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February 5, 2019

By email

Department of Energy Resources
100 Cambridge St., Suite 1020
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Subject: Clean Peak Standard (CPS) Draft Stakeholder Questions

In response to the Department of Energy Resources' January 15, 2019, request for input on the development and design of the Clean Peak Energy Standard, RENEW respectfully submits the attached comments.

RENEW Northeast, Inc. (RENEW) is a non-profit association uniting environmental advocates and the renewable energy industry whose mission involves coordinating the ideas and resources of its members with the goal of increasing environmentally sustainable energy generation in the Northeast from the region's abundant, indigenous renewable resources. RENEW has focused on highlighting the value of grid-scale renewable resources- specifically offshore and onshore wind, solar and hydropower- and energy storage systems and the benefits of transmission investment to deliver renewable energy to load centers in the Northeast. RENEW members own and/or are developing large-scale renewable energy projects, battery and pumped energy storage systems, and high-voltage transmission facilities across the Northeast. They are supported by members providing engineering, procurement & construction services in the development of these projects and members that supply them with multi-megawatt class wind turbines.

Thank you for the opportunity to provide this feedback.

Sincerely,

Francis E Pullaro

Francis Pullaro
Executive Director

Clean Peak Standard (CPS) Draft Stakeholder Questions

<u>Definitions of Key Terms</u>

<u>Clean Peak Resource</u>

Clean peak resource is defined as "a qualified RPS resource, a qualified energy storage system or a demand response resource that generates, dispatches or discharges electricity to the electric distribution system during seasonal peak periods, or alternatively, reduces load on said system."

1. Should only resources interconnected to the electric distribution system be eligible to qualify, or should resources connected to the transmission system also be eligible to qualify?

2. Should DOER interpret the use of the term "electric distribution system" to mean that only facilities on the electric distribution system in the Commonwealth should be eligible to qualify as clean peak resources under the CPS? Should the CPS also include all distribution and/or transmission level resources connected in the ISO-NE control area? Should it include adjacent Control Areas such as NYISO, Quebec, or New Brunswick?

Eligible resources should be allowed to interconnect at the distribution and transmission levels.

A threshold issue is whether the General Laws prohibit qualification of transmission level resources under the CPS. Clean peak resources interconnecting at the transmission level are not prohibited from participating in the CPS as the definition requires the resource to transmit its electricity *to the distribution system not interconnect* at the distribution system level. Additionally, a "clean peak certificate" is defined as a credit of each MWh of energy or energy reserves. Reserves do not exist at the distribution utility level but are an ISO New England wholesale market product used to balance supply and demand at the transmission level. Incorporation of this term in the CPS law means the legislative intent could not have been to exclude transmission level resources from the CPS.

As a matter of policy, transmission level resources should be eligible to maximize benefits to consumers. While distribution-scale resources provide important benefits like lowering energy losses and deferring investments in local utility infrastructure, large-scale RPS resources, based on recent Section 83A and 83C RFPs compared to SMART compensation rates, are overwhelmingly the least cost for the reasons explained in RENEW's response to Question 31.

RENEW recommends resource eligibility be modeled after Massachusetts' RPS regulations, which does not limit participation to only distribution connected resources, by adopting its requirements on resource location (225 CMR 14.05(1)(d)), capacity obligations as applied to intermittent resources (225 CMR 14.05(1)(e)(1)), and the special provisions for resources located in adjacent control areas (225 CMR 14.05(5)).

Demand Response Resource

Demand response resource is defined as "changes in electric usage by end-use customers in the commonwealth from their normal consumption patterns in response to: (i) changes in the price of electricity over time, including, but not limited to, time-of-use rates for residential and small commercial and industrial customers; or (ii) incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized."

3. What types of resources should be included in this definition?

4. Should electric vehicles (EVs) qualify?

5. How should DOER interpret the inclusion of different types of rate designs in this definition?

6. Should this definition only be limited to active demand response?

7. Should standalone energy storage resources (i.e. not directly connected to another resource type) be eligible to qualify as demand response resources? What requirements, if any should standalone energy storage resources face in order to qualify as demand response resources?

8. Should the DOER view thermal storage facilities as a Demand Response Resource? What requirements, if any, should thermal storage facilities face in order to qualify as demand response resources?

Demand response resources should be required to reduce demand during the daily time windows. If demand is reduced by switching to behind the meter generation that generation should be a qualified RPS resource and/or a qualified energy storage system to ensure Massachusetts receives the environmental benefits of not using customer sited emitting resources like diesel generators and fuel cells.

The biggest challenge for incorporating demand response resources involves determining the "normal consumption pattern". Demand response resources must not be able to increase their demand during baseline periods to be paid for peak period performance based on the inflated benchmark.

A thermal storage unit that allows a facility to offset consumption of electricity during the Clean Peak hours should qualify provided it reduces "normal consumption patterns" during the Clean Peak hours and the unit's system is powered by renewable energy either on-site or virtually.

Qualified Energy Storage System

Qualified energy storage system is defined as “an energy storage system, as defined in section 1 of chapter 164, that commenced commercial operation or provided incremental new capacity at an existing energy storage system on or after January 1, 2019; provided, however, that such system operates primarily to store and discharge renewable energy as defined in said section 1 of said chapter 164.”

9. How should DOER define what constitutes “incremental new capacity at an existing energy storage system”?

DOER should follow the same requirements established for RPS resources under 225 CMR 14.05(2).

10. How should DOER interpret the requirement that a Qualified Energy Storage System operate “primarily to store and discharge renewable energy”?

   a. Would alignment with the federal ITC requirement that storage is eligible for a credit as long as the battery is charged by a renewable energy system more than 75 percent of the time be appropriate?

A co-located resource should be eligible but not the sole type of Qualified Energy Storage Systems.

   b. If not directly physically or electrically connected to a renewable energy resource, how can the qualified energy storage system demonstrate that it operates primarily to store and discharge renewable energy? Purchase and retirement of RECs? Some other means?

RENEW recommends DOER adopt a virtual or contract-based approach, which also accounts for relevant transmission constraints, to track the amount of renewable energy consumed to charge and subsequently discharge from a Qualified Energy Storage System. This flexibility can allow innovation in the energy storage space. The charge and discharge of stand-alone storage facilities could be coordinated with one or more non-collocated renewable assets regardless of whether it is owned by the storage operator or a third-party.

11. How should DOER view thermal storage facilities with respect to eligibility as a qualified energy storage system?

A thermal storage unit that allows a facility to offset consumption of electricity during the Clean Peak hours should qualify provided it reduces “normal consumption patterns” during the Clean Peak hours and the unit’s cooling system is powered by renewable energy either on-site or virtually.

Qualified RPS Resource

Qualified RPS Resource is defined as "a renewable energy generating source, as defined in subsection (c) or in subsection (d) of section 11F that has: (i) installed a qualified energy storage system at its facility; or (ii) commenced commercial operation on or after January 1, 2019."

12. Given the requirement that RPS resources that commenced commercial operation prior to 2019 must be paired with a qualified energy storage system in order to qualify for the CPS, what, if any, requirements should DOER adopt regarding how much energy storage needs to be installed?

a. Should there be a minimum percentage threshold on the ratio of the size of the energy storage to the size of the renewable resource (e.g. minimum installed storage capacity equal to 25% or more than installed renewable capacity)?

No specific sizing requirements are necessary. The program should be flexible and allow the resource owner to install an amount that is feasible and cost-effective. As long as the addition of storage provides demonstrable ability to "shift" clean production to the peak, this approach would tend to increase the opportunities for pre-2019 RPS projects to deliver benefits under the program.

13. With respect the quantity of its capacity that a Qualified RPS Resource can qualify under the CPS, should the DOER discount a Qualified RPS Resource's eligible capacity based on the capacity it can supply through the duration of each seasonal peak period (e.g. a 2 MW solar resource that can only provide 50% of its capacity value over the peak period would qualify as a 1 MW facility)?

No adjustment to capacity value is required. The program should focus on the benefit of shifting energy production from RPS capacity to the specified peak periods. Capacity value is based on a different methodology and as such is unaffected by the selection of the peak periods established for measuring performance under the CPC.

14. Should DOER adopt any additional requirements regarding the CPS eligibility of renewable energy generating sources as defined in subsection (c) or in subsection (d) of section 11F (e.g. emissions thresholds, fuel sourcing, etc.)?

No.

Seasonal Peak Periods

Establishing Seasonal Peak Periods

DOER is required to establish seasonal peak periods, which are defined by that statute as "the daily time windows during any of the 4 annual seasons when the net demand of electricity is the highest; provided however, that a seasonal peak period shall be not less than 1 hour and not longer than 4 hours in any season, as determined by the department."

15. Given these limitations, how should DOER establish different seasonal peak periods to both optimize cost reductions for ratepayers and emissions reductions for the Commonwealth?

The seasonal peak periods should be chosen to capture the majority of the peak load occurrences while remaining stable and relevant so as not to require frequent adjustments.

Based on assessment of peaks daily peaks over the past seven years conduct by Daymark Energy Advisors for RENEW, RENEW recommends DOER adopt a methodology that examines three to five years of historical data to capture trends in the timing of the peaks. DOER should adopt three seasons: summer, winter, and shoulder. A single peak period for each season best matches the timing of expected peak occurrences.

Inspection of a few historical daily load shapes for the New England system shows summer typically has a single broad peak, winter two peaks (a lower morning and higher early evening peak) and shoulder a fairly flat load across the day with the peak most frequently towards the early evening (Figure 1).

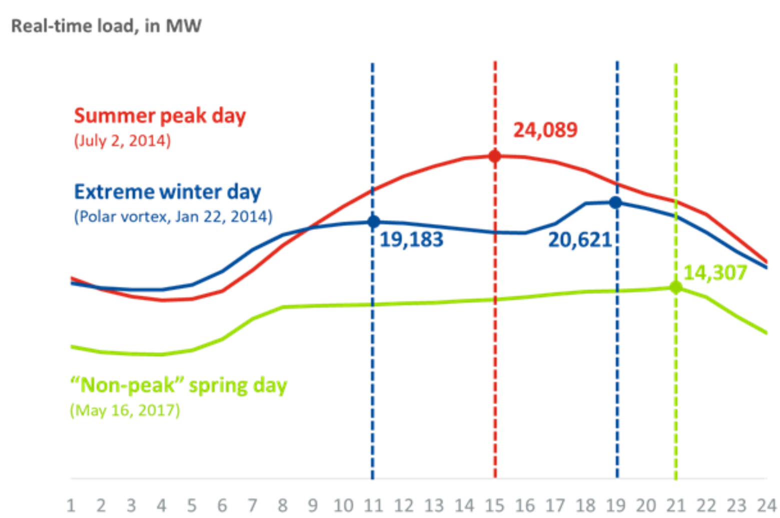

Figure 1: Example of the 3-season usage peaks

Daymark gathered historical daily peak load data from ISO New England for the years 2012-2018. The data were broken into season and then summed into two-hour and four-hour bins for each season by year (refer to the figures below). The majority of daily peaks in the summer occur in the four-hour period HE 1700-2000.

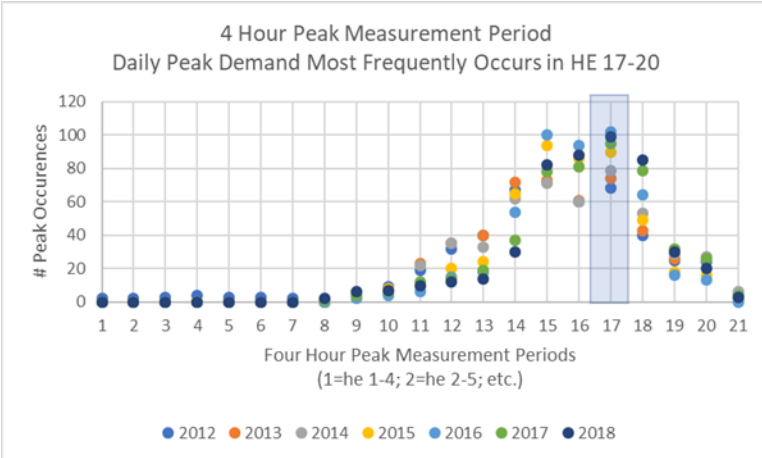

Figure 2: SUMMER: 4-hour peak measurement period

The winter season has two peaks occurring in the morning and evening, as shown in Figure 1. The winter season was examined through a single 4-hour peak window (Figure 3) as well as two 2-hour peak windows (Figure 4 and Figure 5). The morning peak is less consistently placed in time, with most occurrences between HE 700-900 and HE 1100-1200. The afternoon peak, however, is quite stable and almost always the daily peak.

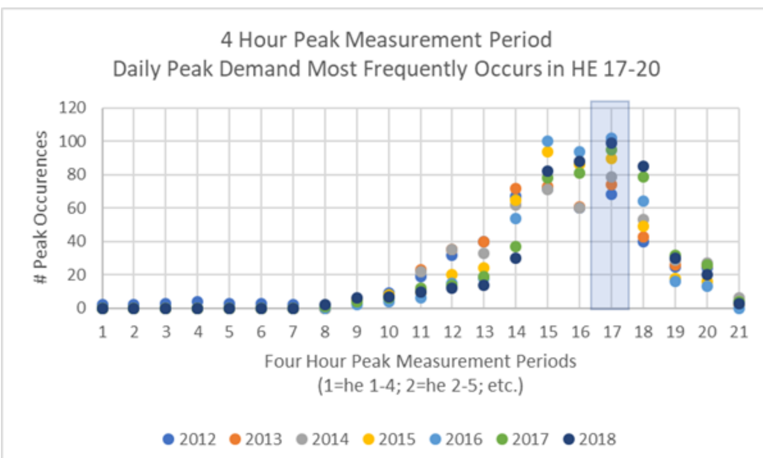

Figure 3: WINTER: 4-hour peak measurement period

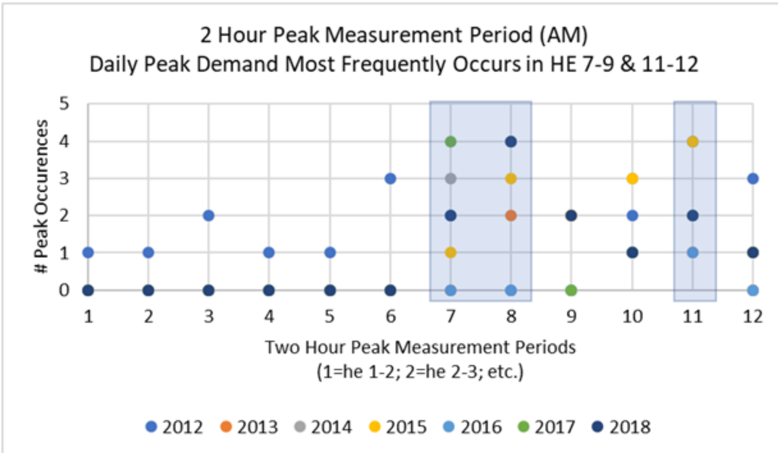

Figure 4: WINTER: 2-hour peak measurement period for the hours ending 1-12

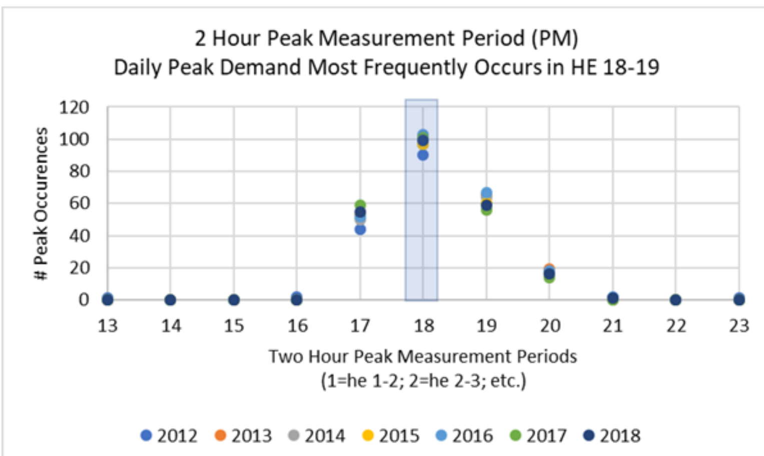

Figure 5: WINTER: 2-hour peak measurement period for the hours ending 13-24

The shoulder seasons (fall and spring) remain relatively flat, as shown in Figure 1, with a minor single peak. The number of peak occurrences in 4-hour increments were found to have the daily peak demand most frequently occurring between hours ending 18-21 (Figure 6).

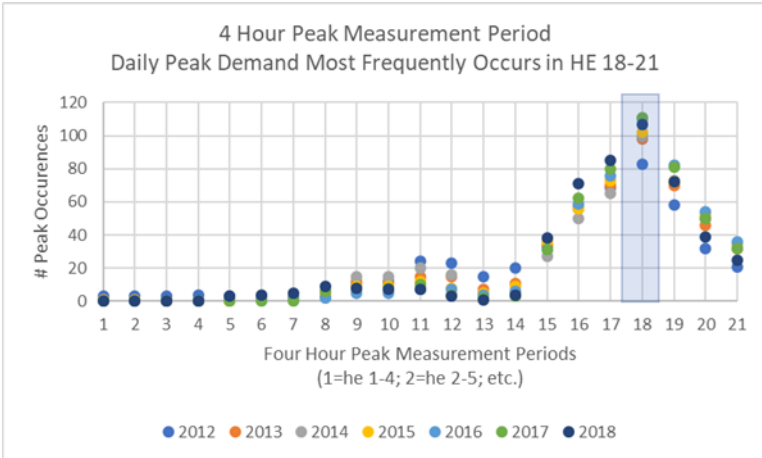

Figure 6: SHOULDER: 4-hour peak measurement period for shoulder periods

If the shoulder periods were split into their respective seasons, the number of peak occurrences within a 4-hour period would not change. It is still with the hours ending 18-21 whether it is in the fall (Figure 7) or spring (Figure 8). With this data in mind, it is advised to use a single shoulder period rather than making a distinction between the spring and fall, or shoulder, seasons.

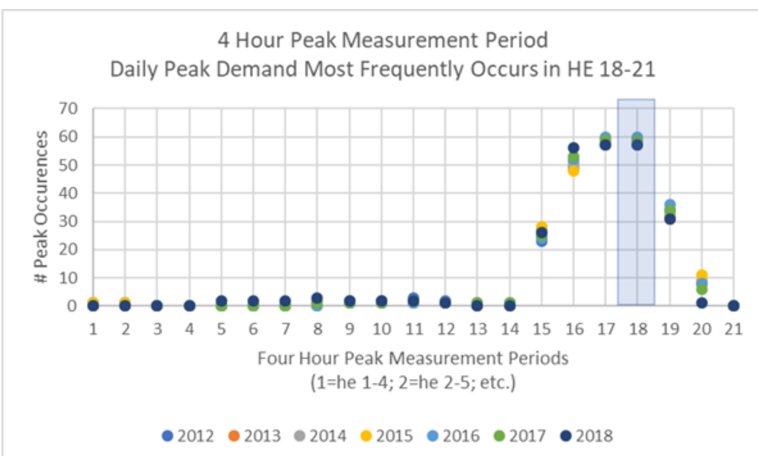

Figure 7: FALL: 4-hour peak measurement period

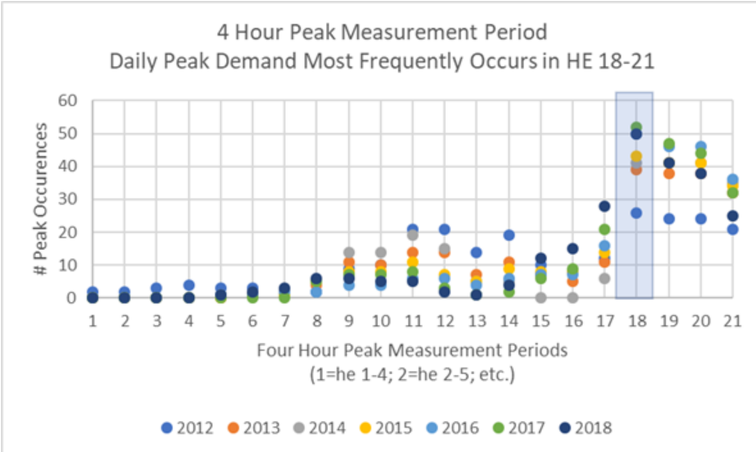

Figure 8: SPRING: 4-hour peak measurement period

16. DOER is considering announcing seasonal peak periods on an annual basis based on 1 to 3 years of historical data.

    a. What formula should DOER use to set the seasonal peak periods to reflect real time operating conditions?

    b. What data sources should DOER use to determine seasonal peak periods?

    c. What time period(s) should each of the 4 annual peak periods cover?

    d. Should seasonal peak periods be different lengths depending on the season?

    e. How often should the seasonal peak periods be examined and/or adjusted to reflect changes in seasonal peak demand over time? What should be the trigger and/or the process for making such adjustments?

To ensure that the historical periods are sufficient to capture trends in the data on which reasonable estimates of future conditions might be made while keeping in mind the confounding effects on peak load of such this as weather, economic performance, net impact of behind the meter generation, RENEW recommends DOER look at three to five years of data.

For RENEW, Daymark examined seven years of hourly load data gathered from ISO New England for the years 2012-2018. RENEW recommends DOER use the same source. The hour of the daily peak was counted for each of the three seasons: summer, winter, and shoulder. The Summer and Winter peak hour counts are shown in Figures 9 and 10. The summer data shows a clear trend towards the daily peak falling later in the day, with most of the peaks in HE 1800. After that, the daily peak occurrences are spit roughly between HE 1700 and 2000. The recommended four-hour peak period will capture all the majoring of daily peaks from the Summer season historical sample. Moreover, it

seems probable that the four-hour period will continue to capture most of the daily peaks at least into the very near future.

SUMMER	DAILY PEAK						
	2012	2013	2014	2015	2016	2017	2018
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0
4	1	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	1	0	0	0	0	0	0
7	2	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
11	0	0	0	0	0	1	2
12	5	5	4	5	2	3	4
13	4	2	3	3	2	2	1
14	10	16	15	2	2	6	3
15	13	12	13	10	9	3	4
16	13	10	2	9	5	8	6
17	31	34	32	44	38	20	17
18	15	17	24	31	48	47	55
19	1	0	2	2	3	6	10
20	21	23	21	13	13	22	17
21	3	3	6	3	0	4	3
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	1	0	0	0	0	0	0

Figure 9: Summer daily peak occurrence count 2012 – 2018

The winter daily peak count data does not show the same trend towards later in the day that we see in the summer data; most of the peaks have occurred in HE 1800 to 2000 or the last six years. Closer examination suggests the peaks may be shifting earlier, with more of the daily peaks clustering closer to HE 1800. The data is not clear on this point and it is premature to draw any conclusion. That said, if this trend is correct, at some point a two-hour afternoon winter peak period may at some point be preferred.

WINTER	DAILY PEAK						
	2012	2013	2014	2015	2016	2017	2018
1	1	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0
4	1	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	1	0	0	0	0	0	0
7	2	0	0	0	0	0	0
8	0	0	3	1	0	4	2
9	0	2	1	2	0	0	2
10	0	0	1	0	0	0	0
11	2	1	2	3	1	1	1
12	2	0	0	1	0	1	1
13	1	0	0	0	0	0	0
14	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0
17	2	0	0	0	0	0	0
18	42	52	50	53	52	59	55
19	48	47	47	44	51	42	44
20	17	18	17	16	16	14	15
21	1	1	0	1	2	0	1
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	1	0	0	0	0	0	0

Figure 10: Winter daily peak occurrence count 2012-2018

At least as the program begins, RENEW recommends DOER adopt the longer four-hour periods to maximize both the probability most daily peaks are captured to maximize the periods over which resources can participate. The first objective addresses uncertainty regarding the actual timing of the daily peaks while the second objective may have more importance as it effectively providing a larger market into which resources can offer. That will enhance participation and competition in the nascent program.

Seasonal peak periods should be re-evaluated no more frequently than biannually. The net load shape may change as load patterns shift and as new renewable resources enter the market; it may also be necessary to modify the peak window as time goes on. However, RENEW recommend changes be made as infrequently as possible while still ensuring that the parameters are reasonable to maximize certainty for participants. Once a peak period has been established, it would have lifespan against which parties could structure contracts and seek financing.

For example, if the summer peak period is set at HE 18-20 in 2019, a contract could be written and a resource then financed and built to perform during that peak period for the lifespan of the period, say seven years. If in 2021, the summer peak period is set at HE 19-21, that would not impact the above project; only projects built under the new period. The above project would, however, be exposed to whatever the period was at the time of the expiration of the peak period lifespan. Changes in the peak period should be static

unless absolutely necessary. Otherwise, significant burdens will be placed on operators having multiple projects trying to manage different peak periods across their portfolios.

> 17. Are there alternative methods of establishing seasonal peak periods the DOER should consider?

RENEW recommends DOER keep the methodology simple. The basic analysis presented in response to questions 15 and 16 could provide a framework. It simply involves grouping the data and examining the groups into which the daily peaks are most likely to fall and selecting that as the period for each season. Absent information that suggests that observed trends are not likely to continue, this approach with a review every two or three year should suffice.

<u>Atypical Peak Events</u>

Not all system peaks occur within the same 1-4 window throughout the course of a season (e.g. a 95 degree day on a weekday in May will almost certainly not have a peak that occurs at a similar time of day as the bulk of peak periods in the same month).

> 18. Should DOER establish peak periods other than the seasonal peak periods during which clean peak resources are eligible to generate clean peak certificates?

No, due to the erratic nature of the weather. One of the primary objectives of the CPS is to provide investment signals to resources that can deliver clean energy on peak. These signals should be stable, consistent, and uncluttered by the noise that sporadic weather-based peak load excursions introduce. Nevertheless, after the Clean Peak Standard has been fully established expanding the program's definition of peak to include extraordinary events might be appropriate.

> a. If so, what criteria should DOER use to establish these periods and what mechanism(s) and should be used to trigger and announce these events in advance of them occurring?

N/A

> b. Should DOER specifically target ISO system peaks?

Yes. ISO New England commits and dispatches the region's generation fleet to meet the system peak. Emissions in the region are consequently a clear function of system-wide loads. Structuring the program to target system peaks is aligned with the goal of reducing emissions at peak. The multiple utility peaks may or may not coincide with the system peak. Targeting those peaks may not take an emitting resource off the margin. The analysis conducted in these responses was conducted with ISO real-time hourly peak demand data from 2012-2018.

Generation of Certificates

Some clean peak resources may only be capable of generating clean peak certificates during a portion of a seasonal peak period. For example, a solar resource trying to deliver energy for the duration of a summer seasonal peak period that lasts from 6-9 PM may generate a significant number of certificates in the early part of that window compared to the latter.

> 19. Should only resources that can provide value for the entire duration of a peak period be able to generate certificates?

The methodology should be straightforward and maximize participation and competition among resources that can deliver clean power at peak. Resources should receive credit for any MWh delivered during the clean peak performance period. The peak period performance windows have been selected to include the most probable hours in which the peak will fall during the season. Peaks can and do fall across this period and the portfolio of resources procured under the standard will have the aggregate effect of reducing the peak. Irrespective of a given resource impacting only a part of the period or sporadically hitting the actual peak.

This approach will allow clean peak certificate buyers to assemble the portfolio of resources that most cost effectively meets their CPS purchase requirement while simultaneously satisfying other portfolio constraints.

> 20. Should there be different values provided to resources that can provide value for a portion of a peak period versus the entire peak period? If so, how should DOER differentiate these value streams?

Each CPC (MWh of clean peak reduction) in the performance measurement window should have the same value. However, contracting parties may pay differing prices to secure the CPCs from those resources that regularly deliver during the entire duration rather than a portion of the peak period. To any individual utility, the "value" of adding such resources to the portfolio is a function of the 'portfolio value' of the selected resource adjusted for any transaction costs. The value of the CPC (which will be tradable in the market at the prevailing cash price) is the same.

> 21. Should there be a penalty (i.e. negative credits) if a resource under-produces during the actual monthly peak?

No. The program is not structured to target the monthly peak (neither the utility non-coincident nor the system coincident peak). The program should focus on measuring MWh deliveries during the peak period performance windows and treat each window equivalently for the purpose of assessing resource performance. If a utility puts incremental value on deliveries during its or the system's monthly peak, it should be free to

include compensation for such an incremental service in its contract with the resource, but this should not be a component of the program design.

22. How should resources participating in other state programs (e.g. section 83 procurements, SMART, EE programs, etc.) interact with the CPS?

The resources procured under section 83 are contracted under PPAs; they require no additional revenues to move forward and it is questionable whether adding a CPS-based revenue stream would change their behavior. Similarly, SMART projects and EE programs that have been put in place without CPS should be precluded unless they are able to affirmatively demonstrate that with CPS participation, they would modify the project or program so as to deliver an incremental benefit. New EE programs or SMART projects should be eligible and participate according the established eligibility and participation rules.

23. Should qualified energy storage systems that can demonstrate they were charged during minimum load windows be provided additional incentives or benefits under the CPS? If so, how should these be structured and how should minimum load windows be established?

The objective should not be to encourage charging during low load periods, per se, but rather charging when clean resources are on the margin. This approach would allow storage to explicitly shift clean power from times it would be curtailed and wasted to the on-peak performance measurement periods. RENEW recommends DOER adopt a virtual or contract-based approach to track the amount of clean energy consumed to charge and subsequently discharge from an ESR.

Consider two cases:

Case One: A storage resource that is added to the system (either stand-alone or collocated with existing renewable resource)

In this case, the impact on the margin (what resource is being used to serve the next MW of consumption) is independent of the location of the ESR. Consider, then a simple approach that establishes using historical data by season the percentage of the margin in each hour that is made up of renewable resources. While this is an approximation and may be wrong in any given hour, on average across the season it will be a fair approximation of the amount of energy delivered at the margin from renewable resources. For example, if 25% of the production at the margin during charging hours for a given ESR are from renewables, 25% of the energy subsequently delivered from that ESR during the peak measurement period would be deemed clean and receive a CPC. The contribution of renewable resources to the margin calculations could be updated annually to ensure that they reflect changes to the system through time. While imperfect, the signals that would come from this approach would be aligned with the broader goal of encouraging investment in resources that can move clean power to the peak.

Case Two: A storage resource that is added with a new renewable resource (either stand-alone or collocated)

In this case, a new ESR that is associated with a renewable (either via contract or collocation) can argue that but for the ESR, the renewable would not have been built and the clean MWh never delivered. Thus, any production from the specified renewable resource during charging hours could be directly claimed by the ESR. One way this could be tracked would be for renewables to transfer (sell) its RECs to the ESR. The ESR would then discharge during the peak period and retire (sell) the RECs and CPCs. The ESR would receive (buy) more RECs from the renewable resource than would be retired (sell) due to roundtrip costs. Consequently, the price of the CPC would have to minimally cover the cost of RECs to make the transaction feasible. Of course, if the wind unit would otherwise be curtailed, the RECs should be available from the wind unit at a discount. If the ESR and renewable are collocated and commonly held, these REC exchanges are internal transfers. If the ESR is separately located and owned by a third party, these REC exchanges are governed by contract.

Metering

Verification of Metered Data

DOER proposes that all clean peak resources be registered with NEPOOL GIS as Non-NEPOOL participants. This would mean that, as required by the NEPOOL GIS operating rules, all resources would be required to report their eligible output to NEPOOL GIS by a DOER approved Independent Third Party Meter Reader. This entity would be responsible for verifying the accuracy of the reported data before uploading it to NEPOOL GIS for the creation of certificates.

To ensure that all data is collected, reviewed, and reported to NEPOOL GIS in a consistent manner, DOER would select a single entity to act as the Independent Third-Party Meter Reader, similar to the process used under the SREC programs, in which the Production Tracking System at the Massachusetts Clean Energy Center serves in this role.

24. Do you support this proposal? If not, please describe why.
25. If DOER procures the services of a single Independent Third-Party Meter Reader:
    a. What criteria should DOER use to evaluate the capabilities of the entity that is selected to act as the Independent Third-Party Meter Reader?
    b. Do you support the establishment of a fee structure to support the ongoing services provided by the Independent Third-Party Meter Reader?
    c. How should this Third-Party verification take place?

The NEPOOL GIS is a monthly system having no daily/hourly definitions other than imports from neighboring control areas which are checked on an hourly basis with

monthly RECs then created. Clean peak certificates would not be RECs from a system perspective so they would not be accounted for in the same manner. Using a GIS (or similar platform) makes sense but including this in the current GIS may result in complication verification shortcomings.

Metering Specifications and Requirements

Because clean peak certificate creation is dependent not just on the quantity of energy output, but also its timing, more sophisticated metering will be required than that which is required for many RPS eligible systems, which only require monthly meter reads.

> 26. Describe in as much detail as possible the metering standards and requirements (type, accuracy, etc.) that DOER should employ to ensure the accurate collection of data.

Hourly MWh metering is needed at each site. Accuracy should be high (e.g., 99%) and time accuracy is important but not critical.

> 27. Should different standards apply to different sizes and types of facilities? If so, please describe your recommendations in as much detail as possible.

The hardest sites to 'meter' will be those that reduce based on a time-dependent rate. Those reductions cannot be 'measured' other than to employ a 'expected load shape' vs. 'actual load shape' methodology. The 'actual load shape' can be measured using MWh metering at an hourly granularity. The 'expected load shape' needs to be calculated. There are many ways to calculated 'expected load shapes', the ISO, for instance, does it in its Active Demand Response program and explains the methods in Market Rule 1 Section III.8.2 under Demand Response Baselines.

> 28. What other verification mechanisms could be deployed to simplify the process, particularly for small-scale systems for which some types of metering solutions may be cost-prohibitive?

The creation of standard reductions based on off-line studies of certain types of customers is one approach. For example, a water-heater program that shuts off electric water heaters during the Clean Peak hours could employ an offline study to determine the expected load shape before and after the program.

Value of Certificates

DOER must establish an alternative compliance payment rate and potentially other mechanisms that will help establish the value of clean peak certificates. Please describe in as much detail as possible:

29. How much value is likely needed on a per MWh basis to incentivize different types of existing resources to operate during peak windows and/or new resources developed or financed using CPS revenue streams?

30. How should DOER establish these values?

The initial ACP levels should be set at a level that will lead to project development based solely on CPS revenue. With CPS projects having to procure renewable energy to charge their systems, the ACP amount must include both the project development costs and the costs to charge with renewable energy. The charging energy costs could potentially be proxied as the ACP for the RPS procurements. Alternatively, DOER could establish the component of the ACP related to the cost of new asset development similar to the cost of new entry (CONE) calculation used for traditional generation.

Long-term Contracts

In establishing certificate values, DOER "may include a process by which electric distribution companies competitively procure clean peak certificates from clean peak resources and enter into long-term contracts, subject to the approval of the department of public utilities."

31. If DOER does require competitive procurements:

a. What types of facilities should be able to participate in solicitations? Should it be limited to certain types of facilities (e.g. facilities that are either new and/or not already supported by another type of long-term contract or financing tool)?

b. How frequently should solicitations take place?

c. How large should the procurements be (e.g. percentage of total load or annual requirement)?

d. How should the contract price be established? Pay as bid? Reverse auction mechanism with a single clearing price for all resources? Other?

DOER should leverage its existing procurement programs and approaches to enable financing of clean peak resources at the least cost. Using existing mechanism will allow simply the administrative burdens on both DOER and developers. As these approaches are proven to developers and financiers, they will lower project risk which lowers finance costs. Accordingly, RENEW recommends DOER hold procurements to secure large-scale clean peak resources (over 5 megawatts) under long-term contract like previous RFPs under Section 83 and Section 83A. For projects 5 megawatts and under, the CPS should piggyback on the SMART program.

The use of competitive long-term contracting for meeting Massachusetts RPS goals has enabled developers to provide consumers with low-cost renewable energy. In addition to the power of competition to reach the lowest prices, a significant benefit of long-term

contracts for consumers comes from lowering the development cost of projects by giving developers and their investors the confidence to commit their capital. The key ingredient for the success of a procurement program is providing developers with the knowledge that they can compete for a long-term commitment from a creditworthy counterparty such as the EDCs. Today, renewable energy projects and even most traditional new generation are very difficult to finance without a long-term contract due to the risks of relying on short-term energy markets to recover a project's long-term capital investment. Developers and investors face exposure to the volatile energy market and must make a higher risk investment and correspondingly demand a higher rate of return reflected in higher financing charges and other risk-related considerations for ratepayers. Long-term contracts will also lower the cost of capital since most investors will use a risk-rated return. With less risk from long-term contracts, developers will also accept a lower return.

Clean peak resource procurements should be weighted heavily for large-scale resources to ensure the program goals are attained for the least cost to consumers. According to the *State of Charge* report's information on Use Case Benefit-to-Cost Ratio,[1] utility-scale projects have benefit/cost ratios of 3.00-4.40 for merchant facilities, and from 2.04-4.06 for LSEs, IOUS, and MLPs. By contrast, Behind-the-Meter (BTM) project ratios of 0.49-2.43 ratios make the case for robust deployment of larger projects. Minimizing the deployment of large-scale energy storage, as is done to large-scale solar, would be a mistake. Lower cost large-scale solar projects have barred from participating in the solar carve-out in the Commonwealth, as the only viable program, SRECs, limited project size to 6 MW DC or less per parcel of land[2] while today the SMART program limits projects to 5 MW DC.[3] Utility-scale solar projects could compete in Massachusetts only when Massachusetts participated in the 2016 Clean Energy RFP.[4] While BTM storage provides valuable benefits to local reliability that supports its widespread deployment, the strategy for energy storage should seek to provide balance on cost by including a substantial component of lower cost large-scale storage.

Large-scale energy storage resources can also monetize their benefits in ways BTM cannot. Under ISO's current rules, storage units, to participate in the wholesale market, must be above 10 MWs to provide and be compensated for regulation services for an hour duration.[5] While this cap might be lowered in the future, only larger energy storage resources are likely to be engaged in the ISO markets given the cost and complexity to be a market participant. To provide the most ratepayer benefits and to allow for full

[1] *State of Charge,* Table 3
[2] http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out-2/about-solar-carve-out-ii.html
[3] Confirm
[4] New England Clean Energy RFP, https://cleanenergyrfp.com/2016/10/25/bidders-selected-for-contract-negotiation/
[5] Eric Johnson, *How Energy Storage Can Participate in New England's Wholesale Electricity Markets*, ISO New England, 10 (March 31, 2016), https://www.iso-ne.com/static-assets/documents/2016/01/final_storage_letter_cover_paper.pdf.

participation in the wholesale markets, energy storage projects in Massachusetts should not have an upper capacity limit as was mandated in the SREC program with its 6 MW cap.

RENEW recommends procurements for large-scale resources be held annually and announce a schedule several years into the future to induce developers to build a pipeline of projects to ensure robust competition and ensure sufficient supply to meet CPS objectives.

While bids from Qualified RPS Resources are offered in $/MWh, development of the clean peak standard should evaluate whether bids from eligible stand-alone energy storage system (not co-located with a RPS generator) should be submitted and evaluated on a levelized capacity cost basis (LCC, in $/kW-month), provided they meet the capacity requirements for ISO New England which is currently 2 hours of continuous dispatch. All other Qualified RPS Resources can continue to be evaluated on a levelized energy cost basis (LEC, in $/MWh) including Qualified Zero Carbon Energy resources, like wind and solar, with a storage component.

Post-2019 Minimum Standard Requirements

DOER has established a baseline Minimum Standard requirement of 0% for 2019. Each year after 2019, DOER is required to establish a Minimum Standard requirement for retail suppliers that increases at a rate of at least 0.25% of total retail sales annually.

32. What methodology should DOER use to establish post-2019 Minimum Standard requirements (e.g. fixed annual requirements in a published schedule, supply reactive formula, other)?

33. How large should the minimum standard be?

The Minimum Standard should be set a level to minimize emissions and reduce costs arising from fossil fueled generation units running during peak hours.

Demand Response Resource Carve-out

Separate from the total Minimum Standard requirement, DOER is required to establish "a minimum percentage of clean peak certificates that must be derived from demand response resources."

34. How should DOER interpret this requirement?

35. What methodology should DOER use to establish this carve-out of the larger Minimum Standard?

RENEW submits the carve-out amount requires further study.

Other

36. Please discuss any other implementation issues not addressed above.

RENEW recommends DOER be firmly involved in the changes that are needed in the ISO market rules to ensure full participation of energy storage in the wholesale markets. Questions need to be answered there on how battery storage,pumped storage and hybrids (located renewables and storage) can better participate in the energy, capacity, and ancillary services markets.