**Summary of Comments Reference Technology Selection and Responses**

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| **Comments: Technology Selection** | **Responses** |
| **Brownfield vs Greenfield Plants**A stakeholder raised a concern that basing the reference technology from plants from a single developer that may have installed used equipment in its facilities would not be representative. Further they noted that, “w*hile there is nothing inherently wrong with installing properly refurbished equipment, this developer’s unique position as a developer and LM6000s maintenance provider may not be replicable at the scale necessary to meet ERCOT demand.”* | Brattle has always looked to patterns of actual developments as a guide to which kinds of plants are most economic and suitable as the CONE reference technology. In ERCOT, it turns out that over 98% (4,977 MW) of the 5,055 MW total capacity for thermal dispatchable plants with CODs between 2021 and 2026 (planned) were LM6000 turbines, making that the clear technology choice as indicated by the market.4,777 MW out of this 5,055 MW total are WattBridge or Proenergy projects that use the same turnkey plant design across all projects, but they are not unique in using LM6000s. Of the remaining 278 MW that are not WattBridge of Proenergy projects, 200 MW use LM6000s owned by Rockland Capital and NAES, and only one plant (78 MW) uses a technology other than LM6000. It appears that commenters did not understand that to the extent WattBridge has a low-cost approach that has limited scalability, our assuming its plant design would still not understate CONE since we estimate the costs based on all new equipment purchased from OEMs. (In fact, this could even overstate CONE if, absent supply of LM6000s to refurbish, other technologies became the most economic). |
| **Dual-fuel capability**A stakeholder raised a concern that the reference technology is derived from single developer’s projects that do not have dual-fuel capability and may be interconnected to gas pipelines that also serve local distribution companies with first claims on scarce capacity, rendering these projects at risk of fuel curtailments in extreme cold weather irrespective of their level of contracted fuel transportation service.Furthermore, the stakeholder noted that “*ERCOT has expressed concerns with extreme cold weather risk, and we ask whether the costs of installing fuel oil back-up in the reference unit should be included to align with the reliability needs of the grid operator.*” | The reference location of Harris County has one of the densest networks of natural gas supply pipelines in the nation. Furthermore, as explained in our revealed preferences approach, the market indicates that most gas plants are being built without dual fuel capability opting instead to contract firm gas service. Regardless, the inclusion of firm gas contracting costs in the fixed O&M would generally amount to a greater sum over the years of operation than the capital cost of dual-fuel capability. The overall cost impact on CONE of firm gas cost vs dual fuel capability is minimal. |
| **Plant size**A stakeholder raised a concern about the plant size determined by the number of turbines of the reference technology. This stakeholder mentioned that the reference technology was selected from plants from a developer which had a range of 2 to 12 turbines per site; however “i*n our experience, a site with 8 LM6000s would normally not schedule all units to start in unison. Simultaneously scheduling all units would erode inframarginal rents, thus in normal circumstances the generator owner’s response would be proportionate to the needs of the grid and be informed by the price response when scheduling additional units.”*Stakeholder therefore proposed that the reference unit be comprised of 4 LM6000s. | Brattle explained at the March 22nd meeting that although the average number of units was 7 from the dataset used to select the reference technology unit number, gas plants tend to be built in even numbered units, so based on S&L’s engineering expertise and experience with similar projects we rounded up so that the reference technology would be comprised of 8 turbines.We appreciate this input however and given that the median number of units from the dataset is 6, we agree it is reasonable to lower the reference technology and will update it to contain 6 LM6000s.  |
| **Turbine rated MW**A stakeholder pointed out they are not aware of any unit of an LM6000PC with SPRINT generating much over 50 MW (and only in the winter), let alone the 60 MW assumed in Brattle’s assumptions. Stakeholder also noted that the GE fact sheet lists the new and clean output of an LM6000PC with SPRINT to be 51.1MW. | Brattle clarifies that the capacity numbers presented at the March 22nd meeting were in terms of electrical generator capacity. The CONE study will report seasonal net combustion turbine capacities, which are expected to be approximately50.1 MW in winter (37°F), 48.5 MW at ISO condition (59°F) and 40.7 MW in summer (94°F) for LM6000PC turbines with SPRINT. The CONE calculation will explicitly reflect those rated capacities. |
| **Maintenance costs**A stakeholder noted that “*aeroderivative gas turbines are unique among the power generator fleet, and while OEMs do offer long term service agreements, in our experience they are rarely cost effective because of the low-capacity factors of this technology. Nevertheless, aeroderivatives do incur maintenance costs and tend to be more expensive to maintain than frame GTs.*”This stakeholder also noted that their analysis based on an internal cost model of average major maintenance cost per unit start would be $2,048 and would be willing to review this information with Brattle and S&L. | S&L would like to understand why these maintenance costs are presented in $/start costs for aeroderivatives that follow an hours-based maintenance schedule. Since our O&M estimates do use the OEM's quoted LTSA costs as a basis for much of the fixed and variable cost assumptions, our estimates could be considered on the high end since the stakeholder notes that these are "rarely cost effective". We would welcome additional information regarding their realized O&M costs for their fleet but would require sufficient breakdown in the cost components to ensure complete consideration of all elements we are representing. |