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**VIA ELECTRONIC MAIL**

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Massachusetts Department of Energy Resources  
100 Cambridge St., Suite 1020, Boston, MA 02114

RE: Clean Peak Energy Standard Straw Proposal Comments

We appreciate the opportunity to provide the following comments to the Massachusetts Department of Energy Resources (“DOER”) Straw Proposal which will be used to help develop the Clean Peak Energy Standard required by the enactment of Chapter 227 of the Acts of 2018.

Ingersoll Rand (NYSE:IR) is a global company that advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands—including Club Car®, Ingersoll Rand®, Thermo King® and Trane®—work together to increase industrial productivity and efficiency, enhance the quality and comfort of air in homes and buildings, and commercial transport; and to protect food and perishables. We manufacture CALMAC® ice storage tanks within our Trane® portfolio in Fair Lawn, NJ. The ice tanks work in line with chilled water systems and integrated controls to create thermal energy storage (“TES”) systems. To date, more than 1 GW of TES peak load modifying capacity has been installed globally.

Ingersoll Rand supports efforts to encourage the adoption of energy storage that can reduce peak GHG emissions in Massachusetts. TES is a proven technology with more than 7 MW/45 MWH of CALMAC TES peak load modifying capacity installed in Massachusetts and more than 15 MW/95 MWH installed in ISO New England. TES provides C&I customers like the Moakley Courthouse in Boston with the ability to materially time shift their energy usage during hot

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summer months to reduce electricity costs.<sup>1</sup> TES relies on chillers that make ice typically at night (charging) which is then used to provide air conditioning service during the day (discharging).<sup>2</sup> This process enables building owners to use off-peak energy during peak times. TES is also highly durable, efficient and safe, with no flammable or hazardous materials. CALMAC tanks have a useful life of as long as 30 years with little maintenance cost and achieves round trip efficiencies approaching 97%.<sup>3</sup> Moreover, it can provide cooling service for up to eight hours or more at a time, and most components can be recycled. Overall, TES lasts 2 to 4 times longer than batteries at one-third the cost.<sup>4</sup>

The deployment of TES can also help Massachusetts achieve its clean energy goals. TES is well suited to “storing” the wind energy it uses at night for daytime use.<sup>5</sup> This enables emission-free energy to be utilized during the day and reduces the need for peaking fossil fuel plants.

In response to the Straw Proposal delivered on April 2, 2019, Ingersoll Rand would like to offer the following comments and feedback.

### **Thermal Energy Storage as a Demand Response resource**

In its Straw Proposal, DOER explained that energy storage resources such as TES will be included as an eligible Demand Response resource under the Clean Peak Standard. Ingersoll Rand supports this decision. We agree with DOER that the definition of Demand Response, as codified in Chapter 227 of the Acts of 2018, very clearly states that energy storage in general and TES in particular qualify as resources that can enable “changes in electric usage by end-use customers in the commonwealth from their normal consumption patterns in response

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<sup>1</sup> <https://www.wbur.org/bostonmix/2016/08/19/moakely-energy-storage>

<sup>2</sup> <http://www.trane.com/commercial/north-america/us/en/products-systems/equipment/chillers/ancillary-chiller-equip/ice-making.html>

<sup>3</sup> Batteries by comparison have round trip efficiencies closer to 85% and useful lives of 10 years, according to the 2017 Lazard Levelized Cost of Storage. The report also found that batteries can degrade and must be replaced to maintain capacity. See <https://www.lazard.com/media/450338/lazard-levelized-cost-of-storage-version-30.pdf>

<sup>4</sup> CALMAC® analysis as published in Distributed Energy Magazine, January 2018.

<sup>5</sup> <https://tc0609.ashraetcs.org/documents/research/TC0609%20ASHRAE%20RP-1607%20Research%20Summary%2020180125.pdf>

to...incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.”

In order for Demand Response resources to participate robustly in the Clean Peak Standard, it is necessary to establish a customer baseline load (“CBL”) methodology that does not erode the value of the Demand Response asset over time. For example, many utility and grid Demand Response programs that call intermittent events during grid emergencies use a “look back” window, whereby the resource’s load reduction on an event day is compared to consumption during a previous set of days.<sup>6</sup> Such a “look back” methodology would be inappropriate in this case: the Clean Peak Standard is meant to encourage emissions reductions during all peak hours, when emissions per MWh generated are unusually high; not just during periods of critical grid emergencies.

Instead of “look back” window, we would suggest a methodology based on the metered discharge of the energy storage system during the Clean Peak Window.

### **Conversion of cooling tons offset to kW reduced for TES Clean Peak Resources**

For TES applications, it is necessary to convert from tons of cooling offset to kW reduced; this makes the measurement and verification (M&V) process somewhat different for thermal energy storage than it is for electrical battery storage. For TES Demand Response resources in the Clean Peak Standard, we recommend that DOER use the same methodologies as those currently employed by Massachusetts utilities when determining TES-based demand reductions. This approach will enable simplicity in terms of minting Clean Peak Certificates, which will enable greater participation in the program while reducing program administration costs.

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<sup>6</sup> See for example, ConEdison’s Demand Response programs. <https://www.coned.com/-/media/files/coned/documents/save-energy-money/rebates-incentives-tax-credits/smart-usage-rewards/customer-baseline-load-procedure.pdf?la=en>

In Eversource's February 5, 2019, comments to DOER regarding the Clean Peak Standard, Eversource wrote in response to question 8, as regards TES:

If the thermal storage is set to offset load every day at the same time, it functionally looks similar to "passive" energy efficiency. As described in question 6 above, once "passive" energy efficiency measures are installed, the baseline load at a facility is normally permanently altered, so any measurement must be done at the time of installation and carried forward for the life of the measure.

We agree with Eversource's opinion on this issue – TES does indeed resemble a "passive" energy efficiency measure when dispatched in the daily manner that the Clean Peak Standard would incentivize. Therefore we believe that, in terms of kW reduced per tons of cooling offset, the evaluation of TES's impact as a Clean Peak Resource should be done at the time of installation and carried forward at that level throughout the life of the resource's measured and verified operation.

For the integrity of the Clean Peak Standard it is necessary that all resources, including TES resources, be subject to monthly reporting as outlined by DOER's Straw Proposal. For TES Clean Peak Resources, we recommend that the Resource owner be required to submit hourly interval data regarding the charge and discharge of the TES equipment in terms of cooling tons and ton-hours. For the purposes of Clean Peak Credit generation, this meter data should then be converted into kW and kWh using the conversion factor determined at the initial measurement of the TES system's installation.

## **Metering**

We agree with DOER proposals to verify performance of Clean Peak Resources. But Ingersoll Rand respectfully asks that DOER be flexible in how verification is performed. Thermal energy storage systems are often integrated with advanced monitoring and controls equipment in lieu of a traditional meter. This equipment can be used to provide the same data needed for verification purposes as a meter does. Adding an additional meter to TES equipment unnecessarily increases cost and complexity and so Ingersoll Rand respectfully asks that DOER be flexible on how verification data is provided for performance evaluation purposes.

## **Eligibility of BTM Storage as a Clean Peak Standard Qualified Energy Storage System**

We believe that under certain circumstances, DOER should consider behind-the-meter (“BTM”) energy storage, including BTM thermal energy storage, as a Qualified Energy Storage System under the Clean Peak Standard, regardless if it is co-located with renewable energy. We believe that if a storage resource is virtually “paired” with a Class I REC, it meets the standard of Qualified Energy Storage System as outlined in Section 9 of the enabling legislation – even if it is not physically charged by a renewable energy source.

In the legislation, a Qualified Energy Storage System is defined as a system that “operates primarily to store and discharge renewable energy.” We believe that a storage system is primarily performing this task if it meets the following criteria:

- The storage resource is discharged during the Clean Peak Window (i.e. results in load reduction);
- It can be proven that the storage resource is charged by lower emissions resources during hours outside the Clean Peak Window.

A broader definition, along the lines proposed above, meets the DOER’s objective of fostering cooperation of energy storage and clean generation. Further, it will facilitate adoption of energy

storage by a broader range of customer classes across the Commonwealth, including urban ratepayers that do not have the available space for locating renewable energy resources onsite.

**Clean Peak Resources located within Municipal Lighting Plant**

Systems located within the footprint of a Municipal Lighting Plant in Massachusetts should be considered eligible for Clean Peak Credits. Such a policy would be consistent with the law's intent to incentivize clean energy technologies throughout the Commonwealth.

Please contact me with any questions.

Sincerely,

*Evan Berger*

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