Addendum:

Expert Elicitation of Cost, Performance, and RD&D Budgets for Coal Power with CCS

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The Monte Carlo simulations shown in Figure 2 of the pre-print GHGT-10 paper include estimates from all of the experts that provided information in the coal power and CCS expert elicitation. In contrast, the Figure 2b in this addendum shows the results of Monte Carlo simulations in which only the experts that provided estimates for all of the questions are included (two experts included estimates for only a subset of the five scenarios presented to them).

The simulated cumulative distribution function with 100,000 simulations is shown in Figure 2b for the estimated capital cost in four scenarios (reference 2010, BAU 2030, and two 2030 RD&D funding scenarios) as reported by five experts that provided a full set of answers. The Monte Carlo analysis was done to concisely summarize results for understanding the range of results we obtained. Like Figure 2, Figure 2b does not account for differences in the expert's opinion on current costs or their familiarity estimating percentiles. The simulated distributions indicate that experts believe that it is very likely that for a new coal plant with CCS, the 2030 BAU capital cost will be lower than technology that could currently be deployed, absent any additional policies. At median values, the simulated 2010 overnight capital cost of a new coal plant with CCS is $2,900/kW, higher than the simulated 2030 capital cost under the BAU RD&D portfolio by $230/kW. Under the recommended RD&D portfolios, the simulated median capital cost falls an additional $280/kW from BAU levels to $2,400/kW, capturing both the cost reductions attributable to technical change that will occur over time absent RD&D policy and the cost reductions that will be driven by federal RD&D policy. Finally, at median simulated values, in the scenario with 10-times the recommended RD&D funding level, the capital cost from 2030 BAU levels is reduced by $640/kW to $2,100/kW. The simulated distribution under the recommended and ten times recommended RD&D scenarios highlight the experts' perceptions about the role of RD&D policy driving innovation in the area.

We find that there is still considerable uncertainty among experts on both current and projected capital costs. For example, in the 2030 BAU scenario, the difference between the simulated 90th percentile capital cost and the simulated 10th percentile capital cost was $2,900/kW, greater than the simulated median estimate for this scenario.

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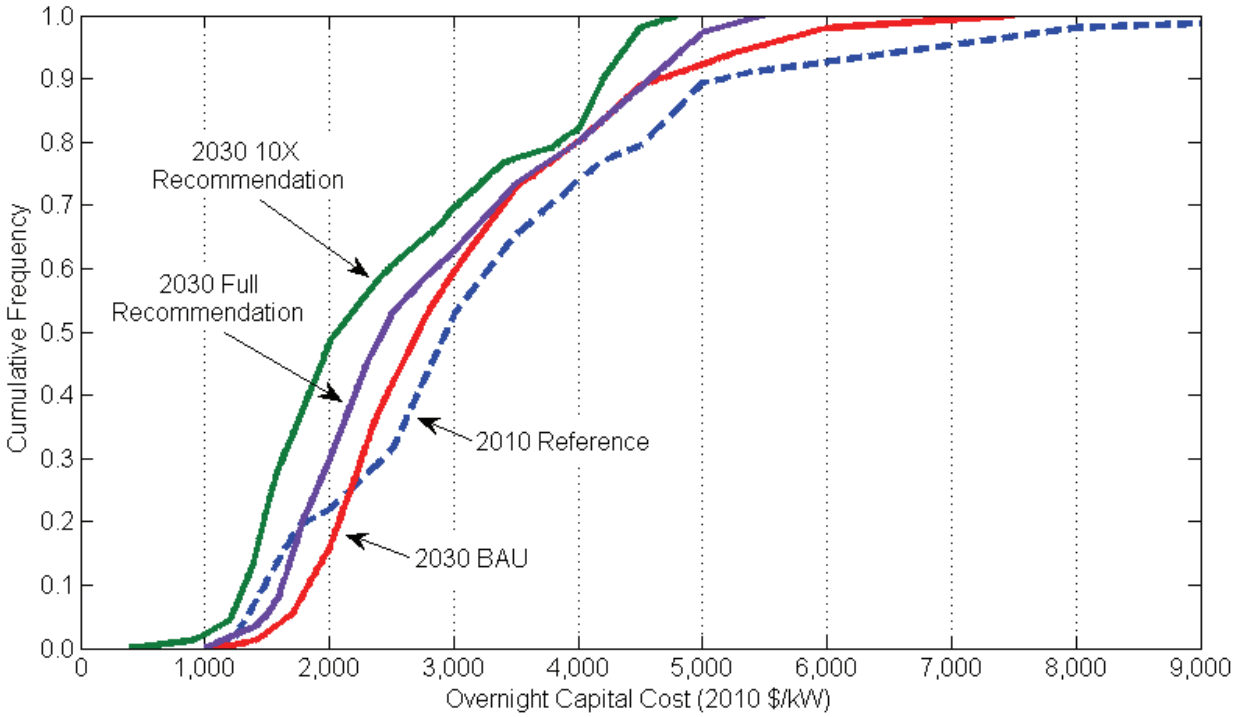

Figure 2b. Capital cost of a new coal power plant with CCS - simulated results from expert judgment

The capital costs reported in the literature for a new Nth of a kind (NOAK) CCS plant can be adjusted for consistent and updated raw material costs, financing parameters, and operating conditions, allowing comparisons [16]. Adjusted point estimates from the literature for all types of coal-fired CCS technology (post-combustion, pre-combustion, and oxy-fired combustion) span \$2387/kW to \$4168/kW[1]. The range of adjusted estimates from the literature falls between the 38th and 83rd percentiles on the 2030 BAU distribution, whereas the literature range falls between the 48th and 83rd percentiles on the 2030 distribution of capital costs assuming each expert's recommended level of RD&D is implemented. This suggests that the literature only slightly better captures what the experts described would be likely when RD&D funding does not change, placing likely costs closer to the upper end of the distribution when RD&D funding is expanded.

[1] The ranges do not represent uncertainty in the typical sense, but rather the full range of estimates in the reviewed studies.