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Real Options and Investment Decision Making; Consultation 32/12

Dear James

Wales & West Utilities (WWU) is a licensed Gas Distribution Network (GDN) providing Gas Transportation services for all major shippers in the UK. We cover $^{1}/_{6}^{th}$ of the UK land mass and deliver to over 2.4 million supply points. WWU is the only company that focuses solely on Gas Distribution in Great Britain.

WWU welcome the opportunity to offer its thinking in this area. Our current approach(es) to investment decision making, and responses to the questions asked in this consultation paper are set out below.

We are at the forefront of asset management decision making and always willing to implement new and innovate tools that allow better decision making. Our RIIO GD1 business plan submission is available on our website and contains a specific document "Part B6 Asset Strategy (including the April 2012 addendum) that shows how we have developed our asset strategies and supporting tools we use to support our investment decision making process.

Do you agree or disagree that a real options approach is useful in the context of policy and investment appraisal in the energy sector?

WWU agree that any approach to investment decision making should be based on wider data sets and commercial judgments than those which a simple NPV test would deliver. Many factors (inc NPV) are correctly considered to determine the 'best'' decision for WWU and its customers. Our existing approaches to all forms of investment utilise a range of economic, regulatory and business decision making tools. Only by doing so, can any decision be correctly assessed and qualified in what is most often a judgment based on certain assumptions, which may legitimately alter over time.

It is important to recognise in the context of this approach that there may be occasions where statutory requirements on the Network dictate a course of investment that does not usefully lend itself to a wide range of investment decision making tools.

In what other policy areas, if any, do you consider the real options approach could help improve decision making?

The principle of applying a real options approach to other investment policy areas could be appropriate subject to the factors listed below. The majority of investment considerations already benefit from the assessment of whether the investment should be correctly deferred/delayed.

In assessing whether to approve a project either involving capital or operational expenditure, WWU consider the following which all contribute to determining the 'best' solution' from the customer's point of view. Examples of these include:-

Environmental impacts
Investment considerations will include cost benefit analysis that will include environmental impacts such as greenhouse gas emissions. In as much as these are not financially quantifiable then these will not be captured by an NPV or a Real Options approach.

Safety
Investment considerations will included an assessment of safety implications, while some of these may be financially quantifiable some may not be and therefore will not by captured by an NPV nor a Real Options approach.

Lead time to project commencement and completion
Investment decisions will often have a series of stages and go/no go decisions. In many cases, to reduce potential overall costs, some design and preliminary preparation work may be required, over and above that required to estimate the costs of the scheme, resulting in a sunk cost if the scheme does **not** go ahead.

Ongoing assessment
Many sizeable investments require ongoing assessment to ensure the most viable and cost effective solution is provided. Economic tools will assist in this regard, which will ultimately allow decisions to be made which can be qualified and substantiated.

WWU believe that all of the above 'tools' are invaluable when assessing investment decisions on its Network. It is supportive of any other 'tool' which acts as an enabler for its decision makers in this area.

Q Do you have any views on the practical applications of real options pricing set out in this paper in relation to (i) scale and timing of network investment, and (ii) valuing interruptible contracts?

The practical approach used is credible, and clearly a considerable amount of thought and effort has gone into the consultation. Inevitably it has had to include a number of assumptions to derive values used in the analysis. While those made are plausible, there are many other *equally plausible* assumptions that could be made that will lead to different values for the expected distribution of demand and therefore the value of the option.

Some of these assumptions may be less amenable to analysis and therefore they are unattractive even though they may be reasonable. Listed below are some of the assumptions made in the Consultations supplementary annex, that have not been commented on in the consultation paper (for example we have excluded the assumption that the NPV of original investment is zero, as this is mentioned by Ofgem).

Consultation reference	Assumption	Alternative assumption
Para 1.3	Mean is mid-point of green gas and electric revolution	Mean is mid-point of all four scenarios (amongst other possibilities)
Para 1.6	Bi-nominal event tree; bi-nominal approach is used	Multinomial tree is appropriate as demand outcomes are continuous not discrete
Para 4.7	Distribution of demand; random walk utilised	Other options, for example autoregressive or moving average equally plausible.

The approach assumes that numerical values can be attributed to each of the outcomes. In some case these can be estimated, albeit with a significant resource; however in other cases they may not be capable of any sensible estimation. While a forecast of overall network demand may be amenable to the approach suggested, interruption is assessed on the relevant part of the network. An example of this is whether a new load will be connected to a particular part of the network or conversely whether a load will disconnect from the network. Both of these may affect whether interruption may be required in future but the assumptions about the probabilities may be difficult to estimate and may be arbitrary.

It should be noted that under the real option approach the total cost would be higher if the high demand scenario materialised compared to if the project was done in year 1. While we fully understand that the real option approach can offer value, it may not necessarily be understood by others who question why networks paid option payments to customers, when the outcome meant that the investment was ultimately required. This has been seen with respect to private financing initiatives relating to post construction refinancing of debt at much lower interest rates than obtained prior to construction.

There is some evidence of a mis-understanding of the cost of risk and uncertainty. We would wish to avoid a scenario whereby a deferred investment (due to payments to customers for interruption contracts for example), ultimately led to a **later** investment that provoked criticism. Such a decision could be misinterpreted as... “Network spent £XM on payments to customers for interruption contracts that were never used, and then spent £ZM on reinforcement works that it had been considering for several years”. Appendix 1 to our consultation response highlights this issue raised in a report by the Public Accounts Committee.
Public Accounts Committee - Forty-Fourth Report Lessons from PFI and other projects July 2011.

It is recognised there is a considerable amount of work required to put this approach into practice, therefore Ofgem recommends:

- A default value for the option value
- A value at the low end of the range Ofgem have calculated

While this seems reasonable, it is unclear if this is intended to apply to all projects or just interruption and whether this is the correct value for longer time periods and occasions where there is less volatility than 7%. Intuitively, as volatility tends to zero, then the option payment should tend to zero, and it seems plausible (from an inspection of the values provided in Table 5.1 on page 25) that this could be non linear.

We also note that the graph in figure 4 on page 24 shows some interesting features;

1. The real option value increases with volatility
2. The real option value increase with the length of the option
3. The option value length of option relationship is not linear but becomes more linear as the length of the option increases; the relationship is also not smooth
4. This fluctuation decrease as volatility decreases

While 1, 2 and to a lesser extent 4 are intuitively plausible, observation 3 is not. It would be helpful to understand if this observation is due to the number of Monte Carlo simulations and if so whether this suggests that further work is required.

We question the statement made in 1.12, that "(If, for example a project had a strongly positive NPV, there is a much lower value in a wait and see strategy, and a much lower option value)". While this may be true in all practical circumstances it is possible to think of an example where a project has a strongly positive NPV if a very unlikely event occurred.

For example, one could envisage a power station being built that had exceptional levels of resilience to various extremely unlikely events. This might make it uneconomic in all but very unlikely circumstances but in those circumstances it may be able to earn very large revenues. In this case the NPV may be strongly positive but it would never be built as the probability of building it and never using it would be extremely high. In this case a "wait and see" strategy would have little value as stated.

In other circumstances such as lower probability of the extreme event occurring or lower expected revenues if the extreme event occurred the NPV could be low. In this case the business would still probably not be willing to pay for an option as the probability of the project delivering a negative return is so high that a normal risk averse business would not consider the project.

In this case a more appropriate strategy is the minimax strategy of minimising the maximum loss or in non-economist terms the "no regrets" strategy. This strategy gives the decision theory basis for what would be a natural business decision that a risk averse business would not consider projects with that risk profile.

Q Do you have any views on our approach to estimating the real option value associated with interruptible contracts?

The approach in the example assumes that the option to reinforcement can be done immediately once the demand in year t+1 is known. In practice, reinforcement, whether to rebuild a governor or to reinforce a pipeline has a significant lead time, therefore the decision to reinforce is likely to be taken based on indications of demand at least one year in advance. There is still uncertainty therefore as to the level of demand at the time the decision to reinforce is made. In practice the interruptions process has offered consumers to give offers that comprise

- An option fee
- An exercise fee

The analysis seems to assume that the only fee paid is the option fee and that the exercise of the option is free. In practice we expect customers to view the option fee as a general price of

disruption, and the exercise fee as the on the day opportunity cost (for example, having an idle or less productive workforce). To apply the model we would either

- Need to set a requirement that the exercise fee was zero
- Estimate the number of interruptions likely in a year and factor that in to the value of the option

The model simplifies the interruption decision to demand being high or low in a given year. In practice, interruption is likely to be affected by the weather and interruption may be required more than once in given year. There are both long and short term determinants of demand. The modelling adequately captures the long term effects but does not capture effects of weather that are essentially random around seasonal trends over the timescales considered in this analysis.

I trust these comments are viewed positively. We look forward to working with Ofgem to develop thinking in this area that matches the existing investment decision criteria with this additional complementary approach.

Yours sincerely

Steve Edwards
Head of Commercial and Regulation
Wales & West Utilities

Appendix 1

Public Accounts Committee - Forty-Fourth Report Lessons from PFI and other projects July 2011

http://www.publications.parliament.uk/pa/cm201012/cmselect/cmpubacc/1201/120102.htm

2 The returns to investors

8. Investors typically provide 10% of the finance of a PFI project. There are primary investors (developers and constructors) and secondary investors (those who acquire shares in operational PFI projects). The secondary investors are typically specialist PFI investment funds which manage a portfolio of PFI contracts to generate an income stream for those who have invested money in the funds.[25]

9. There is little information available on the returns made by primary and secondary investors on their PFI investments making it impossible for the public sector, Parliament and the public to assess whether the investors' returns are reasonable for the risks they bear.[26]

10. Innisfree told us that there was little money to be made in the initial stages of a traditional construction project - contractors on big construction projects typically worked to profit margins of 2% to 3%.[27] Yet a recent report[28] suggested that primary investors in PFI projects could sell their shares soon after construction is complete and average a profit of over 50%.[29] Innisfree, which is involved in developing PFI projects, did not accept the accuracy and objectivity of the report's findings. They argued that they had suffered losses on the Cornwall Schools and Dalmuir PFI projects which had to be balanced against the opportunities for profits.[30] Innisfree and Semperian agreed to make information available on the purchase and sale of their PFI investments.[31]