2-3 UK Scenarios Development Method

Neil Strachan (strachan@psi.org.uk)
Senior Research Fellow, The Policy Studies Institute
(UK)

In the UK, there have been considerable efforts over the last 5 years to develop methods to construct and quantify low carbon energy scenarios. Recent UK energy scenarios include those developed by the Royal Commission on Environmental Pollution (RCEP), the Cabinet Office - Department of Trade and Industry (DTI), and the Tyndall Centre.

A typology of energy scenarios can be broken out into descriptive and normative. Descriptive scenarios include:

- Forecasting: Extrapolation from existing energy system, based on historical trends and expert opinion, with a resulting shorter-term focus.
- Exploratory scenarios: Illuminating key drivers at the landscape level, able to encompass surprises, and with a focus on longer term technological change.
- Technological scenarios: Focus on static representation of technologies, with less detail on social drivers.

Normative Scenarios include:

- Visions: Specific viewpoints of desirable energy futures, which encompass surprises and social change.
- Back-casting: Pathways to reach a desired end-point, relying heavily on stakeholder consultation.
- Roadmaps: Also with stakeholder consultation, and aiming to identify key barriers, opportunities and key timing of actions.

Of the recent UK energy scenarios, RCEP (2000), which was a basis for UK Energy White paper (including the 60% CO₂ reduction target by 2050) was a technological scenario. Cabinet Office-DTI (1999 – 2006) which was the UK government quantification of the 60% CO₂ target, and included quantification using the MARKAL dynamic optimisation model, was an exploratory scenario. Tyndall Centre (2005), which used a scenario generation approach and included additional sectors (i.e., aviation), was a back-casting approach.

In modelling the Cabinet Office-DTI Scenarios, three scenarios (both carbon constrained and unconstrained) were defined based on detailed qualitative descriptions of scenarios by the titles of Baseline, World Markets and Global Sustainability. In practice the modelling quantification of these was much simpler and focused on energy prices (oil, gas, coal), and energy demand projections (by sector). Sensitivity runs were carried out on innovation and diffusion by technology class and by energy efficiency.
A range of scenario quantification issues have emerged from the UK experience and include:

- **Focus:**
  - Scale of task to reach target; what do future (unconstrained carbon) worlds look like?
    - Metrics include population, GDP, energy demands, global energy prices
  - Differentiation of pathways; for a state of the world, what can policy makers influence?
    - Metric include technology costs, efficiency uptake, local energy prices

- **Ensuring a valid comparison between base and carbon policy cases**

- **Are scenarios different enough?**
  - Categorizing the range of uncertainties
  - Capturing the interactions between uncertainties

- **Which modelling outputs?**
  - GDP impacts, fuel use, technology uptake and costs, security implications etc

- **Which modelling tools?**
  - e.g., MARKAL: great technological detail and can add: elastic demands, Macro component, learning curves
  - What to account for or endogenize in the model?