Committee: House Energy and Commerce
Subcommittee: Energy, Climate, and Grid Security
Hearing: *The Role of Artificial Intelligence in Powering America's Energy Future*
Author: Dr. Jeremy Renshaw, EPRI

The Honorable H. Morgan Griffith
Question: Could peak power plant optimization and predictive preventative maintenance, augmented by AI software, extend the useful life of currently operating fossil fuel power plants?

Response: Yes, by optimizing how and when power plants are cycled, the useful lifetime of power plants can be extended by reducing the stresses from cycling on the power plant equipment in the units in addition to minimizing turning peaker plants on and off. EPRI is currently working on a project related to this concept (link to the relevant document is below).

- Report (free to the public): Quick Insights: Optora - How to Optimize Multi-Unit Dispatch

Similarly, optimizing predictive maintenance is an important industry issue. Many current methods for maintenance are performed on a time-based methodology, however, if the asset is functioning properly this practice can increase risk due to the potential for doing unnecessary maintenance and/or improper re-assembly of components and the risk of introducing foreign material (e.g., debris) into a system. EPRI and others have developed proprietary software tools incorporating AI models to optimize power plant usage as well as predictive maintenance for a range of assets.

The Honorable Frank Pallone, Jr.
Question: The processes used today to connect new generation sources to the power grid are not built for the current large volume of requests, which are dominated by dispersed renewable resources that produce far higher volumes of generation interconnection requests than traditional thermal power plants. This has overwhelmed grid operator staff and their study processes, which are heavily labor-intensive, delaying new generation from coming online sooner. Do you see the potential to leverage proven automation and cloud computing technology that exists today to speed up interconnection studies and save grid operators a great deal of unnecessary time, effort, and expense? How so? If so, what do you think is holding back that potential from being realized? Any recommendations for policymakers?

Response: There is potential for AI (as well as emerging advanced computing resources, including quantum computing) to help improve and streamline interconnection requests, however, this is not a simple matter.

While cloud computing and other automation methods could potentially be utilized (and have done so already in some regions) to run studies more efficiently, power system interconnection studies are non-binary in nature. This means that the results of these studies do not follow simply a pass/fail criteria. A level of engineering judgement is necessary to determine 'degrees of pass/fail' which in turn can initiate various levels of mitigation. Hence, any platform that relies on binary pass/fail criteria can pose challenges.

Further, information related to power system infrastructure is often categorized as critical energy infrastructure information (CEII). As a result, there can be security concerns/challenges related to uploading and use of this data/information in a cloud environment. This is not to imply that a cloud environment cannot be used or that they are not secure. Many, if not all, utilities have some form of cluster architecture for running studies. A few have started to use commercial cloud services like AWS or Azure (after addressing CEII requirements). This is also something that will gain more importance in the near future as the data volume and computational burden of planning studies is increasing.

AI can provide more insights in relieving the bottleneck of interconnection studies, but this concept has not been fully analyzed. More research is needed to fully explore the potential. AI can be used to more efficiently suggest potential sites, identify system reliability issues, propose optimized system reinforcement etc., but needs more work and validation before it is implemented.