

**Modeling Work Group Members:**

Erin H., Jim C., Randell J., Bob Pauley, Maryam S., Samir S., Iowa PSC representative, Seth K., Ben D., Dawei ?, (Navigant), Stan H. (ORNL), Tyler R., Denis B., Steve G., Rocio Uria, Chris H., Russell Lee (ORNL), Terry Black., Wil B., John B. (EIPC), Dave W. (EIPC), Tom S. (NREL) , Hisham C., Michael G. ,Alex S. (ORNL), Catherine M. (Keystone)

The WG discussed the charge of the SSC to estimate the costs associated with the assumptions defined in some of the futures and a few sensitivities be accounted for after completion of the MRN-NEEM modeling:

1. Increase in EE/DR/DG in F4B and F8B
  - King and Stan have distributed information on the EE/DR/DG cost studies in advance of the call
  - King provided DR costs based on one EPRI study which estimate EI-wide AMI and broader smart grid costs
  - ORNL is trying to derive some \$/MW installed DR or avoided MW, but this is still under development; some of the costs are scaled – that is the average costs change based on how many are installed, not an issue with the cost of meters, which has a flat supply curve,
  - Costs vary with the types of customers and the types of programs, however. Could have rough estimates acceptable for this purpose by the end of Aug.
  - Wil asked that NGO experts also participate in the DR cost research.
  - EE/DR/DG could continue under the demand Subteam or stay at the MWG level. Erin will explore this further with the Subteam leads.
  - Randell raised the importance of making sure that the costs are comparable with the other costs being calculated by MRN-NEEM
  - EE – we know the amounts but not the type; could use a flat \$/kwh for all EE; Stan and King agree that a flat average is the appropriate level of detail
  - Denis raised the question of whether the total utility costs or total resource costs or societal cost are the appropriate basis for estimating costs.
  - Study from GA did not include lighting as an independent program because it had a great deal of efficiency built into the BAU, including incandescent bulb standards. We are likely to have the same difficulty since quite a lot of EE has been built into some of the load forecasts of regions, e.g. NE.
  - Denis noted that the NE efficiency estimates, although high, represent only one-sixth of the potential. Still a lot more room for expansion. Just focused on the electric sector so it doesn't mix the gas EE potential.
  - Denis noted that economic EE will actually generate system cost savings; John B. noted that the kwh savings are captured in the MRN run.
  - Ryan agreed with Denis that we should only consider utility costs, citing an example of appliance incentives that simply reduce the incremental cost that participants would incur anyway.
  - How do we account for the recurring costs beyond the life of the EE? Should there be a life extension cost or replacement costs? King explained that the levelized cost reflects the annual cost over the lifetime so it can be extended beyond the life if you assume the cost of replacement is the same.

- McKinsey used industrial retail delivered price to determine cost effectiveness, but Stan said that shouldn't be important because the cost of energy saved is calculated by the model.
  - Stan would strive to have estimates by mid- Aug for WG consideration and then for review by the SSC in Sept. Dave and Catherine will confirm whether this needs to be formally approved by the SSC or simply presented for information.
  - DG is represented by distributed PV and we know the amount (Future 4) so the MWG just needs to look at a credible source for cost (AEO 2011 only has utility scale solar costs)
  - Randell asked whether the cost of DG should be captured in the BAU case as well. Stan thought it would be embedded in all Futures and therefore would be netted out in comparison. But Randell suggested that the difference will not be the only factor of importance. In some cases the absolute cost is significant and important in itself.
  - Stan noted that it would be very time consuming to estimate because it is very diverse types of DG. (24 GW by 2030 in BAU)
2. Nuclear uprate costs in Future 7 - Nuclear resurgence Future:
- Approved - Uprated at 8.7% at the capital costs of \$2600/kw
  - CRA could not account for these costs in the model therefore the MWG has been asked to look at the uprates in the Future
  - Doug Kallesan notes on how the 8.7% value was derived will be forwarded to Erin by Randell
3. Increase intermittency penetration limit beyond 25% in F2B, F3B, F5B, F5S7, F6B, and F6S5
- The increased operational costs associated with the higher levels of intermittent generation.
  - What are the options if the MWG is asked to estimate these costs
  - John B. raised the question with the planning authorities, who have done sub-regional studies; PAs felt that the best route is to look at more generic data rather than region-specific studies.
  - Stan identified a report in June 2011 by NREL/DOE that looked at this issue. Conclusion: no universal agreement on methods for calculating renewables integration costs. Looked at various studies out there, and found that finding a method for comparison that acknowledges other generation costs in the alternative. It is a very dynamic number that escalates rapidly when you increase penetration beyond 35% and depends on the geographical scope of the integration.
  - Another study underway looking at 80-90% renewables by 2050 which is under review.
  - Jim C. noted that there is a study underway by PJM that is expected to generate some information on this by 2012. May want to watch the evolution of this data
  - Tyler suggested using EWITS 30% penetration estimates of integration as a proxy value. (\$5-\$8/MW)
  - Tom S. noted that there is no sudden point of escalation in costs above 30%. The main increase in cost is planning reserves increase requirement which is taken into account in MRN-NEEM through the discounted contribution from renewables.
  - Walter Short - Marginal curtailment rates (incremental growth in curtailment) grows significantly at 50% penetration
  - Samir agreed that while the costs may be higher at 50% penetration, the model did not take into account flexible DR and storage as an offsetting cost, so the use of EWITS data may be a good compromise.
  - Randell requested a table that identifies all the sensitivities where the regions exceeded 25%.

- Are we considering the integration costs of other generation, e.g., Uplift costs of nuclear, reserve costs from increased contingency costs, particularly the case where significant amounts of a single type of generation such as nuclear and natural gas cc.
- Data is available in Hirst, 2003 - \$3/MWh is contingency; Michael will circulate the links to the documents.
- Need clarity from the SSC - is the incremental amount beyond 25% or all wind and what other costs should be considered; Several members believe it was beyond 25%.
- Wil B. asked if the PAs could provide the information available on integration costs for consideration by the MWG
- The cost of interconnecting remote wind in the Phase II transmission analysis according to John B.

#### 4. General Housekeeping

- Lessons learned: Wil explained that the RUWG is developing lessons learned document to be included in the EIPC Phase I report and suggested that the MWG might want to develop a similar list. For instance to explain limitations of the Model and how the group worked around it. Could help to inform future efforts. Wil suggested that this could be a short document inserted into the Phase I report.
- John B. questioned the value of such a document; it might be a completely different model and process in the future.
- Agree to put before the SSC whether it should be integrated in the report.
- Consolidated recommendations document – linked to the google docs – should be completed by Keystone shortly.
- Need to clarify how CRA is numbering the sensitivities that are being moved to make sure they are aligned.
- Erin will touch base with the subteam leads to determine the process for finalizing estimates.