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Dear Ms Berge,

Project Discovery

As requested in your Project Discovery Consultation dated 9th October 2009, ATCO Power is pleased to provide the responses to the specific questions which you have set out at the beginning of each chapter.

ATCO Power currently has ownership and operations involvement in 15 major power and CHP plants worldwide, including two plants in the UK. Should you require any further information, please do not hesitate to contact us.

Yours sincerely

Richard Hodgson
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Consultation Responses to the Project Discovery Energy Market Scenarios

Ref 122/09

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Project Discovery considers various energy scenarios over the coming decades to determine whether or not security of supply will be maintained and green targets are achieved. Its general conclusion is that if all market participants respond as they should to market signals, then security of supply will not be compromised; however consumers are likely to face significant increases in energy charges.

There are so many uncertainties that the value of the exercise is necessarily quite limited; however at least it does signal the enormous risks that the market faces over the coming years.

Britain's energy prospects still turn, to a very high degree, on whether or not the country is willing to become dependent on imported gas; the vagaries of market prices and security that attend it; and whether the ambitious renewable targets set are achievable.

Chapter: One

There are no specific questions in this chapter.

Chapter: Two

***Question 1**: Please provide comments on our approach of using scenarios and stress tests to explore future uncertainty, and as a basis for evaluating policy alternatives.*

The use of scenarios and stress tests to explore future uncertainty is a good approach at determining the extremes of the energy market scenarios. It would be expected that a hybrid market is actually realised embracing elements of each scenario. The use of stress tests does identify the issues and impacts should such a situation arise. The details associated with the support / incentive mechanisms contained within the policy alternatives are not discussed though it would have been helpful if they had been.

***Question 2**: Are there other techniques for analyzing uncertainty that we should consider?*

Power generation investment appraisal is undertaken utilizing the current market conditions / forecasts and associated known support mechanisms. Support mechanisms that may expire during the investment period are inevitably discounted by developers in order to reflect that uncertainty. Seeking clarity associated with renewables support incentives, implications of the

IED and long term certainty with the EUETS are essential to enable investment appraisals to be conducted with any confidence. A key area of uncertainty is the criticality of the generation industry providing transmission ancillary services. The high anticipated energy cost under many of the scenarios likely to be borne by energy intensive users must be considered against a backdrop of their international competiveness.

***Question 3**: Do you agree with how we measure the impacts of our scenarios and stress tests?*

The measures used to evaluate the impact of scenarios and stress tests consider generation capacity margin, gas consumption and carbon abatement. It would be prudent to examine the capacity factor of the generation units, fuel poverty and grid integrity. Understanding these areas would identify the credibility of the generation mix proposed and the likelihood that general public support will be forthcoming.

***Question 4**: Do you agree with our key scenario drivers and choice of scenarios?*

The scenario drivers and choice of scenarios enable a wide range of generation mixes to be analysed. It would be prudent to estimate the probabilities of each scenario evolving from current market conditions. Alternative policy support mechanisms should then be discussed together with the attendant support incentives and overlaid on the scenarios again accompanied by the expected probability.

***Question 5**: Do you believe our scenarios sufficiently cover the range of uncertainty facing the market, and hence cover the areas where future policy responses may be required?*

The assumption that market participants respond adequately and timely to market signals is over simplified, the ability to provide new generation capacity is reliant, inter alia, on obtaining:-

Finance,
A grid connection,
Planning approval
And sourcing of services and equipment.

These requirements introduce a significant time-lag in the ability of the generation industry to realize the benefit which market signals and environmental policy swings indicate is available to the generator.

Environmental policy changes and uncertainty regarding renewables support mechanisms are the most significant issues facing developers. Long term policies and support mechanisms provide market stability enabling generators to make investment decisions with appropriate discount rates.

***Question 6**: Do you have any specific comments on scenario assumptions, and their internal consistency?*

The green transition assumes that the cost of carbon will rise. It is unclear how this in reality would arise, as carbon value in theory would decrease as supply exceeds demand; unless the green transition plan assumes that the current EUETS cap and trade system is radically changed.

The current electricity wholesale market price is sufficient to recover the cost of carbon for a gas fired CCGT station. If carbon prices were to fall and the dash for gas were to arise it is possible that generators may fuel switch to coal should that commodity fall in price.

If the electricity renewables target of 30% is achieved by 2020, the value of ROC's and LECs would crash; there would be surplus credits available within the market, forcing renewable generators to offer significant discount to retailers for the purchase of certificates. The additional revenue stream for the renewable generator associated with the ROC buy-out cash allocation would also reduce to zero, as energy retailers would have sourced sufficient renewable energy certificates to meet their obligations.

It is expected that domestic heating customers will fuel switch from gas to electricity once the lower cost renewables energy market is established. No scenario identifies this probable energy switch. This could be accelerated through the introduction of the renewable heat incentive (fossil heating fuel levy).

The green transition and green stimulus scenarios would require the UK government to significantly reduce the availability of carbon credits which, without similar action across Europe, would have little impact on the market price of carbon. Evaluations should be made regarding the extended utilisation of CER's to offset carbon emissions within Europe.

***Question 7**: Do you agree with our methodology for modeling gas and electricity supply/demand balances?*

It is unclear how the current bilateral market will manage the demand response in order of least cost discussed in Para 2.10. National Grid Transco (NGT) will need to consider enhancing the Short Term Operating Reserve (STOR) contracts that it currently only offers to small black

start units with surplus capacity and fast acting reserve plants. It is envisaged that large CCGT stations will have to be contracted to NGT to offer grid balancing support to counteract the intermittent delivery of wind energy. In addition to the CCGT stations, open cycle gas turbines (OCGT) will also be required to provide fast acting support. In essence to support a significant wind energy portfolio both low capacity factor OCGT units and more capitally intensive CCGT units will be required to operate. Without a STOR contract or similar commercial arrangement, it is unlikely that these units will be available to offer the demand support required.

***Question 8**: Do you agree that LNG is the likely medium-long term source of "swing gas" for the European market*

In the absence of stored gas, LNG will be the only option for the provision of “swing gas”.

Additional Comments

It is unclear as to how the infrastructure development costs would be funded. Does the report envisage government funding or private sector investment? Para 2.55 The question of under and over investment is perhaps one of the key areas that should be applied as a stress test Para 2.58 What is the cost of finance that the study has used?

Para 2.53 ‘Feed-in’ tariffs for 5MW and below will not make a major contribution to the energy mix, lacking any economy of scale and technology largely unproven. In order for there to be widespread take up a developer will require significant project returns to meet the high risks.

Para 2.54 Renewable heat provision is likely to have a very low take-up. Support mechanisms for CHP are marginal, when taking into account the significant additional capital plant investment required and difficulties dealing with heat host load fluctuations and so-called ‘mill risk’ (the risk that the heat host ceases business). Sustainable energy crops generally need to be locally sourced to avoid punitive transportation charges, restricting energy centres geographically and not necessarily adjacent to the heat host. Energy crop yields from coppice do not materialise until three years from planting requiring a significant investment by the grower.

Source data for market price forecasts should be identified and the current market forward forecast commodity prices should be plotted against the evaluated scenarios.

CHAPTER: Three

***Question 1**: Do you have any observations or comments on the scenario results?*

Security of supply Gas

Para 3.1.1 the global dash for LNG under the scenarios assumes a linear build out of global production capacity; however the required capacities vary significantly between scenarios. The assumption that this hypothetical increasing capacity once stressed, leads to shortfall undermines the credibility of the scenario. Liquefaction plants will be constructed with the expectation of 100% utilization and not spare capacity.

Para 3.30 the security of supply for gas on a peak winters day assumes that the market behaves logically and that sufficient infrastructure improvements are made to match scenarios. However the scenarios identify significant differences in projected gas demand which is likely to ultimately lead to physically different infrastructure improvements. The scenarios assume market growth that satisfies future expected requirements however the scenarios then predict that the anticipated infrastructure fails to deliver security of supply over the prolonged cold winter; surely if growth assumptions are made these should also cover such eventualities.

Security of supply Electricity

Para 3.34 In a world of low environmental action, there is a significant build out of CCGT whilst in a world of significant environmental action to manage the intermittent generation thermal assets will need to be flexible. CCGT's do not offer instantaneous response, to achieve the greater flexibility fast acting OCGT's will be required, which unfortunately have lower thermal efficiencies than CCGT's and are currently not supported by the Environment Agency.

Para 3.37 the dash for energy assumes that a large build out of CCGT's occur, dual fuel is not offered as standard on the large single shaft CCGT units which will prevent fuel switching at coincidental high gas demands. Grid stability is critical should a significant proportion of the UK energy be supplied from wind it is not known what ancillary services will be available to manage transmission quality.

Para 3.38 the expectation that the de-rate capacity margins will remain positive is reliant on generators being incentivized by the grid to construct plant that will have a lower capacity factor than historical norms.

Para 3.44 environmental policies have had the greatest affect on capacity margins through the introduction of the LCPD and the IED. Developers are extremely reluctant to commit to long term development timetables when policy is still under debate in the European Parliament and may be subject to further change, which could significantly influence commercial viability of the project.

Para 3.46 the assumption that CCGT can operate flexibly is valid however the CCGT's will not be fast starting to support wind variability; the use of OCGT's will be required. Additional CCGT

flexibility through the use of supplementary duct firing is also possible however the right signals for the provision of this technology must be provided.

Para 3.47 A load factor of 30% for a CCGT will not be economic under current market prices. A 50% load factor for a new CCGT utilizing current forward price curves achieves marginal viability. A reduction in capacity factor will put the CCGT at risk of becoming a distressed asset. CCGT's will need a STOR contract from NGT or an equivalent supporting mechanism. NGT have only recently started to offer 10 year contracts whilst traditionally they were for only 2 years, but only for OCGT's, predominantly black start with spare capacity and fast acting reserve. NGT would then need to dispatch cost effective STOR contract plant to manage the intermittency of wind.

Investment

Para 3.60 the annual investment associated with the green transition and stimulus peaks at £30 billion against a backdrop of the annual expenditure in 2008 of £8 billion, itself an increase of 40% on 2007 levels. This significant increase in capital expenditure will only be possible by increasing the power generation specialist labour pool. Power generation construction and operational labour is currently in short supply.

Para 3.61 Current forward market gas prices would indicate the market is expecting a dash for energy scenario. It would be helpful if, when quoting commodity prices, the impact of seasonality is addressed.

Para 3.65 The green scenarios present lower wholesale electricity costs as a result of the reduced requirements for carbon permits; however greater intermittent generation will require much higher levels of spinning reserve in order to protect capacity margins. This will, in turn, give rise to increased capital requirements for additional asset infrastructure to facilitate grid expansion works for both onshore and offshore renewable generation, albeit with much lower utilisation. It is therefore not clear why the transmission and distribution charges appear to be the same under all scenarios.

***Question 2**: Do you agree with our assessment of what the key messages of the scenario analysis are?*

The key messages from the scenario analysis are whether renewables targets are achieved and whether sufficient capacity margin is achieved. A major consideration should be given to evaluating the robustness of the transmission system, fuel poverty and security of supply.

***Question 3**: Are there other issues relating to secure and sustainable energy supplies that our scenarios are not showing?*

The scenarios should consider capacity factor of the generating plants and highlight the mechanisms that will support fossil fuel plant providing essential back-up for intermittent renewable generation. The scenarios should also consider a significant increase of electricity imports.

***Question 4**: To what extent do you believe that innovations on the demand side could increase the scope for voluntary demand side response in the future?*

No comment.

CHAPTER: Four Stress Tests

***Question 1:** Do you agree that our stress tests are representative of the types of risks facing the GB energy sector over the next decade?*

The stress tests are being applied to perfect models in which the market responds to market demands and a perfect build out rate is achieved. Perhaps a true evaluation should address situations where new-build capacity significantly lags the market signals. The scenarios themselves are in fact de-stressed already. For example the scenarios assume that the LNG gasification infrastructure is built up to support predicted demand on a 'just-in–time' basis - the stress test is then applied to what was deemed an adequate matching infrastructure.

***Question 2:** Are there further stress tests that you think should be considered?*

Further stress tests could include fuel poverty risk, finance constraints, carbon price swings, ROC price swings, grid connection delays, resources not being available, public acceptance of the rising energy costs, government policy on renewables abandonment, industry corrections due to high energy price, Investment return, delays with new build, change in legislation etc. Implications of the stress tests arising at the same juncture should also be considered.

***Question 3:** Do you agree with the assumptions behind our stress tests?*

Wind capacity assumption at 0% is considered to be realistic as we believe that wind generation has historically dropped to 5% on a cold winter's day.

Why in the various scenarios does demand appear to rise for all scenarios that are stress tested vs. the without stress test? Consideration should be given to superimposing multiple stress tests as gas shortages within Europe may lead to the UK exporting electricity through the interconnector.

***Question 4:** Do you have any views on the probabilities of these stress tests occurring?*

Wind capacity assumption at 0% is considered to be realistic as we believe that wind generation has historically dropped to 5% on a cold winter's day.

Question 5: *Do you agree with how we have modelled demand curtailment in response to constrained supply?*

No comment.

Question 6: *Do you have any other comments on our stress tests?*

No comment

CHAPTER: Five

There are no specific questions in this chapter.

Appendix 2

Commodity Prices

Please explain the rationale for commodity prices differing significantly in 2010 under the four scenarios when effectively all scenarios start from the same point in time? The carbon prices within the green scenarios rise significantly in value post 2015 when it would be expected that demand would be reducing. Does the current European cap and trade market change at this juncture?

Gas Supply Assumptions

The Shtokman, Nabucco and Yamal pipeline supply projects detailed within the Annual EU Gas Supplies should be considered as shocks within all the scenarios as failure for the projects to be developed will significantly influence the generation capacity margins in some shocked and un-shocked scenarios.

Electricity Assumptions

The generation capacity tables are informative however the provision of the capacity factor assumptions envisaged for the generation types would be extremely informative and lead to discussions on probable investment decisions/ required support mechanisms.

Capital Costs

The capital costs per £/kW proposed are lower than those used currently by industry which for example are typically CCGT £670; on shore wind £1300 to £1500 and bio waste £3000 to £5000.

De-rating factors for existing plant

The annual availability XX%, is this in reality the anticipated commercial capacity factor of the plant? It is currently envisaged that a new CCGT may only currently achieve a 60% commercial capacity factor. The coal de-rating factor of 90% for existing plant and CCS is more likely to be 80%.

Demand Curtailment

The assumption that CCGT's undertake fuel switching is unlikely as the majority of new build CCGT's will not offer dual fuel capability as standard.