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Via Electronic Mail: [samantha.meserve@state.ma.us](mailto:samantha.meserve@state.ma.us)

Subject: Comments on Draft APS Regulations and Guidelines

Dear Ms. Meserve:

I am writing to provide comments on the current draft regulations and guidelines related to renewable thermal technologies in the Alternative Energy Portfolio Standard (APS). My comments are largely specific to Ground Source Heat Pumps (GSHPs). I have read the comments made by the New England Geothermal Professional Association (NEGPA) and concur with all of NEGPA's comments, concerns and recommendations. Of particular importance are NEGPA's identification of apparent flaws in the equations used to calculate AECs; issues related to simultaneous heating and cooling in a building; and metering requirements. In addition to the NEGPA comments, I present the following:

1. The draft regulations appear to utilize a simple approach to calculating AECs for small and intermediate-sized GSHP systems that rely on the full-load COP of the equipment. I believe this may not capture the efficiency of multi-stage and variable speed, inverter-driven GSHPs, which operate at much higher COP when at part-load than at full-load. In all of the installations we are currently completing or proposing, systems capable of part-load are being utilized and are likely to operate *most of the time* at part-load. Failing to capture the performance advantages of these more advanced GSHPs has the undesirable consequence of providing an unintended advantage to less efficient, older technology equipment options because of the associated lower capital cost. As detailed below, a modeled COP is more accurate as is MassCEC's approach of averaging full and part-load COPs.

2. An alternative to a prescriptive calculation of COP could rely on the various advanced software models available for design of GSHPs systems. These models are produced both by manufacturers for design with their own equipment or by independent software providers for use with all GSHPs. These software packages use information including, but not limited to, detailed building heating and cooling loads, local climate information, and equipment-specific performance data to allow for equipment selection and design of the underground heat exchanger. As part of the design, the software calculates various parameters including the thermal energy extracted from the ground source. As such, 'Useful Thermal Energy' that will be generated is potentially available at a greater degree of accuracy than the proposed prescriptive equations would provide. To be clear, by using the calculated annual heat extracted from the ground source, there would be no need for correction based on electrical use or impacts of either cooling or simultaneous heating and cooling. I believe this is a more direct approach to calculating AECs that leverages existing good practice for GSHP design.
3. MassDEP and the Licensed Site Professionals Association have on-going efforts promoting renewable energy use during remediation of contaminated sites and the ultimate re-purposing of remediation systems to provide renewable thermal energy via various renewable thermal technologies including GSHPs. In general the proposed regulations will be supportive of these efforts. However, remedial approaches can, depending upon the contaminants being addressed and site-specific conditions, involve either heating or cooling of the subsurface. Depending upon the direction of heat transfer and the specifics of utilization in the remediation system or on the property being treated, there could be conflict with the proposed regulations. For example, if a remedial approach requires heating of the subsurface or groundwater being treated, the source of the heat may be harvested from a proximate building that has need for space or process cooling. From the remedial perspective, this would be renewable thermal heating but from the APS perspective could be excluded because of the space or process cooling component. I suggest that use of renewable thermal technologies at remedial sites qualify for AECs regardless of the direction of heat transfer.

Additionally, use of GSHPs (or other renewable thermal technologies) at remedial sites comes at a significant capital cost compared with currently utilized technologies such as electrical resistance or fossil fuel-based heating sources. I believe that the public health and public welfare benefits associated with remediation are clear and substantial. In recognition of this and the reduction in greenhouse gas emissions that use of renewable thermal technologies would provide, I recommend that an

additional category be added to the Guideline on AEC Multipliers that is specific to remedial systems. I suggest that an additional multiplier of 2 be provided for use of renewable thermal energy at MassDEP or USEPA regulated remedial projects and for conversion or re-purposing of existing remedial systems.

Thank you for your consideration of my comments.

Sincerely,  
*Achieve Renewable Energy, LLC*

Lawrence H. Lessard, PG, LSP, LEP  
President