THE COMBINED USE OF SCENARIO AND MODELLING TECHNIQUES FOR INFORMING NEAR TERM ENERGY POLICY DECISIONS WITH RELATION TO LONG TERM ENERGY FUTURES

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1. Overview

Scenario planning techniques provide a framework for decision making in the context of future uncertainty. Such techniques are considered to be of use to energy policy because it is an area in which crucial near term decisions must be made in the context of long term uncertainty. Energy-economic models such as MARKAL also provide a framework for decision making with regard to energy futures- they operate at a high level of technological detail, but with a reduced level of detail regarding social, political and cultural interactions, whose impacts are treated as broad assumptions within the model, which can be varied through sensitivity analysis. This paper aims to consider the extent to which scenario approaches can complement modelling tools in order to deliver a more nuanced and policy relevant analysis, through a review of the historical development of scenarios, and their use in a range of recent UK energy futures studies.

2. Methods

This study was carried out through an extensive literature review of previous applications of strategic decision making scenarios in business and policy making contexts, from sources including Wack (1985), Kleiner (1996) and Shell (2006); and a literature search and selective analysis of energy scenarios focussed on the UK energy system, published since 2000.

3. Results

The paper analyses the development of strategic decision making scenarios in the 1950s by the US based Hudson Institute, and later by the Royal Dutch Shell company. A key insight from this tradition is the use of 'branching points' to show how a variety of possible futures could feasibly develop from the known present. This facilitates both proactive and reactive decision making, to steer towards or away from a particular envisaged future.

The paper also reviews a number of UK focussed energy scenarios which have been published since 2000. Several of these make extensive use of energy system modelling tools such as MARKAL; others have a more qualitative approach to describing possible future energy systems, exploring the potential impact of various long term drivers through the development of narrative 'storylines'. Through this review process, and in the context of the broader tradition of scenario building, embodied in the work of the Hudson Institute and Shell, the following observations are made:

UK Energy Scenarios tend to be teleological in focus. They often depict future 'end-points' in considerable detail, but are less focussed on nearer term decision points which may move society towards one future or another. This focus is nevertheless somewhat understandable as they are being produced in the context of high priority but very long term goal- significant reduction in carbon emissions by the middle of the century.

UK Energy Scenarios' technology depictions tends to the binary. It is far easier in conceptual models to swap entire technologies in and out of the system, to turn some options

'off' and others 'on', than in reality. This can be enlightening in a limited way, however it is frequently conducted with a limited explanation of what such a curtailment would represent in reality, and through what combination of factors it might be brought about. Crucially, it tends to diminish issues of path dependency, where technological systems develop in ways that tend to 'lock-in' to certain types of technologies.

UK Energy Scenarios do not consider dynamic system interactions. Scenarios tend to have a limited exploration of the interplay between political, economic, cultural, scientific and technological 'sub-systems' (as described in Freeman and Louca, 2001). Policy for example, is often represented as something which can be switched on and off as required. This tends to diminish the importance of the political realities in which policies are made, where norms of cultural and social acceptability exert significant pressure on the feasibility of policies through the force of democratic mandates. More informative scenarios would be developed if all five 'sub-systems' were considered as evolving in parallel, influencing each other. This would also help in improving the 'near term' focus of scenarios, where futures are seen to evolve from plausible interactions emerging from the present system.

4. Conclusions

Energy-economic models such as MARKAL are valuable and indispensable tools for policy making in the context of challenging long term goals such as major reductions in carbon emissions, as they provide frameworks for considering system interactions, resource and efficiency trade-offs, and economic impacts at a level of detail which would not otherwise be possible. However, inherent in every model are a range of assumptions which are not within the framework of the model to analyse. Such important assumptions include changes in social behaviour due to major cultural shifts, and the changing energy system interactions that this could imply; the social and cultural acceptability of exerting different kinds of policy controls; the impact of technological and cultural 'lock-in'; the rate and extent of technological change, including the occurrence of surprise technological breakthroughs.

Scenario techniques come out of a rich tradition of analysing future societal developments, accounting for multiple simultaneous drivers, in the context of significant uncertainty about the future. As a tool in energy policy making, they can therefore be used in conjunction with models to develop a plausible and consistent set of assumptions for any particular model run. However, recent UK energy scenarios have tended to be somewhat focussed on long term end points, and to have a less detailed depiction of near term branching points, which may prove to be crucial in determining whether a society 'locks in' to one kind of system or another. Lessons can be taken from the older Hudson / Shell scenario tradition in producing energy scenarios which not only depict more or less desirable long term futures, but postulate key near term developments which could open or close off routes to those futures, presenting policy makers with clear indications of proactive or reactive measures which could be taken to achieve them.

References

Freeman C. and F. Louça (2001) *As Time Goes By*. Oxford: Oxford University Press

Kleiner, A (1996) The Age of Heretics. London: Nicholas Brealey

Shell (2006) *Scenarios, an explorers guide*. London: Shell International Ltd

Wack, P. (1985) "The Gentle Art of Reperceiving". *Harvard Business Review*, (September-October 1985) pp. 73-89 and (November-December) pp. 139-150