UTILITY 2050

Decision Theatre: International Perspectives [North America] Empirical Report

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Utility 2050 Decision Theatres: International Perspectives [Europe]

1.0 Introduction to the Utility 2050 project decision theatres.

The utility 2050 project assess the impacts of low-carbon energy futures on electricity utilities, and explores how they can access new markets.

The Utility 2050 project recognises that the energy sector faces uncertainty. There are many possible futures with different generation mixes, flexibility technologies, final demands, consumer preferences, and political priorities. The Utility 2050 project uses innovative interdisciplinary approaches to quantify and explore big questions about future market sizes, regulatory priorities and customer preferences.

This empirical report summarises the output of the decision theatre held on 30th January 2018 at the British Consulate General in Chicago. The Decision Theatre was organised by the Science and Innovation Network and the Department for International Trade led by the team based at the British Consulate General in Chicago. Decision theatres present participants new data on a specific multi-stakeholder problem. In this case the Utility 2050 project, findings were presented (see section 3.1). The information given to participants was used to reach a decision on the following question:

What are the most important CHANGES needed to enable utilities to access new markets in the [UK] *energy transition?*

The rest of this report is structured in four sections. Section 2 summarises the decision theatre method, and the justification for its selection for this study. Section 3 summarises the data given to participants prior to the decision theatre and once again at the start of the workshop. Section 4 describes the decision theatre process and the results of each stage, including the final decision. Section 5 concludes and explains next steps.

2.0 The decision theatre method

Decision Theatres (DTs) are workshops that culminate in participants or stakeholders taking decisions. DTs are one off events often within a longitudinal research process that may involve several DTs, groups of participants, and decision-making dilemmas.

Arizona State University pioneered the use of decision theatres to consider decision-making in a context of climate uncertainty. Their study explored the complex relationships that exist between

rapidly growing populations and finite water supplies[1]. Decision theatre techniques have been used to explore complex issues of resource and infrastructure governance such as local energy infrastructures[2], urban flooding[3], and forestry management[4]. Decision theatres are being used internationally to tackle complex, multi stakeholder issues with cutting edge analytics.

The Utility 2050 decision theatre work package aims to run four separate decision theatres with four groups of energy system decision makers. These are present utilities (both established and new entrants), European stakeholders, North American stakeholders and policy and regulation. The central question and preparatory material will be common to all the decision theatres. This process will generate four sets of prioritised changes to the energy system that are designed to make a breakthrough in UK energy system planning. Results of prior decision theatres will be disclosed to participants at the end their own DT.

The Utility 2050 International Perspectives [North America] decision theatre comprised 9 participants from the European and international energy market: 2 x executives of established utilities, 2 x public officers representing a state Commerce Commission, 1 x international oil and gas company, 2 x energy distribution network company, 1 x power generation developer, 1 x investment Bank, and 1 x energy stakeholder platform company. In addition, a representative of a British energy innovation company and a representative of the British Consulate General were present. Neither of the latter two contributed to the long-list of decisions, but representative of a British energy innovation company did contribute to group discussions. The stakeholders were chosen to provide insight from across the North American energy supply chain, and included businesses with an existing or possible future interest in the UK market. Some of them had involvement in the UK energy market before and hence were able to provide their inputs based on their knowledge on similarities and differences between the UK and their native energy system.

3.0 Preparatory Utility 2050 data

At the beginning of the decision theatre facilitators shared the findings of the Utility 2050 project to date. This information was sent to participants prior to arrival and comprised three datasets from the Utility 2050 project. The data presented to participants is presented in sections 3.1 to 3.3.

[1] White, D.D., Wutich, A.Y., Larson, K.L. and Lant, T., 2015. Water management decision makers' evaluations of uncertainty in a decision support system: the case of WaterSim in the Decision Theater. *Journal of Environmental Planning and Management*, *58*(4), pp.616-630.

[2] Bush, R.E., Bale, C.S., Powell, M., Gouldson, A., Taylor, P.G. and Gale, W.F., 2017. The role of intermediaries in low carbon transitions–Empowering innovations to unlock district heating in the UK. *Journal of Cleaner Production*, *148*, pp.137-147.

[3] Walsh, C.L., Glendinning, S., Dawson, R.J., England, K., Martin, M., Watkins, C.L., Wilson, R., McLoughlin, A., Glenis, V., Parker, D., 2013. Collaborative platform to facilitate engineering decision-making. Proc. ICE Eng. Sustain. 166, 98e107.

[4] Boukherroub, T., D'Amours, S. and Rönnqvist, M., 2016. Decision theaters: a creative approach for participatory planning in the forest sector. In *Proceedings of the 6th International Conference on Information Systems, Logistics and Supply Chain (ILS'2016), Bordeaux*.

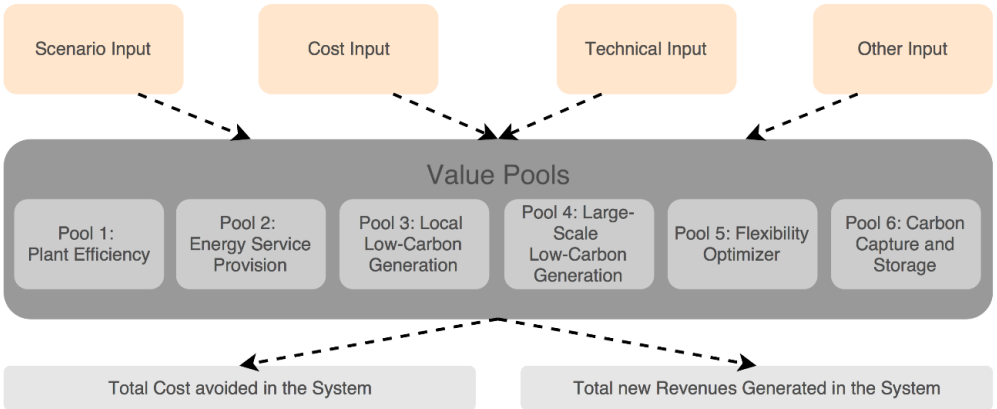
3.1 Dataset #1: New financial opportunities 'Value Pools'.

The Utility 2050 project asked what new financial opportunities are presented by future energy systems. These new opportunities were called 'value pools'. The value pools quantified by the research team are either new revenues to the system or avoided costs i.e. through technology switching or efficiencies.

The six value pools we quantified were:

- VP#1: Plant efficiency, the easiest avoided cost to understand, simply what can be saved by investing in the existing generation portfolio to make it more efficient over time.
- VP#2: Energy services, this value pool includes all new revenues available by installing energy efficient appliances and management systems in homes as well as electric vehicle charge kit *and* new revenues from the extra electricity needed to charge electric vehicles.
- VP#3: Local low carbon (distributed) generation. Essentially the market for microgeneration, this is where utilities companies offer solar lease and servicing along with offering trading or brokerage platforms for local generators.
- VP#4: Large scale low carbon generation. This value pool is an 'avoided cost' value pool because, depending on carbon prices and fuel prices, low-carbon generation should become cost competitive with gas CCGT in the future. Therefore, with the right carbon price, companies would choose to build low carbon as opposed to traditional generation to cover the same net capacity. This value pool is calculated without feed in tariff subsidies.
- VP#5: Flexibility, the value of battery storage and demand response can be both new revenues or avoided costs, this value pool captures price arbitrage and the provision of energy services to the transmission system operator.
- VP#6: Carbon Capture and Storage, estimates the costs avoided by building CCS plant under a range of carbon prices.

Figure 1: Value pools identified and conceptual model map.



To test the values pools, we selected eight UK future energy scenarios. These were:

Author	Name of the Scenario
DECC – 2050 Calculator (2010/2011)	High Renewables, higher Energy Efficiency Higher Nuclear, less Energy Efficiency Higher CCS, more Bioenergy

National Grid (2016)	Gone Green No Progression
Realising Energy Transition Pathways (2008)	Market Rules Central Coordination Thousand Flowers

The results show that in 2050, depending on the scenario assessed some value pools are very robust, some are volatile, and some are destroyed completely. Across the scenarios tested these new revenues and avoided costs were compared against the size of the entire market. Figure 4 shows that new revenues and avoided costs combined are a maximum of 31% and a minimum of 14% of the future market size across the scenarios. Across the surveyed scenarios, the potential new revenues in the UK energy system are up to £12.8bn per year in 2050. The cost savings potential is up to £9.7bn per year in 2050.

Figure 2: Cumulative new revenues across system futures in 2050 by value pool

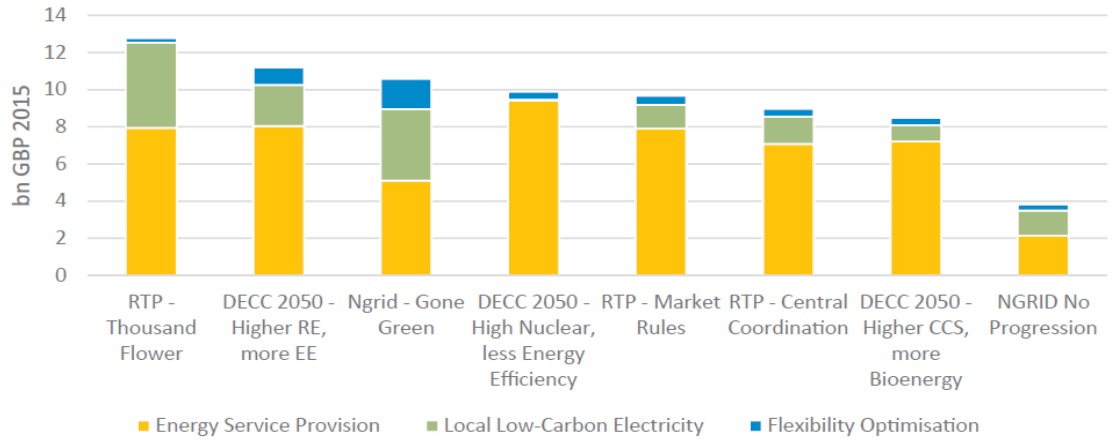


Fig. 15. Cumulative new revenues across system futures in 2050 by value pool.

Figure 3: Cumulative avoided costs across system futures in 2050 by value pool

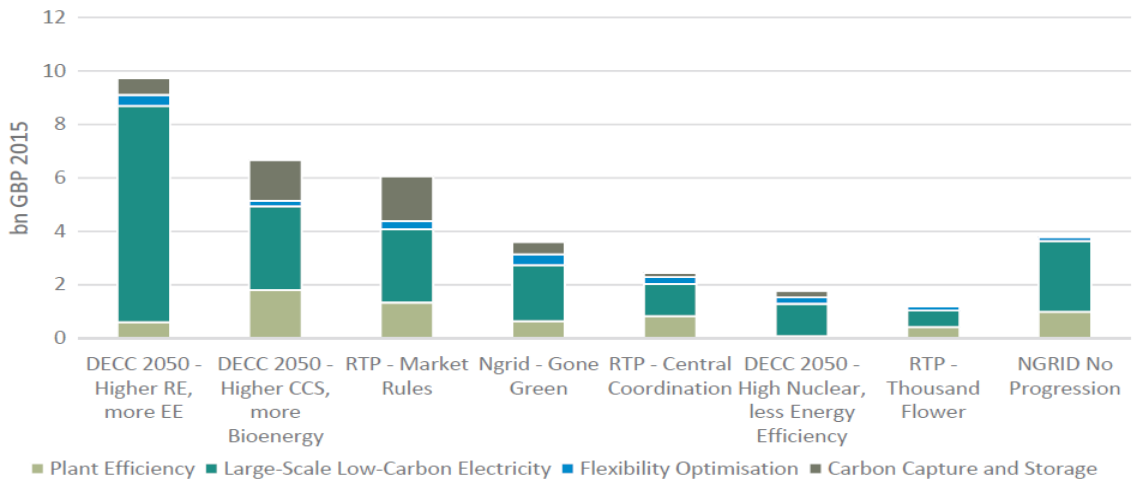
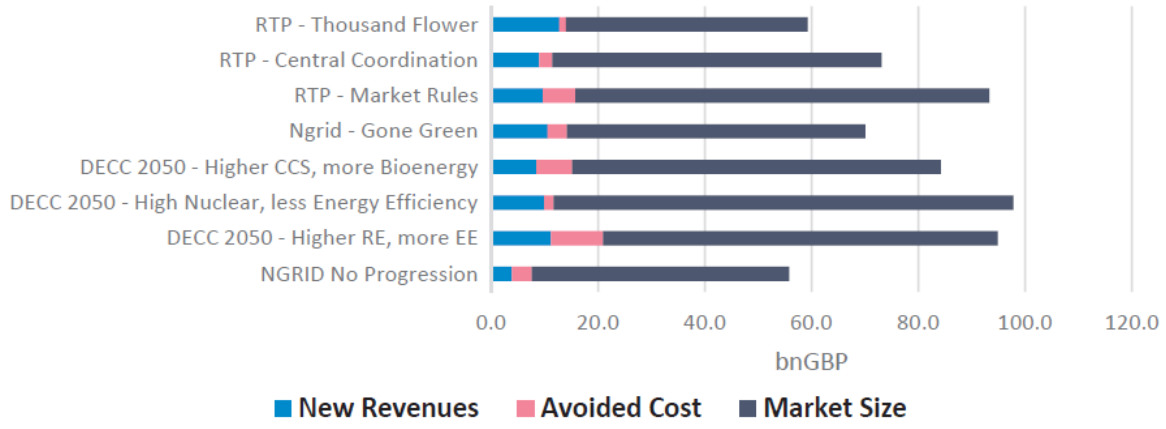


Figure 4: Comparison of indicative market size against new revenues and avoided costs in 2050.



The main insights from this work are summarised below, specific questions were encouraged from participants during the decision theatre. Each insight is accompanied by a 'provocation' which led into activity #1 of the decision theatre.

1. The cost of carbon in the UK's carbon price floor is critical to both CCS and large scale low carbon generation value pools. We used the Committee on Climate Change's expected carbon prices. Without direct subsidy the main driver for firms to construct large scale low carbon generation (VP#4) are the cost differentials between these and conventional technologies. Across the scenarios analysed the carbon price only reaches a sufficiently high value to make these value pools positive in 2050. These points support previous analysis in suggesting that linked long term subsidy contracts of low carbon generation alongside carbon pricing will continue to be necessary to deliver required levels of large scale low carbon generation. However, this analysis demonstrates carbon capture and storage is extremely sensitive to what future energy scenario is followed. This raises **Provocation #1: Will anyone really invest in CCS when it is such a volatile value pool?**

2. The energy service provision value pool is robust across all scenarios, and the dominant driver of new revenue is the electric vehicle service element. Across all climate compatible scenarios there is a substantial commercial opportunity available in electric vehicle service provision. Indeed electric vehicle services are the single biggest element of new revenues available across all assessed future energy scenarios including 'no-progression'. This prompts **Provocation #2: Utilities can capture lots of value from electric vehicles so they will lead the way on promoting them.**

3. Revenues and avoided costs from flexibility markets (i.e. batteries and demand response) are extremely volatile across scenarios. Through the operation of battery storage technologies new revenue streams in the range of 46–565 mGBP in 2030, and 46–1040 mGBP in 2040 and 2050 can be accessed in the power and balancing market. Power firms can potentially generate new revenues from DSR in the balancing market between 160–390 mGBP in 2030, 190–550 MGBP in 2040 and 210–610 mGBP in 2050. While at the same time DSR can avoid wholesale cost in the order of 115–270 mGBP in 2030, 140–375 mGBP in 2040 and 150–410 mGBP in 2050. Despite this volatility, storage, demand response, and flexibility are key enablers in other parts of the energy market. **Provocation**

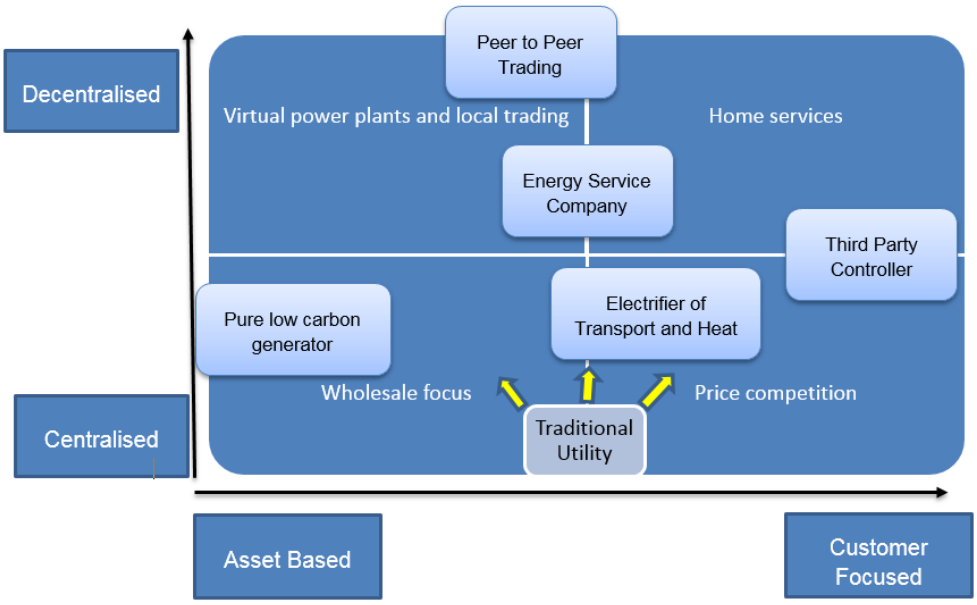
#3: Flexibility value is so volatile only small start-ups will bother with it and it will never reach the scale needed.

4. In the National Grid Gone Green and RTP Thousand Flowers scenarios the combined value pool #3 for distributed generation is £3.8 and 4.5bn in 2050, where in those scenarios with more centralised generation the value pool is often below £1bn by 2050 or in some does not exist at all. This value pool envisages utilities leasing consumers' microgeneration equipment (largely solar) and providing local power exchanges for trading. **Provocation 4 is: Distributed energy and electricity utilities will always be in competition because large utilities won't pursue this value pool.**

3.2 Dataset #2: Business model innovation

In summer 2016 the Utility 2050 team ran a workshop on the utility business models of the future. The 5 business models proposed were: **low carbon generation only businesses** focussed on building low carbon capacity and/or CCS, a **'New Electrifier'** which installed electric heating and electric vehicle charge provision, **Energy Service Companies** offering appliances, efficiency retrofit and electric vehicle services, **peer to peer trading platforms** for local generation, and **'Third Party Control'** which essentially bundles utilities around consumer needs and takes switching decisions on the consumers behalf. These business models were placed on the following matrix:

Figure 5: business model market positions.



Adapted from: White, N., Ingham, K., von Bechtolsheim, D. M., Haischer, M. & Francis, D. R. (2013) *The future of energy utilities - How utilities can survive the "perfect Storm".* Arthur D. Little.

Each of the business models can capture one or more of the value pools proposed above. The intricacies of each business model were not presented at length but DT participants were asked to use them as ways of understanding how utilities might capture new value pools. The provocations which came from this analysis are:

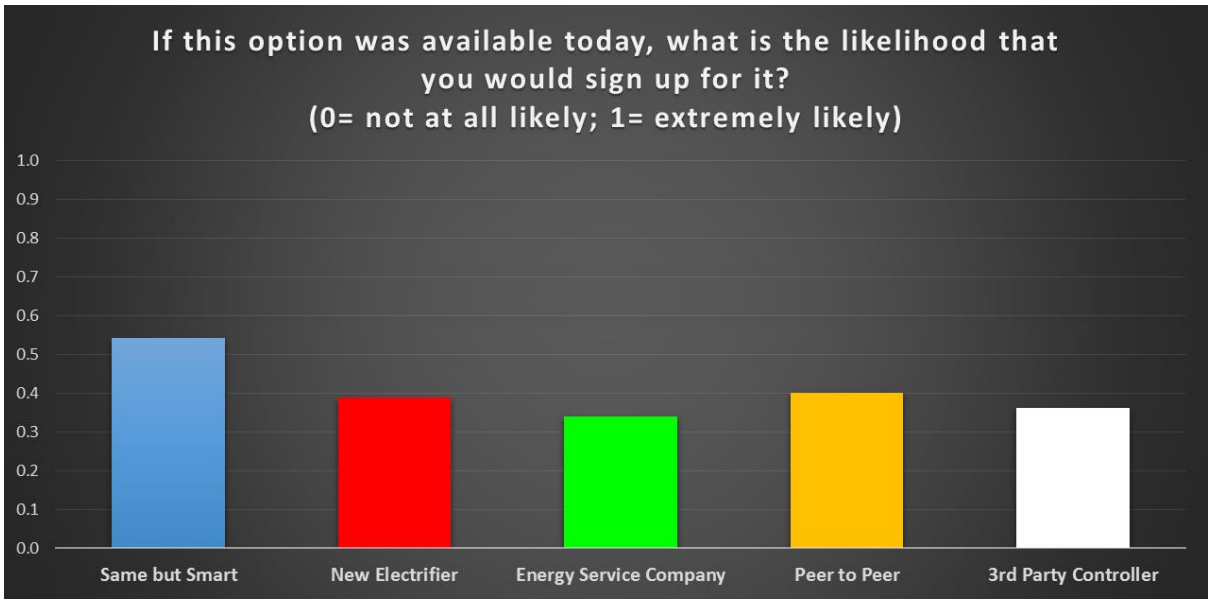
- **Provocation #5: Regulation gets in the way of business model innovation**
- **Provocation #6: Some business models just too risky for the levels of return in the sector**

- **Provocation #7: Some business models are technically possible but just too complex to understand**

3.3 Dataset #3: Consumer Insight

Business model innovation will only turn 'value pools' into revenue if consumers want what is being sold. The Utility 2050 team undertook a consumer facing survey. We presented key attributes of the business models we generated to a representative sample n=2000+ of UK energy bill payers and asked which of the business models they found attractive. The attributes and results are shown in figure 6 below:

Figure 6: Spread of preferences in comparative choice exercise



We expected consumers would want business models closer to what they are familiar with. However the Peer to Peer Trading (which means more control and engagement) and the Third Party Controller (which means giving up both control and data access) models scored very well. This suggests consumers are happy to give up data and have more or less control in return for some benefit (financial or lifestyle). There was no 'total loss' business model i.e. all BMs were attractive to one market segment. This means consumers may be more segmented than we think. The provocations we can draw from this are:

- **Provocation #8: Consumers are more engaged than we think when given meaningful choices.**
- **Provocation #9: Consumers are not as engaged as they say and any business model based on deep engagement is bound to fail.**

The nine provocations provided by the facilitators were:

- *Provocation #1: Will anyone really invest in CCS when it is such a volatile value pool?*
- *Provocation #2: Utilities can capture lots of value from electric vehicles so they will lead the way on promoting them.*
- *Provocation #3: Flexibility value is so volatile only small start-ups will bother with it and it will never reach the scale needed.*
- *Provocation #4 is: Distributed energy and electricity utilities will always be in competition because large utilities won't pursue this value pool.*
- *Provocation #5: Regulation gets in the way of business model innovation.*
- *Provocation #6: Some business models just too risky for the levels of return in the sector.*
- *Provocation #7: Some business models are technically possible but just too complex to understand.*
- *Provocation #8: Consumers are more engaged than we think when given meaningful choices.*
- *Provocation #9: Consumers are not as engaged as they say and any business model based on deep engagement is bound to fail.*

4.0 Decision theatre results.

Stage 1 was designed to facilitate discussion whereby further provocations identified by the attendees simply in order to generate discussion around the aims of the DT. Those generated by the International Perspectives [North America] attendees were:

- Demand growth [in EVs and electric heat] will overstep the value proposition as the main driver of new generation
- The values pools are additive and future growth will require an "all of the above" approach for CO_2 reduction
- In the end industrial and finance players will need large stable generation but home / [ineligible] may allow for variation in availability
- Grid hardening (reinforcement) will be the biggest change
- There will be disruptive technologies that we don't yet understand that will change the direction of travel in a meaningful way
- Incumbents will vigorously defend their turf and adapt
- Large low-carbon generation cannot succeed financially without significant government subsidies
- Consumers are willing to pay higher prices for electricity generated from renewable energy
- Large utilities will invest in vertical integration to drive demand up [note: means they will become "new electrifiers"]
- Consumer varies (e.g. low-income and can't pay consumers) – some just want to pay bill and hope it's low. Others are more sophisticated and want to be engaged and have best rate for value and willing to pay up front for energy efficiency and green. How do you progress if consumer advocates so opposed to progressive energy growing pains?
- Geography varies (urban, industrial, rural) – no one size fits all. Some farmers don't want transmission lines & wind turbines.
- Regional coordination. In US [there are] many borders – what if one state needs [something] from another state & [there is] no cooperation

- Rate payers being held accountable for projects they weren't on board with [I think this relates to a microgrid project that a distribution company went ahead with without Commission approval].
- Should utilities be investing in innovation? Is it better suited for the private sector?
- Are consumers informed enough to make critical decisions?
- Will data create greater threat to security beaches?
- Until there is sufficient political courage to properly tax for carbon markets they will not open fast enough to meet the immediate need for EV growth
- Until there is an individual carbon score [analogy to credit score] that rewards and penalises like a FICO [US credit score] score, breakthrough market transformation will not occur
- Consumer outreach, engagement is the most difficult thing to achieve. Utilities will cross the meter.
- Micro-nuclear is too scary and transmission is greatest weak link for 2050.
- While domestic consumers shape attitudes, large consumers constitute most load. Therefore central generation cannot go away.
- The effect of EVs will be restricted to suburban networks which have sufficient capacity because of parallel improvement in efficiency (appliances, insulation, etc).
- Gross asymmetries in consumers' potential to participate in markets will prevent / slow large-scale market reform.
- Consumers are more engaged and will act when given value added products and will pay more
- Flexibility value will dramatically increase with electrification of heat
- Physical engagement with consumers (e.g. living labs) are essential for them to understand new business models and the benefits to them

This discussion phase of the decision theatre is designed to allow participants to adopt a 'system' mind-set and pay attention to long term trends rather than the current moment of energy policy. Clearly there are too many issues to cover from the list of provocations generated, however, there are clear common themes of

- the need for energy and carbon penalties and incentives of energy system participants
- the need for future flexibility including new markets
- the need for consumer engagement, including living labs

that were picked up and developed in the next exercise.

The following four stages, [2-5] comprised the active stage of the decision theatre. In the North American decision theatres, participants were more likely to propose changes that were more aligned with their professional interests than in the European context. This means the following data is as much a representation of North American Firm preferences as it is a strategic positioning towards new value in the UK market.

Stage 2 – Playing god/system architect

In stage 2 participants were asked to take account of the data presented and the provocations made, and adopt the role of a powerful 'system architect' to 'play god' and decide what changes they would make to the system so that new financial opportunities could be exploited and low carbon energy futures be delivered. Participants were asked to 'think big' to 'not be constrained by the current system' and to individually prepare 3 specific changes needed in one to three sentences explanations recorded on A5 report cards.

The changes proposed by individuals are presented below in no particular order with a short explanatory summary. Some changes are grouped where they share an outcome or theme. There were 24 original individual propositions, listed below:

- "I declare a universal, undisputed carbon tax synced to global GHG emissions"
- Develop a carbon score rating system AKA a FICO score for individuals, companies (Moody) and Cities (Bond rating)
- Launch an Energy Token that would have the public pay for smart meters then implement a carrot and stick based on efficiency and improvement and penalty to pay a higher rate and the tokens going to the improved and more efficient customers that the higher rate charged customers have to pay
- Create data driven platforms to enable new tools & standards
- Utility enabled GIS systems for service territories to know better what is happening locally
- Take existing available data (from smart meters) to find where immediate changes possible to add value ASAP + build on that
- National / global shared practices
- Allow wires company owners to own the means to regulate voltage & frequency at the substation level
- Focus on infrastructure (robust grid) to enable more efficient connection of generation to customers
- Testing / demos through pilot projects so consumers & government can see tested value
- To allow new utilities entry into market I would reduce the regulatory burden on new generation assets
- Reduction in regulatory lag
- Reduce regulation to allow more efficient delivery of projects
- Deregulation to allow market participants by new entrants / disruptors
- Fast track / simplified planning approval for projects
- Amend planning criteria to reflect nominal, or even base-case system conditions rather than worst-case conditions to encourage new participants
- Simplified or streamlined construction labour agreements [Note: this was a specific issue on labour costs in UK]
- Consumer oriented market design
- I would design the electricity delivery system to maximise consumer energy delivery choice
- Create markets animation and incentives for flexibility, resilience and capacity
- I would ensure large base load generation is properly valued in the marketplace for electricity, focusing on reliability, resiliency and safety
- Allow utilities to earn a higher rate on technologies which increase capacity, flexibility or reliability
- Effective incentives to drive results
- Government backstops' incentives on project funding [e.g. gov de-risks project funding]

After grouping by theme became 11 propositions agreed by the group to go into the prioritisation exercise. The suggestions at this stage are not giving balanced recommendations, rather they are answering what would be necessary to allow the value pools presented above to be captured. The change proposals were:

- Place incentives / penalties on energy / carbon behaviour on those responsible, including individuals
- Create markets animation and incentives for flexibility, resilience and capacity
- Government backstops' incentives on project funding
- Consumer-orientated market design
- Streamline regulation to drive market innovation and efficiency
- Fast-track / simplified planning approval for projects
- Simplified or streamlined construction labour agreements
- Create a data driven smarter energy system
- National / global shared practices
- Give grid operators more tools that allow them to manage the system better
- Testing demo's through pilot projects so consumers & government can see tested value

Stage 3 - prioritise the changes

Stage 3 asked participants to work together with the change proposals listed above. Participants were asked to order the change proposal by priority, still remaining within the mind-set of what would be ideal from their perspective if they were 'in charge' of the system and wanted to access the value pools identified. This was a timed exercise and the group was given guidance by facilitators where necessary, but otherwise given freedom in how to order change proposals by priority. Importantly the group was asked to seek 'consent not consensus' i.e. not all participants needed to agree, but had to reach a prioritisation of proposals within the timed session, with which they could agree to move forward with.

Stage 3 observations:

An overarching observation is that during prioritisation, participants had a desire to focus on timelines – e.g. "you would need to that, before you can do this". The facilitators made several interventions to steer participants to focus on the most important decisions. A linked observation was the reluctance of participants to take any decision off the table. Instead they focused on combining decisions together, which resulted in 11 priorities being reduced to five priorities.

There was a rich discussion on the role of consumers in the future energy system. "Consumer-oriented market design" and "incentives and penalties on carbon / energy use" were both initially placed as top priorities. The former was moved down to 4th priority by the end of the exercise. There was clear tension between the need to place incentives on consumers (for example a carbon tax) and trust that consumers will act in the right way. An example cited was Cape Town – "They have 60-days left until they have no water" – in relation to the fact that consumers haven't adjusted behaviour despite impending water shortages. This was supported by discussions around "letting the market try until 2040, then we'll just have to mandate the solution if it isn't working". By the end of discussions, there was consent that if consumers are expected to play a role in the transformation of the energy sector, then it will be important that consumers are engaged and that the services available should reflect their needs and desires. This led to a wider discussion on what would constitute fairness and equality in a future market, with an emphasis on those consumers least able to engage. At several points the question arose whether they reach a situation where the system provides offers that customers may not demand.

There was little discussion about specific new business models and how the consumer-energy business relationship could change in the future. There was more discussion about information available to consumers and incentives / penalties to drive behaviour. A consistent theme was linking energy and carbon behaviour to "scores, like to FICO credit score". A counterpoint to this was that previous taxes on behaviour hadn't always been successful "[the] sugar tax was a disaster".

There was substantial discussion on reducing regulatory barriers. This included "reducing regulatory burden on new generation assets", "deregulation to allow participation by new entrants", "simplified planning approval" and "simplified labour agreements". These relate to both creating space for new entrants (removing prescription in regulation) and to reducing regulatory burden (cost) on incumbents. Alongside this discussion, there was a wider discussion on creating market structures and expanding the remit of utilities (such as distributers) so that new value available could be efficiently captured. Discussion included "ensuring base-load generation is properly valued in terms of reliability, resiliency and safety" and "allowing utilities to earn a rate on technologies which increase capacity, flexibility or reliability". UK labour agreements were specifically noted as a high cost to UK projects.

There was a discussion on the importance of trials to build the evidence case for regulatory reform and also to demonstrate the validity of new business models to consumers.

Finally, a unique feature of this decision theatre was the reluctance of participants to let any theme leave the table, so instead the group combined all the change propositions. This led to some rich discussions about where themes could be combined and how that affected the relative priority (for example not combining customer oriented markets and incentives and penalties on energy / carbon use ultimately resulted in the form being ranked as lower priority than the latter). This process took the initial 11 change propositions, which themselves were an amalgam by theme of the initial 24 propositions and combined them into five change proposals which were then prioritised as shown below. While this facilitated the task of the group, i.e. to arrive at concrete changes needed in the UK energy sector, it rendered the facilitators unable to track the all the individual reasons for combination. All five change propositions were considered priorities.

Change proposition priorities:

1. Place incentives / penalties on energy / carbon behaviour on those responsible, including individuals
2. Create data driven platforms to enable new tools & standards
3. Streamline regulation to drive market innovation and efficiency
4. Consumer-oriented market design
5. Create markets animation and incentives for flexibility, resilience and capacity

Stage 4 took the prioritised list of 'system architect' changes and asked the North American DT stakeholders to consider the other communities involved in delivering the UK energy transition, namely present utilities, investors, and consumers. This exercise aimed to take a list of actions entirely aimed at allowing utilities to access new financial value pools and reflect them against the known constraints of markets, consumers, energy politics, and the goals of system regulation. This was also a timed 'consent not consensus' exercise. The agreed re-prioritisation aims for a rationalisation of

change proposals, a clearer division between consumer, regulatory, and strategic concerns and a removal of the 'middle ground' proposals, ending in a clearer set of priorities.

In common with the UK Policy and Regulatory decision theatre and the International Perspectives [Europe] decision theatre, the participants had intuitively incorporated the views of other stakeholders in stage 3 prioritisation. Therefore, the group stuck with its initial priorities identified in figure 7. In other decision theatres a further figure has been produced to show how priorities change when other stakeholders interests are discussed, this was not necessary in this case.

Stage 5 took the re-prioritised list and finalised the decision process by taking the highest priority change proposals and re-writing these as concrete actions that could be undertaken by different system stakeholders. This final stage was introduced by facilitators by explaining that these were the changes that the research team would take to future decision theatres with other system stakeholders in the Utility 2050 project, and would form the main empirical product of the International Perspectives [North America] decision theatre.

In the International Perspectives [North America] decision theatre this process ran in a single stage as the participants had already agreed five clear change proposals. The process involved re-wording the change proposals to increase the clarity of the decision and the outcomes sought ("we need...to ensure"). For most change proposals this was a simple process of wordsmithing. For change priority four, around consumer oriented market, this caused participants to reflect on the language and intent, resulting in the introduction of concepts of fairness and equality for consumers. There was no change to the order of the change priorities in this exercise. The change proposals in order of priority were:

1) We need to place incentives & penalties on energy & carbon use, down to the individual level to spur investment in clean energy technology and to meet carbon targets

2) We need to create open, data driven platforms to provide actionable evidence to improve & develop energy system (management) tools and regulations

3) We need to reduce regulatory barriers to drive market innovation and efficiency

4) We need to design and operate an equitable consumer-oriented market to ensure consumer engagement and fair access to energy

5) We need to create incentives to animate the markets to ensure flexibility, resilience and reliable capacity

" WE NEED TO PLACE INCENTIVES & PENALTIES ON ENERGY & CARBON USE, DOWN TO THE INDIVIDUAL LEVEL TO SPUR INVESTMENT IN CLEAN ENERGY TECHNOLOGY AND TO MEET CARBON TARGETS"

Utility 2050 International Perspectives [North America] Decision Theatre, Chicago 2018

"WE NEED TO CREATE OPEN, DATA DRIVEN PLATFORMS TO PROVIDE ACTIONABLE EVIDENCE TO IMPROVE & DEVELOP ENERGY SYSTEM (MANAGEMENT) TOOLS AND REGULATIONS"

Utility 2050 International Perspectives [North America] Decision Theatre, Chicago 2018

"WE NEED TO REDUCE REGULATORY BARRIERS TO DRIVE MARKET INNOVATION AND EFFICIENCY"

Utility 2050 International Perspectives [North America] Decision Theatre, Chicago 2018

"WE NEED TO DESIGN AND OPERATE AN EQUITABLE CONSUMER-ORIENTED MARKET TO ENSURE CONSUMER ENGAGEMENT AND FAIR ACCESS TO ENERGY"

Utility 2050 International Perspectives [North America] Decision Theatre, Chicago 2018

"WE NEED TO CREATE INCENTIVES TO ANIMATE THE MARKETS TO ENSURE FLEXIBILITY, RESILIENCE AND RELIABLE CAPACITY"

Utility 2050 International Perspectives [North America] Decision Theatre, Chicago 2018

5.0 Summary and next steps

This is an empirical report and as such does not conduct analysis or draw conclusions.

Section 1 of this report introduced the decision theatre framing and the Utility 2050 project. Section 2 presented the data produced for decision theatre participants. Section 3 summarised the decision theatre method. Section 4 detailed the results of the five stage decision theatre process and the distillation of the four most important changes needed to enable utilities to access new markets in the energy transition.

This was the final of four decision theatres. The next step is to produce a set of priorities around which UK electricity system stakeholders can find common ground advancing the low carbon agenda. These proposals will then be used by the Utility 2050 team in final dissemination to UK energy policy-makers, both current and future.

The Utility 2050 Team would like to thank the British Foreign and Commonwealth Office for both part funding and organising this Decision Theatre.

Appendix A: Consent to take part in Utility 2050 research [example for reporting purposes only]

UNIVERSITY OF LEEDS

	Add your initials next to the statements you agree with
I confirm that I have read and understand the information sheet/ letter dated 16th May 2017 explaining the above research project and I have had the opportunity to ask questions about the project.	
I agree for the data collected from me to be stored and used in relevant future research in an anonymised form.	
I understand that relevant sections of the data collected during the study, may be looked at by auditors from the University of Leeds or from regulatory authorities where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
I agree to take part in the above research project and will inform the lead researcher should my contact details change during the project and, if necessary, afterwards.	

Name of participant	
Participant's signature	
Date	
Name of lead researcher	
Signature	
Date*	

*To be signed and dated in the presence of the participant.