Thank you for the invitation to be here today. I'm Matt Barmack, Vice President of Market & Regulatory Policy for Calpine. Calpine is a large independent generator with approximately 26 GW nationally concentrated in restructured wholesale markets in PJM, New England, New York, California and Texas. We have approximately 5.5 GW in PJM including 2.5 GW in Pennsylvania at our York and Bethlehem plants. Most of our fleet consists of modern, efficient, gas-fired or dual fuel combined cycle generation. In addition, we own and operate the largest geothermal facility in North America, we have ~1.5 GW of batteries either operating or under development, and we are actively developing carbon capture retrofits to some of our existing gas plants and have obtained DOE grants for carbon capture pilots and engineering studies.

As Calpine's in-house economist, I have had two main roles. First, I have been involved extensively in market design related to resource adequacy and capacity markets, initially in California but more recently in Texas, PJM and New England. Second, I have overseen the development of multiple studies related to reliable and cost-effective long-term grid decarbonization.

This experience provides a few key lessons for PJM and Pennsylvania today:

It is important to establish clear and robust reliability requirements and resource counting rules that reflect the reality of system conditions.

For example, solar's contribution to reliability is limited and tends to decline as more solar resources are added to the grid. In California, solar was counted generously towards capacity requirements for many years because its output was correlated with peak loads, but as solar penetration increased, it pushed reliability problems later in the day, when solar is less available. It took a long time for California's capacity counting rules to catch up with this change. Solar counting declined from 75% to 11% of nameplate in September, California's most challenging month from a reliability perspective. Applied to the 16.4 GW of solar capacity currently on California's grid, this decline amounts to 10.5 GW. California has scrambled to make up the gap—partly with the gas generation that had been crowded out of the market by the overcounting of solar. Gas plants that had been on the verge of retirement are now valued resources that are in scarce supply. The California ISO stopped us from retiring one of our oldest plants because it was needed for reliability. Similarly, we are hosting diesel backup generators procured by the State at a site where we recently shut down an older gas plant.

Relatedly, California has experienced several blackouts or reliability close calls in the last few years due to the failure of load forecasts to reflect more extreme weather as well as inadequate capacity requirements pegged to these load forecasts. In reaction, California has revamped its load forecasts and increased its capacity requirements directly through its resource adequacy program, California's bilateral capacity market, and through out-of-market reliability-related procurement, including a mandate for approximately 18.8 GW of new capacity (mostly batteries).

Obviously, it is easier to address the types of problems that California has faced proactively rather than reactively. Consequently, Calpine is encouraged by PJM's recent efforts to reform its capacity market. PJM is taking reliability requirements and resource counting head on with a proposal that would be robust to growing penetrations of renewables (or any other resource mix) *before* PJM has the very high penetrations of renewables that are likely to lead to California-like problems. In addition, the proposal explicitly addresses extreme cold weather, such as we recently experienced with Winter Storm Elliott. Calpine also appreciates PJM's forward-looking modeling of reliability and decarbonization in its recent Retirements, Resources, and Risks Report.

Some GHG policies don't actually reduce GHG.

While not in Pennsylvania, policymakers in many surrounding states have focused on shutting down gas generation, e.g., Illinois's CEJA. All of the modeling in which I have been involved (as well as numerous other studies) shows that retaining gas generation (potentially operating at lower than current capacity factors) is critical for reliability and affordability even with increased reliance on other cleaner resources. Displacing gas generation entirely with intermittent renewables and storage tends to require large and expensive overbuilds. To the extent that policymakers choose to eliminate gas generation entirely, some form of generation with the same operating characteristics, including dispatchability and the absence of significant fuel or energy limits, will be critical. Resources that might have these characteristics include hydrogen (essentially gas generation using a different fuel), nuclear, and carbon capture. Of these resources, Calpine is particularly excited about carbon capture.

Similarly, while Calpine has supported carbon pricing for a long time, carbon pricing only reduces emissions when it is implemented correctly. Carbon pricing that only applies to certain states in an integrated wholesale electricity market, such as RGGI, is particularly problematic because rather than reducing emissions, it tends to shift emissions to states without carbon pricing and can actually increase overall emissions.

Thanks again for the opportunity to be here and I look forward to your questions.