the need for flexibility and therefore what market mechanisms need to be put in place by when, and the policy options for supporting late-stage innovation.

Other applications: energy storage as one of the 'eight+ great', to look at potential applications (esp. auto), and therefore how to get most value out of the UK investment.

Manufacturing: opportunities to scale-up production in UK

Process

- Science & technology trajectories: what could be delivered by when
- Energy system scenarios: understand the requirements for storage

Describe through a process of:

- Expert input
- Participatory workshops
- Review
- Publication

Collaboration with key stakeholders will be critical:

- Academia (including UKERC Roadmap activity)
- Industry
- Policy-makers, Parliament, regulators
- NGOs, learned societies

Outline timescale

M1 – M3	Literature review: technology developments, existing non-UK roadmaps, across energy storage technologies and applications
M1 – M3	Learn from other UK roadmapping exercises (e.g. marine, auto council) to inform process
M3 – M5	Interviews with expert community; input of Hub Advisory & Science Boards
M6 – M9	Series of workshops with stakeholders
M9 – M11	Drafting
M11 - M12	Consultation on draft and revision
M12 +	Maintain

So far...

Grand Challenge project 'Energy storage for low Carbon Grids' drafting 'White Paper' on research needs in storage technologies for grid applications to inform stakeholders in industry, government and funding agencies of the opportunities and needs

Describing:

- The value of storage in future low carbon energy systems, and the storage functionality we might need
- The need for innovation and new technologies for grid storage

Will provide authoritative guide to the technology options:

- Lithium ion batteries, Sodium ion batteries, Supercapacitors, Flow batteries, Compressed air energy storage, Thermal storage, Power to gas, Control and integration of energy storage

Thank you

□ Contact:

Jonathan Radcliffe

j.radcliffe@bham.ac.uk

<http://www.birmingham.ac.uk/research/activity/energy/research/centre-energy-storage/>