

**ExxonMobil**  
*Gas & Power  
Marketing*

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2050 Pathways Call for Evidence Co-Ordinator  
Department of Energy and Climate Change  
3 Whitehall Place  
London  
SW1A 2AW

2050 Pathways Model : Call for  
Evidence

Dear Sir/Madam,

ExxonMobil International Limited welcomes the 2050 Pathways Excel Model development as a significant attempt to raise public awareness of what may be required in terms of the changes required if the UK is to meet its 2050 target of reducing carbon emissions by 80% versus 1990 levels.

We have explored the online facility for responding to the Call for Evidence but have elected to reply in the usual way; this is consistent with the limited number and generality of the comments that we wish to make at this stage. We trust nonetheless that DECC will be able to consider these limited comments as it moves to the next stage of development of the 2050 work.

Our comments are provided in the form of (i) general reactions to the 2050 Pathways modeling and analysis and (ii) responses to a few of the non technology specific questions raised by DECC.

As well as providing our own input below we would draw your attention to the response by Oil and Gas UK and its reference to Poyry's report "Gas: At The Centre of a Low Carbon Future" - which provides some compelling analysis supporting a long term role for gas (both Natural Gas and biogas) not only in power but in efficient (CHP based) district heating schemes. The report supports an argument that both unabated gas and Gas CCS must be sectors in the pathway model; the unabated gas option must remain for as long Government requires at least one proven degree of freedom if it is to be able to respond to affordability and energy security imperatives. The CCS gas option is a further distinct technology option available for commercial trial and competition with coal CCS over the longer term.

## General Reactions

DECC has presented a balanced analysis covering most of the technology options, and a useful selection of alternative pathways to illustrate the impact of sector specific policies applied at differing levels of intensity.

We were encouraged by, and agree with, many sensible and realistic observations that DECC make in its supporting analysis document, including:

- That none of the identified pathways is a preferred option, that there are a number of uncertainties and it is not possible to determine an optimal solution now. The trajectories are not projections based on policy decisions.
- Acknowledgment of a number of difficulties involved in predicting the technologies required for decarbonisation and the evolution of either capital or operating costs, the amount of energy needed, the overall costs and benefits of any particular action, and the availability of resources in the UK and abroad.
- That a detailed policy roadmap covering such a long timeframe is neither possible nor plausible and any such prescriptive approach would not be reasonable at this time given all the uncertainties involved.
- That all parts of society have a role to play in achieving a low carbon economy that includes decentralization to enable pursuit of a broader slate of solutions.

The model demonstrates DECC's desire to include all technologies (that it is currently aware of) that could make a contribution to energy supply, even if at this stage some do not make a significant contribution. This is an important aspect of DECC's approach and one that we entirely support.

## Questions and Responses

### 1. Scope of model:

- (a) Are there any low carbon technologies or processes or major demand-side options which are not currently included within the scope of the model but that you consider should be in future ?

*Gas CCS should be included separately rather than be implied to be included within coal or fossil fuel CCS. With a 50% lower demand on storage space and infrastructure capacity than coal and with residual emissions also 50% of those of coal, Gas CCS can make a significant difference where power sector decarbonisation of 95% + is Government's ambition.*

*DECC have otherwise been comprehensive in their inclusions. In future there may be other technologies or variations that would need to be included.*

## 2. Scope of sectors:

- (a) Does the range of alternative levels of ambition presented for each sector cover the full range of credible futures? If not, what evidence suggests that the range of scenarios should be broader than those presented ?

*We doubt that the model can be claimed today to cover the full range of credible futures – there will be a number of new developments. It seems to us that model is reasonably fit for purpose today, once gas CCS is included as a sector, but that if it is to achieve credibility it must remain flexible to incorporate future new technologies.*

## 3. Input assumptions and methodologies:

- (a) For each sector, are the input assumptions and the methodologies applied to those input assumptions reasonable ?

*The model is not sensitive to population and GDP growth assumptions although variances in these could significantly impact the results. Whilst we would not necessarily disagree with the fixed assumptions used it seems to us that the model would be improved if there could be some user selectivity on both of these input assumptions.*

- (g) Could the relative roles of coal and gas out to 2050 vary from the assumptions shown in this work, and if so, how ?

*DECC indicate that both gas and coal will have a long term role in a future low carbon world – in power-generation these roles will include provision of backup to renewable sources. DECC should provide a Gas CCS sector (distinct from a coal CCS sector) in subsequent refinements and we would recommend it also explores pathways that involve gas continuing to provide some base load as well as renewable backup.*

*The importance of gas relative to that of coal will depend, inter alia, on the extent to which each can meet flexibility requirements on the network. Generating units operating with CCS may be more limited in their ability to respond to backup demands on the network than units that are operating today on an unabated basis.*

*The current model allows for an unabated gas option and this option should remain for at least as long as a fast response facility is required and is not available from other sources.*

*The relative role of gas and coal will also depend on the extent to which available storage infrastructure (pipelines, platforms and reservoir pore space) acts as a constraint on daily, annual and cumulative carbon sequestration levels. Twice as much infrastructure capacity is required for a CCS coal plant than the equivalent CCS gas plant.*

*In summary we believe the model could be improved by providing a separate CCS gas and CCS coal description and allowing the distribution of gas vs coal power to be influenced by the best view of storage infrastructure constraints over time.*

## **5. Impact of pathways:**

- (a) What criteria should be taken into account in understanding the impact and relative attractiveness of pathways ?

*As we have mentioned GDP assumptions will affect model outcomes. At the same time the “levels” of change in each sector will have different and potentially significant impacts on society. The relative attraction of different pathways should be considered from the perspective of the changes required to lifestyle and behaviour ; critical questions include whether such changes can be absorbed into the economy with only minimal shock and whether business will have the ability to continue to operate and contribute to the GDP assumed.*

## **6. Cost analysis:**

- (a) Can you suggest a methodology by which the wider cost implications of choosing one pathway over another could be accurately reflected, and any relevant findings from such an approach?

*This question anticipates a next step of expanding the model to provide a reasonable measure of costs for pathway choices.*

*We would advocate the next step of development of a simple costs model, not dynamic, and not necessarily precise in an absolute sense over the timeframes for its use. For capital intensive developments costs should be provided that include the expected costs of financing projects. The objective should be to provide all consumers with a clearer sense of the relative costs (and benefits) of different pathways for both current and future consumers. The user can make the same selections as on the pathways model receives information feedback on the relative cost of the selection compared to a suitable reference case.*

*But for us the most important development that could now be made to the model is one that sets a reference (or base case) pathway based on (i) experience with existing policies coupled with (ii) an EU-ETS carbon price profile (adjustable as an input by the user) and including a UK floor price as appropriate driving forward economic selections. This would contrast with the current reference case which reflects more of a status quo or no change and transparency understanding would be significantly improved if it can be made clear how a new reference case has incorporated existing policies/directives/regulations that are in place to reduce emissions.*

## **7. Future improvements to model:**

- (a) Do you have any further suggestions for refining the 2050 Pathways Calculator ?



*Our responses above include our main suggestions for improvement. We have listed below a few questions that may be of value to you in determining other, albeit minor improvements that could be made.*

- *Has the impact on heating requirements been considered with switch to LED lighting?*
- *To what extent does the model allow for the significant variation in efficiency impacts where power plants with CCS are providing low or intermediate load in pathways where there are large shares of intermittent renewables ?*
- *Is the composition of the industrial sector modified in pathways where there is a significant switch to use of low carbon technologies/fuels ?*
- *How is available bioenergy "allocated" to various sectors? If global supplies are limited, what determines related use under alternative pathways? Does aviation get preference relative to road transport for instance ?*
- *What sort of cost assumptions are assumed for ICEs, hybrids, PHEVs, and BEVs over time ?*
- *In industrial pathways, trajectory D implies a smaller industrial base with large emission reductions though GDP basis implies growth of 2.5% persists. What accounts for offset to less industrial output and how does that change the energy / emissions challenge?*

We trust that you will take into account these comments when determining the next stage of development, and if you require any further clarification please do not hesitate to contact us.

Yours sincerely,

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