



HeatSmart is a program of Solar Tompkins
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To the Climate Action Council,

Generally speaking, we are favorably inclined toward Scenario 3 with the greatest reliance on building electrification in particular ground source heat pumps, both individual loops and district systems. In short, for reasons of equity, cost, scale, grid peak shaving, ground source heat pumps (GSHPs) both individual loops and interconnected thermal energy networks (TENs) must represent an increasingly large part of the heating sector.

Our comment on the Scoping Plan concerns primarily some concerns about the assumptions made about building electrification pathways in Appendix G, the analysis done by E3.

The following points should be more fully taken into account:

- 1) The longer life of GSHPs (about double the lifespan of the heat pump itself and the 50+ year lifespan of the ground loop or borehole)
- 2) The lower maintenance costs of GSHPs
- 3) The considerably higher COPs of GSHPs (calling into question E3's COP of 3.44 for GSHP)
- 4) The potential for even higher (6+) COPs of TENs (calling into question E3's COP of 3.44-4.5 for TENs)
- 5) The benefits to peak shaving that are achieved by building TENs (see reference)
- 6) The potential role of the public utilities in capitalizing, maintaining, and operating TENs
- 7) An analysis of the cost to ratepayers of utilities building TENs vs. maintaining and repairing existing gas infrastructure (with or without the inclusion of the social cost of carbon)
- 8) An analysis of the financial and health benefits of GSHPs and/or TENs for disadvantaged communities
- 9) An analysis of feasibility of getting electrification at scale within the emissions reduction timelines with utility-owned TENs vs. a building-by-building approach.
- 10) An analysis of when gas prices will outpace electricity prices and the payback period for GSHP and TENs (see reference)

Further, Section 3.3 of Appendix G on page 32 reads:

"In all scenarios electric heat pump space heating technologies are predominantly cold climate air source heat pumps (ASHPs) with electric backup and a significant role for ground source heat pumps (GSHPs); ASHPs are significantly more efficient than electric resistance heaters during most heating load conditions but lose efficiency during the coldest hours of the year and require some backup heat source. ASHPs with electric backup use electric resistance as the backup heat source, resulting in increased electric system peak impacts (but generally lower than purely resistance heaters alone), whereas ASHPs

with fuel backup use combustion or thermal heat sources to provide backup heat while ground source heat pumps operate with little to no performance degradation in cold conditions.”

In the HeatSmart Tompkins (Tompkins County is Climate Zone 6) program we have overseen hundreds of residential retrofits with cold climate ASHP. Homes with mini-splits (these are the majority) have no electric resistance back up. Homes with ducted ASHP may or may not have electric resistance back up. I’m not sure why that is assumed to be needed for retrofitting NY buildings. Further, this paragraph says that ASHP with electric resistance back up has a lower peak impact than electric resistance alone. I’m not sure why that would be the case, the COPs of ASHP are virtually identical to electric resistance in very cold weather.

In the case of GSHP, many systems in our area are installed with electric resistance backup allowing the customer to buy a smaller, more affordable GSHP, but in this case GSHPs will also contribute to winter load peaking during cold snaps.

The next section talks about building shell improvements and mentions that new buildings must be code compliant. In addition to code compliance, the Climate Action Council should consider passive house design recommendations, building material recommendations and planning recommendations for new communities to be walkable, bikeable, and connected to public transit.

Section 3.5 does look at greater employment of TENs in terms of peak shaving, but the assumptions made about costs should be examined more fully and the 10 points made above taken into account. Analyses in MA have demonstrated cost competitiveness with the cost of maintenance and repair of existing gas pipe. Existing district geothermal systems have demonstrated average COPs of 6 and above.

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References:

The Falcon Curve: Implications of Seasonal Building Energy Use and Seasonal Energy Storage for Healthy Decarbonization: <https://www.researchsquare.com/article/rs-1054606/v1>

Inflection Point: When Heating with Gas Costs More:
<https://aeclinic.org/publicationpages/2021/01/13/inflection-point-when-heating-with-gas-costs-more>