BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

PROCEEDING NO. 18R-0623E

IN THE MATTER OF THE PROPOSED AMENDMENTS TO RULES REGULATING ELECTRIC UTILITIES, 4 CODE OF COLORADO REGULATIONS 723-3 REGARDING HOUSE BILL 18-1270 AND THE ENERGY STORAGE PROCUREMENT ACT.

COMMENTS OF THE ENERGY STORAGE ASSOCIATION

Pursuant to the Colorado Public Utilities Commission ("Commission") Notice of Proposed Rulemaking ("NOPR") in the Matter of the Proposed Amendments to Rules Regulating Electric Utilities, 4 Code of the Colorado Regulations 723-3 (Electric Rules) Regarding House Bill ("HB") 18-1270 and the Energy Storage Procurement Act issued on September 13, 2018, the Energy Storage Association ("ESA") respectfully submits these comments.

In the comments below, ESA provides a response to the proposed revisions to the Electric Rules attached to the Notice of Proposed Rulemaking, and respectfully submits suggestions for additional modifications for the Commission's consideration. Many of these recommendations were submitted as part of ESA's comments[1] on January 31, 2018, in the Review of ERP, RES and Integration Rules proceeding number 17M-0694E and are described in greater detail in ESA's recently published report *Advanced Energy Storage in Integrated Resource Planning (IRP)*, which is attached to these comments as an appendix.[2]

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[1] Comments of the Energy Storage Association in Proceeding 17M0694E, Review of ERP, RES and Integration Rules, available at: https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_fil=G_740992&p_session_id=.

2 Energy Storage Association, Advanced Energy Storage in Integrated Resource Planning (IRP), June 2018, available at: http://energystorage.org/system/files/attachments/esa_irp_primer_2018_final.pdf.

I. ABOUT THE ENERGY STORAGE ASSOCIATION

ESA is the national trade association dedicated to energy storage, working toward a more resilient, efficient, sustainable and affordable electricity grid – as is uniquely enabled by energy storage. With more than 160 members, ESA represents a diverse group of companies, including independent power producers, electric utilities, energy service companies, financiers, insurers, law firms, installers, manufacturers, component suppliers and integrators involved in deploying energy storage systems around the globe.

II. COMMENTS ON ELECTRIC RESOURCE PLANNING RULES

The Energy Storage Procurement Act (HB 18-1270) determined that it is in the public interest to establish procurement mechanisms for energy storage as part of the electric utilities' resource planning process.[3] The State Legislature rightly identified that the resource planning process is an appropriate avenue for considering the procurement of energy storage. Doing so will ensure that the procurement process complements the identified system needs.

ESA commends the Commission for engaging stakeholders in the development of the proposed draft revisions to the Electric Resource Planning (ERP) rules governing how electric utilities conduct their resource plans. The draft regulations proposed in the appendix to the NOPR are an important starting point for a conversation on the needed revisions to the rule in order to meet the requirements outlined in The Energy Storage Procurement Act (HB 18-1270). ESA's recommendations below aim to strike a balance between providing utilities an opportunity to provide information and analysis on how they have met their statutory requirements and providing adequate guidance to ensure that energy storage is effectively incorporated into the resource planning process.

Furthermore, ESA applauds Xcel for incorporating emerging market-transforming technologies in prior resource plans to provide ratepayers with the most cost-effective and efficient solutions for the State

[3] Reference HB 1270

of Colorado's grid. Thanks to Xcel's leadership, many of the best practices being developed in integrated resource planning across the country are already in the process of being developed and deployed in the State of Colorado. To embed these best practices into normal course of planning – along with other important reforms – they must be codified in the rules.

ESA respectfully recommends the following additional requirements for inclusion in the Commission's Rules Regulating Electric Utilities, 4 Code of Colorado Regulations 723-3 (Electric Rules).

i. Require more granular resource modeling to capture storage benefits

While ESA recognizes that the revisions to the ERP rules 3604 (m) included a requirement for modeling assumptions and analytical methodology that accurately capture the full benefits of energy storage, ESA respectfully submits that this guidance would benefit from being more explicit. Specifically, ESA recommends that the Commission direct electric utilities to use models that use sub-hourly intervals, which are better equipped to capture the flexibility of storage operations providing both capacity and grid services. Several validated commercial models are available that can calculate economic resource options including intra-hourly dynamics, such as PLEXOS, SERVM, and E3 REFLEX. If sub-hourly modeling is not possible, then at minimum an hourly chronological production cost model should be used, rather than sampling from a small set of hours from each season.

Typical resource planning models use three inputs (forecasted demand, the capital cost of available technologies, and those technologies' operating profiles) to calculate long-term economic options for system capacity. These models tend to be simplistic because they only capture the uncomplicated operations of traditional generation units providing capacity. In contrast, current-day advanced energy storage provides high-value grid flexibility services such as frequency regulation or ramping support in addition to capacity. A large-scale energy storage resource dedicated to providing peak capacity when needed—typically a four-hour period in the afternoon and early evening, potentially

only seasonally—can also provide grid services for the many hours when its peak capacity is not needed. Similarly, behind-the-meter (BTM) energy storage systems, aggregated into a Virtual Power Plant, could provide valuable grid services, including ramping, local and system capacity, voltage support and frequency response. Storage resources can do this because they are "always on" and available for service, in contrast to traditional generation units that need to be started up and shut down to provide peak capacity and other services. Many older capacity expansion modeling tools currently used today in CO are unable to estimate the full benefits of storage resources.

ii. Explicitly require accurate data on costs be incorporated into modeling

ESA commends Xcel for conducting a robust RFP that resulted in cost-effective energy storage solutions in its 2016 Electric Resource Plan. ESA notes the importance of learning from these solicitations, and recommends that Commission direct that these lessons be applied to the modeling exercise in the ERP. ESA also respectfully suggests that the Commission add a requirement that utilities use estimates of advanced storage costs that are not more than one year old. Numerous sources report the installed cost of advanced energy storage has declined significantly in recent years, generally faster than market expectations. While estimates of the rate of reduction vary, further cost declines of 8-15 percent year-over-year are projected. Considering this rapid and recent technical progress, it is critical that planners use up-to-date advanced storage cost estimates and forecasts for resource planning model inputs, including both in-front-of-the-meter and behind-the-meter energy storage configurations. Not doing so risks basing investment decisions on outdated and incorrect assumptions.

The Commission may also require a declining cost curve be applied when projecting the future cost of storage. Utility resource plans typically assume the cost of conventional supply technologies increase over time, based on inflation, since combustion turbines and other traditional generation technologies are no longer experiencing significant cost declines. Advanced storage is different because the rapidly increasing scale of manufacturing capacity and deployment has resulted in significant unit cost reductions. Additionally, the ability to value-stack means energy storage can provide value to both the

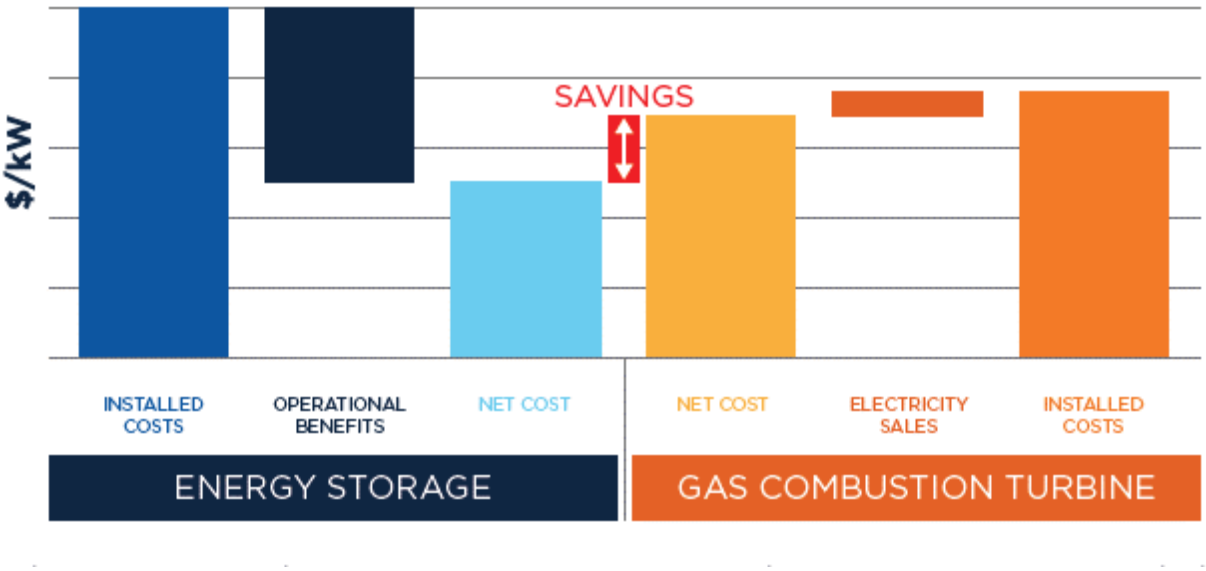
distribution and transmission grids, while at the same time, helping manage customer energy costs. These multiple value streams and benefits should be incorporated into cost effectiveness evaluations for energy storage.

iii. Develop a net cost calculation for comparing resource options

In addition to improving modeling and analytical assumptions to better capture the benefits of energy storage, HB 18-1270 (2018) calls on the Commission to review whether the mechanisms in place for procurement appropriately incorporate and account for energy storage and the benefits it provides. ESA respectfully proposes that there are additional modifications to the evaluation of resources needed to better capture those benefits. Specifically, ESA proposes that the Commission incorporate a net cost evaluation methodology within the resource planning rules that better captures the value of flexibility. Flexibility benefits and avoided system costs of advanced storage operations are significant and can represent a substantial addition to the capacity value of storage. The simplest method to incorporate such storage benefits into resource planning is to use a net-cost-of-capacity approach, as pioneered by Portland General Electric in their 2016 IRP and the concept of which is illustrated in Figure 2:

Net cost of capacity = Total installed cost –Operational benefits (flexibility operations & avoided costs)

Figure 2 Example of Net Cost of Capacity Calculation



Some of the operational benefits of storage are flexibility services directly provided by the individual unit in question. Among these benefits are (1) regulation, (2) load following, and (3) contingency reserves. When the direct operational benefits of storage are modeled, they can represent as much or more than the capacity value of storage. For example, preliminary findings from Portland General Electric's 2016 IRP found that operational benefits of storage were Savings expected to be approximately two times larger than the capacity value (~$90/kW-yr and ~$40/kW-yr, respectively).

Other operational benefits of storage accrue to the entire system as avoided costs, many of which have been explicitly called out in The Energy Storage Procurement Act (HB 18-1270). Among these benefits are (1) reduced operating reserve requirements; (2) reduced start-up and shut-down costs of all generation facilities; (3) improved heat-rate efficiency of thermal plants; (4) reduced curtailment of renewable resources; (5) reduced risk of exposure to fuel price volatility; and (6) reduced local emissions and ability to run without environmental restrictions on operations. As an example, a Massachusetts state-commissioned study of energy storage deployment found that the total value of these system benefits was greater than the value of the direct, compensated services of storage. Similarly, aggregated BTM storage systems, operated as Virtual Power Plants, have been deployed to provide both system and local capacity/resource adequacy benefits, distribution deferral and other grid benefits. Indeed, because these benefits increase the efficiency of the overall grid, they must be accounted for at a system level, rather than at the level of an individual storage resource. Taking account of such avoided system costs and flexibility benefits will ensure Colorado utilities more accurately value the cost-effectiveness of energy storage solutions.

Adopting a net-cost-of-capacity approach will support the Commission's inclusion of energy storage into the modeling exercise and furthermore reform the mechanism by which resources are procured, as is called on the Commission by statute.

iv. Evaluate a more robust set of transmission and distribution alternatives

In addition to serving as an alternative to supply-side resources to meet peaking capacity and other needs, behind the meter and in front of the meter energy storage is being deployed across the country as a distribution or transmission asset that can more cost-effectively defer or replace traditional investment on the distribution system. ESA appreciates that the Commission has included language under the Assessment of Need for Additional Resources section (Section 3610) calling for the utilities to "consider the benefits energy storage systems may provide to increase integration of intermittent resources, improve reliability; reduce the need for increased generation facilities to meet periods of peak demand; and avoid, reduce, or *defer investments*" (emphasis added). ESA respectfully suggests that additional specificity on *how* to evaluate energy storage as an alternative resource is needed throughout the planning process, including the transmission resources section (Section 3608). ESA recognizes that a separate effort is being made to develop regulations pertaining to distribution resource planning. In order to fully capture the intent of HB 18-1280, those regulations must also be updated to incorporate consideration of energy storage and procurement mechanisms.

Finally, ESA recommends that to ensure prudent spending of ratepayer dollars and alignment with the statutory guidance provided in HB 18-1270 (2018), any assessment of need for additional resources must include a thorough demonstration that energy storage and other flexible resources were considered, and outline the reasoning as to why they were or were not selected. As such, revisions to Rule 3102 related to Certificate of Public Convenience and Necessity for Facilities must be considered as part of this proceeding.

III. CONCLUSION

ESA thanks the Commission for the opportunity to provide these comments in support of incorporating additional reforms to the Commission's ERP rules and requirements. In the Appendix below, we offer a recently published report to provide additional background on the recommendations

described in these comments. The report includes up-to-date cost inputs from publicly available sources, a summary of utility Integrated Resource Plans from 2016-2017 that examine energy storage, and a list of recent state regulatory decisions on including storage in resource plans. ESA looks forward to engaging with other stakeholders to further the efforts of the Commission in this proceeding.

Respectfully submitted on this 21st day of September, 2018.

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