Joint Statement on the Role of Government-Affiliated Renewable Energy Forecasting Activities Relative to the Private Sector

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The integration of wind energy generation into the country's transmission system has been greatly facilitated by the availability of advanced wind forecasting services developed over the past decade by the private sector. The three leading U.S.-based supplier firms are AWS Truewind, 3TIER, and WindLogics. The primary subscribers of wind forecasts are Independent System Operators, individual utility companies, wind plant owners/operators, energy traders, and wind turbine construction companies. Collectively these subscribers now obtain high-value forecasts for short-term (sub-hourly to 7-days) planning and decision-making for most of the country's installed wind capacity. Solar forecasting is also growing in demand and is being provided by the same firms. The quality of the forecast information and the tools used to develop forecasts are the best available worldwide. Ongoing investments in research and development by these firms and their clients are continually advancing the state-of-the-art and tailoring products to specific user needs.

In recent months, our firms—representing the private sector renewable energy forecasting community—have been engaged in preliminary discussions with government-affiliated entities about the appropriate roles for public and private sector organizations in the development and supply of short-term wind forecasts to fulfill the needs of the wind energy industry. These organizations can be placed into three categories:

- Government operational forecasting and research entities (NOAA/NCEP and NOAA/FSL)
- Government basic atmospheric research entities (NCAR, DOE labs, NASA, etc.)
- Government renewable energy research entities (NREL, DOE labs, etc.)

These discussions have been prompted by our concerns over the emergence of "new" government wind forecasting research and product development that replicates what commercial providers have been doing operationally for years.

In these times of strong wind industry growth and federal stimulus program funding, there is the opportunity—if not the obligation—for the public sector (encompassing the three government entity types) to work aggressively towards *complementing* the private sector's capabilities to provide the greatest benefits to the wind energy industry's requirements for accurate wind forecasts. If this opportunity is not well planned and coordinated, there is the risk that federally-funded programs for the government entities in support of wind forecasting could be duplicative and in competition with services already provided by the private sector. Our goal is to participate with the public sector in seizing the opportunity before us and to work collaboratively to ensure that the wind energy industry's needs are

met in the most appropriate, sustainable and cost-effective way. In addition to wind, this initiative should be inclusive of other renewable energy technologies (e.g., solar, wave).

The following three broad points reflect our firms' recommendations for priority needs that federal entities can fulfill to the benefit of the entire renewable energy industry.

1. **Enhancing Publicly-Available Weather Data Networks** – The greatest opportunity for enhancing renewable energy forecasting skill throughout the United States is in increasing the number, quality, and reporting frequency of public weather monitoring stations. Current observational networks are relatively sparse and widely spaced and emphasize data collection at a height of only 10 m (or less) above the surface (compared to today's typical wind turbine hub height of 80 m). This situation makes it difficult to detect and forecast mesoscale weather events such as large wind speed or insolation deviations over short time periods (i.e., ramp events). Weather stations should also be upgraded with additional sensors (e.g., lidar, sodar, solar radiation instruments) to measure the portion of the boundary layer (up to heights of 200 m above ground) in which utility-scale wind turbines operate. The data distribution process must also be improved so that field observations are available to users in near real-time. This measurement enhancement program can be phased in over time, beginning with stations within and adjacent to concentrated renewable energy development regions. The benefits of this modernization program would be realized by all sectors of the economy that are vulnerable to severe weather events. A prerequisite and collaborative research component of this program would be to use numerical modeling techniques to identify what new locations would yield the best results for forecasting skill improvement (i.e., observational targeting).

2. **Research into Problem Flow Regimes** – Collaborative field and modeling research is needed in strategic areas of the country to better detect and forecast complex flow regimes, including low-level jets and stable layer flows, that lead to unexpected turbine outages, long-term turbine performance issues, and wind forecasting errors. Occurrences of these problem flow regimes often go undetected or under-detected because most wind monitoring towers are too widely spaced and shorter than the hub height of today's utility-scale wind turbines. A joint public-private research program should be initiated to identify and implement effective approaches to resolving this situation through innovative atmospheric measurement and modeling techniques.

3. **Improvements in NWP Models** – Numerical weather prediction models developed and run by NOAA for national weather forecasting purposes in general underperform European prediction models in terms of forecasting skill. All forecasting organizations, including ours, rely on the outputs of government-run weather prediction models to initialize their own customized higher-resolution models to produce accurate forecasts of local winds and other weather conditions. The inferior skill level of U.S. government-run models has given European firms a competitive edge in this country and is forcing our firms to become more reliant on the same European prediction models. Improving the combination of model performance, data assimilation and model output resolution should be a high priority for the benefit of both the public as a whole and the U.S.-based renewable energy forecasting industry.

While there are other areas of potential interest to advance the science and utilization of renewable energy forecasting, they are secondary in importance and would be fruitless without first accomplishing the essential advancements identified above.

What is the best way to proceed with defining and implementing government entity participation in providing the country's renewable energy forecasting needs? Framing the answer to this important question should begin with the recognition of the current role and accomplishments already established by the private forecasting sector. This sector is well engaged with both the majority of operating wind farms throughout the United States and the full array of forecast users. It best understands the renewable energy industry's needs and the forecasting challenges yet to be overcome.

The next step should be deliberate engagement between the public and private sectors to jointly define government initiatives that would have the greatest impact on the advancement of wind and solar forecasting while avoiding duplication of effort. We propose the initiation of government-sponsored meetings of representatives from the public and private forecasting sectors to formulate a roadmap for addressing the country's renewable energy forecasting needs and challenges. The roadmap would include a collaborative research plan that defines key priorities and problems, identifies geographic regions where to focus first, defines technology and model development paths as well as data assimilation approaches, proposes respective roles and relationships, and develops budgets and a timetable. Sound planning, coordination and implementation will optimize the assets existent within the public and private forecasting sectors. It will also ensure a robust and second-to-none U.S.-based forecasting infrastructure and forecasting industry that enables the realization of the nation's full renewable energy potential.

Respectfully,

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