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Federal Energy Regulatory Commission
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Introduction

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today. My name is Jamie Simler, and I am the Director of the Office of Energy Policy and Innovation of the Federal Energy Regulatory Commission (FERC or Commission). I appear before you as a staff witness; my testimony does not necessarily represent the views of the Commission or any individual Commissioner. My testimony will cover the requested area of the Commission's Notice of Inquiry on Variable Energy Resources and filed comments of interest.

Background

The Commission regulates transmission and sales for resale of electric energy in interstate commerce to assure the rates, terms and conditions of transmission service and wholesale power transactions are just and reasonable and not unduly discriminatory or preferential.

The existing wholesale electricity supply function relies on the coordinated operation of transmission and generation resources. There exist two models to accomplish this. In some parts of the country Regional Transmission

Organizations (RTOs) and Independent System Operators (ISOs) coordinate the transmission and generation resources from a number of utilities and provide service to load serving entities through organized wholesale markets. In this model, the RTO/ISO uses day-ahead and real-time markets to assess the demand for electricity and to commit and dispatch generation and transmission resources to meet that demand. In other parts of the country (primarily western and southern regions), individual utilities use their own generation and transmission resources and may enter into bilateral arrangements with third-party generators and transmission providers to ensure that they have sufficient generation available to serve load reliably.

At all times, regardless of the model used to provide electric service, system operators must maintain a balance between the amount of energy put on the grid and the amount of energy being taken off of the grid. Complicating this task is the fact that there is a significant degree of variability in the moment by moment operation of the grid. For example, the demand for electricity (known as load) changes on a constant basis, and generation resources must be dispatched to meet this demand. Additionally, outages can occur whenever generation or transmission resources unexpectedly trip offline.

System operators have developed a set of tools that allow them to both plan for and react to these variations. In the case of load variability, system operators have significant experience in developing load forecasts, which rely on statistical analysis, temperature forecasts, and historical load patterns, to estimate the amount of load at any point on the grid in any given time period. These load forecasts are then incorporated into unit commitment and scheduling processes, in which system operators determine the generation and transmission resources needed to serve the anticipated load. Conventional generation resources, under normal conditions, are scheduled assuming precision in power production. However, variable energy resources cannot be scheduled with the same precision as conventional generation resources, so accurate power production forecasts play a more important role in allowing system operators to make accurate before-the-fact determinations of power production.

By their nature, load and power production forecasts are not perfect, and conditions such as weather can deviate from those forecasted. Accordingly, system operators have developed a variety of remedial actions that can be employed in real-time to maintain the balance between generation and demand for electricity and to react to unforeseen circumstances. For example, system operators deploy operating reserves, which are generation (or demand response) resources that stand ready to quickly increase or decrease power production or consumption as needed. Reserves are also available to accommodate what are called contingency events, such as the forced generation or transmission outages mentioned above. By forecasting anticipated conditions and having the tools in place to react to events as they happen, system operators maintain a balance in what is a constantly changing electric system.

As greater numbers of variable energy resources come online, system operators are increasingly faced with additional challenges. Variable energy resources have a limited ability to control their output. They can also experience significant increases or decreases in the amount of power they produce when a weather system moves through the area.

Notice of Inquiry

To gain a better understanding of the impact of increasing numbers of variable energy resources on the electric grid, the Commission issued a Notice of Inquiry (Notice) in January of this year. The stated purpose of the Notice was to seek comment on the extent to which barriers may exist that impede the reliable and efficient integration of variable energy resources into the electric grid and whether reforms are needed to eliminate those barriers. The Commission explained that it is taking a fresh look at existing policies and practices in light of the changing characteristics of the nation's generation portfolio. To that end, the Notice posed a number of questions on a wide range of subjects. Many of these questions explore ways in which existing operational practices or market rules may have the effect of imposing unnecessary costs or burdens on both variable energy resources and the transmission systems in which they are located. Thus, the Notice included a number of questions related to scheduling practices, unit commitment protocols, and reserve requirements.

Most relevant to the subject of today's hearing, the Notice included inquiries into existing power production forecasting techniques and data provision requirements. Among other things, the Notice posed questions about current practices used to forecast power production from variable energy resources, and whether those practices would be adequate as the number of these resources increases. The Notice also sought information on whether additional data, tools, and reporting requirements are necessary to accommodate state-of-the-art forecasting techniques, and whether safeguards need to be in place to ensure that commercially-sensitive data remain protected.

Commission staff is currently in the process of reviewing comments from more than 130 parties, and we are evaluating what future action may be appropriate. A consistent theme in many of these comments is that improved forecasts will play a critical role in facilitating the integration of variable energy resources into the grid. A few examples are provided.

National Weather and Power Production Forecasts

Several commenters noted the importance of understanding two aspects of variable energy forecasting: national weather forecasts and power production forecasts. National weather forecasts span comparatively large geographic regions and are developed by NOAA and associated government agencies. These national weather forecasts form the foundation for power production forecasts. Power production forecasts are designed specifically to predict the energy output of individual wind and solar facilities. They go beyond the national weather forecasts and incorporate additional site-specific information—such as terrain features, local atmospheric phenomena, and specific generator equipment—to develop a more detailed forecast of the anticipated power output of a given facility. These power production forecasts are generally developed by commercial forecast service providers and are specifically tailored to the needs of their clients, which could be a variable energy resource, a local utility, or an RTO or ISO.

Some of these commenters indicated that existing national weather forecasts are optimized for predicting temperature and precipitation, and that additional data, models, and computing capabilities are needed to generate more detailed weather forecasts that are suited to the challenges associated with predicting the output of variable energy resources. A number of commenters encouraged the development of rapid-update national weather models that utilize data obtained and shared from variable energy resources. Many commenters indicated that such improvements to the underlying weather forecasts, developed by government agencies like NOAA, could provide significant improvements to the ability of those in the industry to predict the output of variable energy resources in both the day-ahead and real-time operational time frames.

Different Uses of Power Production Forecasts

Additionally, because different market participants are often simultaneously engaged in predicting the output of the same variable energy resources, the Notice of Inquiry included questions about whether the Commission should encourage the development of either centralized or decentralized forecasting protocols. "Centralized" forecasts are power production forecasts developed for system operators. These forecasts are used in the generator unit commitment process to ensure that sufficient generation is scheduled to meet anticipated load. "Decentralized" forecasts are developed for individual variable energy resources and are used to create energy production schedules and offering strategies.

Comments indicated that there is likely a role for both decentralized and centralized power production forecasts. Commenters noted that different market participants use power production forecasts in different ways. Variable energy resource operators need accurate power production forecasts to submit bids to system operators that they are capable of meeting in real-time. By submitting bids they can meet in real-time, these resource operators mitigate their exposure to penalties as well as requirements to buy energy in spot markets to make up for any imbalances. System operators, on the other hand, need accurate power production forecasts to determine an appropriate commitment schedule for generation resources in advance of the operating hour and to deploy reserves as conditions change in real-time.

While different market participants use power production forecasts to different ends, the accuracy of these forecasts is ultimately affected by the data inputs that are used. Because different data sets are available to different market participants, some forecasts may include less-than-ideal information. The Notice therefore sought comments on whether there is a need for data reporting requirements among market participants. A number of commenters indicated that additional data reporting among market participants is needed. They provided various lists of the types of data and the frequency with which data are reported to support advances in power production forecasting capabilities. Commenters generally pointed to the need for additional meteorological, operational, and specifically generator outage and de-rate data in developing state-of-the-art forecasts. Some commenters, concerned about the confidentiality of commercially sensitive data, suggested that meteorological data collected from individual generators could be reported to a centralized repository such as NOAA because NOAA has no economic stake in the electric industry.

Conclusion

The Commission received over 2,800 pages of comments to its Notice of Inquiry; and Commission staff is in the process of analyzing how power production forecasts are used in existing electric markets and how potential regulatory reforms may achieve the Commission's goals of ensuring just and reasonable rates and result in benefits to market participants. Upon completing its analysis, the Commission staff will make recommendations to the Commission on possible courses of action on these issues. Thank you again for the opportunity to testify today. I would be happy to answer any questions you may have.