California Independent
System Operator Corporation

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice-President, Market & Infrastructure Development

Date: May 10, 2010

Re: **Decision on Interconnection Requirements Reform for Renewable Resources**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Variable energy resources will increasingly displace conventional resources as California advances toward satisfying its aggressive renewable portfolio standard targets. In so doing, certain technical characteristics either inherent in, or historically required from, conventional resources will also be displaced. As a consequence, the extent to which the grid can successfully integrate variable generation will be significantly influenced by the ability and extent to which variable generation also contribute the basic technical characteristics embodied by interconnection requirements.[1] The ISO, in coordination with its expert consultant, GE Energy Applications and Systems Engineering, believes that the proper approach to supporting large-scale penetration of variable renewable generation is to specify performance standards, design features, and capabilities comparable, whenever practical, to those required from conventional generators. This philosophy is consistent with the approach adopted by NERC's Integration of Variable Generation Task Force, among others. Accordingly, the recommendations on proposed refinements to interconnection requirements apply largely, but not exclusively, to variable renewable resources.

In conducting this initiative, the ISO has balanced reliability considerations against the potential disruption to renewable energy development, including those projects seeking financial benefits under the American Recovery and Reinvestment Act. This required the ISO to weigh several

[1] Large generating facilities under ISO interconnection procedures are those greater than 20 MW of gross capacity. Further, the ISO's interconnection authority generally extends to generating facilities seeking to interconnect to transmission facilities under ISO operational control. Thus, the requirements discussed herein are not intended to apply to generating facilities seeking to interconnect at the distribution system level under rules and procedures other than the ISO's Large Generator Interconnection Procedures (LGIP). In addition, generating facilities with gross capacity of 20 MW or less are governed by the ISO's Small Generator Interconnection Procedures, which are also not implicated by this initiative.

considerations. First, the ISO assessed the efficacy of deferring to similar efforts pending at the national level through NERC and at the regional level through WECC given the value to variable generation developers and their original equipment manufacturers of uniform requirements. Second, the ISO evaluated the feasibility and timing of compliance with the revised requirements in light of the current or impending availability from original equipment manufacturers of the necessary equipment and technology. Third, the ISO recognized that any new requirements should not disrupt the timing of the ISO's scheduled completion of ongoing interconnection studies. Lastly, the ISO considered the financial impact of additional interconnection costs on those projects with executed or tendered power purchase agreements, whose terms may not permit recovery of the incremental cost of complying with the new requirements.

As discussed more fully below, the ISO believes the correct balance has been struck. Efforts have been made to limit the initiative's scope to those interconnection requirements most important to maintaining reliability. The ISO has also maximized reliance on existing requirements where possible, assured the technical feasibility and commercial availability of equipment and systems to comply with the recommendations, and considered cost implications in determining the scope of projects subject to the recommendations. As a result, the ISO believes it has reasonably mitigated the risk of inconsistency with potential future national or regional mandates and of material impacts to project viability. In this latter regard, the ISO has further attempted to reduce the commercial impact of this initiative by excluding from its scope those with projects with executed or tendered interconnection agreements or that can demonstrate a pre-existing binding commitment to purchase specific types of non-compliant equipment.

Moreover, while these interconnection requirements are an important and necessary step towards reliable integration of renewable resources, the ISO will continue to conduct stakeholder initiatives to assess the operational impacts of renewable integration, and notes that these efforts could lead to additional obligations placed on renewable generation resources.

The following documents are attached to this memorandum for the Board's reference:

- GE comments on interconnections requirements for large generating facilities review initiative (Attachment A)
- ISO stakeholder matrix (Attachment B)
- Summary table of recommendations and how they relate to existing standards (Attachment C)
- Letters and equipment specifications from original equipment managers (Attachment D)

RECOMMENDATION

Management recommends that the Board approve the following motion:

> ***Moved, that the ISO Board of Governors approves the proposal to modify existing tariff requirements to interconnect large generating facilities to the***

ISO controlled grid, as detailed in the memorandum dated May 10, 2010; and

Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

DISCUSSION AND ANALYSIS

The Stakeholder Process Has Been Expedited to Protect Reliability and Minimize Project Development Disruption

The ISO conducted this initiative on an expedited basis. There are 83 renewable variable energy projects, totaling nearly 20,000 MW of capacity in the "serial group" and "transition cluster" portions of the ISO interconnection queue. Of the total in the ISO interconnection queue, 25 - predominantly serial group projects - representing approximately 6,000 MW of capacity have either executed interconnection agreements or have been tendered an interconnection agreement for negotiation. For the remaining capacity, the interconnection studies are nearing completion or are being accelerated to finish by June 2010 in order to accommodate potential funding opportunities under the American Recovery and Reinvestment Act.

A consequence of the ISO's decision to accelerate the interconnection studies is a corresponding need to accelerate this interconnection requirements stakeholder process. Moreover, given the vast amount of renewable generation capacity currently in the ISO interconnection process, the ISO cannot defer policy decisions on interconnection requirements to ongoing efforts occurring at the national level through NERC and the regional level through WECC. Those efforts simply will not be concluded in time to incorporate their outcomes into interconnection agreements of the generation currently in the interconnection queues. Thus, the urgency for this initiative rests in the possible loss of a future opportunity for the ISO to require basic interconnection performance capabilities from any resource that did not incorporate those requirements into a binding contractual arrangement in the form of an executed large generator interconnection agreement (LGIA).

The Power Factor and Voltage Regulation Requirements are Technically Feasible and Rest on Concepts of Fairness in Providing for Grid Reliability

- ***Recommendations - Extend Existing Wind Requirements to Solar Photovoltaic Facilities so as to Place Asynchronous Variable Energy Generators on an Equal Footing with Other Generators***

The ISO recommendations rely on extending and clarifying existing power factor and voltage control requirements, while accommodating the special characteristics of asynchronous generators. The specific salient recommendations are as follows:

1. Extend wind standard of 0.95 lag/lead, measured at point of interconnection, to all asynchronous generators. This serves to treat asynchronous solar photovoltaic generators

similar to asynchronous modern wind turbines, rather than as synchronous conventional resources.

2. No reactive support will be required from the asynchronous variable energy generators whenever the resource is exporting less than 20% of the maximum rated power to the point of interconnection. This accounts for the fact that under low active power conditions, it can be difficult for asynchronous machines composed of individual generators interconnected via an extensive collector system to control voltage and reactive power.

3. The maximum amount of reactive support will be determined by the amount of power exported to the point of interconnection. Example, a VER is exporting 10 MW to the point of interconnection. The VER should be capable of injecting or absorbing up to 3.3 Mvar at the point of interconnection.

4. The reactive power requirement will apply without the need to perform an interconnection study. This constitutes a deviation from recent FERC precedent.

5. Install an automatic voltage control system so that the generating facility can help regulate the transmission voltage at the point of interconnection both under steady state and disturbance conditions, as per the voltage schedule provided, which is simply a clarification of the existing requirement.

6. All reactive power devices used to vary the generating facility's reactive power output should be under the control of the automatic voltage control system.

7. Scope of exemptions or transition periods:

    a. Wind resources with signed or tendered LGIAs that do not incorporate a power factor requirement.

    b. Solar photovoltaic resources with a signed or tendered LGIA can select which standard to meet.

- ***Reactive Power is Fundamental to Maintaining Voltage Stability***

Reactive power is necessary to energize and transmit power in an alternating current system. Without reactive power, system voltage cannot be maintained. There are various sources of reactive power in a transmission system, but the most controllable and robust source of reactive power has been synchronous generators. Displacement of conventional generation therefore threatens to leave the system deficient of reactive power resources. Displacement of conventional generation by asynchronous wind and solar facilities could also potentially reduce the voltage regulation capability otherwise provided by the conventional generator. This will decrease the voltage stability of the system. Thus, the ISO believes that it is critical to ensure

replacement of the lost reactive power and voltage regulation capability that will result from high penetration levels of asynchronous variable energy generators.

- ***Position of the Parties***

The main concerns raised by stakeholders regarding the reactive power and voltage regulation requirements do not rest on technical feasibility or costs. Instead, the issues relate to who should bear the burden of these costs – asynchronous generators and their customers or transmission users – and should one category of generators be excluded from providing this grid support capability unless the ISO demonstrates the specific need on a study-by-study basis. (See Attachment B)

As noted in the summary table (Attachment C), all generators, other than wind turbines, are required to provide reactive power under the tariff of 0.90 lag to 0.95 lead. This means that the generator must be able to both absorb and provide reactive power for the grid. For conventional synchronous machines, providing this reactive capability inherently increases the cost of the generator, which must generally be designed to carry more armature current than otherwise necessary. Wind generators have a separate standard under the tariff pursuant to FERC Order No. 661-A, issued in December 2005. Under Order No. 661-A, wind facilities have been required to meet power factor and voltage regulation functionality if required by the transmission operator, such as the ISO. This has been accomplished routinely either through inverter designs that produce reactive power combined with other control equipment or through auxiliary equipment, including switched capacitors or static VAR compensators. There does not appear to be any commercial or technical reason why the approaches adopted by the wind industry cannot apply equally for the solar photovoltaic industry.

Notwithstanding the technical capability of providing the critical reactive power and voltage regulation capability, current FERC precedent does not impose an absolute obligation on wind resources to do so. As noted, Order No. 661-A places the burden on the ISO to prove the need for reactive power from each studied resource. FERC recently applied the Order No. 661-A approach to a solar photovoltaic facility being developed by Sempra Generation. The ISO proposal deviates from current FERC precedent by requiring all asynchronous generators to be required to meet power factor and voltage regulation functionality.

One of the inherent justifications for Order No. 661-A is no longer pertinent – asynchronous machines can inherently satisfy power factor requirements. (Attachments A and D) Similar to other conventional generators on the system, which have had to incur costs to provide this grid support function, asynchronous machines can do so based on commercially available technology. Moreover, there is a fundamental need for all asynchronous resources to satisfy these power factor capabilities as evident in renewable integration studies. For example, the ISO's 2007 Integration of Renewable Resources study concluded that all new wind generation units must have the capability to meet ± 0.95 power factor, notwithstanding the installation of shunt capacitors and static VAR compensation on the transmission grid. More recent analyses of the Carrizo Plains area in PG&E's service territory and the Devers area in SCE's service territory

similarly conclude that generation in those remote regions require reactive power support from proposed asynchronous generation to support voltage.

Discussions on this issue also raised a fundamental policy question of whether the asynchronous generation owner and its customers should bear the obligation of providing reactive power services or whether it should be provided through transmission level solutions where the costs are socialized to all grid users. The ISO believes the latter arrangement is suboptimal because it increases the risk of lower grid performance until a problem actually occurs, and potentially increases the cost of a deferred solution. (See Attachment A)

Ride-Through Requirements Increase Stability of the Grid to Withstand Disturbances

- ***Recommendation is to Extend Existing FERC Order No. 661-A Standard for Voltage and WECC Criteria for Frequency***

The specific recommendations are:

1. Extend the low/zero voltage ride-through requirement adopted by FERC in 2007 in Order No. 661-A for just wind resources to all generators. The ISO is not currently including a high voltage ride-through requirement in its standards because of the technical hurdles to developing this capability in the near-term. The ISO intends to pursue this issue either through a subsequent ISO process or through the national standards process at NERC.

2. Clarify that all generating facilities and, in particular, asynchronous generators, comply with current specifications in the WECC Under-Frequency Load Shedding Relay Application Guide. This recommendation to follow the WECC frequency ride-through requirement is consistent with current ISO LGIA and therefore simply re-iterates that all new generators, including all variable energy generators, must comply with this requirement.

3. Scope of exemptions or transition periods:
    a. Exempt resources with executed LGIAs or tendered LGIAs that do not include the requirement, i.e., wind resources prior to effective date of Order No. 661-A.
    b. Asynchronous generators that can demonstrate a binding financial commitment to procure inverter equipment covering greater than 30% of the projects ultimate capacity and that is incompatible with this requirement by the date approved by the Board will also not be subject to the requirement.

- ***It is critical to grid reliability that all new resources be designed with fault ride-through capability***.

Sympathetic tripping[2] off-line of wind plants and solar facilities is a known issue for faults near generating stations. Immediately after a fault occurs, the voltage will typically collapse on the faulted

[2] The term "sympathetic tripping" refers to a generation plant tripping off-line in response to a grid disturbance that causes a deviation in voltage or frequency.

phase or phases. Typically most transmission system faults will be cleared within several cycles. However, if new generation facilities are not designed with ride-through capability to withstand the temporary low voltage conditions during the fault inception and clearing periods, then generation facilities will trip and stay offline even after the fault is cleared. The result is that generation will be lost.

WECC policy states that a control area operator should be able to withstand the loss of the largest generator by procuring sufficient spinning reserves. One consequence of regularly losing all or part of the generation due to sympathetic tripping from the outage of transmission lines or other generators is the adverse impact on control area performance. A fault that trips a nearby generation unit plus a significant amount of wind or solar generation (via sympathetic tripping) would result in a more severe system imbalance on the control area. This could potentially increase the magnitude of the largest single contingency, which has both reliability and financial implications.

Similarly, the frequency on the power system is related to the amount of load and generation that are connected. When the load and generation are precisely balanced, the frequency will be 60 Hz. In the event that generation is lost through an unplanned or forced outage (e.g., a generating unit trips off line), the frequency will deviate below the nominal of 60 Hz. Immediately following the disturbance, the governors on the remaining generation units will adjust to attempt to arrest the frequency decline. It may be necessary for the ISO's capacity on automatic generation control to make adjustments to bring the system frequency back to 60 Hz. During this transition time, it is essential for the system generators to remain on line. If additional generators trip during the transition, the system frequency will continue to deteriorate, and frequency restoration will be more difficult.

- ***Position of the Parties and ISO Response***

The primary issues with the ride-through requirements are technical feasibility and cost impacts. (Attachment B) As a general matter, conventional synchronous machines have ride-through capability and this requirement simply renders the obligation explicit for this category of resources. Wind generators also have been required to provide for disturbance ride-through capability since adoption of Order No. 661-A by FERC in 2007. Thus, the ISO's proposal regarding voltage ride-through does not represent any change in requirements for wind technology.

The primary motivation for the requirement is to require the solar photovoltaic industry to abandon use of distribution oriented inverters that have been designed to trip off-line in compliance with set standards. However, based on information provided by GE, the inverters used by the photovoltaic industry are substantially similar to inverters used in modern wind turbines that are ride-through compliant. Several original equipment manufacturers have confirmed that their inverters for solar facilities either currently do, or will soon have, the ability to comply with the Order 661-A ride-through requirements. (See Attachment D) Thus, the main technical feasibility issue confronting compliance by solar facilities is whether their "balance of plant" systems, such as cooling systems, will not trip-off or can restart following a ride-through event. The ISO believes these issues are manageable and, in any event, that the reliability need outweighs any burden in performing the necessary modifications.

By omitting a high-voltage ride-through requirement, the ISO has avoided most of the technical and cost concerns raised by stakeholders. GE has stated that the costs for achieving low voltage ride-through capability *may* involve relatively little cost for most generators. (See Attachment A) As a general matter, the ISO concludes that the potential additional costs of ride-through capabilities are outweighed by the potential need for the ISO to carry additional contingency reserves to account for the possible tripping of additional generation. Further, it is inequitable to burden classes of variable generation, i.e., solar thermal and wind, and exempt other similarly situated generation, i.e., solar photovoltaic. Nevertheless, to account for the fact that certain solar photovoltaic projects may have significant compliance costs, the ISO is exempting those projects that can demonstrate financially binding commitments to procure incompatible inverters as of the date of this Board of Governors meeting.

Generation Power Management Allows for Greater Control over Grid Operation

- ***Recommendations for Generation Power Management Requirements***

The ISO's proposed generation power management capabilities are modeled after recommendations developed by GE and Alberta Electric System Operator pursuant to extensive stakeholder discussions, which are consistent with pending recommendations by ISO New England. Those recommendations are:

1. Variable energy generators must have the ability to limit their active power output in response to a dispatch instruction or operating order from the ISO. This ability should apply to the resource's full range of potential output so that the resource's reduction in output can range from incremental to full curtailment.
2. The capability must be able to reduce active power output on step-sizes in no greater than 5 MW increments, which also should not result in voltage steps greater than 2% under normal system conditions.
3. The variable energy generator is expected to interface with the ISO in a manner similar to any other generating facility. As such, the resource must be able to receive and respond to automated dispatch system instructions and any other form of communication authorized by the tariff and in conformance with the time periods prescribed by the tariff.
4. If a variable energy generator is ordered off-line or curtailed, the plant operator must not reconnect the plant to the grid or increase output without prior approval from ISO operating personnel similar to other generating resources.
5. Variable energy generators must be able to limit and control their ramp rates at the request of the ISO, except for downward ramps resulting from the loss of wind or sun to fuel the generating facility. The ramp rate limiter should have the ability to set their ramp rate between a range of 5% and 20% of rated capacity/minute with a default setting of 10%.
6. Variable energy generators must have an over frequency control system that continuously monitors the frequency of the transmission system and automatically reduces the real power output of the generator in the event of over frequency. An intentional dead band of up to 0.036 Hz can be designed for the over frequency control system. The over frequency response

design requires a droop setting of 5%, which means that a generator will change its output 100% for a 5% (3 Hz) change in system frequency.

7. Scope of exemptions or transition periods:
    a. Variable energy generators with executed LGIAs or tendered LGIAs as of the date this policy is approved by the Board.
    b. Accommodation for non-exempt resources that have purchased non-compliant equipment. ISO will coordinate with the project to develop requirements consistent with the capability of the control equipment and will submit this LGIA as a non-conforming agreement, i.e., independent review and approval by FERC.
    c. Transition date – all non-exempt resources must comply with the requirements for generation power management by the later of January 1, 2012 or their commercial operation date.

- ***Generation Power Management is Needed and Consistent with Existing Tariff Obligations***

Under section 4.2 of the tariff, a participating generator, regardless of technology, "shall comply fully and promptly with dispatch instructions and operating orders." Exceptions are permitted only if compliance would impair public health or safety or is "physically impossible." The ISO has generally interpreted the physically impossible exception to be restricted to real-time operating circumstances, such as forced outages, start-up times, and, in the case of many renewable resources, lack of fuel, but not predetermined design limitations. Modern variable energy generators, including solar photovoltaics, are physically capable of controlling output, to varying degrees, as dictated by available wind or sun and the equipment rating. Thus, current tariff provisions require all generating facilities with Participating Generator Agreements to operate such that the ISO can control their output under both normal and emergency conditions. The generation power management recommendations, therefore, do not impose a new obligation, but rather clarify existing requirements for variable energy generators. The ISO believes this clarification is necessary to unambiguously establish the expectations for variable energy generators, which historically have not provided generation power management capability or flexibility commensurate with their anticipated importance in the State's future energy portfolio.

The need for generation power management functionality from variable energy generators is supported by good utility practice, experience, and recent ISO analysis. Grid operators must be able to reduce the output of generators in cases where the grid is experiencing over-frequency conditions caused by system-wide over-generation, local transmission congestion caused by contingencies, planned clearances, or unexpected generation output, or for any other threat to system security that may be alleviated by reducing real power output. In short, situations will occur where the system cannot absorb all available generation. The ISO recognizes that variable energy generators use clean, low to no cost fuel, so curtailing such resources may not constitute the most economical or environmental solution to solving many system wide conditions. Nevertheless, circumstances will arise where, due to location, variable energy generators may be the only source of generation capable of efficiently mitigating the problem, or able to contribute to the solution because other dispatchable resources are operating at minimum levels, must maintain their operating capability for subsequent time periods, or for other reliability services, i.e., localized voltage support, frequency response, etc. The requirement that variable energy

generators have the capability of controlling their output is common to many systems with significant penetration levels of such technologies.

In addition, the ISO in coordination with the consulting firm KEMA, Inc., prepared a report for the California Energy Commission in 2009 that quantified changes in system frequency, area control error and the corresponding impact on system performance resulting from the aggregate increase in system volatility under 20% and 33% RPS scenarios. The report concluded, among other things, that the degradation of system performance appears to be predominantly caused by renewable resource ramping in the morning and evening along with traditional morning and evening load ramps.

A significant quantity of additional regulation and balancing capacity of up to 10 times that needed currently may be required to maintain system performance under the studied scenarios. Consequently, the report recommends investigating appropriate protocols and incentives for altering or controlling the ramp rate of wind and solar resources for known ramp events. As discussed further below, the ISO has committed to commencing a stakeholder process to address possible protocols and incentives, but without the foundational generation power management capability, the efficacy of the outcome of this process is likely be significantly impaired.

- ***Position of Parties and ISO Response***

The primary concern raised by stakeholders over adoption of a generation power management requirement did not relate to the recommended capabilities themselves, but rather centered on the ultimate use of those capabilities. (Attachment B) For instance, the concerns targeted questions such as under what circumstances will the capability be triggered, what operational or market protocols will govern the hierarchy of generation reduction, and what, if any, market rules will apply to compensate for the curtailment or incent voluntary reduction of output in response to price signals. How and when generation power management capabilities may be used will be explored fully in subsequent stakeholder processes. The ISO commits to deferring any use of the active power control capabilities until after a stakeholder process has resulted in identified market rules and procedures. Consistent with this commitment, the compliance date for non-exempt resources has been set for January 1, 2012 to accommodate the anticipated timing of the stakeholder process and any transition requirements.

Until the final rules on the application of generation power management are finalized in a subsequent stakeholder process, some uncertainty over their impact on resource production levels will exist. The ISO is aware that this uncertainty has the potential to affect project financing. The ISO has attempted to mitigate this impact by clarifying that the generation power management requirements do not: (1) apply where the ability to comply is limited by a lack of sufficient primary energy source, i.e., wind or sun, (2) otherwise require the resource to install any storage mechanism, or (3) generally require reservation of generating capability, i.e., "spilling" wind or sun, to permit the resource to *increase* output to supply a grid service. In other words, the ISO is not requiring capabilities, such as under-frequency governor response, that would prevent the resource from generally operating at full capability.

The ISO has also modified its proposal to be more consistent with existing control capabilities of variable energy generators. (Attachment B) To address power curtailment, there are generally two solutions. One solution is to have a coordinated plant control system manage the reduction in output and ramp rate. Alternatively, for facilities that do not select a coordinated plant control

solution, manual reduction can occur by shutting down individual generators or feeders. This usually results in a "stair-step" reduction capability because it works by dropping discrete blocks of generation. The ISO acknowledged this solution by increasing the reduction incremental from 1 MW to 5 MW. In doing so, the ISO modified its requirement to allow for both types of curtailment mechanisms.

The proposed exemption and transition recommendations for generation power management rest on the understanding that such capability is currently available from multiple original equipment manufacturers for both wind and solar photovoltaic technologies. (See Attachments A and D) Given the commercial availability, coupled with the ISO's understanding that equipment procurement generally follows LGIA execution, the ISO believes the proposed requirements will not impact development timing. However, to the extent a non-exempt facility can demonstrate a binding commitment to purchase non-compliant equipment of as of this meeting date, the ISO will consider the specific capability of the resource's equipment and develop requirements for the individual project that are consistent with that capability. Such projects will be subject to submission of a non-conforming LGIA. The ISO anticipates that the universe of potential projects in this category will be small to non-existent based on the sequencing of development events and the relatively short lead time for delivery of control equipment.

CONCLUSION

The extent to which the grid can successfully integrate variable generation will be significantly influenced by the ability and extent to which variable generation also contribute the basic technical characteristics embodied by interconnection requirements. The ISO, in coordination with its expert consultant, GE Energy Applications and Systems Engineering, believes that the proper approach to supporting large-scale penetration of variable renewable generation is to specify performance standards, design features, and capabilities comparable, whenever practical, to those required from conventional generators. This philosophy is consistent with the approach adopted by NERC's Integration of Variable Generation Task Force, among others. Accordingly, the recommendations on proposed refinements to interconnection requirements apply largely, but not exclusively, on variable renewable resources.

In developing these proposed interconnection requirements and exemption provisions, the ISO has sought to balance the application and scope of the requirements with concerns over not unduly obstructing the development schedule and commercial arrangements for resources currently in the interconnection process. To that end, the ISO believes it has struck the right balance and the final proposal limits the requirements to those most important to maintaining reliability. The ISO has also maximized reliance on existing requirements where possible, considered the technical feasibility and commercial availability of equipment and systems to comply with the recommendations, and considered cost implications in determining the scope of projects subject to the recommendations. While these interconnection requirements are an important and necessary step towards reliable integration of renewable resources, the ISO will continue to conduct stakeholder initiatives to assess the operational impacts of renewable integration, and notes that these efforts could lead to additional obligations placed on renewable generation resources.