Geothermal **E**xchange **O**rganization

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To: MA Energy Efficiency Advisory Council
From: Ryan Dougherty, President, Geothermal Exchange Organization

RE: Remarks on 2022-2024 Three-Year Energy Efficiency Plan

Thank you for the opportunity to give some brief remarks. The point I want to make might seem quite obvious, but I think it is one still worth making. And that point is that there are two kinds of heat pumps, air-source and ground-source. Let's ignore gas heat pumps, which really we all ought to do generally as good practice. That there are two types of electric heat pumps might seem obvious, but you'd be forgiven if you only ever contemplated air-source. In Massachusetts for some inexplicable reason, these two very different technologies have been treated the essentially the same way from an energy efficiency program planning perspective.

The fact is that they perform quite a bit differently, and anyone who knows about HVAC options likely recognizes that. In extreme weather conditions though, their performance differences are dramatic. That's the most important aspect, at least from a grid planner's point of view. Everyone here involved in the question of broad building decarbonization needs to be thinking hard about the coldest hour of the coldest day of the year. Are the utilities thinking proactively about doubling their generation capacity to meet winter peak? What would the ratepayer implications of something like that be? This thorny issue is the boogeyman that the American Gas Association uses to argue against widespread and rapid building decarb.

The Brattle Group issued a study[1] last year that examined building decarb in New England and the difference between the two technologies and their peak effects is stark. Geothermal heat pumps are not currently getting proper credit for kWh demand reductions. The leveling effects of geothermal heat pumps ought to be appropriately factored into any planning process and I'd be happy to provide real world evidence of those effects. I'm grateful that the EEAC and the PAs are taking steps to address the deficiencies in the TRM and I'm hopeful that those changes will soon be implemented. I'd also ask that these decision makers ensure the adequate recognition of the separate life of the ground heat exchanger portion of a geothermal system. Once it is in the ground, it's effectively there forever. That ground loop will be an energy resource a century in the future. This should be reflected in any savings calculations and cost testing.

[1] http://www.energy.ri.gov/documents/renewable/The%20Road%20to%20100%20Percent%20Renewable%20Electricity%20-%20Final%20Report%2012-31-20.pdf

The conventional wisdom is that ground-source is more efficient, sometimes a good deal more efficient, but they are just too expensive to install and truly be cost-effective. And to be honest I'm really shocked at the higher prices for installs than in other states in the region. I do think that's mainly a market and workforce development issue that the EEAC can have a significant impact on. If you look to New York and what their utilities are doing with heat pumps, you might see a model to emulate. Like Massachusetts, New York is serious about emissions reduction and they're putting in the work to ensure their buildings will transition. Con Edison is offering $5,000/ton[2] for geothermal systems in their service territory and higher in gas constrained areas (please see chart on the next page). $5,000/ton ought to be the starting point for discussions around incentive levels in Massachusetts. The movie Field of Dreams famously had the line, "If you build it, they will come" and the same is true with geothermal. A robust geo program will draw industry professionals into the state, it will encourage business development, create jobs, and most importantly it will reduce emissions and make happy, comfortable customers.

Lastly, an often overlooked difference between air-source and geothermal is that geo heat pumps are factory sealed and charged with refrigerant at the site of production. Air-source heat pumps are charged in the field and this leads to a risk of on-site refrigerant emission. These refrigerants have a global warming potential many thousands of times higher than CO2.

And let me be clear, I'm not anti-air-source. They are great machines that have to be part of the clean energy solution. But we are going to need ALL of the heat pumps in the mix if we are going to ensure affordability and reliability.

I would be happy to answer any questions that the councilors might have. Thank you.

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[2] https://saveenergy.ny.gov/NYScleanheat/assets/pdf/NYS-Clean-Heat-Program-Manual.pdf

Category	Description	Incentive	Central Hudson	Con Edison	National Grid	NYSEG/ RGE	Orange & Rockland
1	*ccASHP: Partial Load Heating*[7]	$/outdoor condenser unit	$500	$500	$500	$500	$500[8]
2	*ccASHP: Full Load Heating*[9]	$/10,000 Btu/h of maximum heating capacity at NEEP 5°F	$1,300	$2,000 a. Plus integrated controls (inclusive): $3,500 b. Plus decommissioning (inclusive): $5,000	$1,000	$1,000	$1,600[10] a. Plus integrated controls (inclusive): $2,400 b. Plus decommissioning (inclusive): $2,400
3	*GSHP: Full Load Heating*	$/10,000 Btu/h of full load heating capacity as certified by AHRI	$2,000	$5,000	$1,500	$1,500	$2,000[11]
4	*Custom Space Heating Applications*	$/MMBtu of annual energy savings	$80	$200	$80	$80	$80
4A	*Heat Pump plus Envelope*[12]	$/MMBtu of annual energy savings	$100	$400	$100	$100	$160
5	*HPWH (up to120 gal)*	$/unit	$1,000	$1,000	$700	$700	$1,000
6	*Custom Hot Water Heating Applications*	$/MMBtu of annual energy savings	$80	$200	$80	$80	$80