# Review of the Report:

# "Electricity Generation Costs and Hurdle Rates Lot 1: Hurdle Rates Update for Generation Technologies", NERA, July 2015

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*Background and Terms of Reference*

1. I have been requested to conduct an independent peer review of the draft (July 2015) NERA Economic Consulting (NERA) report for DECC on updating DECC's hurdle rate assumptions for renewable and non-renewable technologies. The scope for this peer review was defined to include:

a) Review of NERA's methodology and approach
b) Review on limitations of the study, challenges and effectiveness of mitigation options adopted (where applicable).
c) Choosing a point estimate of Hurdle Rates for each technology from ranges and sensitivities provided
d) Review of variation of Hurdle Rates between technologies
e) Review of methodology for projecting Hurdle Rates out to 2030

I have been informed that the hurdle rates should be assessed as they might be perceived by potential investors at "project appraisal stage", ie the point before initial development costs and risks are incurred. The purpose is to help DECC in setting parameters (eg ASPs and CONEs) for future CfD and CM auctions, as well as in DECC's general modelling of the energy system and evaluations of various policies.

2. In undertaking this review, I have done so in my personal capacity as a consultant. All opinions are my own and do not reflect those of various organisations with which I am affiliated. I have no association with NERA, nor any conflicts of interest in undertaking this report as an independent advisor.

3. My qualifications for undertaking this review are briefly summarised as follows. I am a Professor at London Business School, with over 30 years experience in research and advisory work for the electricity sector. I have been Editor of *Journal of Forecasting* since 1984, formerly Editor of *Energy Economics*, and founding Editor of the *Journal of Energy Markets*. I have been a special advisor to the House of Commons Select Committee on Energy and Climate Change, consultant to the UK Competition Commission on Electricity Market Abuse, Expert Advisor to the National Audit Office in their review of the electricity industry reforms, peer reviewer for modeling work by DECC and Ofgem, and Expert Witness in

several litigation cases before the High Court in London and at international arbitration. I currently serve as an independent member of the Balancing and Settlement Code Panel.

*Comments*

4. The NERA report provides new insights into the hurdle rates that companies might be using to appraise potential investments in electricity generation facilities. To inform this, NERA draw mainly upon a new survey of stakeholders, which they undertook, as well as some of their own modelling and with regard to evidence from other sources which they used for benchmarking. The report is a comprehensive synthesis of evidence and concepts. NERA undertook a similar study[1] for DECC in December 2013, and this "update" is particularly timely as the intervening year provides market evidence from the first CfD and capacity auctions, as well as the changing industry sentiment following the appearance of tighter funding constraints (LCF). Overall, the update is informative and authoritative, and is particularly useful in placing the new assessments in context alongside previous estimates from other studies.

5. The substance of the NERA report is mainly survey based. The benefit of this is in terms of it being new and timely market research. The low sample size is not unusual in studies such as this[2], but it is a concern and I think it is so small that at best we can only suggest that the new results are indicative. The sample was 24, within which only 19 quantitative assessments were obtained and from which there were 16 follow up interviews. The sample does, however, appear to be representative of the population of potential investors/advisors. [I wonder how many in this sample were also used for the NERA survey in 2013. If there were some overlap, it would have been useful to identify a "panel" aspect to the monitoring, to track more directly the changes in market sentiment and provide some extra precision.] Apart from the sample size, there is a concern about human bias in the responses. It is possible that some respondents might see the survey as an opportunity to influence DECC; it is also likely that sentiment might be impressionable and may have over-reacted to the recent auction results and LCF worries. The report notes this possibility at the beginning, and also alludes to this when comparing these survey results with other studies, but it is not clear how it is handled in the interviews, nor is there any comment at the end. It is possible that policy risk sentiment could have been at a transient high level during this survey period.

6. The main results were based upon the survey. NERA created a qualitative ranking of relative riskiness from the survey and then interpolated by linear regression for any missing quantitative assessments. It is a good approach to get qualitative rankings first of all, as with previous studies. However, I think forcing a single linear equation through all of the data is too strong an assumption. One concern with this regression is that the independent variable used is the average ranking for each technology. There is no reason to expect these rankings

[1] NERA (2013): Changes in Hurdle Rates for Low Carbon Generation Technologies due to the Shift from the UK Renewables Obligation to a Contracts-for-Difference Regime.
[2] OXERA (2011): Discount Rates for low-carbon and renewable generation technologies, was based upon a similar survey but received only 8 responses.

to be a linear scale with respect to risk[3] and so a precise application of ordinary regression is not really valid. I think a simpler analysis than forcing a linear regression might have been preferable: looking at the median hurdle rates for each technology for example and undertaking pairwise interpolations (ie creating a piece-wise linear function rather than a single regression line). Even if the single regression model were sufficiently close to a piecewise function as an interpolator, it would be important to know how dispersed the rankings are for each technology. The dispersions of hurdle rates by technology are displayed, but not the dispersions of the rankings. The pattern of hurdle rates v average rankings is reasonably plausible but it does not exactly match previous hurdle rate rankings at DECC and there are some anomalies. The fact that gas technologies were seemingly low risk but high hurdle rate was dismissed rather easily as outliers. CCS and nuclear are in contrast relatively high risk but low hurdle, and uncommented. I would therefore suggest that this part of the analysis may not be very robust, and should at best be taken as indicative alongside other sources of evidence (as indeed NERA undertake).

7. I suspect NERA would have liked to progress financial theory, including real options, more than they were able to achieve. Despite the opening comments on CAPM, real options and asymmetric risks, the core recommendations are based upon the survey and its interpolations. It is suggested in the report that the CAPM framework gave a structure to the interviews in terms of thinking through diversifiable, asymmetric and non-diversifiable risks. To the extent that this coaching of the assessments in CAPM concepts influenced the interviewees[4], it does imply that the hurdle rates so derived have a (perhaps slightly) normative element. NERA proposed with the agreement of DECC to apply CAPM, and so if these estimates are slightly biased with respect to what the market participants as a whole might apply, in the absence of similar CAPM coaching, then it is by design. Furthermore, if this was indeed useful interview framing, it would be useful for future reference if more commentary on the interviewees' responses to this deconstruction had been provided in the Appendix. It would also have been useful if the report could have given a more intuitive explanation of what has been achieved from backing out the betas from the various other sources. They are interesting aspects of comparison, but do not feed into the final recommendations and I think the same comparative points could have been made directly from the various hurdle rates. Actual market data analysis is very limited and is complicated by the companies' rather special and evolving circumstances. Moreover, even if the WACCs could be evaluated from reliable data, it is often the case that many investors will require a higher hurdle rate for risk averse reasons, or because of alternative uses of capital, in order to take an investment forward at FID. Overall, the CAPM framework was interesting, perhaps slightly influential to the assessments, but apparently not substantially material to the final recommendations and I think this may reflect that fact that CAPM as a theoretical construct

[3] In OXERA (2011): Discount Rates for low-carbon and renewable generation technologies, analysis of a similar survey prompted an observation that the range of discount rate estimates at the top end of the risk ranking was greater than at the lower end.

[4] Informal comments from NERA suggested that the hurdle rate responses may have been higher without the CAPM framing.

does not contribute very much to our understanding of hurdle rates in the context of the type of investors actually involved at the outset in these projects.

8. This analysis has an underlying economic investment perspective, in common with many studies such as these. The concept is an IRR calculation based upon a single project with cost and revenue streams. There is a presumption that the cost of capital will be WACC based with the costs of equity and debt, as well as the level of gearing, being constant over the project life. This is different from a multi-stage, business model perspective. The report recognises that many projects are actually in three stages: development, construction and operational; often with different players engaged with different risk/return preferences, different gearing, debt metrics and equity expectations. The NERA report recognised this at the beginning, but it would have been useful if this three stage concept could have been explored further to establish the robustness of the single project concept as adopted. I understand that NERA considered this to have been out of scope. The underlying concept, therefore in this report, under which the hurdle rates are evaluated, is that of a single project in three stages rather than as a sequence of three projects. Thus, allocation risk only applies to the first stage, and only in the context of auctions for government support from CfDs or as CMUs. The business model for developers, eg private equity, is very different from that of investors in an ongoing operational project, eg institutional investors. There are several studies published that identify the multi-stage, multiplayer aspect of financing, eg the offshore wind analysis by the European Wind Energy Association[5], and some reports[6] have even suggested it is a "fallacy" to use the single project model. That is an overstatement, but it would have been relevant if this analysis had been scoped to examine the robustness, or otherwise, of a single appraisal stage hurdle rate as a surrogate for the complexity of the overall business model. I suspect this could be done by a simple three stage decision tree embedding the distinct sequential investment criteria.

9. Allocation risk is a strong feature of this report and the major theme in updating the hurdle rate estimates from 2013. This refers to the impact that the uncertainty on future funding restraints (eg through LCF) might have in terms of increasing the project risk. The survey respondents mention that this factor may be adding about 200bps to hurdle rates, and possibly more to offshore wind projects. NERA indicated that this could be backed out by assuming a 25-30% success rate for projects and thereby quantifying an allocation risk premium as compensation for the prospect of “wasted” development expenses that project developers might incur. NERA undertook some sensitivity analysis on this, showing that if the success rates went up to 50-70%, the allocation risk premium would halve to about 100bps. Whilst the survey results are empirical market indications and should therefore be used as such, I am concerned about taking forward the notion that allocation risk can be computed from the statistical chance of success, and whilst I realise that this was only imputed as a sense check from the respondents in the survey, there is a danger that this concept and metric may become

[5] http://www.ewea.org/fileadmin/files/library/publications/reports/Financing_Offshore_Wind_Farms.pdf

[6] http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-deloitte-establishing-the-wind-investment-case-2014.pdf

part of the basic calculation. Allocation risk refers to several impacts of funding restraints; in an auction context both the chance of success and the expected clearing prices may be influenced with budgets. In December 2013, NERA undertook a detailed analysis[7] of how the change from ROCs to CfDs might influence hurdle rates. This was before DECC had introduced auctions and by instruction it did not consider allocation risks related to auction successes. It concluded that a net increase of 5-40 bps could be attributed to the move to CfDs which was a different interpretation of allocation risk related to the Government's risk exposure in the difference payments between strike and power prices[8]. In the 2015 report, NERA did not revisit this calculation but it is presumably still one of several drivers in the full assessment of allocation risk. NERA do not suggest, nor is there any evidence, that the statistical chance of success is the way that market participants think about quantifying allocation risk as a supplement to an IRR calculation. However, there would be concerns if this construct is taken forward too simply:

- From DECC's perspective there is an awkward amount of endogeneity here. Policy-makers should not be placed in a situation of having to offer higher rates of return to investors at times when government funding is constrained and/or when investors are highly competitive with many wanting to acquire CfD or CM support. In both cases the outcomes would appear irrational to market forces. Budgetary constraints should not lead the Government to be more generous, and more competition should not lead to higher costs. Furthermore, if industry thought that DECC would add an allocation risk premium to hurdle rates according to the probability of success, there may be a moral hazard as it might encourage a larger number of uncompetitive tenders.
- According to the Arup[9] analysis, preconstruction costs, as a percentage of total costs, range substantially by technology, eg 2% for offshore wind, 6% for solar, 8% for biomass. This lower percentage for offshore wind raises a question over the survey respondents who indicated that the allocation risk premium might be around 200bps for the main technologies but 200-600 bps for offshore wind. That discrepancy seems to imply more about an elevated sense of general policy risk sentiment and a perhaps an over-sensitive response to the policy news in early 2015.
- It is not appropriate to think of allocation risk in purely statistical terms as if winning a CfD were purely a matter of chance. The lower cost tenders will win, as they should, and high tenders will lose, not because of chance but through being uncompetitive. It would be inefficient to over-reward the low cost producers on the basis of the average wasted costs of their more expensive competitors. The prospect of an allocation risk supplement to IRR following a formula is therefore rather unattractive and a more pragmatic approach may be necessary to respond to the market anxiety.

[7] Op cit.
[8] With CfDs there is a risk that the wholesale prices turn out to be lower than anticipated, increasing payments and thereby reducing the amount available (under LCF) for future CfD allocations.
[9] Review of the generation costs and deployment potential of renewable electricity technologies in the UK. Report for DECC by Ove Arup & Partners Ltd, 2011

10. Ideally, allocation risk should be met with some endogenous adaptation in the market. My own sense of the industry reaction to allocation risk is that developers will continue to consider portfolios of projects but only fully develop proposals for the most competitive ones. NERA recognise the same point when they discuss the trajectory to 2030 hurdle rates, but only insofar is an adaptation to a "new equilibrium" may thereby increase the "probability of success" (*sic*). Market sentiment is an important consideration and there is evidently more anxiety in 2015 than previously, but it may be more constructive to see allocation risk as part of general policy uncertainty on the budgets for funding than as a separate element of statistical risk.

11. The NERA report is strong in its equity perspective and the attentive references to yieldco returns is very relevant. I was surprised to see rather less analysis of the debt side, and if that was out of scope, it was unfortunate. Some input from the ratings agencies could have been useful on project finance and whether different technologies get rated differently. More analysis of the terms of lending and the need for refinancing during the life of the project would also have been beneficial. Figure F1 is interesting insofar is it indicates that the survey respondents did not see the cost of debt rising at all, across the risk rankings for the projects. Further comment on that would have been useful.

12. The discussion of the various sources of risk is very useful in the report. I would add that operational risk did not feature as much as I would have expected. This covers not only volume risk for renewables, but load factor degradation over the project life for all, but especially gas and thermal, plant. Apparently, it was considered a diversifiable risk, which is reasonable, but outside a CAPM framework, it may enter investors' hurdle rates (eg through the cost of debt). From the same perspective, it would have been of interest to consider more fully if there is any diversification value in allocation risk to portfolio equity investors. In addition, scale effects did not get a mention. Very large projects are perceived at company level as being more risky, even though scale is a hard factor to include in capital markets theory.

13. The suggested ranges from NERA and the actual ranges from the survey are shown below[10] as well as the previous OXERA ranges, being compared to the DECC 2013 Final Delivery Plan and Electricity Generation Costs report[11]. These are reported as pre-tax real.

| **Hurdle Rates in 2015** | **NERA Range** | | **DECC 2013** | **Survey** | **OXERA** |
|---|---|---|---|---|---|
| ***Renewables*** | **Low** | **High** | | | (2011) |
| Solar PV 1MW- 5MW | 5.5% | 8.9% | | | |
| Solar PV >5MW | 6.5% | 9.4% | 5.3% | 6.3 -10% | 6-9% |
| Biomass CHP | 11.7% | 15.7% | 13.6% | 12.7 -15.2% | |
| Biomass Conversion | 10.0% | 13.2% | 10.9% | 12% | |

[10] This Table is based upon an earlier draft of the NERA July 2015 report upon which I was instructed to review; I note that in the latest version some of the technology categories have been aggregated.

[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269888/131217_Electricity_Generation_costs_report_December_2013_Final.pdf

| | | | | | |
|---|---|---|---|---|---|
| Onshore wind | 6.1% | 10.3% | 7.1% | 3.6-10.1% | 7-10% |
| Offshore wind | 8.3% | 12.4% | 9.7% | 7-13.6% | 10-14% |
| ACT standard | 8.7% | 12.6% | 7.9% | | 7-10% |
| ACT advanced | 9.7% | 13.6% | 10.7% | 9.8-15.6% | |
| ACT CHP | 10.7% | 14.6% | 9.5% | | |
| AD 1MW - 5MW | 8.6% | 12.2% | | | |
| AD >5MW | 9.7% | 13.6% | 11.5% | | |
| AD CHP | 11.7% | 15.6% | 13.1% | | |
| EfW CHP | 10.1% | 12.7% | 10.8% | 8.1-9.2% | |
| Landfill gas | 7.1% | 10.7% | 5.7% | | |
| Sewage gas | 7.1% | 10.7% | 7.5% | | 7-10% |
| Hydro | 5.6% | 9.2% | 5.8% | 7% | 6-9% |
| Wave | 9.7% | 13.2% | 11.0% | | 10-14% |
| Tidal stream shallow | 10.3% | 14.3% | 12.9% | | 12-17% |
| Tidal stream deep | 10.8% | 14.8% | 12.9% | | 12-17% |
| Geothermal | 9.0% | 12.9% | 22.0% | | |
| Geothermal CHP | 11.0% | 14.9% | 23.8% | | |
| ***Non-renewables*** | | | | | |
| CCGT | 7.8% | 11.8% | 7.5% | | 6-9% |
| CCGT IED retrofit | 7.7% | 11.6% | | | |
| CCGT CHP | 9.8% | 13.8% | 7.5% | | |
| OCGT | 7.8% | 11.8% | 7.5% | | |
| Retrofit SCR | 8.2% | 12.1% | | | |
| Nuclear | 9.7% | 13.6% | 9.5% | 10.3%-11.5% | 9-13% |
| Gas - CCGT with post comb. CCS | 10.8% | 14.8% | 13.8% | | |
| Coal - ASC with FGD with CCS | 11.0% | 14.9% | 13.5% | 11.5% - 14% | 12-17% |

It is clear from the above that the survey gives an incomplete set of results, and furthermore, some of the ranges were based upon as few as 3 responses. Nevertheless, the ranges and lack of any estimates in some cases indicates the difficulties of market perception for some of these projects and the awkwardness of identifying a typical hurdle rate. It is understandable why NERA chose to leave the report with suggested ranges.

Yieldco values are good references for the operational stage of projects, but were only available for operational solar (5.4- 5.5%) and onshore (5.2-6.4%) facilities. Nuclear and Geothermal are rather special and need to be evaluated on a case by case basis.

In general, I would suggest taking values towards the lower end of the NERA ranges for the following reasons:

a) DECC2013 provided the basis for the first round of CfD and CM auctions. There is no evidence from the auctions and the subsequently published reviews that the specification of these hurdle rates was unacceptable. Actual market prices generally cleared below the caps. It is possible that this might have been due to bidders discounting some fixed costs. Nevertheless, it might appear strange if the caps in the

next round are increased. That is not to say the earlier analysis, being substantially based upon the previous OXERA and ARUP reports was better grounded – they also had a small survey basis, but at least they were not apparently contradicted by subsequent auctions.

b) Hurdle rate assessments should not change much year by year without good reason, since they are meant to be forward looking, being informed by the risks anticipated for many years into the future. Consistency has several virtues and a credible approach which provides a rationale for any changes to the previous values is appealing not least in mitigating a potential area of perceived policy risk.

c) Taking DECC2013 as the basis, it is clear from the survey and other commentaries in 2015 that policy risk is perceived to be higher in 2015 than in 2014, and so some upward adjustment is appropriate. I would suggest that the allocation risk sentiment in the survey should be cautiously interpreted, however, given the timing of this survey.

d) I am wary of the regression interpolations for the reasons discussed above.

e) The evidence provided in Appendix B.1.3 from the EC State Aid decisions on UK FIDeR for biomass conversion, offshore wind and Hinkley Point are a the lower end of the NERA ranges, and for all three technologies, are around 9.7%. Clearly these do not include an allowance for allocation risk, and it is an open question what view the EC would take on an allocation premium in hurdle rates.

f) I suspect there is more likely to be upward bias in the survey estimates than underestimation bias, and I note that DECC2013 values were towards the lower ends of the OXERA ranges produced at that time.

14. Regarding the evolution of hurdle rates to 2030, apart from the empirical evidence from the survey, the analysis in the report points to the risk-free rate and the equity premium each reverting to their long term means, which is sensible, but says very little about project spreads in the debt rates. Lenders look at Debt Service Coverage Ratios and there is some evidence that these will degrade as the market structure includes more renewables[12], leading to higher project spreads going forward. In simple terms, volume risk may increase and erode the incremental value of new investments[13].

15. For 2030, NERA produces scenario ranges which help give a sense of variation and the analysis develops assessment based upon adjustments from their 2015 "reference points". NERA point to the sparsity of respondent information but have nevertheless sought to achieve a coherent synthesis. The report (Figure 5.2) observes that the medium risk trajectory is less than that of the underlying term structure of the risk free rate, which in itself is rather surprising. It is speculated that respondents may be seeing technological risks reducing in the future. NERA also note that they would expect allocation risk to reduce from

[12] http://www.sciencedirect.com/science/article/pii/S0301421515000038

[13] Hirth, Lion (2013): "The Market Value of Variable Renewables", Energy Policy 38, 218-236. doi:10.1016/j.eneco.2013.02.004

around 200bps, which is included in the reference cases, as the "market adjusts to a new equilibrium".

The approach taken by NERA in structuring the interviews was to focus upon risk classes and "delta" adjustments, which is very credible and should help to avoid casual estimates. In offering three scenarios, NERA have allowed considerable discretion to DECC in producing final values. Given the small sample of survey results, this is a prudent summary but the range does indicate how sensitively market participants viewed the investment risks at that moment. The ranges of hurdle rates across the three scenarios are quite variable, with the High values ranging from 50% to 100% above the Low ones. I suspect the High scenario could have been subject to wider levels of interpretation amongst the subjects.

I think the following aspects should moderate the adjustments going forward to 2030 from the chosen 2015 hurdle rates

- The baseline trajectory should start from the **risk free term structure.** Although the NERA report (Figure 5.2) shows this amounting to an increase of 100bps over 2015 by 2030, the BoE real forward curve[14] as of this date shows a much lower trajectory to a negative 80bps by 2030 (compared to the 2 year short end of the forward curve yielding negative 114), indicating a 34 bps increase over the term from 2015-2030. However, these fluctuate daily at the short end and have reduced considerably since the beginning of the year 2015 when NERA presumably recorded the 100bps increase. DECC will need to consider this volatility carefully when they confirm the hurdle rates to 2030.
- Adjusting for **allocation risk** is controversial and I believe it should be seen as part of general policy risk sentiment. The question going forward is whether this is likely to increase or decrease. The idea which NERA advanced of moving to a new equilibrium with lower allocation risk is predicated upon a view that bidders will self-select to only their most competitive tenders. Whilst there may be more self-selection in 2015 compared to 2014, it is not obvious that allocation risk will change going forward from the 2015 basis, nor are there strong reasons to believe that policy risk in general will change. However, extreme negative sentiment might be transient in 2015 and the view advanced by NERA that it will moderate going forward is plausible.
- **Technological learning** is likely to reduce costs for all unestablished technologies and whilst the main effect on levelised costs will be through the actual costs rather than discount rate, the reduced project uncertainties will lower the cost of capital. This will be manifest mostly in the second construction stage, but also impacts the development and operational phases as well.
- **Revenue** risks are unlikely to reduce. Whilst the price hedge of CfDs is already presumed into the 2015 base, going forward, operational risk in terms of load factors may become more uncertain as the market takes in more intermittent and interconnected supply, and balancing cash-out prices are likely to increase. It is hard to say whether dark and spark spreads for fossil generators will become more or less

[14] http://www.bankofengland.co.uk/statistics/pages/yieldcurve/default.aspx

volatile, whilst bark spread risk for biomass may suffer from supply chain considerations. As for the price of carbon allowances, this may recover and increase in the next decade, especially with the proposed floors in Britain and France, but at the same time, to the extent that decarbonisation is successful, it will become less material in price formation and profitability.

On balance, my view would be to take a slightly lower 2015 base than the NERA reference case and from those slightly reduced 2015 base hurdles rates lean towards the Low scenario for a trajectory to 2030. In other words, this would be a shift downwards of the NERA Low scenario if the NERA 2015 reference points are above those chosen by DECC[15]. This would also depend upon any further changes on the BoE real forward curve. I notice that the previous DECC2030 estimates are generally around 100bps below the Low values (except for tidal were the NERA results have been more optimistic about risk reductions going forward). Geothermal is a special case that requires further investigation, regarding drilling explorations, as noted in the NERA report.

16. Overall, I believe the NERA report provides a useful update from new survey evidence, framed within CAPM concepts, and whilst I am inclined to moderate the inclusion of allocation risk, I do not disagree with a need to include the market sentiment around this issue. However, I think care needs to be taken if it is being quantified on the basis of anticipated statistical success rates. It is a behavioural resistance that reflects a more general sentiment around policy risk. Whether there was an element of oversensitivity in the market to policy risk at the time the survey was undertaken is debatable, and if so, whether this means that the risks of the project development stage were over-weighted in the hurdle rate for the whole lifetime of the projects as a whole, is a further consideration. But, apart from these reservations, the process undertaken by NERA and the ranges produced appear to be reasonable. The report is thorough in its consideration of related evidence and in its processing of widely differing and fragmented evidence. I note that the previous DECC hurdle rate estimates were also based upon rather limited survey evidence, and whilst those are in place as the default values, this new analysis by NERA provides an informative basis for considering some revisions to these previous values.

[15] In section 11 above, I suggest taking values for 2015 slightly closer to the Low end of the NERA ranges than the NERA References.