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Deliberating the Public Acceptability of Energy Storage in Great Britain

RESTLESS — Realising Energy Storage Technologies in Low-carbon Energy Systems

Understanding Risk

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Introduction

Public acceptability will play a key role in shaping if and where energy storage technologies can be deployed. Development of new energy infrastructure has often been found to raise significant social and ethical concerns among citizens, which can lead to opposition and delays to deployment [1, 2]. However to date, no study has empirically examined public perceptions across a broad range of storage technologies available. We address this gap by presenting qualitative findings from four deliberative workshops held with members of the British public in England, Scotland and Wales between July and October 2017.

In future energy systems characterised by increasing electrification, intermittent or inflexible low-carbon electricity generation, energy storage is increasingly being viewed as a promising option for matching variable supplies with consumer demand, regulating frequency and voltage fluctuation and optimising utilisation of generating capacity. Storage technologies may be deployed on electricity transmission and distribution grids or in homes for 'behind the meter' electricity and thermal applications. Such changes will require significant changes to citizens homes, communities and daily lives, however to date, not study has empirically examined how a broad range of potential storage technologies may be received [3].

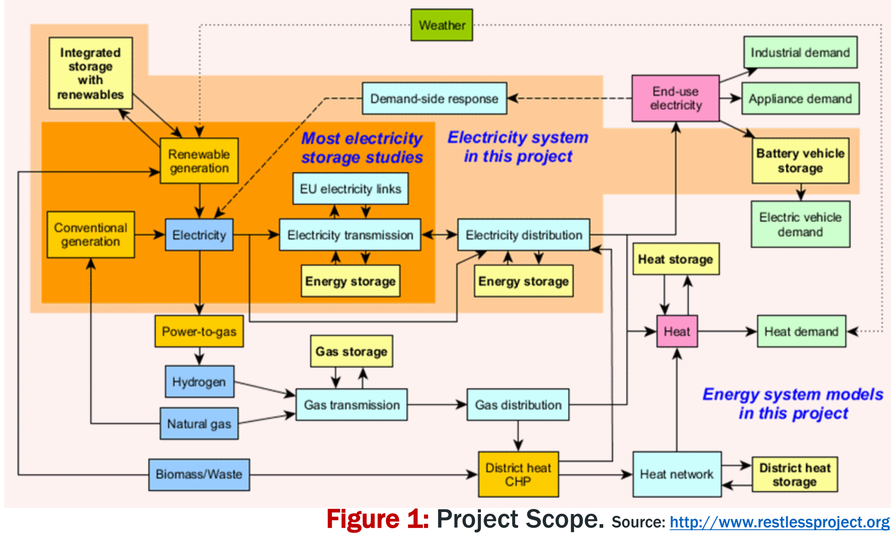

Figure 1: Project Scope. Source: http://www.restlessproject.org

Aims & Objectives

- Investigate how members of the British **public** think about the current UK energy system and the need for enhanced flexibility/ storage.
- Identify key **risks** and **benefits** members of the public associate with proposed **technologies** for energy storage at different scales (centralized, decentralized, domestic).
- Examine how different **governance** models for incentivizing and managing citizen interactions with storage are viewed by members of the British public.

Methods

Deliberative workshops are spaces in which small groups come together to learn about and discuss a specific issue in depth. Expert information and facilitation are provided to allow explore their responses in an open and considered way [4]. We convened four deliberative workshops in England (x2), Scotland and Wales between July and October 2017. Each workshop lasted approximately 7 hours and was attended to 11-12 local people (total=46), recruited to ensure an even gender split and reflect a wide diversity of socio-economic and demographic characteristics.

Low awareness of storage needs

Figure: Participant drawings of the UK energy system.

When discussing the state of the current British energy system, few participants mentioned storage as something that might or should be present. When prompted, participants explained that storage of intermittently produced wind and solar energy was something they has not previously considered, assumed was already in place or could be easily introduced.

> *"I think producing it from natural sources, is the best method, so it's taken straight where it's going to be used. But it's obviously not a possible thing to do... I just assumed it would be."*

Technology Risks/Benefits

Upon being exposed to technical information on storage technologies, risks and benefits formed a key lens through which participants developed nuanced responses. Thematic analysis of these discussions identified six dimensions of risk and benefit through which participants evaluated storage: aesthetic and spatial impacts, efficiency, environment and sustainability, reliability, safety and technological progress. Table 1 shows the most common ways in which storage technologies were evaluated but across participants views were more mixed and no storage technology was viewed as entirely unproblematic.

Table 1: Most salient evaluations of storage technologies against each risk/benefit dimension

	Storage technology:						
	Pumped hydro-electric	Compressed Air	Power-to-gas	Batteries on the Grid	Batteries in Homes	Heat in Homes	Community Heat
Aest. and Space	+	+	n/a	-	-	+/-	0
Efficiency	+	+	+/-	-	+/-	-	+
Env. and Sust.	+	+/-	+/-	-	-	n/a	0
Reliability	+	+	n/a	n/a	+/-	+/-	+
Safety	+	+/-	-	-/0	-/0	0	n/a
Tech. Progress	n/a	+	+/-	+	+	-	n/a

+ positive evaluation — - negative evaluation — 0 ambivalence or conditionality — -/+ divergent opinions between participants

Table indicates issue salience and therefore does not reflect full spread of perceptions relating to each technology, issues raised only briefly and not taken up in wider discussions are thus not included.

Justice Concerns

In addition to technological risks and benefits, participants raised wider concerns relating to fairness and equity which bore a striking resemblance to those raised in extant literatures on energy justice [5, 6]. Justice concerns became most prominent when discussion moved from individual technologies to how storage could be incentivised, introduced and operated in practice.

Participants expressed widespread dissatisfaction with the current UK energy market, which they felt was exploitative and limited capacity for citizen participation in decision making. More participatory approaches to managing storage such as citizen or community owned batteries were also viewed as problematic due to concerns that complexity and affordability may prevent vulnerable groups from accessing potentially beneficial technologies, exacerbating pre-existing inequalities.

Conclusions

- Public awareness of the need for storage is low and this may pose a risk for policy approaches which expect citizens to contribute directly to storage costs or host storage infrastructure in homes and communities.
- While no technology was viewed as entirely, on many evaluative criteria pumped hydroelectric and compressed air storage tended to be viewed most positively.
- Justice concerns relating to participation in decision making and distribution of benefits played a key role in discussions.
- Across groups participants felt vulnerable groups should not be penalized for inability to access or participate in storage technologies or schemes.

References

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Acknowledgements

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