2050 Pathways Calculator

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Personal Comments 16/08/10

The following comments on the 2050 Pathways Calculator are provided in a personal capacity. Some comments do not fit the format of the consultation questions and so are itemised below.

- The calculator is a truly excellent tool. Its development and publication are to be welcomed. Public dissemination of the entire tool in spreadsheet format will ensure that wide and meaningful consultation takes place.

- The calculator provides a number of pathways which do not yet address economic considerations. While the publication of the calculator in its present form is again welcome, it will be the cost of potential pathways which determine the actual pathway taken to 2050.

1. My main concern is that 2050 is used as a fixed cut-off date for the analysis. An energy pathway which reaches the goal of 80% emission reductions by 2050 must also sustain clean energy production into the future. While modelling out to 2050 and then beyond has large associated uncertainties, the fixed cut-off date masks some important issues.

1.1 Since modern nuclear plant has a design life of 60 years, the addition of new plant has a strong, long-term cumulative effect. This is already clear from the calculator. If the cut-off date were to be extended to 2075 for example, the integrated effect of accumulating nuclear capacity would continue to displace fossil fuels.

1.2 Since renewables have a typical design life of 20 years, there is clear saturation effect as new build starts to replace aging plant which has reached the end of its design life. This saturation effect can be seen prior to 2050, but would become more pronounced if the calculator was run to 2075.

1.3 A fixed cut-off date of 2050 and fixed target of 80% emission reductions precludes a sensitivity analysis. It would valuable to consider the effect of stretching the cut-off date for the 80% target, or stepping back from the 80% target at 2050 to allow more modest, and in some case more credible, build rates.

2. The level of ambition for the growth of nuclear power is based on build rates of 5 GW per year, based on experience in France. While this is clearly an ambitious goal, it represents what was achievable in France based on a 1970/80s economy and national GDP. Given that France was able to essentially decarbonise its entire electricity production in 10-15 years, perhaps this could be used as the stretch goal of level 4 for nuclear power.

3. The growth in nuclear power appears to assume large EPR type plants with a 1.5 GW capacity. However, there is credible commercial development of modular nuclear power such as the Babcock and Wilcox mPower 125 MW plant. Such devices could lead to a quite different pathway for nuclear power with smaller, compact plants distributed geographically (akin to CCGT gas plants) rather than centralised in large energy parks.

4. While generation IV nuclear plant is underdevelopment and is not available commercially, the emergence of fast spectrum reactors, Liquid Fluoride Thorium Reactors or Accelerator Driven Systems could begin to provide a meaningful contribution by 2050, particularly if supported by an

ambitious R&D programme. Again, the goal should not simply to meet an 80% emission reduction target at 2050, but to build a clean, low cost energy infrastructure for the long-term.

5. The potential of unconventional gas (such as shale gas) is not explicitly considered in the calculator. Although opinion varies, some view shale gas as major supply of low carbon energy for the 21st century. Again, relaxing the 80% goal at 2050 may allow the use of unconventional shale gas in a more credible transition towards a long-term, low carbon economy (continued use of CCGT gas plants). The increased use of gas is seen by some as part of the natural decarbonisation pathway of improved energy density transitions from wood to coal, oil, gas and nuclear energy.

6. It is assumed that transportation will largely be electrified by 2050. However, the use of a potentially growing supply of low cost gas (see comment 5) for transportation may represent a useful incremental development, particularly for fleet vehicles. Gas can be an almost direct substitute for petroleum in transportation through the retro-fit of a pressure tank to an existing internal combustion engine.

7. While micro-renewables are included in the calculator their contribution is extremely modest. The accompanying report notes that they can “empower individuals” and are an “important tool in engaging the public”. I do not believe that such qualitative outcomes should be considered as part of an analysis of energy pathways.

8. While the calculator and accompanying report are designed to allow various energy pathways to be explored, research and development is not explicitly considered. Future energy production, particularly out to 2050, will be underpinned by R&D investments made now. Perhaps an additional variable to consider is levels of R&D investment which would then couple to future costs (in a later release of the calculator) and future build rates.