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

RE: APS Straw Proposal Comments

Dear Ms. Petion:

The University of Massachusetts ("UMass") appreciates the opportunity to provide comment on the Alternative Energy Portfolio Standard ("APS") Straw Proposal issued by the Massachusetts Department of Energy Resource ("DOER") on July 20, 2021. UMass is a five-campus public research university system renowned for its academic programs, research, and adherence to its public service mission. UMass provides access to high-quality, affordable education to almost 74,000 undergraduate and graduate students across five campuses located in Amherst, Boston, Dartmouth, Lowell, and Worcester. As a public university, UMass has an obligation to the people of the Commonwealth to effectively manage and control its energy costs. As a public agency of the Commonwealth, UMass has an obligation to advance the policy goals of the Commonwealth including reducing greenhouse gas emissions from institutional operations per Executive Order 594.

Over the last 15 years, UMass has been able to significantly reduce greenhouse gas emissions from campus operations despite substantial growth in student enrollment and gross building square footage across the five campuses. Since 2005, UMass' total emissions from campus operations have fallen by over 20% while enrollment increased by over 40% and total gross building square footage across all campuses has increased by nearly 50%. This progress on reducing emissions despite the institution's growth has been enabled by a mix of fuel switching for campus heating, consistent investment in energy efficiency, and the adoption of onsite renewable electricity generation.

A key driver of UMass' emissions reduction has been the adoption of high efficiency combined heat and power ("CHP") cogeneration plants at three of the five campuses. In 2009, UMass Amherst completed a new central heating plant with 15.5 megawatts ("MW") of electric cogeneration capacity that replaced the campus' 80-year-old coal-burning power plant. In 2012,

UMass Medical School in Worcester expanded and upgraded the campus' 35-year-old central heating and cooling plant, installing a new high-efficiency 7.5-MW gas-fired combustion turbine and heat recovery steam generator with advanced emissions and control systems. In 2015, UMass Dartmouth completed a new central heating and cooling plant with 1.6 MW of electric cogeneration capacity that replaced the campus' 40-year-old oil-burning central plant. These three CHP systems are registered as APS Alternative Generation Units and produce Alternative Energy Certificates ("AECs"), which provide an important revenue stream for UMass to help reduce energy budgets and to fund ongoing investment in energy efficiency measures and distributed energy resources[1].

In addition to helping the University reduce its emissions footprint, CHP cogeneration has significantly improved utilities service reliability and resiliency on campus. UMass Amherst hosts technical intensive research activities that require uninterrupted utilities service with rigorous power quality standards. Furthermore, UMass Amherst's Mullins Center, which receives electrical service from the CHP system, serves as an emergency shelter for Hampshire County. UMass Medical hosts a 400-bed hospital including critical care facilities, where service reliability is a must. The CHP systems at UMass Amherst and UMass Medical are configured to island and maintain uninterrupted electrical service should the local power grid experience an outage, enabling each campus to continue operating without disruption to critical research, health care, and shelter activities.

In April 2021, Governor Baker issued Executive Order 594, which significantly increases decarbonization and beneficial electrification targets for public agencies over those in Executive Order 484. Executive Order 594 requires public agencies as a whole and, to the greatest extent feasible individually, reduce emissions associated with the burning of onsite fossil fuels at buildings and in vehicles (using a 2004 baseline) 20% by 2025, 35% by 2030, 60% by 2040, and 95% by 2050.

The targets included in Executive Order 594 require a fundamental overhaul of energy infrastructure across UMass' five campuses. Despite highly efficient CHP processes at three of the five campuses, UMass will not be able to achieve the reduction in fossil fuel use called for without transitioning its energy sources and infrastructure to further decarbonize campus operations. UMass' recent energy and carbon master planning efforts have concluded that the transition to campus electrification and deep decarbonization will take years to complete based on the massive infrastructure changes required, both on campus and on the Commonwealth's power grid. For

[1] For example, UMass Amherst used AEC sale proceeds to fund the installation of a behind-the-meter 1.32 MW/4 MWh lithium-ion battery system on campus in 2019. UMass Amherst was awarded an Advancing Commonwealth Energy Storage ("ACES") grant from MassCEC for the battery system as part of the Commonwealth's flagship energy storage demonstration program.

example, UMass Amherst's district electrification plan, which is estimated to cost more than $1 billion to implement and assumes the conversion of the campus' steam distribution network to a low-temperature hot water network along with the installation of a large-scale geothermal system, is not estimated to be completed until at least 2032 assuming implementation work begins in earnest today. AEC sales revenue generated by the campus' CHP cogeneration system is expected to be one of the key sources of funding to commence this work, so the campus would need to find alternative sources of funding if this sales revenue is phased out as proposed by DOER. To avoid disrupting the University's core educational mission, and in UMass Medical's case core health care mission, the campus' phased decarbonization plans will rely on CHP cogeneration at UMass Amherst, UMass Dartmouth, and UMass Medical as the bridge between UMass' current energy infrastructure and UMass' future energy systems.

With this long-term target in mind, UMass recommends that DOER makes changes and clarifications in three areas of the APS Straw Proposal when the Department finalizes program changes in the coming months. The first issue relates to the DOER's proposed phase out of gas-fired CHP cogeneration from the APS between 2023 and 2030. If DOER has chosen to phase out CHP systems from the APS, which UMass believes sets the wrong precedent, then UMass recommends that DOER grandfathers CHP systems that provide utilities resiliency to critical health and public safety facilities until at least 2030. This treatment would appropriately reflect the importance of these microgrids in supporting the Commonwealth's efforts to achieve beneficial electrification in the coming years, especially in light of the increasing risk of long-duration grid outages due to extreme weather events.

The second issue is that today UMass and end users throughout the Commonwealth cannot currently use the APS to fund the installation of APS Renewable Thermal Generation Units without sacrificing the associated emissions reduction benefits. As written, 225 CMR 16.00 does not allow an end user like UMass to claim credit for the emissions reduction produced by an APS Renewable Thermal Generation Unit <u>if</u> the end user sells the AECs generated by the Unit. This restriction will inhibit and delay the adoption of renewable thermal technologies. End users are unlikely to adopt renewable thermal technologies without external financial support due to the capital cost requirements and in certain cases operating cost premiums to their existing energy systems. To address this economic challenge, end users could sell the AECs produced by an APS Renewable Thermal Generation Unit, as the Program intends, but by doing so would not be able to claim any of the emissions benefits or in the case of UMass claim the institution has met the emissions goals

set forth in Executive Order 594. This is a fundamental flaw; by handcuffing end users' ability to use the APS incentives to facilitate the funding and adoption of renewable thermal technologies, this restriction defeats the point of having electric ratepayers fund the APS in the first place.

The third issue is DOER's current eligibility requirements for renewable natural gas ("RNG") and biodiesel to qualify for the APS. In the APS Straw Proposal, DOER states that CHP systems utilizing a renewable fuel will not be subject to the proposed phase down between 2023 and 2030. DOER needs to clarify two points on this statement: 1) that RNG is considered a renewable fuel in this context and 2) RNG that is injected into a gas utility's distribution network in the U.S., Canada, or Mexico qualifies for the APS. The APS currently states that RNG must be delivered to an end user by a dedicated pipeline to be able to generate AECs. Unless a dedicated pipeline is considered to include gas utility distribution networks and/or the interstate pipeline system, DOER will be ignoring how the emerging RNG market functions and there will be little to no adoption of RNG due to the APS. Lastly, the current definition of APS-eligible biodiesel is going to limit the adoption of biodiesel in the Commonwealth due to the extremely limited local supply market for biodiesel derived from waste oil. UMass recommends that biodiesel eligibility is expanded to include soy-based biodiesel, which accounts for the majority of biodiesel supply available in the U.S. biofuel market today.

1. **If DOER has decided to phase out CHP cogeneration from the APS by 2030, CHP systems that provide resiliency benefits for end users, i.e., systems that can island host facilities during local grid outages, should be grandfathered to produce AECs without any discount factors until 2030.**

The simple fact is that there is no mechanism through which the monetary value of the greenhouse gas emissions reductions from a cogeneration plant can be realized by companies that install such cogeneration facilities and have the emissions accounting systems attribute the reduction in those emissions to the Commonwealth. The APS was established to serve this purpose and, in the process, incentivize the adoption of alternative energy technologies that contribute to the Commonwealth's clean energy goals, including increasing energy efficiency, improving service reliability, and reducing the need for conventional fossil fuel-based power generation. The CHP systems installed at UMass achieve these three objectives.

UMass has made significant investments in implementing CHP cogeneration to help advance the Commonwealth's energy goals. Changing APS qualification standards for existing systems would be poor policymaking and would create uncertainty for end users throughout the Commonwealth whether investments in APS-eligible renewable thermal technologies could face similar eligibility questions and stranded cost risks in the future should new thermal production and distribution technologies emerge that the Commonwealth wants to support. Renewable thermal technologies could very well see major advancements in the coming years, making this a real concern for end users should the wrong precedent be set by DOER.

That being said, based on the APS Straw Proposal it seems that DOER plans to move ahead with a phase out of all CHP systems from the APS by 2030, despite numerous commentors' objections during the 2020 APS Minimum Standard Review. If this is the path that DOER has chosen, then DOER should grandfather CHP systems that can island the host facility (or campus as applicable) to recognize appropriately the significant resiliency benefits these CHP systems provide to the Commonwealth. Under UMass' proposed approach, grandfathered CHP systems would be allowed to produce AECs without any discount factors until at least 2030.

At this time, distributed renewable energy generation and battery storage technology have not progressed to the point where microgrids can be reliably run on zero-emission fuels for long-duration grid outages. Therefore, end users with critical energy needs have to either rely on CHP or diesel generators as a backup option for long-duration outages. If the Commonwealth is going to significantly add demand on the power grid to achieve beneficial electrification of transportation and space heating, resilient CHP systems will become all the more important as a safety net, especially with the increasing frequency of extreme weather events. Existing CHP cogeneration that enables microgrids for critical health care facilities and emergency shelters is going to serve as an important bridge between today's energy system and the decarbonized energy system of the future. The APS should recognize this through targeted grandfathering.

2. **DOER needs to revise 225 CMR 16.02 to make it clear that AECs are a tradable instrument that exclude any bundled emissions attribute. Without this change to the definition of APS Alternative Generation Attribute, end users will not be able to use the APS to help accelerate adoption of renewable thermal technologies.**

In our December 2020 comments, UMass detailed the current obstacles to using the APS to help fund the installation of renewable thermal technologies across the University's five campuses. The APS Straw Proposal appears to not include any revisions that would eliminate this obstacle, specifically modifying the definition of Generation Attributes in 225 CMR 16.02. Without this change, UMass and other end users throughout the Commonwealth will be unable to use the APS to fund investment in renewable thermal technologies without sacrificing the claims to resulting emissions reduction, which fundamentally undermines the objectives of the APS. This issue needs to be resolved by the DOER in the program changes adopted in the coming months.

In 225 CMR 16.02, Generation Attribute is defined as "a non-price characteristic of the energy output of a Generation Unit including, but not limited to, the Unit's fuel type, emissions, vintage and APS eligibility." The inclusion of "emissions" in this definition is fundamentally problematic for end users like UMass that are considering adopting APS-eligible renewable thermal technologies. The term should be removed from the definition of Generation Attribute.

225 CMR 16.07(1) states the total annual sales of each Retail Electricity Product sold to Massachusetts End-use Customers by a Retail Electricity Supplier, under contracts executed or extended on or after January 1, 2009, shall include a minimum percentage of electrical energy sales with APS Alternative Generation Attributes. APS Alternative Generation Attribute is defined in 225 CMR 16.02 as "the Generation Attribute of the energy output, or the equivalent of such output as provided in 225 CMR 16.05(1)(a)2.b., 225 CMR 16.05(1)(a)3., and in 225 CMR 16.05(1)(a)6.b. of a specific APS Alternative Generation Unit that derives from the Generation Unit's production of APS Alternative Generation."

Based on the definition of Generation Attribute, retail electricity suppliers that acquire and retire AECs to demonstrate compliance with the APS technically own the emissions attributes associated with the production of those AECs. In other words, if an end user installs an APS Renewable Thermal Generation Unit, produces AECs from the Unit's delivery of useful thermal energy to the host facility, and sells those AECs to a retail electricity supplier, the supplier has the right to claim (or assign the claim to its retail electric customers for which it has retired the AECs) the emissions reductions the end user has realized in its own Scope 1 and Scope 2 emissions inventory from the adoption of the APS Renewable Thermal Generation Unit.

This poses a conundrum for the AEC seller, the end user hosting the APS Renewable Thermal Generation Unit in most cases, on multiple fronts. First and foremost, if the end user is a public agency like UMass and cannot claim credit for reducing its emissions to make progress

towards future emissions goals set forth in Executive Order 594, UMass would have to avoid the APS entirely and could not use the Program as a tool to help reduce the substantial cost of transitioning the campuses' existing energy infrastructure to decarbonized alternatives. This would defeat the purpose of including renewable thermal technologies in the APS and would be an inefficient outcome for Massachusetts ratepayers and taxpayers.

Second, producing a change in ownership of the emissions attribute with the AEC sale opens a Pandora's box for emissions accounting. There is no standardized methodology for an AEC buyer or seller to calculate the emissions attributes of an AEC. This means it is unclear what a change in ownership of the emissions attribute actually means for the AEC buyer and seller.

To illustrate this emissions accounting problem, it is helpful to draw a parallel between the accounting associated with RECs with that associated with AECs. Consider a common situation today where a UMass campus has installed solar PV generation on its campus under a long-term agreement and where the developer/owner of the generation or the campus' local electric utility (in the case of SMART) retains the RECs. In this case, the accounting is straightforward and standardized. The RECs and therefore emissions attributes from the generation flow to the developer/owner or utility, and the campus uses the electricity generated behind its meter to offset grid purchases it would otherwise have made. For emissions accounting purposes for the campus, the electricity generated from the solar PV facility is treated as "system power" and assigned the emissions attributes of that source of electricity. This assignment is possible because the sources that make up system power are well-defined each hour over the life of the solar PV plant and its emissions attributes now are measured, albeit after-the-fact.

Contrast this to the case of AECs. If a UMass campus sells the AECs associated with the operations of its CHP cogeneration, it is no longer able to include in its greenhouse gas inventory the emissions from the cogeneration plant. Instead, the campus must assign to its inventory the emissions that would have occurred **but for** the development of the cogeneration plant, just as it does with the REC example noted above. The problem is that there is no "system power" equivalent. Instead, each AEC producer must develop its own baseline measure of emissions. While this may be possible to a reasonable degree of accuracy in the first year or even first few years of operation of the cogeneration plant, it is simply not possible over the life of that plant. For example, the UMass Amherst CHP cogeneration plant displaced coal when it came on-line in 2009. It is inconceivable that UMass would still be burning coal in the same boilers over a decade later, let

alone a decade from now. And yet, DOER's current regulation necessitates making this assumption, or in the alternative, some other equally uncertain and ambiguous default or baseline scenario.

Looked at from the perspective of the buyer of AECs, the situation is even more problematic. An AEC buyer could argue that an AEC purchased from the UMass campus grants it the ability to claim the emissions benefits of the CHP cogeneration plant, i.e., the difference in the campus' Scope 1 and Scope 2 emissions with the cogeneration plant and its reconstituted Scope 1 and Scope 2 emissions had the cogeneration plant not been installed. This begs the question – how is the buyer of the AECs ever going to develop such an estimate? And, if the AECs are sold to different buyers or assigned to retail customers of the buyer (in the case of an electricity supplier), how are these different entities ever going to make sure that each uses the same emissions attributes?[2]

The notion of reconstituting emissions for thermal production systems is problematic in that it creates the opportunity for arbitrary emissions accounting in the inventory developed by the AEC seller and in the claims by an AEC buyer and could lead to notable inconsistencies between end users' emissions accounting practices and the Commonwealth's emissions accounting practices. Taken together these outcomes would undermine the goals of the APS and the Commonwealth's long-term emissions targets.

It is worth recognizing that other state and federal programs that aim to incentivize the adoption of renewable heating and transportation fuels avoid bundling emissions attributes with the certificates used to track and certify program compliance. For example, New Hampshire's Thermal Renewable Energy Credit Program and Maine's Thermal Renewable Energy Credit Program both define thermal renewable energy credits ("TRECs") as a tradable instrument that represents an amount of useful thermal energy delivered by a qualified production source to an end user equivalent to a unit of electricity (3,412,000 British thermal units). Similarly, Renewable Identification Numbers ("RINs"), the currency and compliance mechanism of the U.S. Renewable Fuel Standard, are tied to each gallon of renewable fuel produced but exclude a bundled emissions attribute associated with the fuel.

[2] Similarly, an AEC buyer could argue than an AEC purchased from an end user with an APS Renewable Thermal Generation Unit grants it the ability to claim the attribute of the APS Renewable Thermal Generation Unit, the difference in the AEC seller's Scope 1 and Scope 2 emissions with the APS Renewable Thermal Generation Unit and the AEC seller's reconstituted Scope 1 and Scope 2 emissions had the APS Renewable Thermal Generation Unit not been installed.

Revising the definition of Generation Attribute to exclude emissions attributes does not create a pathway for end users or the Commonwealth to double-count emissions reductions attributed to APS Renewable Thermal Generation Units, so long as AEC sellers are prohibited from selling emissions attributes into another state, regional, or federal emissions compliance program, for example the California's Low Carbon Fuel Standard.

One might think this double-counting concern would be a real issue based on experience with Renewable Energy Credits ("RECs") associated with renewable electricity generation.[3] RECs are fundamentally different from AECs due to design and physics of the electricity grid. New England's electricity market and transmission system are regionally integrated, and due to the physics of electricity flows electrons generated by renewable generation facilities cannot be individually tracked from the point of production to the point of end use. Furthermore, because certain renewable generation facilities can register and sell RECs into multiple states' RPS programs, RECs need to be a bundled tradeable certificate and emissions attribute. RECs allow each New England state to clearly understand how much renewable electricity generation is retired and allocated on behalf of its ratepayers due to its RPS requirements. But most importantly, the operations of the electric grid permit a simple-to-calculate, easy-to-measure and generally accepted default, baseline or but for case in the form of system power.

In contrast to a common platform like the power grid where deliveries of energy cannot be individually tracked and validated, useful thermal delivery from an APS Alternative Generation Unit to individual end users can be clearly measured and tracked at a single point of use. Furthermore, because APS Alternative Generation Units and APS Renewable Thermal Generation Units have to be located at end user facilities located in Massachusetts, there is no double-counting fuel inputs or emissions reduction claims across state lines.

For the reasons described above, UMass asks DOER to revise 225 CMR 16.02 to make it clear that AECs are a tradable instrument that exclude any bundled emissions attribute. To remedy this issue DOER could simply strike "emissions" from the definition of Generation Attribute in 225 CMR 16.00. With this change, Generation Attribute would be defined as "a non-price characteristic of the energy output of a Generation Unit including, but not limited to, the Unit's fuel type, vintage and APS eligibility."

[3] A Renewable Energy Credit ("REC") is a tradeable certificate that represents the emissions attribute of one megawatt-hour ("MWh") of electricity generated by a renewable energy source. One REC is produced for each MWh of renewable electricity generated. By purchasing and retiring (i.e., not reselling) a REC, a retail electricity supplier serving a retail load in the Commonwealth can demonstrate compliance with the Renewable Energy Portfolio Standard ("RPS").

This change would remove a significant obstacle for end users to leverage the APS as a means to fund decarbonization of energy infrastructure and to be confident that they can take credit for the emissions reductions resulting from the adoption of renewable thermal technologies. Without such a change, each entity in the Commonwealth that has sold AECs will need to revise its greenhouse gas inventories retroactively to the date the APS-eligible facility came on-line. If DOER does not make the change, then it must address this fundamental problem and provide explicit guidance to all AEC sellers with respect to how to measure and report their Scope 1 and Scope 2 emissions.

3. **DOER's current requirements for RNG and biodiesel to be considered renewable fuels under the APS will limit end user adoption of these fuels. DOER needs to align eligibility requirements for biogas to how the emerging RNG supply market works and should expand biodiesel eligibility requirements to enable end users to purchase soy-based biodiesel.**

In the APS Straw Proposal, DOER states that CHP systems utilizing a renewable fuel will not subject to the proposed phase out from the APS. DOER needs to clarify that renewable fuel in this context includes RNG that is injected into a gas utility's distribution network in the U.S., Canada or Mexico. 225 CMR 16.05(1)(a)(6)(a)(iv) states that Eligible Biogas Fuel must be conveyed directly from its source to the biogas Generation Unit in a dedicated pipeline. The term "dedicated" seems to imply that the pipeline would have a single injection point at the biogas source and a single takeoff point at the end user's facility. To borrow a term of art from the electricity sector, the production and use of the biogas must occur behind the customer's retail natural gas meter. We presume that DOER would never propose to restrict the RPS program to only renewable electricity generators located behind-the-meter. It is equally inappropriate to impose this restriction on RNG. If this interpretation is correct, there is likely no end user in the Commonwealth that could meet these requirements. This would prevent end users from accessing the emerging RNG market, which allows end users to contract for environmental attributes and/or physical supply of RNG throughout North America and maintains the same global net emissions outcome as biogas delivered by a local "dedicated" pipeline.

If DOER wants to fully support end users moving away from distillate fuel and natural gas to renewable fuels, biofuel eligibility under the APS needs to be expanded to allow soy-based biodiesel and other biodiesel supply that contains virgin oil feedstocks. These feedstocks are the

primary supply option currently available in the North American biofuel market. Despite this, they still come at a significant premium to the cost of natural gas, making AEC sales revenue a key requirement to level the economics of biofuel adoption.

The supply market for current APS-eligible biodiesel is extremely limited and poses serious challenges for end users adopt biodiesel. For example, UMass has not been able to find a fuel supplier that will supply APS-eligible biodiesel at a fixed price. The lack of pricing indices for APS-eligible biodiesel and the inability to hedge supply risk places a significant financial risk on end users considering adoption and are a real obstacle to renewable fuel adoption.

UMass is available to respond to any questions DOER may have about the comments and recommendations included herein.

On behalf of the University of Massachusetts,

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