

December 4, 2020

Samantha Meserve  
Massachusetts Department of Energy Resources  
100 Cambridge Street, Suite 1020  
Boston, MA 02114

RE: APS Review Comments

Dear Ms. Meserve,

Kinsley Energy Systems (KES), based in East Granby, CT, is a leading distributor and long-term comprehensive service provider for combined heat and power systems, with a range of manufactured products from 35 kW micro-CHP to multi-MW packaged systems. KES is a subsidiary of The Kinsley Group, a fifty-five year old business that has established a leadership position in the Northeast in supplying and servicing a wide range of power generation equipment. We have a long-term commitment to CHP as a proven and important market solution for providing three fundamental benefits: energy savings, energy resiliency, and greenhouse gas savings.

We have reviewed the Daymark Energy Advisors AEPS Review and have found significant issues with their methods and conclusions. Daymark states, with little evidence, that CHP does not provide greenhouse gas savings in Massachusetts. We provide, below, analysis that refutes this statement, and demonstrates that significant GHG savings are achievable with well-applied CHP systems. Daymark also conducts an economic payback analysis, and concludes that CHP projects can have a payback of less than one year without the APS incentive, and therefore do not need an incentive. While Daymark's economic analysis is not presented in detail, many of their inputs are flawed, as we describe below. CHP projects generally have a simple payback of between four and seven years in Massachusetts, with all incentives included. We will conclude our comments with specific recommendations for the program moving forward.

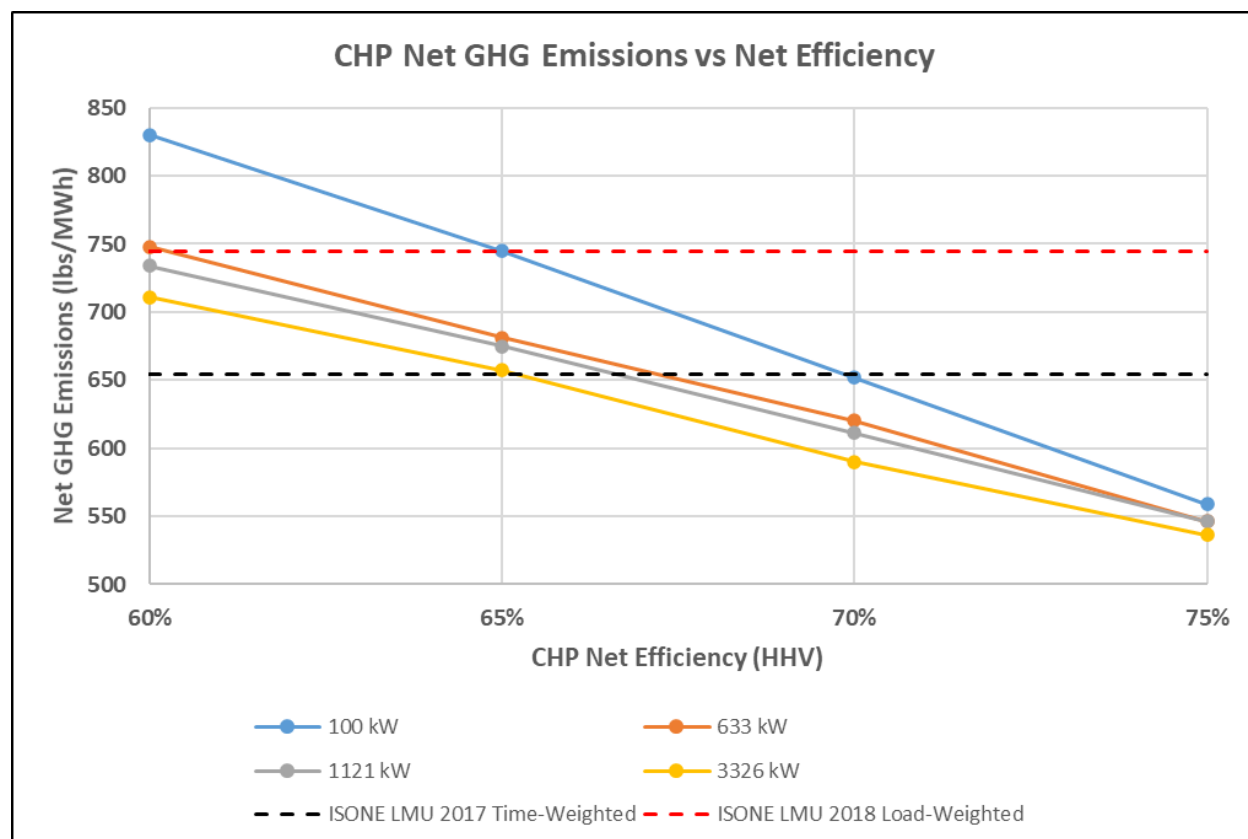
#### *Greenhouse Gas Savings of CHP Systems*

The Daymark study states, without evidence, that CHP does not provide any GHG savings when applied in Massachusetts. This is not true. In fact, CHP can provide significant GHG savings when applied with a typical use of the thermal energy output of the system. The table and graph below calculate the net effective GHG emissions for the range of CHP systems represented in the EPA Catalog of CHP Technologies, from 100 kW to 3.3 MW. The net GHG emissions for each system size are calculated at a range of net overall efficiencies from 60% HHV (generally the minimum for a project to move forward to

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receive both federal and state incentives) and 75% HHV (a practical upper limit, although technically projects can greater than 80% overall efficiency).

<i>Effective GHG Emissions Rate (lbs/MWh)</i>							
CHP Electric Output		100 kW	633 kW	1121 kW	3326 kW	ISONE LMU 2017 Time-Weighted	ISONE LMU 2018 Load-Weighted
Electric Efficiency (HHV)		27.0%	34.50%	36.80%	40.40%		
Thermal Output (MMBTU/h)		0.67	2.78	4.32	10.67		
Net Overall Efficiency (HHV)	60%	830	748	734	711	654	745
	65%	745	681	675	657	654	745
	70%	652	620	611	590	654	745
	75%	559	546	546	536	654	745



The horizontal lines on the graph represent the ISONE average LMU emissions for both 2017 and 2018. The Daymark study used the 2017 average time-weighted LMU emissions rate of 654 lbs/MWh. We have added the most recent data from the 2018 emissions report, and selected the newly-calculated

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load-weighted data as being more representative of the displaced utility emissions. This 2018 average load-weighted LMU emissions rose to 745 lbs/MWh.

We must also point out that Daymark used a life-cycle emissions factor for natural gas of 158.1 lbs CO<sub>2</sub> per MMBTU. We use the combustion, stack-based emissions rate of 116.9 lbs CO<sub>2</sub>/MMBTU. While the life-cycle emissions factor has some merit, the ISONE LMU emissions rate used for the electric utility carbon emissions is not a life-cycle emissions factor, but is essentially a stack-based emissions factor. Daymark's mixing of these factors results in a major error in their calculation, under-representing the actual carbon savings benefit of CHP.

The conclusion of this analysis is that CHP can in fact provide GHG emissions savings when applied in Massachusetts. In fact, all system sizes have a net GHG emissions rate of less than the ISONE 2018 LMU, except for a small 100kW system if applied with a net efficiency less than 65% HHV.

#### *Financial Analysis / CHP Simple Payback*

Daymark concludes that CHP projects typically provide a simple payback of 0.6 to 1.0 years, depending upon the size of the system, without the APS incentive. In our experience, by comparison, that typical, well-applied CHP projects in MA show a simple payback from four to seven years, including the MassSave incentive. While Daymark does not provide details of their calculation, they do provide their input assumptions, many of which we challenge, as follows:

- Total installed cost of CHP does not reflect high costs for utility interconnection
- Total O&M costs for CHP are too low by a factor of ten
- Utility export benefit for CHP is overstated
- Range of MassSave incentive level is not represented
- Federal investment tax credit is not available for governmental and non-profit entities

Daymark uses CHP cost data from the EPA Catalog of CHP Technologies, which is a reasonable source for industry cost data. One thing missing from the EPA data, however, is the high-cost of utility interconnection throughout most of Massachusetts. This high cost of interconnection, for both engineering and equipment, is the result of the high penetration of distributed generation on the aging utility system. Interconnection costs can easily add 10% or more to the total installed cost for CHP.

Daymark appears to completely under-represent the total O&M costs for CHP System. While the EPA catalog clearly shows that total O&M costs range from \$0.016 to \$0.025 / kWh, depending upon the size of the system, Daymark uses O&M costs that are over 10 times lower than this, of \$8 - \$20/kW-year, which translates to \$0.0009 to \$0.0023 / kWh.

Daymark states that CHP can financially benefit from selling excess energy back to the utility grid. In practice, this is rarely allowed and/or financially attractive for the CHP owner. If excess electricity is available, the value to be gained from selling to the utility is far less than the value of offsetting behind-

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the-meter utility consumption. This is not an additional financial benefit, but rather a less-attractive alternative.

Daymark uses an average MassSave incentive of \$938 /kW for a typical CHP project. In reality, this incentive can vary from a low of \$614 /kW to over \$1,100 /kW for extremely efficient projects. We also must point out the inequity of Daymark not accounting for the state incentives available for other technologies because they vary widely. The MassSave incentive for CHP varies widely, but Daymark was comfortable using a single indicative value for their analysis. A proper financial analysis should endeavor to include the state financial incentives available for renewable thermal technologies as well.

Daymark states, correctly, that CHP projects benefit from a 10% federal investment tax credit. Projects for governmental and non-profit entities, however, do not qualify for this benefit. While third-party financing can bring the federal ITC back into the project, the 10% benefit is generally offset by the additional financing fees.

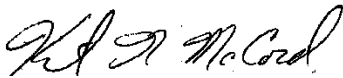
There are numerous variables that go into modeling the economics of a CHP project in Massachusetts, and we will not endeavor to document all of them here. Our analysis shows that typical, well-applied CHP projects in MA show a simple payback from four to seven years. Daymark's analysis showing a 0.6 – 1.0 year payback puts into question their methodology and results.

#### *Recommendations*

Recognizing that CHP can provide significant carbon savings, and may need additional financial incentives to be financially viable, we strongly recommend CHP continue to be an eligible technology in the APS program. In fact, given the potential for carbon savings across all eligible technologies, we believe that the demand side of the program should be increased so that the Commonwealth can realize these carbon savings.

Thank you for your continued support of low-carbon technologies such as CHP, and we look forward to a vibrant market for CHP in Massachusetts in the years to come.

Sincerely,



Kent McCord  
Sales and Project Engineering

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