UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Electric Storage Participation in Markets Operated	**)**	
By Regional Transmission Organizations	**)**	**Docket Nos. RM16-23-000**
And Independent System Operators	**)**	**and AD16-20-000**

COMMENTS OF NRG ENERGY, INC.

NRG Energy, Inc. ("NRG") hereby submits comments on the Notice of Proposed Rulemaking ("NOPR") issued by the Federal Energy Regulatory Commission ("the "Commission") on November 17, 2016 in the above-captioned proceeding.[1] NRG appreciates the Commission's leadership to address the complicated issues raised by the participation of electric storage resources and distributed energy resource aggregations in the organized regional transmission organization ("RTO") and independent system operator ("ISO") markets. The increased presence of electric storage technologies in providing products and services at both the retail and wholesale levels will influence investment and operations across the power industry. Ambiguity around the retail and wholesale nature of the products and services offered by electric storage resources and aggregations of such resources has the potential to negatively impact ongoing innovation and investments in storage and distributed energy technologies and business models, as well as competitive price formation in power markets. Therefore, it is timely for the Commission to take proactive steps towards setting forth clear market rules which establish performance and compensation frameworks around electric storage resources.

Among other comments below, NRG recommends that the Commission:

[1] *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 157 FERC ¶ 61,121 (2016) (the "NOPR").

- Direct all RTOs/ISOs to develop clear and consolidated market rules to support "bi-directional" resources, such as energy storage resources;
- Clarify that energy storage resources and distributed energy resource aggregations may participate in multiple markets, so long as the products provided are different and where each set of delivery obligations can be independently achieved;
- Limit telemetry and reporting requirements for aggregations of distributed energy resources to the aggregated performance characteristics visible to the RTO/ISO at its interface with the aggregator of the distributed resources;
- Direct RTOs/ISOs to not require "energy schedules" where a resource's physical characteristics make it capable of providing ancillary services from an energy withdrawal or energy-neutral state; but also require all resources providing ancillary services to have valid energy offers, to enable the efficient dispatch of operating reserves.

I. BACKGROUND

A. NRG

NRG is at the forefront of changing how people think about and use energy, and is deeply involved in a number of proceedings across the country designed to examine the costs and benefits of distributed generation and energy storage. NRG is the nation's largest independent power producer, with a diverse resource mix that includes over 50,000 megawatts of both renewable and conventional generation. NRG affiliates also aggregate several thousand megawatts of demand response and other distributed energy resources in the organized markets, and are actively seeking to deploy battery and other energy storage systems across the country.[2]

NRG's retail businesses serve nearly three million customers across more than a dozen states, providing both electricity and natural gas supply service. By giving customers access to the latest tools to better monitor and manage their energy usage, NRG is also a pioneer in enabling customers to make smarter and more sustainable energy choices. The technologies also

[2] NRG currently has over 40 megawatts of storage projects that are contracted and under development in California, including about 25 megawatts of "Ice Bear" storage/load shifting projects. NRG Curtailment Solutions, Inc. has several thousand megawatts of demand response nation-wide.

allow NRG and its customers to aggregate customers into a "virtual power plant" that can provide loading relief in key areas and participate in the wholesale energy markets.

B. The NOPR

In this NOPR, FERC proposes to require the RTOs/ISOs to revise their tariffs to establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, accommodates their participation in the organized wholesale electric markets, for all products for which they are technically capable. The NOPR also proposes to define distributed energy resource aggregators as a type of market participant that can participate in the organized wholesale electric markets under the participation model that best accommodates the physical and operational characteristics of its distributed energy resource aggregation and establish market rules for such participation.[3]

FERC's objective is to remove barriers to the participation in capacity, energy, and ancillary service markets of:

- Electric Storage Resources, which are resources capable of receiving electric energy from the grid and storing it for later injection of electricity back to the grid regardless of where the resource is located on the electrical system. These resources include all types of electric storage technologies, regardless of their size, storage medium (e.g., batteries, flywheels, compressed air, pumped-hydro, etc.), or whether located on the interstate grid or on a distribution system.

- Distributed Energy Resource Aggregations are either sources or sinks of power that are located on the distribution system, any subsystem thereof, or behind a customer meter. These resources may include, but are not limited to, electric storage resources, distributed generation, thermal storage, and electric vehicles and their supply equipment.

FERC further proposes that it is appropriate for each RTO/ISO to limit the participation of resources in the organized wholesale electric markets through a distributed energy resource aggregator that is receiving compensation for the same services as part of another program.

[3] NOPR at ¶ 3.

II. COMMENTS

Storage, distributed resources, and other forms of supply-side and/or demand-side power management are fundamental components of a fully competitive (and thus more efficient) energy system. FERC-jurisdictional competitive markets must support these next generation technologies and the associated business models. Tariffs must enable full recognition of the services and value that storage and other bi-directional resources can provide to the bulk power grid as well as enabling access to customer and distribution grid revenue streams (as appropriate) to fully leverage the flexibility of storage resources and other distributed energy resources.

The proliferation of distributed energy resources promises to provide an unprecedented degree of flexibility to manage the electric system. The competitive wholesale markets should enable and facilitate participation of these highly-flexible, highly-controllable resources through aggregations managed by third parties that can deliver both sophisticated interaction with the wholesale markets and value-added services and management of customers' energy needs and costs.

NRG generally supports the Commission's directive on "participation models" and observes that there should be three fundamental participation models for resources in wholesale markets:

1. Generators, which inject energy into the system;

2. Demand response, associated with customer load, which adjusts the demand by moderating and shifting the rate and time of withdrawals of energy from the system; and

3. a "bi-directional" resource, which can appear to the system as a net withdrawer of energy and a net injector of energy at different times, and in doing so, has characteristics of both generators and demand response.

In NRG's experience, the generator and demand response models are well-documented in ISO/RTO tariffs, but the bi-directional model, where it is defined at all, is disjointed and not

easily deciphered in existing tariffs. The bi-directional participation model would encompass energy storage as defined in the NOPR, as well as aggregation composed of multiple distributed energy resources that create, in aggregate, a performance profile that can both moderate levels of energy withdrawals and inject energy into the system.

A. Electric Storage Resources and Distributed Resource Aggregations Should be Eligible to Set Price when Withdrawing or Injecting Energy or Participating in the Capacity Market.

The NOPR suggests a goal to allow electric storage resources and distributed resource aggregations to participate as wholesale seller and buyer simultaneously.[4] The participation models for bi-directional resources should provide that such resources must be eligible to set price in the markets, consistent with RTO/ISO rules for price-setting by generating (source) resources or demand response (sink) resources, depending on whether the resource is operating as a net generator or load at the time. As the Commission has noted in its energy market price formation docket, proper price formation "…should lead to prices that more transparently reflect the marginal cost of serving load, which will reduce uplift costs and thereby improve price signals to support efficient investments."[5] While many distributed energy resource aggregations will be accommodated by the existing demand response participation model, others (particularly batteries and other energy storage resources) are capable of both injecting and withdrawing energy. In its Final Rule, the Commission should require each ISO and RTO to ensure that these resources are accounted for in the price formation process for any increment in which they are participating in the wholesale market.

[4] NOPR at ¶¶ 81-83.
[5] *Fast-Start Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 157 FERC ¶ 61,213 at Summary (2016).

The Final Rule should also require each ISO or RTO to ensure that all distributed energy resources – whether they are part of an aggregation, individually telemetered, in front of, or behind-the-meter, are part of the price formation process not only in the energy markets, but in the capacity markets as well. Currently, some ISOs and RTOs simply deduct behind-the-meter distributed energy resources from the entities' installed reserve margin, which means that these resources effectively bypass the capacity market and decrease capacity market prices, but are not subject to adjustment for actual performance, including Equivalent Forced Outage Rates ("EFORd") calculations, Performance Incentives in New England, Capacity Performance requirements in PJM, or the like.[6] By contrast, demand response resources are typically viewed as supply-side resources and thus are subject to the full suite of performance incentives and penalties. Going forward, NRG strongly recommends that the Commission follow the path laid down by DR resources and require distributed resources and aggregations of distributed resources to play by comparable rules to existing DR and generation resources.

Similarly, distributed energy resource aggregations – even those participating as resources by selling their capacity – are currently exempt from mitigation in PJM and NYISO, while they are subject to mitigation in New England. As these resources become an increasingly important part of our nation's energy mix, the trend should be towards requiring these resources to be subject to comparable rules to reflect their actual cost in the capacity markets.

NRG strongly recommends that the Commission use this proceeding to harmonize the requirements of distributed energy resource aggregations, whether they act as load modifiers or as supply-side resources. After all, as the NOPR notes, many distributed energy resource

[6] *See, e.g.*, *ISO New England, Inc.*, 154 FERC ¶ 61,008, *order on reh'g*, 155 FERC ¶ 61,145 (2016).

aggregations already blur the lines between supply and demand, and that trend will only continue.

B. Energy Storage Resources and Distributed Resource Aggregations Should be Able to Access Multiple Revenue Streams in Certain Circumstances.

The NOPR correctly observes that distributed energy resource aggregations located in the distribution system should not be compensated in wholesale markets and through distribution-level mechanisms *for providing the same services*.[7] However, the Commission in its Final Rule should carefully distinguish between resources capable of providing *separate* services on both the distribution and transmission levels, and ensure that resources are not arbitrarily prohibited from participating in both retail markets and wholesale markets unless there is a conflict that would prevent the resource from fulfilling both obligations.

1. The Distributed Energy Resource Business Model Relies on Ability to Earn Multiple Revenue Streams.

NRG's experience is that distributed energy resources will, in many cases, be located on the host-customers' premises. In many cases, the primary justification for these resources will be to provide the host-customer value, in the form of bill savings, resilience, or stability of power supplies. However, the financial reality is that distributed resources must be able to aggregate additional "value streams" to make the resource a value proposition for most customers. These can include participation in the wholesale energy markets, participation in state programs that, for example, provide compensation for contributing to the deferral of distribution investment or payments in exchange for local grid support, or most commonly, a mix of both wholesale and state-jurisdictional revenues. Either way, the ability for an aggregated or single distributed

[7] NOPR at ¶¶ 133-134.

energy storage resource to participate in the ISO/RTO markets is critical to making these new technologies and business models financially viable.

2. Distributed Resources, Whether Alone or in an Aggregation, Should be Permitted to Provide Multiple Services.

Many distributed energy resources and aggregations are capable of providing multiple functions and services. In many cases, the "customer" for each of these services may be different. The customers can include the ISO or RTO, the local distribution utility, or even the host-customer of the distributed energy resource. It is highly efficient to allow distributed energy resources, or aggregations of such resources, to sell electric services to each of these customers so long as the resource is capable of independently meeting each of its obligations.

The Commission's policy and the RTO/ISO tariffs should focus on whether the services the distributed resource aggregation is providing to a host-customer or a distribution system interferes with its ability to participate in the wholesale market. For example, a group of aggregated distributed energy resources can often provide local grid support services, such as local VAR or voltage support, and allow a utility to defer investment on its distribution system by relying on the distributed resources. Unless the "retail" compensation program imposes obligations that are inconsistent with the aggregated resources' participation in wholesale markets, then there is no conflict. The Commission should draw this line carefully so as to not preclude storage and bi-directional aggregations from fully realizing their value to customers, to the distribution grid, and to the bulk power system.

3. Issues Raised in the Policy Statement Regarding the Electric Storage Resources Should be Comprehensively Considered in any Final Rule.

NRG strongly disagrees with the Commission's recent Policy Statement suggesting that storage resources could receive cost-based compensation for grid support services and also seek

the ability to receive market-based compensation for participation in wholesale markets.[8] While it is appropriate to enable storage and other bi-directional resources to access multiple revenue streams, each resource must pick which business model it wants to participate in – either regulated utility cost of service or market-based – and stick with that business model. Allowing resources to mix, or to toggle between the higher of cost or market would fundamentally undermine this burgeoning new industry.

The Commission should also adopt a strong presumption for third-party ownership and operation of storage and distributed energy resource aggregators. Utility ownership of storage resources in competitive RTO/ISO markets should not necessarily be categorically prohibited, but should be limited to applications that are uniquely suited to the utility's regulated monopoly business model, such as reliably serving customers at the end of long radial lines, where a cost-of-service energy storage resource solution may represent the least cost method of supplying reliable power. However, the general rule should be that competitive firms should drive investment in energy storage resources and other distributed technologies, and in aggregation business models. This way, captive ratepayers are not exposed to technology or operational risk, and avoid another generation of stranded costs.

Even in the circumstance where distributed technologies are used for targeted grid support services, in the vast majority of cases, it would be preferable for those resources to be owned and operated by a third party under contractual arrangements with the utility. In the rare case where it is appropriate to include energy storage resources in transmission rates, the impacts of that resource and its behavior on the markets and other market participants must be carefully

[8] *Utilization of Electric Storage Resources for Multiple Services When Recovering Cost-Based Rate Recovery*, 158 FERC ¶ 61,051 (January 17, 2017).

evaluated and mitigated. These matters are best explored as part of the Commission's Final Rule in this docket.

C. The Ability to Aggregate Resources is Critical to the Participation of Distributed Resources in the Commission-Jurisdictional Markets.

The purpose of aggregation of distributed energy resources is to provide RTO/ISOs with a consolidated "resource," precisely to avoid RTO/ISOs from having to monitor and track what all of the individual resources are, and how each one is performing. In the NOPR, the Commission correctly underscored that "recent improvements in metering, telemetry, and communication technology should facilitate better situational awareness and enable management of geographically disperse distributed energy resource aggregations."[9] In NRG's view, the interface for the RTO/ISO with a suite of aggregated energy resources is at the aggregated level and should allow for aggregated bidding of bidding parameters, performance and settlement all occurring at that aggregated level. It should be the responsibility of the aggregator to provide telemetry that meets the RTO/ISO requirements, to ensure that the aggregated performance of the distributed energy resources meets the claimed and offered performance. It is also the responsibility of the aggregator to manage and settle accounts with individual resources within the aggregation.

1. The Final Rule Should Embrace Cross-Nodal Aggregations.

In its simplest form, an aggregation would only be constituted of distributed resources that are downstream of a single pricing node on the RTO/ISO system. In this simplistic view, each resource in the aggregation would set price and be compensated in a manner comparable to generators, which are generally priced nodally. Reality is likely to be more complicated: most distributed energy resource aggregations will involve resources behind multiple nodes,

[9] NOPR at ¶ 138.

particularly necessary when aggregating to meet the minimum size requirement for an aggregated resource, which would be comparable to how demand response aggregations have evolved. [10]

The Commission should require each ISO/RTO to embrace this additional level of complexity as key to the distributed resource aggregation business model. While involving cross-nodal aggregations into wholesale prices may involve additional complexity in settlements, it is absolutely imperative that ISOs and RTOs allow aggregations to participate in the price formation process.

The California Independent System Operator Corporation's ("CAISO") has started to examine these issues in Docket No. ER16-1085, in which it proposed rules to facilitate participation of distributed energy resource aggregations. In that filing, the CAISO explains that:

> [An aggregation of distributed resources] must provide a net response at the pricing node level that is consistent with the CAISO's dispatch instructions and, in the case of aggregations across multiple pricing nodes, consistent with applicable generation distribution factors that the resource submits with its bid. The CAISO is seeking a net response at the pricing node level rather than an individual distributed energy resource location in order to capture the value that the aggregation provides at the transmission-distribution interface.
>
> Under the CAISO's proposed provisions, the scheduling coordinator will submit schedules and bids for an aggregation based on the aggregation's generation distribution factors. CAISO market awards and dispatch instructions will then reflect these distribution factors that correlate to individual pricing nodes. Scheduling coordinators will submit aggregated meter data to the CAISO and the CAISO will settle the resource's response at the level of the aggregation based on a weighted locational marginal price associated with each pricing node.[11]

[10] NRG recognizes that the Commission approved CAISO's Distributed Energy Resource Provider where it concluded that resources within a distributed energy resource aggregation could respond in different directions to a CAISO dispatch instruction.

[11] *California Indep. Sys. Operator Corp.*, Distributed Energy Resource Provider Initiative at page 12, Docket No. ER16-1085 (filed March 4, 2016).

NRG suggests that the Final Rule look to the suggestions made by the CAISO for how to address pricing across nodes. At the end of the day, however, the key principle is that it is the *aggregator* which bears the responsibility for building any particular aggregation – including bearing the financial implications of the dispatch pricing sent by the ISO/RTO.

2. The Final Rule Should Eliminate Any Minimum Size Requirement to Participate in an Aggregation.

In addition, NRG submits that there should be no minimum size for an *individual resource* in a distributed energy resource aggregation. NRG does support a minimum size of 100kW for distributed energy aggregation as an efficient minimum size resource for RTO/ISO participation. The 100kW minimum size should not be restrictive on the development of the aggregation business model and is consistent with how RTOs/ISOs currently treat generation and demand response.

D. Information Requirements for Distributed Energy Resources

The Commission has requested comments on what information and data requirements for distributed energy resource aggregations are appropriate and correctly suggests that "information and data requirements that apply to distributed energy resource aggregations must not pose barriers to the participation of small distributed energy resources or distributed energy resources relying on any specific technology in the organized wholesale electric markets through a distributed energy resource aggregator."[12] The Commission should be very cautious about imposing reporting or metering requirements within the Aggregation, to avoid burdening the business model and market participation model with information that is not needed by the RTO/ISO to efficiently operate the system and settlement market resources. The interface for the RTO/ISO to monitor and measure the aggregation is at the aggregated level, and the

[12] NOPR at ¶ 145.

reporting requirements within an aggregation should be limited to ensuring that each individual distributed energy resource asset is participating in only one distributed energy resource aggregation.

The Commission should err on the side of business model formation, requiring fewer upfront information requirements from individual resources in a distributed energy resource aggregation and ensuring that applicable penalties and restrictions on distributed energy resource aggregators are effective at disciplining market behavior. The distributed energy resource aggregation business model is only in its infancy, and the relevant technologies may exist only within niche policy-market constructs at the state and federal levels. By enabling greater market access of aggregated resources into wholesale markets, the Commission should truly seek to provide a *market* framework – heavy on back-end consequences, and lighter on upfront rules – to encourage the innovation necessary to deliver better distributed energy resource aggregation products and services at lower costs.

Moreover, required information and data should be at the aggregation level. All performance, metering, settlements, etc. with the RTO/ISO should be conducted through the aggregation, and the aggregator should be responsible for all performance obligations, not the individual resources. Required information should be updated promptly if the individual distributed energy resources in the Aggregation change in ways that alter the aggregate characteristics and performance. This will ensure that the RTO/ISO always has current information regarding the capabilities of all resources participating in its markets.

E. Bidding Parameters

The NOPR proposes model bidding parameters for storage, such as real-time state of charge, upper charge limit, lower charge limit, maximum energy charge rate, and maximum

energy discharge rate, with optimal minimum charge time, maximum charge time, minimum run time, and maximum run time.[13]

For aggregations, bidding parameters should match the appropriate participation model, *i.e.*, for distributed energy resource aggregators composed strictly of distributed generators, the generation bidding parameters would apply; for distributed energy resource aggregators containing load resources and with no ability for net injections into the system, the demand response bidding parameters would apply; and the bidding parameters for bi-directional resources should be general enough to encompass the bidding requirements of distributed energy resource aggregators as well as purely storage resources.

The NOPR asks whether there should be a mechanism that identifies bids and offers coming from the same electric storage resource. NRG strongly agrees that each ISO/RTO should develop safeguards that prevent a storage resource from purchasing power to charge the resource at the same time the storage resource is dispatched to provide energy.[14] As part of the bi-directional participation model, the Commission should consider a consolidated inject/withdraw bidding interface, with safeguards that prevent energy buy bids from being lower than energy sell offers. The consolidated interface would ensure that bids and offers appear on the same screen for market participants; while the safeguards would produce a warning or prohibit an entry if the prices offered and bid are not compatible.

In addition, the NOPR suggests that RTO/ISO rules should allow electric storage resources to derate their capacity from "nameplate" in order to meet min-run-time requirements.[15] This is one example of appropriate flexibility that should be afforded to storage

[13] NOPR at ¶¶ 66-71.
[14] NOPR at ¶ 83.
[15] NOPR at ¶ 49.

and other bi-directional resources. Likewise, an energy storage device should be provided the flexibility to claim a capacity rating that is less than its nameplate in order to allow the energy storage resource to meet its capacity obligations while still allowing for state-of-charge management. While the Final Rule should allow flexibility on how much capacity an energy storage resource elects to sell into the capacity market, it must make clear that resources electing to participate in the capacity markets meet the same performance metrics and criteria.

Lastly, the NYISO has proposed a "transition time" parameter, which is the number of minutes needed for the resource to transition from withdrawing energy to injecting, or vice-versa. This concept should be explicit in RTO/ISO bid parameters for bi-directional resources, including storage.

F. Energy Schedules and Eligibility to Provide Ancillary Services

The NOPR seeks input on whether FERC should direct RTO/ISOs to relax existing requirements that a resource have an "energy schedule" in order to be eligible to provide ancillary services.[16] NRG agrees that eligibility to provide ancillary services should be based on the technical capabilities of resources. Where a particular ancillary service does not require a resource to be "spinning," there should be no requirement for an "energy schedule." In addition, where a resource, such as storage, has the capability to respond very rapidly to ancillary service needs from a state of no energy output or even net energy withdrawal, such resources should not be required to have "energy schedules" in order to be eligible to provide and be compensated for any ancillary services that they are capable of providing.

The capability of resources to provide an ancillary service absent an energy schedule can be determined in the regular performance tests that the RTO/ISO conducts. For storage

[16] NOPR at ¶¶ 51-52.

resources, there should be an explicit understanding that response times can be virtually immediate, so there should be no requirement to be in any particular mode of charging or discharging to be eligible for providing ancillary services, including "spinning" reserves and frequency regulation.

That said, the Final Rule should require that all distributed resources participating in the wholesale market provide economic energy market offers. This ensures consistency between distributed energy resources and conventional generation, as well as promotes the efficient operation of the system. Every resource that is available for dispatch should have a schedule of offer prices conforming to the RTO/ISO rules. Further, resources providing operating reserves and other ancillary services must include the ability to convert the offer to provide reserve into actual energy. Therefore, there needs to be a price to establish a co-optimized economic order when activating reserves, as well as to price the energy produced when reserves are activated.

G. Energy Pricing

The NOPR states that all purchases from and sales to the ISO-administered markets associated with storage resources should be at the wholesale locational marginal price.[17] First, this requires consideration of whether the NOPR is referring to a zonal price, which is the price paid by load in many RTO/ISOs, or to a nodal price, which is the price paid to generators. NRG recommends that the Commission clarify that wholesale market energy interchange with storage resources take place at the applicable nodal Locational Marginal Price ("LMP").

However, in the special case of a storage resource located behind a retail load meter, it would be difficult to efficiently and accurately distinguish energy purchased from the grid and sold back to the grid later from energy purchased and used to serve on-site retail load, without

[17] NOPR at ¶ 100.

sub-metering and data protocols acceptable to the utility and the RTO/ISO. NRG recommends that in this situation, energy at the single retail meter would be valued at the applicable retail rate. If the project chooses to participate through a distributed energy resource aggregation, the combined distributed energy resource aggregation would interact with the RTO/ISO at the applicable nodal LMP and the aggregator would need to manage the differentials between the aggregation's RTO/ISO energy valuations and those of the individual distributed energy resources. Alternatively, project owners could forego the benefits of customer bill management associated with a behind-the-meter configuration, and opt for separate metering to access wholesale energy prices through their aggregations. If individual project owners meet the size and telemetry criteria to access the wholesale energy markets directly, then those resources should be subject to the performance requirements associated with the applicable participation model. If, however, a project chooses to participate through a distributed energy resource aggregation, then the aggregation itself should be responsible for meeting all performance requirements.

Likewise, distributed energy resource aggregators should transact energy with RTO/ISO markets at the applicable nodal LMP. Any differentials between the value of energy transacted at the Aggregation/RTO interface and the value of energy at the meter of the individual distributed resource would be the responsibility of the aggregator through its agreements with individual resource owners and operators.

H. Managing the State of Charge Should Always be an Option for Storage Resources.

The NOPR suggests that an RTO/ISO could, in some cases, assert a right to manage the state of charge of an electric storage resource.[18] A storage resource (or aggregation) that includes storage should always have the option and ability to manage its own state of charge. While a resource owner/operator should be able to transfer that control to the RTO/ISO through an optional tariff provision or a commercial agreement, the presumption and default position should be that the owner/operator manages the state of charge. This recognizes that the owner/operator of the storage resource is able to preserve the integrity of the resource equipment, as well as to have the right to optimize between customer reliability and resilience needs, customer demand charge and bill management, local grid support services, and wholesale market participation.

The alternative is to add significant complexity into the ISO/RTO bidding processes. For example, if the Commission elects to allow an ISO/RTO to mandate that it manage a storage resource's output and state of charge, then the ISO/RTO must include sufficient bidding options that respect the ability of the distributed energy resource to meet core customer demands, manage state of charge, and other key parameters. Given that such bidding tools would likely take years to develop, NRG strongly prefers that aggregators and system owners/operators be permitted to self-manage their own resources.

[18] NOPR at ¶ 69.

I. Aggregations Should be Allowed to Include Multiple Types of Distributed Energy Technologies.

The NOPR notes in several places that aggregations of distributed resources may include multiple types of distributed technologies.[19] This is an important provision that should be emphasized, especially as some RTO/ISOs may seek to limit aggregations to a single technology. Microgrids are one example of multi-technology aggregations that should absolutely be able to participate in the wholesale markets as a single entity. There are likely other business models in which distributed energy resource aggregators will want to combine multiple technologies, such as solar and storage, to take advantage of the complementary characteristics and performance capabilities to develop aggregations that meet, for example, the strict performance requirements assessed on capacity resources participating in PJM's Capacity Performance market. Indeed, it is easy to see how an aggregated set of distributed technologies would be more successful in such a market than an aggregation that is artificially limited to a single technology.

J. Make-Whole Payments

The NOPR asks whether the proposed participation model for electric storage resources and, by extension, any bi-directional aggregations, should allow make-whole payments when a resource participating under this participation model is dispatched as load, and the price of energy is higher than the resource's bid price.[20] RTO/ISO dispatch should never result in resources receiving less compensation than their stated prices for the services provided. The real objective is to eliminate such "make-whole" payments through price formation reforms that capture the full marginal cost of the RTO/ISO dispatch in market prices, but where that is not yet

[19] NOPR at ¶¶ 133, 151.
[20] NOPR at ¶ 85.

accomplished, make-whole payments should be available to any resource that does not receive its stated prices for services provided when following RTO/ISO dispatch or for consuming energy at prices above its stated price.

K. Coordination Between Aggregators, ISOs/RTOs and Host Utilities

The NOPR asks for comments on the level of detail necessary in the RTO/ISO tariffs to establish a framework for ongoing coordination between the RTO/ISO, a distributed energy resource aggregator, and the relevant distribution utility or utilities, including comment on any related reliability, safety, and operational concerns and how they may be effectively addressed.[21] The host utility should have comparable visibility into the status and operation of distributed energy resources acting as part of an aggregation as the RTO/ISO, meaning visibility into the aggregate status and performance. However, the host utility may require more granular visibility to the extent the resources are operated (and compensated) for local grid support services. The latter is a communication and coordination issue among the utility and the individual distributed energy resource aggregators which should be governed by state tariffs.

There is a hierarchy of "control" in this context. The utility should have visibility regarding the status of distributed energy resources on its system to the extent needed for operations, at a meaningful level of aggregation (*i.e.*, not individual residential solar installations, but perhaps all solar on a particular feeder segment, or all storage connected to a particular substation) to support situational awareness. The utility should also have sufficient awareness and visibility of all distributed energy resources and the right to disconnect any and all distributed energy resources in the event of immediate safety concerns. With that in mind, utility visibility into and/or control over distributed energy resources should not compromise efficient

[21] NOPR at ¶ 155.

market-based deployment and innovation in distributed resources. In other words, utility safety needs must not become a convenient excuse for creating burdensome reporting requirements or barriers to third-party distributed aggregation and innovation. Acknowledging the utility's legitimate need to protect public and worker safety must not direct the market towards utility ownership or control over distributed energy resources, and the Commission must carefully ensure that relevant safety protocols do not implicitly compromise third-party business models and investments in distributed resources.

Also, the NOPR asks for comment on the appropriate lines of communication to require, including how the distributed energy resource aggregator model proposed herein would interact with or complement the Distribution System Operator ("DSO") model being discussed in some states, and whether a DSO model might add value to the distributed energy resource aggregator model in terms of facilitating communication among affected entities.[22] In all cases, distributed resource aggregators should have a direct communications link to the RTO/ISO, consistent with all other wholesale market participants. As discussed above, it may be appropriate for the aggregator to also provide visibility to a DSO, where the distributed energy resources affect the operations of the DSO's grid. However, the Commission should ensure that the DSO is not inserted in the communications link between an aggregator and the ISO/RTO. Instead, the primary relationship between a wholesale market participant and the ISO/RTO should always rest with direct communications between those two parties.

L. NRG Supports the Commission's Implementation Timeline.

NRG supports the Commission's proposal to require each RTO/ISO to submit a compliance filing within six months of the date the Final Rule is published and twelve months from the date of the compliance filing for implementation of the proposed reforms to become

[22] NOPR at ¶ 156.

effective.[23] As the NOPR reflects, new technologies and business models have resulted in a hazier bright line, and the Commission must play a clarifying role in defining the economic realities underlying the physical operations of the power system. In addition, with distributed energy resources continuing to come online, the Commission needs to ensure rational and consistent integration of new technology in markets and protect wholesale price formation and reliability obligations. At a minimum, setting up clear and consistent market designs around how these resources will be integrated is crucial. The barriers the Commission has identified to meaningful participation by energy storage resources and demand energy resource aggregations are real, and there is a need to expedite elimination of these barriers to enable deployment.

IV. CONCLUSION

NRG broadly supports the Commission's initiatives and respectfully requests that the Commission considers the aforementioned comments.

February 13, 2017

Respectfully submitted,

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[23] NOPR at ¶ 159.

Certificate Of Service

I hereby certify that I have served a copy of the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Princeton, New Jersey this 13th day of February, 2017.

/s/ *Maria DeLuca*
Maria DeLuca