

The Role of Radical Energy Futures in Understanding How Regulation Might Evolve.

Presented to Ofgem as part of a Lunchtime seminar series on 5th June 2019 by Mark Workman and Kate Roelich

Abstract

The UK electricity sector is undergoing an unprecedented period of transformational innovation. The most salient driver, digitisation, will enable the sector to become service orientated, allowing the way and extent to which consumers can engage with energy, to be revolutionised and blurring the boundaries between traditionally separate sectors. The decarbonisation driver of the electrification of heat and transport augments this disruption. The falling cost of decentralised technologies has converted consumers to prosumers and business model evolution is increasingly rapid. This is leading to a geometric increase in the possible ways that the electricity sector might evolve. It also introduces higher levels and different forms of risk and uncertainty to which energy system actors are exposed within a time constrained 2050 UK net zero innovation envelop.

The UK energy sector still relies on policy and regulatory innovation frameworks which have yet to accommodate these disruptive drivers. Furthermore, the suite of tools and innovation mechanisms that are being employed in the energy sector are out of step with policy makers and regulators needs in order to develop the relevant insights. The technology centric, didactic and static processes presently employed are blinding policy makers and regulators as to the possible extent of possible electricity futures.

This presentation advocates the need for and justifies the role of developing radical futures, taking novel perspectives and unorthodox approaches to developing insights regarding possible electricity and energy futures. Without this, the high dimensional future option space will not be explored and the regulatory mechanisms to open-up the option space not considered. For example, the application of novel, holistic and anthropological approaches has allowed the following, respective insights to be developed regarding UK electricity sector evolution:

- Using a market pull, value pools perspective allows insights as to how energy sector service development need to managed e.g. electricity system imperatives such as flexibility optimisation is likely to need to be regulated as a function of low revenue opportunities presented for utility actors and EV scaling will require limited stimulation as the commercial opportunities will be substantial - of the order of multiple £ Billions¹;
- Developing broader insights on consumers beyond energy highlights that trust is a significant driver of segment membership. Results suggest that it is not trust in the energy supplier alone that drives segments to prefer different business models, but also trust across societal institutions; this will require a holistic set of interventions beyond energy to resolve². The need for consumer co-production is also emphasised in the work where to build trust and engagement requires substantial and sustained support going beyond public information campaigns and heralds a need to undertake and learn from consumer trials to engage a wider demographic; and
- Technology stress testing suggested that technology is not a barrier to business model evolution³. Therefore, technology application trials need to be integrated with clear consumer value propositions and explicitly tied to wider business model innovation which in turn will allow new consumer offers to emerge which characterise new innovation within current technological options. Yet present UK innovation competition analysis - as is evident from the Network Innovation Competition benefits criteria - appear to be based on technological detail.

These insights suggest the need for new approaches to regulation and new relationships between innovators and regulators *Away from supply and demand innovation to...“a learning-focused, network-brokering and information-discovery role for innovation policy, focused on the opportunities for, and constraints to, entrepreneurial action.....It would seek to achieve the goals of innovation policy by whenever possible reducing*

¹ Wegner, S.M., Hall, S., Workman, M.H.W. and Hardy, J. 2017. Valuing energy futures; A comparative analysis of value pools across energy system scenarios. Applied Energy

² Hall, S., Anable, J., Hardy, J., Workman, M.H.W., Mazur, C and Matthews, Y., 2020. Which consumers want the new business models the energy system can offer? Nature Energy

³ Mazur, C., Hall, S., Hardy, J., and Workman, M.H.W., 2019. Technology is not a Barrier: A Survey of Energy System Technologies Required for Innovative Electricity Business Models Driving the Low Carbon Energy Revolution. In *Energies* 2019, 12, 428.

uncertainty for entrepreneurs.....[there will need to be] a more experimental conception of the role of the state....."⁴

These have been explored in a number of workshops where an experimental construct was advocated as evidenced from the following piece of analysis⁵ and these quotes:

- *Policy makers need to be able peer in [to the living lab] and form their own objective judgements. They need to be able to trust the results.’ BEIS*
- *‘It is really important to be able to get challenges from Ofgem and BEIS - not just provide solutions - as well as work with them iteratively within the living lab.’ Start-up*
- *‘It has got to be able to scale. I am talking 10,000 houses minimum’ Large Manufacturer*

This in turn is suggesting a rethink and considerable shift as to the tools that are presently used, the way that innovation is undertaken and way that actors undertaking innovation within the energy sector are curated within the policy and regulatory environment. It encourages embracing emergent outcomes within an adaptive and eventually anticipatory construct – see figure 1, below.

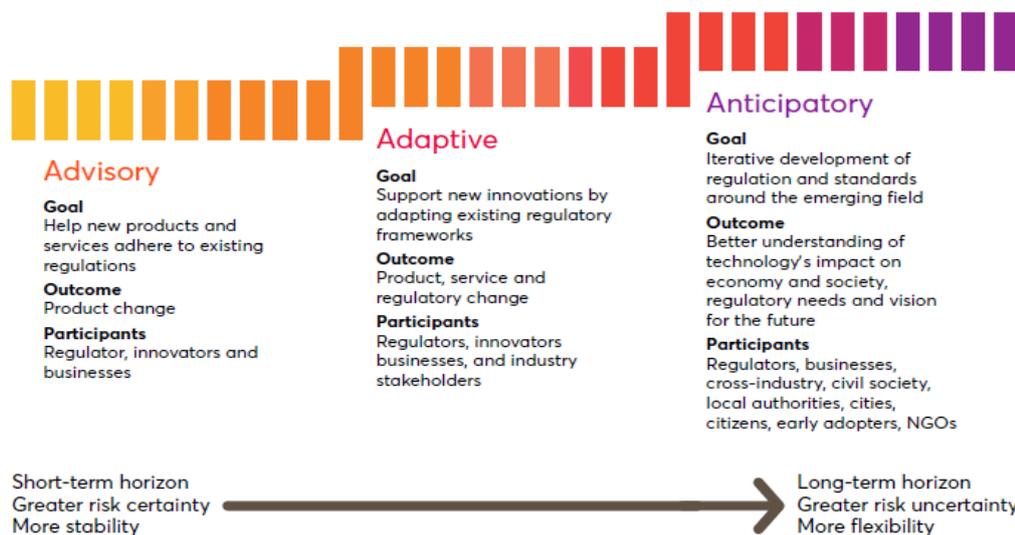


Figure 1: The Advisory, Adaptive and Anticipatory Model of Anticipatory Regulation (Nesta, 2017)⁶.

There is substantial activity in this area being innovated in other sectors which the energy sector can build on allowing capacity to be developed. For example, in adaptive decision making a group of decision support approaches in the water sector have demonstrate that:

- Actors can explore how to express uncertainties and options in a different way allowing a response to uncertainties, not ignoring or eliminating them;
- Enable foresight about future options and identifying which options regulators need to open up or close down by actions in the short term; and
- Build flexibility into decision making allowing identification of the ease regulators can move to alternative pathways.

The question is when are energy regulators and policy makers going to adopt new tools, broaden the scope of innovation competitions to beyond technology development, embrace emergence and engage in more of an experimental dialectic between innovators, regulators and policy makers to allow a more systematic exploration of possible electricity futures. The option space is clearly available - it is only regulation and policy which will allow it to be explored and in turn exploited for mutual value and across actors in the energy sector.

⁴ **Bakhski et al 2011** State of Uncertainty Innovation policy through experimentation. Nesta 2011 pp20

⁵ **Hall, S., Mazur, C., Hardy, J., Workman, M.H.W., and Powell, M., 2019.** Prioritising business model innovation: What needs to change in the United Kingdom energy system to grow low carbon entrepreneurship? **In Energy Research and Social Science 60 (2020) 101317**

⁶ Harry Armstrong and Jenny Rae, 2017. A Working Model for Anticipatory Regulation: A Working Paper dated 17th November 2017 - available [here](#).