



NY GEOTHERMAL ENERGY ORGANIZATION

VIA E-MAIL

Hon. Kathleen H. Burgess
Secretary to the Commission
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223

July 1, 2019

Re: – Comments from NY-GEO on Case 18-M-0084 – *New Efficiency, New York* including comments on the May 21, 2019 Joint Utilities Filing

Dear Secretary Burgess:

Please accept NY-GEO's comments regarding Case 18-M-0084 – *New Efficiency, New York* including comments on the May 21, 2019 Joint Utilities Filing.

Sincerely,

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The New York Geothermal Energy Organization (NY-GEO) is a non-profit trade association representing geothermal heat pump (GHP) installers, manufacturers, distributors, drillers, consultants and industry stakeholders from throughout New York State and beyond.

**Comments regarding Case 18-M-0084 –
New Efficiency, New York including
comments on the Joint Utilities’ May 21,
2019 Filing**

**NYS Department of Public Service
Case Number 18-M-0084**

**In the Matter of a Comprehensive Energy
Efficiency Initiative**

**NY-Geothermal Energy Organization
(NY-GEO)**

July 1, 2019

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Executive Summary

Our key proposals regarding the 2019 05 21 Joint Utility Filing (and their location within our review NY-GEO's 2018 recommendations):

- Maintain the jurisdictional utilities' 5 TBtu goal for residential heat pump installations (recommendation #2)
- Develop incentives that respond to current market realities and maximize carbon and peak reduction performance (recommendation #s 9 and 13)
- Reconsider NYSERDA's revised energy savings calculations (recommendation #2 and Appendix B)
- Exclude the federal geothermal tax credit, scheduled to end December 31, 2021 in missing money calculations for a program scheduled to run 2021 to 2025 (recommendation #9 and 13)
- Consider the Net Zero LMI Neighborhood proposal (recommendation #9)
- Ensure the transition to utility programs leaves no gap (recommendation #14)

Review of 2018 07 16 Recommendations

In our 2018 07 16 comments ¹ in support of New Efficiency New York, NY-GEO made the following recommendations in the Executive Summary:

1. Hold utilities harmless for added beneficial electrification load and count the energy efficiency impacts of beneficial electrification toward the 185 TBtu goal
2. The preparation and adoption of a glide path for energy and carbon reduction in the heating and cooling sector that includes distinct annual targets for ground source and air source heat pump penetration in New York State;
3. The integration of the likely impact of projected heat waves on demand for air conditioning and development of a plan to minimize the impact of increased AC demand on peak summer electricity demand and the health of low and moderate income (LMI) New Yorkers;
4. The adoption of a process to re-examine methane greenhouse gas emissions including the time frame used and leakage rates assumed;
5. The adoption of a rate structure for heat pump customers that eliminates the current subsidy they pay in the form of excessive volumetric delivery rates;
6. The formation and execution of a plan to integrate the initiatives adopted under 18-M-0084 in current rate cases as well in adopted rate cases through a reopening mechanism;
7. The identification and execution of the tasks necessary to institute residential PACE financing in New York State;
8. The development of a worker training program whose key elements are IGSHPA training, education for building professionals and wage supplementation for on the job training;
9. The adoption of substantial support subsequent to the current NYSERDA rebate program for addressing upfront costs for GSHP installations, including strong incentives, 3rd party ownership and ways to bring installations to the LMI market;

¹ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf - Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

10. The development of a detailed glide path to a net zero carbon emission building code for New York State;
11. The development of a statewide online pre-screening tool so building owners can easily access data on the geothermal potential of their properties, building on models developed for New York City's Local Law 6 and the NYPA/NYSERDA Geothermal Clean Energy Challenge;
12. The adoption of kWh as opposed to Btu as the unified Energy Efficiency unit of measurement to bring NYS in line with the rest of the world as well as with a post-electrification future dominated by electrical energy use as opposed to fossil fuel burning;
13. The adoption of a process to prepare for decapitalization of the natural gas utility industry that minimizes the exposure of ratepayers; and
14. The adoption of an incentive structure that balances the importance of locational and other granular factors with the importance of encouraging market penetration by virtue of being easy for property owners to understand.

These recommendations encompass much of the subject matter of the Joint Utilities May 21, 2019 filing in this case ² (JU filing) but they also articulate a broader approach to 18-M-0084. We believe it is important to maintain a comprehensive approach to this matter and we will comment on the JU Filing in the context of a review of our initial 2018 recommendations.

² NY Utilities Updated Report-05.21.19.pdf – Item Number 138 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> Accessed 2019 06 23

1. Hold beneficial electrification harmless

Full Recommendation from NY-GEO's July 2018 comments:

Hold utilities harmless for added beneficial electrification load and count the energy efficiency impacts of beneficial electrification toward the 185 Tbtu goal

In its 2018 12 13 Order the Commission noted ³

"The White Paper described how heat pumps can improve overall efficiency and reduce carbon emissions. However, programmatic complications occur because the costs and benefits of heat pumps cross traditional fuel and accounting lines. Heat pumps improve efficiency compared with conventional air conditioning and heating but increase overall electricity usage when they offset onsite fossil-based heating sources. The increase in total electricity sales can have a beneficial effect on non-participating electric ratepayers, as the increased sales units from heat pump customers reduce per-unit rates for all customers. By changing primary fuel use from direct combustion to electricity, heat pumps will utilize the low-carbon electric generation mix the State is developing, resulting in large reductions in GHG emissions over time, compared with on-site combustion by customers.

The White Paper recommended that an all-fuels approach to efficiency programs should be adopted in order to encourage heat pumps, and that a longer-term market strategy should be developed for large-scale integration of heat pumps into efficiency and carbon reduction goals."

The all-fuels approach was supported by many of the parties to this proceeding and the Commission adopted this approach:

"The electric reduction target will be adjusted to reflect load increases from heat pumps and electric vehicles." ⁴
and,

"Electric sales increases from heat pumps and other forms of beneficial electrification will be netted against electric efficiency achievements so that they do not count against the achievement of targets." ⁵

³ 2019 12 13 PSC Order - 201_18-M-0084 Order and Appendices.pdf Item Number 77 – Page 56 - Order Adopting Accelerated Energy Efficiency Targets
<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

⁴ 2019 12 13 PSC Order – Page 26

⁵ 2019 12 13 PSC Order - page 35

NY-GEO commends the Commission and other parties, including the utilities who have embraced a “hold harmless” stance for beneficial electrification relative to the 185 TBtu goal.

It is not clear to us at this point how this “hold harmless” provision will be put into place. Presumably a deemed value for the extra electricity each installed beneficial electrification measure adds to electricity consumption will be subtracted from the electricity sold by each utility before that utility’s savings number is calculated. Perhaps these values will be developed and adopted as part of the Clean Energy Dashboard mentioned on page 14 of the May 21 Joint Utilities filing ⁶. The accuracy of the deemed, or otherwise determined, values will be essential to the actual success of New Efficiency: New York and NY-GEO requests to be an involved party in that process from its inception.

As this proceeding has moved forward, the calculation of energy savings from converting fossil fuel systems to heat pumps has shown itself to be complicated and there has already been one revision put forth from NYSERDA. ⁷ It is crucial that accurate numbers and methods are used to represent energy savings, carbon savings, dollar savings, peak value and Technical Resource Manual values, as beneficial electrification takes hold in New York. We will comment on the values developed in NYSERDA’s May 2019 Update more under the glide path recommendation (#2 below).

It is important to note that the amount of electricity used for beneficial electrification of the heating and cooling sectors – and by extension, the amount that will be removed from utility sales before calculating their energy efficiency performance - is directly related to the heating and cooling loads that heat pumps replace, divided by the coefficient of efficiency (COP) of the heat pumps. The May 2019 update significantly reduced the

⁶ NY Utilities Updated Report-05.21.19.pdf – Page 14 - Item Number 138 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> Accessed 2019 06 23

⁷ Case 18M0084.NYSERDA HP Analysis.May 2019 Update.23 May 2019.pdf – Item Number 139 <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 24

deemed heating loads from those in NYSERDA's January report. As we will explain below, the new projected savings for geothermal systems are significantly below the actual savings being experienced and documented in the field in New York. It is important that the best available real-world data is used both to hold utilities harmless for beneficial electrification in the context of the 3% energy efficiency target, and to inform New York's heat pump programs. Theoretical energy savings are NOT what reduce consumer energy bills, and theoretical carbon reductions WON'T mitigate our climate emergency.

NY-GEO is well positioned as a partner in developing these values as our members regularly evaluate energy use and savings in each project. We continue to offer our expertise grounded in the practical experiences and real-world data our industry can provide at the earliest possible point as these values are generated. We are wary of processes that exclude our input until it becomes "too late in the game" to integrate it in any practical way.

Finally, we request a clear, detailed explanation for how the "electric reduction target will be adjusted to reflect load increases from heat pumps and electric vehicles" as this case proceeds.

2. Glide path for energy and carbon reduction

Full Recommendation from NY-GEO's July 2018 comments:

The preparation and adoption of a glide path for energy and carbon reduction in the heating and cooling sector that includes distinct annual targets for ground source and air source heat pump penetration in New York State;

"5 TBtu is established here as a minimum target that utilities should include in their program filing for 2021-2025. The filing should detail the allocation of this target among utilities and should include a statewide framework to achieve market adoption. This target may be adjusted upwards by utilities in their 2021-2025 filing or may be adjusted upward by the Commission in a future order, based on confirmation of benefit estimates, potential studies, and strategies for extending heat pump programs to larger buildings.⁷³ NYSERDA presented a statewide goal of 6 TBtu assuming 100,000 residential buildings. The jurisdictional target of 5 TBtu, representing 83,000 buildings, is a reasonable portion of that goal."⁸

NY-GEO commends the Commission for setting the 5 TBtu target as a minimum. The Joint Utilities May 21 filing projects savings of 2.7 TBtu⁹ or 54% of the Commission's order. NY-GEO urges the Commission to order the Joint Utilities, by a date certain, to reset their savings target for residential buildings to meet the 5 TBtu minimum.

We also commend the Commission and the Governor for cementing the relationship between increasing energy efficiency and reducing greenhouse gas (GHG) emissions as expressed in the December 2018 Commission order.

As noted in our July 2018 comments in this matter,¹⁰ the heating sector is responsible for approximately 1/3 of New York's fossil fuel GHG emissions. As we will explain below

⁸ 2019 12 13 PSC Order - page 60

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

⁹ NY Utilities Updated Report-05.21.19.pdf – Page 7 - Item Number 138 from

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> Accessed 2019 06 23

¹⁰ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf - Item Number 25 from

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

under recommendation 4 regarding methane, changes in New York State law will significantly increase the importance of heating sector emissions.

The only glide path analysis to date we are aware of, set an annual number of 226,000 replacements of fossil fuel heating systems with heat pumps from 2018 to 2030 in order for the heating sector to contribute adequately to New York's goal of a 40% reduction in GHG emissions by 2030 ¹¹. This analysis was submitted by the Alliance for a Green Economy in the Orange and Rockland rate case completed in March of 2019.

NY-GEO has read the comments from Central Hudson, NiMo, NYSEG and RG&E, the utilities that have committed to lower TBtu goals than those ascribed to the Heat Pump Potential Study ¹². NY-GEO shares their concerns about the difficulties of achieving market penetration and the adequacy of projected incentives and proposed funding levels. However, in the absence of an official glide path, and in light of the 226,000 annual estimate for what is necessary, a program providing for 83,000 residential installations and 5 TBTU in savings over five years needs to be embraced as a minimum. We urge the Commission to once again order the Joint Utilities to meet the 5TBtu minimum and to amend their proposal which current provides only 54% of the Commission ordered energy savings (2.71 TBtu vs 5).

In this context, we also note the following from the Commission's December 2018 order:

Much larger estimates of feasible heat pump penetration have been put forward. The Vermont Energy Investment Corporation's analysis suggested that a 12 TBtu target would be achievable for New York under moderate growth. Energy Efficiency Advocates' analysis proposed that 30TBtu is achievable 2025.

¹³

¹¹ Alliance for A Green Economy – AGREE - OR – Testimony – Jerry Acton Item No. 30 <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-E-0067&submit=Search> (accessed 2019 06 26) 2nd page of exhibits list, conversion table on page 16 in this testimony

¹² NY Utilities Updated Report-05.21.19.pdf – Page 7 - Item Number 138 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> Accessed 2019 06 23

¹³ 2019 12 13 PSC Order - page 61 <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

Several of the utilities have mentioned that programs for larger scale installations, non-pipeline solutions and Low and Moderate Income (LMI) installations could be employed to move the needle from 54%. We agree these programs can be important contributors to improving New York's efficiency and GHG reduction performance, but given the urgency of the climate emergency, we agree with the Commission's original order to meet 5 TBtu through residential installations by New York's Commission regulated utilities.

In the December 2018 order the Commission noted, " NYSERDA presented a statewide goal of 6 TBtu assuming 100,000 residential buildings. The jurisdictional target of 5 TBtu, representing 83,000 buildings, is a reasonable portion of that goal." ¹⁴ We can surmise that the 6th residential TBtu would come from the non-jurisdictional utilities – PSEG-LI and New York's municipally owned utilities and co-ops. It would be helpful to know what follow up there has been on the 6th TBtu.

May 2019 updated savings methodology filed by NYSERDA

In May, NYSERDA filed an update ¹⁵ to its January Heat Pump Potential report, which had provided data on energy savings that was used to set goals for each utility to reach a combined 5 TBtu energy savings goal. The May updated savings numbers projected for heat pump installation were significantly lower, prompting the utilities to project the need for more installations and larger budgets to meet the savings goals. All of the utilities but Con Edison and Orange & Rockland subsequently projected not meeting their originally suggested share of the 5 TBtu goal in the JU filing.

The reduced savings in NYSERDA's update resulted from two primary factors. First, NYSERDA changed the projected efficiency of the "counterfactual" against which heat pump savings would be measured. Instead of measuring the savings against older furnaces and

¹⁴ 2019 12 13 PSC Order - page 61

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

¹⁵ Case 18M0084.NYSERDA HP Analysis, May 2019 Update. 23 May 2019.pdf – Item Number 139

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 24

boilers that heat pumps would replace, NYSERDA counted the savings using the efficiencies of code compliant fossil fuel furnaces and boilers that heat pumps would be competing against as a choice for ratepayers in deciding to replace their older equipment. For oil heating, the efficiencies were assumed to be 66% in the January report (page 23) and 83% in the May report (page 4).

Second, NYSERDA used a different methodology to calculate the projected heating load, resulting in much lower estimates for the heating load. With a significantly lower projected heating load to save against, projected savings per installation were lower. The difference can be seen by comparing tables 4-7 and 6-4 on pages 16 and 26 in the January report with table 4 on pages 8 and 9 in the May update. As an example, the projected full site heating load in Upstate/Western NY was projected at 87 MMBtu while the May projection is 67 MMBtu. The projected savings for a geothermal system replacing an oil system were 112 MMBtu in the January table 6-4 and 65 MMBtu in the May table 4.¹⁶

For several reasons, and with the benefit of decades of experience, NY-GEO considers NYSERDA's original numbers to be more accurate and closer to real-world savings experienced in the field. We are pleased to be in discussion with NYSERDA, DPS staff, their consultants, and the Joint Utilities' Technical Resource Committee to come to a shared, factual basis for the savings estimates. We attach, as appendix A, a more technical exploration of some of the issues involved. For the purposes of this review of the JU filing, we caution that actual savings experienced in the field are significantly larger than those projected in NYSERDA's May 2019 Updated and assumed by the utilities as the basis for their May 2019 filing.

¹⁶ While it may seem counterintuitive that the savings can be more than or almost equal to total site load, the actual energy used (and thus available to be saved) is considerably more than the full site load because fossil fuel efficiencies are considerably less than 100%. – assumed to be 66% for oil in the January report (page 23) and 83% in the May report (page 4) as noted above.

Comments on the Utility Chapters

In addition to the points above, we would like to add a few observations, regarding some of the individual utility programs as they relate to the goals of New Efficiency: New York.

Central Hudson

We commend Central Hudson for their chapter, which includes informative detail. It would have been helpful for them to unpack their projected average incentive figure of “approximately \$1,169 per ton” ¹⁷, and we look forward to seeing their proposed incentives per technology. We are concerned by GHSP’s projected role within the total mix of ASHP, Mini-split and GSHP installations (6.8% on page 51 and 15% on page 54) ¹⁸ and will address this item more in our recommendations 3 and 14 below. Central Hudson’s “Up-Take vs. Incentive Levels” discussion starting on page 52 is an important contribution to the ongoing discussion of what it will take to reach New York’s goals. It was also helpful to see their estimate of \$68.9M required to achieve the 416 GBtu target.

As noted above, NY-GEO recommends the site energy savings figures be revised once again, which would reflect actual savings while making it more realistic and less expensive for each of the utilities to reach their full target.

Finally, regarding Central Hudson, in delving into the Joint Utilities’ projected energy savings and installations figures in tables 8 and 9 ¹⁹, we discovered an odd phenomenon.

¹⁷ 2019 05 21 JU report page 51

¹⁸ 2019 05 21 JU report pp. 51 and 54

¹⁹ 2019 05 21 JU report page 24

Table 8: Projected Total Onsite Net Energy Savings by Year (GBtu/y)

Utility	2020	2021	2022	2023	2024	2025	Total
Central Hudson	18	26	33	40	56	80	253
ConEd	24	66	94	143	205	273	804
NYSEG	30	50	67	80	90	110	427
NiMo	55	117	167	201	224	246	1,010
O&R	14	19	26	29	34	38	160
RGE	4	7	8	10	12	15	56
Total	145	285	395	503	621	762	2,710

Table 9: Projected Small-Scale & Residential Installations by Year

Utility	2020	2021	2022	2023	2024	2025	Total
Central Hudson	700	1,340	1,933	2,100	2,711	3,150	11,934
ConEd	500	1,400	2,000	3,030	4,347	5,796	17,073
NYSEG	866	1566	2421	3133	3756	4566	16,308
NiMo	975	2,100	3,000	3,600	4000	4,400	18,075
O&R	209	279	370	418	488	557	2,321
RGE	160	234	296	351	405	487	1,933
Total	3,410	6,919	10,020	12,632	15,707	18,956	67,644

Dividing the energy savings by the number of installations results in a projected energy savings per installation. We understand this number can vary quite a bit depending on the mix of types of installations. For example, Mini-spits, covering only a part of the heating load at a lower efficiency level, will have a much smaller savings per installation than a ground source heat pump (GSHP). In NYSERDA's revised analysis, a Mini-split replacing oil in Upstate, would save 48 MMBtu vs a GSHP which is projected to save 98 MMBtus.

Savings/Install	2020	2021	2022	2023	2024	2025	avg	
CHG&E	25.71	19.40	17.07	19.05	20.66	25.40	21.2	
ConEd	48.00	47.14	47.00	47.19	47.16	47.10	47.3	even
NYSEG	34.64	31.93	27.67	25.53	23.96	24.09	28.0	
NiMo	56.41	55.71	55.67	55.83	56.00	55.91	55.9	even
O&R	66.99	68.10	70.27	69.38	69.67	68.22	68.8	even
RGE	25.00	29.91	27.03	28.49	29.63	30.80	28.5	
Total	42.52	41.19	39.42	39.82	39.54	40.20	40.4	

Our chart above, produced in Excel, shows the results. Even while understanding the importance of technology mix, we were surprised to see a wide range of projected savings per installation which ranged from an average of 21.2 MMBtu for Central Hudson to an

average of 68.7 MMBtu for Orange & Rockland, whose service area is adjacent to Central Hudson's.

In addition, the variance in numbers from year to year begs explanation. If each utility is keeping its mix of technologies between ASHP, Mini-splits and GSHP constant from year to year, even though the number of installs and resulting energy savings change, the resulting average should be exactly the same. Yet in every case the numbers change from year to year. For 3 of the utilities, marked "even" in the last column, the variation is relatively small, and may even be due to rounding in their GBtu savings number. However, the variation of CHG&E and NYSEG are each more than 5 MMBtus.

Were these utilities projecting a different mix of technologies year to year? Why do both bottom out in 2022? Lastly it is odd, that the text claims these charts reflect "2/3rds of the total target" of 5 TBtu when, as we noted above, 2.71 TBtu is only 54% of the total target. It will be interesting to hear an explanation for these phenomena.

Con Edison

NY-GEO commends several aspects of ConEd's chapter, starting with the fact that they intend to meet their originally assigned target of .8 TBtu. Of course their savings per customer are much lower than that of the other utilities, but so too is the percentage of customers living in 1 to 4 family residential units targeted by the December 2018 PSC order.

As we will explain in our 3rd point below, we are concerned that air conditioning policies that don't promote maximum efficiency will have a negative impact on peak demand as well as GHG emissions. Thus, we are concerned that ConEd specifically mentions room air conditioners as a "technology to encourage through a \$48 million kicker incentive" ²⁰.

²⁰ 2019 05 21 JU report page 62

We appreciate that ConEd has proposed a budget that will “support incentive levels that will develop a market for heat pumps in its service territory, and would thereby increase customer adoption rates, including in the portion of Westchester County subject to the Company’s temporary gas moratorium.” ²¹

However, as noted above, heating loads, and resulting energy savings are actually higher than NYSERDA’s updated numbers. Thus, while we encourage ConEd to continue supporting adequate incentive levels, we believe the company will not need to pay as many of those incentives to reach their .8 Tbtu goal and may be able to adjust their budget downward.

While participating in prior rate cases NY-GEO has been frustrated by a focus on Earning Adjustment Mechanisms that are isolated to either a gas or electric silo unavailable to technologies that involve fuel switching. We commend ConEd for proposing “Cross-Commodity EAMs” ²² for all-fuels increased efficiency (Annual MMBtu), an LMI focused EAM (Share the Savings EAM), and a CO_{2e} emissions reduction EAM that includes “emissions reduced from the following measures: battery storage, electric buses, electric DR, ice energy storage, medium and light-duty battery and plug-in hybrid EVs, solar PV, the cooling efficiencies from air- and ground-source heat pumps, distributed wind energy, and voluntary renewable energy certificates (“VRECs”) as well as metric tons of CO_{2e} emissions reduced from air-source and ground-source heat pump heating loads, and heat pump water heaters that replace natural gas.” ²³

We do urge the company to look closely at recommendation 4 below as the CO_{2e} emissions EAM is developed. The recently passed Climate Leadership and Community Protection Act contains provisions on GHG valuation that profoundly reshape the way CO_{2e} emissions will be calculated in New York.

²¹ 2019 05 21 JU report page 63

²² 2019 05 21 JU report page 63

²³ 2019 05 21 JU report page 74

In addition to embracing the thrust of the Cross Commodity EAMs we also commend the inclusion of heat pumps in the Electric DER Utilization EAM, and we urge the company to consider the impact of geothermal heat pumps in particular on its ability to meet the peak related EAMs (MWh/MW Ratio) and (System Efficiency) given the capacity of geothermal systems to provide cooling at very high efficiency even during system peak events.

National Fuel Gas Distribution Corporation

National Fuel's attempt to rework the kicker regime to apply to its system ²⁴ appears to be labored and forced. In the absence of a discussion of a peak gas problem in its service territory that the kicker might address, a kicker incentive does not seem to apply. As National Grid notes in their chapter: "As specified in the Energy Efficiency Order, these kickers are to apply to space cooling initiatives, in particular, and potentially to other technologies that could provide additional benefits to the peak and the overall electric system." ²⁵

National Grid, KEDLI, KEDNY

National Grid estimates that NYSERDA's updated energy savings estimates would require them to perform 4,800 more heat pump installations, or a 20% increase in installations. ²⁶ National Grid's original program goal was 1.559 TBtu, the second largest target among the utilities, presumably because its service territory largely consists of 1-4 unit residences, as opposed to multi-family units. NY-GEO was disappointed to see the company reduce its installation goal by more than 9,500 installations and its energy savings goal by 549 GBtu, leaving it poised to pick up less than 65% of its original savings goal.

The Ground Up Alliance has a strong presence in National Grid's territory, as well as NYSEG's. Ground Up members offer a no-money-down installation to eligible customers and have been among the most successful installers under the NYSERDA rebate program. NY-GEO finds no reason to support National Grid's reduction in its energy savings goal,

²⁴ 2019 05 21 JU report page 92

²⁵ 2019 05 21 JU report page 95

²⁶ 2019 05 21 JU report page 96

although we do believe they should be able to get there with fewer than 4,800 more installations, if the energy savings methodology is corrected to reflect current installation experiences.

We do however, find intriguing the company's proposal to enlist it's KEDLI and KEDNY gas utilities in its efforts to meet an appropriate savings goal and contribute proportionally to the 5 TBtu goal. NY-GEO supports the KEDLI, KEDNY rate case proposal to further test a utility loop ownership model for its LMI customers.

NYSEG and RG&E

NY-GEO commends NYSEG and RG&E for presenting research and rationale in its chapter, but recommends against accepting their proposed decreases in savings goals which would take NYSEG down to 22% of its 1.907 TBtu target and RG&E down to 37% of its .153 TBtu target. These utilities primarily referenced data from a Maine air source heat pump program. Despite being limited to ductless Mini-splits Maine's program succeeded in installing over 30,000 units in a 5 year time frame.²⁷ In contrast, NYSEG's proposal calls for 16,308 total installations.

The companies developed and used energy savings estimates that are far lower even than ones in NYSERDA's update. They also chose to cite the possibility of a declining block incentive as a reason for pessimism.²⁸

Orange & Rockland

NY-GEO commends Orange & Rockland for accepting its original target of .16 TBtu and projecting ways of funding its program including looking toward its next 2021 rate filing.

NY-GEO also appreciates this statement by the company regarding meeting the needs of its low and moderate income customers and sees a similar approach where heat pumps replace fossil fuel heating and its companion HEAP grants as being a desirable approach.

²⁷ <https://www.efficiencymaine.com/heat-pumps-faq/> accessed 2019 06 26

²⁸ 2019 05 21 JU report page 105

“The Company supports the expansion of LMI Portfolio to address the needs of LMI customers. Providing customers solely with bill credits to meet their six percent energy cost is not a sustainable paradigm, as it only provides short-term relief without the consideration of a longer-term, more economic and sustainable solution. By reducing LMI customers’ energy bills with a long-lasting energy efficient solution, a more sustainable model emerges that will lower customer bills and ultimately lower the bill credits needed to meet the six percent energy cost.” ²⁹

²⁹ 2019 05 21 JU report page 110

3. Air conditioning and peak demand

Full Recommendation from NY-GEO's July 2018 comments:

The integration of the likely impact of projected heat waves on demand for air conditioning and development of a plan to minimize the impact of increased AC demand on peak summer electricity demand and the health of low and moderate income (LMI) New Yorkers;

In our July 2018 comments on New Efficiency: New York, NY-GEO spent 15 pages exploring the implications of climate caused summer heat increasing the use of air conditioning. We led with the following:

"NY-GEO urges the state to encourage the largest possible penetration of ground source heat pumps (GSHP) to avoid what could become massively expensive summer peaks as hotter summers ramp up the use of cooling equipment across the state.

The International Energy Agency recently released the report *The Future of Cooling*³⁰ The May 15, 2018 release announcing the report on the IEA website included the following quote:³¹

"Growing electricity demand for air conditioning is one of the most critical blind spots in today's energy debate," said Dr Fatih Birol, the Executive Director of the IEA

New York Times covered the release of the report in an article titled "*The World Wants Air-Conditioning. That Could Warm the World.*" which included the following text:³²

The number of air-conditioners worldwide is predicted to soar from 1.6 billion units today to 5.6 billion units by midcentury, according to a report issued Tuesday by the International Energy Agency. If left unchecked, by 2050 air-conditioners would use as much electricity as China does for all activities today.

Greenhouse gas emissions released by coal and natural gas plants when generating electricity to power those air-conditioners would nearly double, from 1.25 billion tons in 2016 to 2.28 billion tons in 2050, the report says. Those emissions would contribute to global warming, which could further heighten the demand for air-conditioning.

³⁰ *The Future of Cooling*, , by the International Energy Agency, May 2018 <https://www.iea.org/cooling/> accessed 2018 07 10

³¹ <https://www.iea.org/newsroom/news/2018/may/air-conditioning-use-emerges-as-one-of-the-key-drivers-of-global-electricity-dema.html> accessed 2018 07 10

³² *The World Wants Air-Conditioning. That Could Warm the World*, Kendra Pierre-Louis, New York Times, 2018 05 15, <https://www.nytimes.com/2018/05/15/climate/air-conditioning.html> accessed 2018 07 10

NY-GEO asserts that it is crucial for the State to continually refine its understanding the role of air conditioning in New York's energy system as the impacts of climate change take hold over the next decades.”³³

A year later, as we write these comments, Europe is experiencing a ferocious and life-threatening heat wave.³⁴

We are in the midst of a reinforcing spiral where a warming climate causes more use of air conditioning, which causes more electricity use, which causes the release of more GHGs, which causes more climate warming. This spiral is a worldwide danger.

If New York makes good on the Climate Leadership and Community Protection Act (CLCPA), which requires carbon free electricity by 2040, at that time we will have stopped contributing to this spiral. In the meantime, New York's electricity peaks come on the hottest days of the year, and on those days the state's dirtiest generators are enlisted to meet demand, contributing excess greenhouse gases to the spiral. A case can be made that, as aggressive and progressive as the CLCPA is, the 20 years between now and 2040 are the ones that will determine humanity's success or failure in bringing climate change under control. A frequently cited United Nations report³⁵ notes, in conservative language, that as early as 2030 we could reach 1.5 degrees C, a temperature that may bring impacts that are “long lasting or irreversible”.

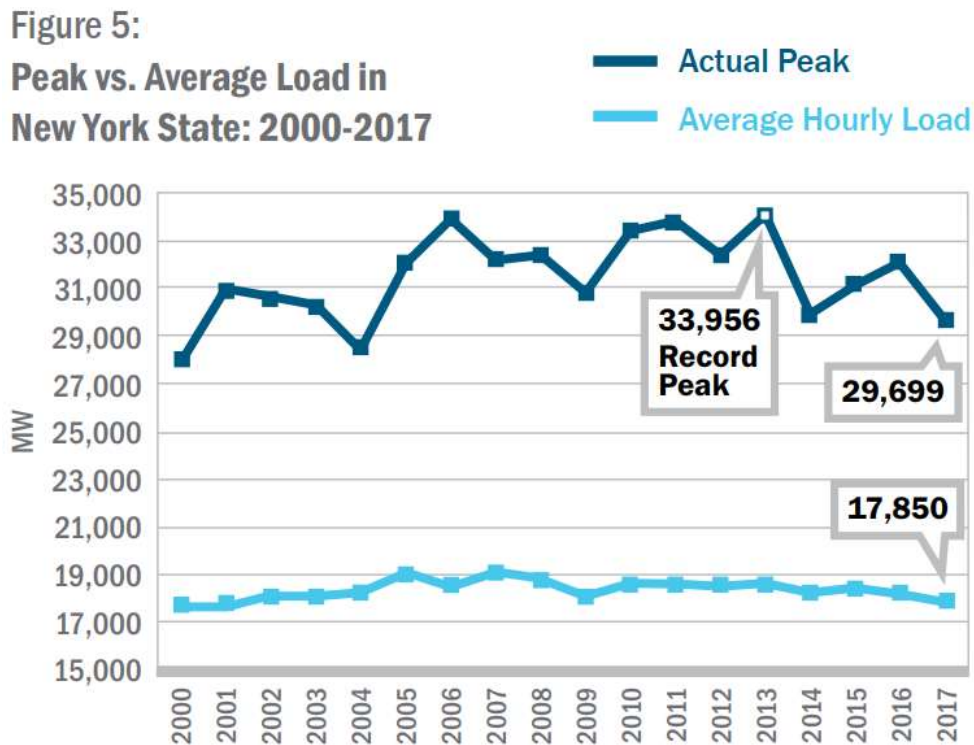
In addition to the environmental impact of electricity demand peaks caused by air conditioning, there is a significant economic impact. Simply put, peak electricity is the most expensive electricity to produce and makes consumer electricity bills less affordable, causing severe hardship for low income New Yorkers.

³³ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf pp 13-27 - Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

³⁴ <https://www.bbc.com/news/world-europe-48780685> accessed 2019 06 28

³⁵ Special Report: Global Warming of 1.5 degrees C, Summary for Policy Makers <https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/> Accessed 2019 06 27

In our 2018 comments, we noted “The figure below demonstrates the considerable difference between average hourly load and peak load in New York State over the 21st century to date ³⁶. This means that roughly half of New York’s generating capacity sits idle on a typical day – capacity for which ratepayers pay to maintain.” ³⁷



New York has largely accepted beneficial electrification coupled with a decarbonized electricity supply as the logical way forward to decarbonize the heating and transportation sectors. In order to keep electricity demand low enough to allow carbon free electricity capacity to catch up with demand, it will be important to limit peak demand.

In that context, it will be crucial to send the right price signals and incentives to the market as a way to reinforce technologies that flatten demand.

³⁶ *Power Trends 2018*, New York Independent System Operator, page 14 https://home.nyiso.com/wp-content/uploads/2018/05/2018-Power-Trends_050318.pdf accessed 2018 07 08

³⁷ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf p. 19 - Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

NY-GEO sees the geothermal heat pump industry as a partner to the air source heat pump industry. There is room for both technologies in the electrification of the heating sector. Many of our members install air source heat pumps as well as geothermal heat pumps.

However, there are two important facts that need to be emphasized when setting priorities in an initiative such as New Efficiency: New York. First, geothermal heat pumps are more efficient than air source heat pumps because the ground is a richer, more stable heat source and sink than the air. NYSERDA and the utilities recognize this fact in the table below taken from NYSERDA's May 2019 Heat Pump Potential Update.³⁸ It is important to note that GSHP's COP, or standardized efficiency, of 415% encompasses the entire heating and cooling seasons. The comparable ASHP efficiency is 258% - a worthwhile improvement over fossil fuel efficiencies of less than 100%, but only 62% of the comparable GSHP efficiency.

Table 1.3 - Heat Pump Heating System Efficiencies

Equipment Type	Rated Efficiency	Standardized Efficiency %	Source
GSHP	4.15 COP	415%	Average of reported COP in MassCEC rebate database (confirmed by NYSERDA rebate data). Rebate databases use average of full and part load COP as proxy for seasonal COP.
Central ASHP (part load displacement)	10.6 HSPF	309%	Average of ducted systems approved in NEEP cold climate ASHP database
Central ASHP (full load replacement)	8.8 HSPF	258%	Based on part load ASHP with de-rating as per stakeholder input
Ductless minisplit	11.3 HSPF	330%	Average of ductless systems approved in NEEP cold climate ASHP database

Second, the GSHP efficiency advantage over ASHP is particularly operational on the hottest and coldest days of the year when air temperatures are most extreme and ground temperatures are relatively stable and moderate. The efficiency of air source heat pumps for heating bottoms out when the air is coldest and provides the least heat to capture. The efficiency of air source heat pumps for cooling bottoms out when the outside air is hottest and least receptive to exhausted hot air. For GSHP systems, the ground temperature below

³⁸ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf p. 4 - Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

the frost line is relatively stable year-round. The ground closest to geothermal ground loops gradually cools over the heating season and warms during the cooling season, but the peak days of both summer and winter usually come mid-season. Ground temperatures near geothermal loops change much less than air temperatures and they are moderate enough to maintain strong efficiency on the hottest and coldest days of the year.

When geothermal heat pumps replace central air conditioning, room air conditioning or cold climate heat pumps, all of which are forms of air source heat pumps, the geothermal installation will lower peak demand significantly. As the need for air conditioning increases across the State it would be advantageous for a maximum number of new and replacement installations to be geothermal.

Inasmuch as this proceeding will be determining incentives for reaching the 5TBtu savings goal it is important that incentives are set both to make the switch to heat pumps attractive for building owners and ratepayers, and to reinforce New York's policy goals, such as lowering peak demand and keeping energy affordable for LMI customers. he most

In this context there are two questionable elements in the Joint Utilities' filing.

The first is a lack of recognition of the advantages of geothermal or ground source heat pumps (GSHP) as the most efficient and therefore the most desirable solution to replacing fossil fuel heating. This comes out in current utility programs that incentivize air source heat pumps (ASHP) but not ground source, such as Con Ed's ³⁹ and Central Hudson's ⁴⁰ It also may be reflected in the following point under the eligibility criteria for the heat pump program:

"The adoption of air source cold climate heat pumps will be encouraged where appropriate, based on the parameters of the application." ⁴¹

³⁹ 2019 05 21 JU report page 84

⁴⁰ <http://www.savingscentral.com/rebates/index.htm> accessed 2109 05 27

⁴¹ 2019 05 21 JU report page 22

This statement may intend that cold climate ASHPs are to be encouraged over conventional ASHPs, or coming second after a first point indicting the range of eligible heat pumps, it may be intended to indicate that cold climate ASHPs are to be considered first and preferred in a general sense over other heat pump installations, including GSHPs. In any case, this point should be clarified. It would also be helpful to include a point that GSHPs are the most efficient form of heat pump installation, are the best at reducing peak demand and should be considered as a first resort.

The second questionable element is the way the Commission's suggestion of cooling "kickers" is being treated by the utilities. It is understandable that the Commission would seek to replace old, poorly performing air conditioning equipment with newer, more efficient air conditioning technology. Given that ASHPs are far less efficient during peak demand periods than GSHPs, and air conditioning will apply increasing pressure on peak demand as the climate warms, it would seem that GSHP should be an important element of any kicker program. Instead the only two mentions of an eligible kicker technology are National Fuel's attempt to adopt the concept to their needs and ConEd's statement "the Company is considering a kicker incentive to drive adoption of efficient cooling technologies, such as more efficient room air conditioners that provide greater system value such as through load relief during peak summer hours." ⁴²

NY-GEO urges the utilities and the Commission to carve out a strong place within kicker proposals for GSHPs, the most potent technology for reducing peak demand in the face of the increasing necessity of air conditioning in a warming world.

Finally it is helpful, if also a bit discouraging, that Central Hudson has given some preliminary number on the mix of the technologies they are anticipating for their heat pump program – 6.8% GSHP in one case ⁴³ and 15% in another. ⁴⁴

⁴² 2019 05 21 JU report page 62

⁴³ 2019 05 21 JU report page 51

⁴⁴ 2019 05 21 JU report page 54

It order for the utilities to commit to energy savings goals it is necessary for to project their mix, given the different MMBtu savings values each technology provides to overall energy savings. We recommend that each of the utilities specify the proposed mix that goes into their proposed energy savings number. It would be helpful for the Commission and stakeholders to understand the proposed mixes, the rationales behind them and the cost/incentive considerations going into those rationales.

4. Methane Greenhouse gas emissions

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of a process to re-examine methane greenhouse gas emissions including the time frame used and leakage rates assumed;

The recently passed Climate Leadership and Community Protection Act (CLCPA) sets the global warming potential term for greenhouse gases (GHGs) at 20 years ⁴⁵. The 20 year term improves on the currently used 100 year term by lining up more directly with New York State's goals to reduce GHG emissions by 40% by 2030 and then 85% by 2050. This provision impacts the standing of natural gas in state energy policy as methane is the main constituent of natural gas and methane has a 20 year carbon dioxide equivalent (CO₂E) of 86 and a 100 year CO₂E of 34 according to the 2013 International Panel on Climate Change Synthesis report ⁴⁶. In addition, definition 13 in the bill ⁴⁷ stipulates that New York's statewide greenhouse gas emissions will now include GHGs produced outside of the state that are "associated with the extraction and transmission of fossil fuels imported into the state." Under this provision leaks that happen during the fracking, drilling and transmission of gas imported into New York from states such as Pennsylvania, will now be counted in New York's greenhouse gas inventory.

⁴⁵ Page 5 of the Climate Leadership and Community Protection Act (CLCPA)

2. "CARBON DIOXIDE EQUIVALENT" MEANS THE AMOUNT OF CARBON DIOXIDE BY MASS THAT WOULD PRODUCE THE SAME GLOBAL WARMING IMPACT AS A GIVEN MASS OF ANOTHER GREENHOUSE GAS OVER AN INTEGRATED TWENTY-YEAR TIME FRAME AFTER EMISSION. <https://www.nysenate.gov/legislation/bills/2019/s6599> accessed 2109 06 27

⁴⁶ Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, 2013: *Anthropogenic and Natural Radiative Forcing*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. table 8.7, page 56, of chapter 8 https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf accessed 2019 06 19

⁴⁷ Page 6 of the Climate Leadership and Community Protection Act (CLCPA)

13. "STATEWIDE GREENHOUSE GAS EMISSIONS" MEANS THE TOTAL ANNUAL EMISSIONS OF GREENHOUSE GASES PRODUCED WITHIN THE STATE FROM ANTHROPOGENIC SOURCES AND GREENHOUSE GASES PRODUCED OUTSIDE OF THE STATE THAT ARE ASSOCIATED WITH THE GENERATION OF ELECTRICITY IMPORTED INTO THE STATE AND THE EXTRACTION AND TRANSMISSION OF FOSSIL FUELS IMPORTED INTO THE STATE. STATEWIDE EMISSIONS SHALL BE EXPRESSED IN TONS OF CARBON DIOXIDE EQUIVALENTS.

The global warming potential of methane doesn't impact the energy savings derived from the heat pump programs in the Joint Utility filings. However, the Commission's April 2018 New Efficiency: New York, report makes clear that a key rationale for this initiative is to aid in reaching New York's climate goals. This can be seen in the opening 2 paragraphs of the Executive Summary of the report

"EXECUTIVE SUMMARY

Energy efficiency is a cornerstone of New York State's national leadership on clean energy and climate.⁴⁸ This white paper establishes an ambitious 2025 energy efficiency target for New York State and proposes a comprehensive energy efficiency initiative to meet that target.

2025 Energy Efficiency Target

The 2025 statewide energy efficiency target established in this paper is 185 trillion British thermal units (TBTu) of cumulative annual site energy savings relative to forecasted energy consumption in 2025—a level of savings equivalent to fueling and powering over 1.8 million New York homes by 2025. These achievements will deliver nearly one-third of the greenhouse gas (GHG) emissions reductions needed to meet New York State's 40 by 30 climate goal."

Cornell University scientists Robert Howarth and Anthony Ingraffea have devoted a great deal of research to the climate impacts of methane and have written several peer reviewed papers on the subject. They have examined the methane valuation clauses in the CLCPA and their initial informal estimate is that the corrections ordered through the CLCPA mean New York has been undervaluing the global warming potential of natural gas by about one half. This has profound implications for State policy and programs moving forward.

NY-GEO requests the Commission to immediately convene a process for accurately recalibrating the CO_{2e} values used for natural gas, fuel oil and propane in this proceeding. The new values could perhaps be interim to an officially adopted set of numbers as part of the DEC's forthcoming GHG emission inventory. In our view it is not acceptable for this program to move forward into 2020 with an outdated, legally obsolete set of CO_{2e} values

⁴⁸ New Efficiency New York.pdf 2018 04 26 – p.2

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 27

for these fossil fuels at its basis. Because methane leaks are far greater in the natural gas life cycle than in the life cycles of fuel oil and propane, the relative carbon value of these fuels will need to be changed, impacting the carbon values of counterfactual fuels as well as the carbon values of technology installations in NYSERDA's calculations. ⁴⁹

One of the key areas of controversy regarding New Efficiency: New York is on the role of natural gas. Some, including at least some of the utilities, see it as a less expensive, less climate impacting fuel and rule out incentives for switching from gas to heat pumps. Others, including NY-GEO, see it as a significant impediment to meeting the State's climate goals and believe the heat pump program should be truly fuel neutral. To proceed to answer this question for the heat pump program without considering the actual, legally current, global warming potential of natural gas is moving forward with blinders on.

⁴⁹ NYSERDA HP Analysis.May 2019 Update – p.9

5. Excessive volumetric delivery rates

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of a rate structure for heat pump customers that eliminates the current subsidy they pay in the form of excessive volumetric delivery rates;

NY-GEO commends the progress being made on this issue. We recognize NYSERDA for presenting data quantifying the inverse cost shift ⁵⁰ under which GSHP customers in particular are overcharged for their delivery costs and thereby subsidize other customers, most of whom heat with fossil fuels. Earlier this year we joined with several utilities and others in a Coalition for Sustainable Distributed Clean Energy to recommend voluntary, demand-based delivery rates that more accurately reflect cost causation. ⁵¹ We also filed a letter in support of National Grid's beneficial electrification rate proposed under the settlement of their most recent rate case. ⁵²

We are currently prepared to support forthcoming proposals under VDER for a voluntary demand-based standby delivery rate that would be available to all ratepayers, including GSHP ratepayers.

We wish to point out that accurate, cost based delivery rates benefit GSHP ratepayers, whose systems are grid positive relative to delivery costs because they reduce summer peak and increase system utilization. However, these rates cannot be considered an incentive. They are a matter of just and accurate cost based pricing.

For that reason we applaud and support this statement in the JU filing:

" This proposal does not envision limiting the ongoing development of alternative rate structures. As a result, customers should in many cases have access to both the statewide framework incentive and opt-in rates." ⁵³

⁵⁰ New Efficiency-NY Analysis of Residential heat Pump Potential and Economics. – NYSERDA, January 2019.pdf pp. 63-4 Item Number 83 in Matter 18-M-0084
<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 27

⁵¹ Coalition Comments -VDER –Item Number 91 Matte 17-01277
<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=17-01277> accessed 2019 06 30

⁵² 2018 12 17 NY-GEO comments NGRID BE rate.pdf – Item 219
<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=17-E-0238&submit=Search> accessed 2019 06 27

⁵³ 2019 05 21 JU report page 31

6. Integrate initiatives in rate cases

Full Recommendation from NY-GEO's July 2018 comments:

The formation and execution of a plan to integrate the initiatives adopted under 18-M-0084 in current rate cases as well in adopted rate cases through a reopening mechanism

Having participated in several recent rate cases NY-GEO recognized shortcomings in the settlements that might hinder the ability of the utilities to reach the 5 TBtu goal. From every indication in the joint filing it appears that the utilities are successfully integrating their proposals under 18-M-0084 with the terms of their currently applicable settlements.

Con Edison has replaced its CES and ETIP/SEEP filings with its proposal in this Matter and has including its proposal in this matter in its current rate case proposal.⁵⁴ They have also proposed cross-commodity EAMS⁵⁵ that fit well with the thrust of this initiative.

Presumably NYSEG/RG&E will do the same. National Grid seeks to integrate the Electric Heat Initiative adopted in its recent rate settlement with the Heat Pump Program.⁵⁶

⁵⁴ 2019 05 21 JU report page 58

⁵⁵ 2019 05 21 JU report page 72

⁵⁶ 2019 05 21 JU report page 98

7. Institute PACE financing in New York State

Full Recommendation from NY-GEO's July 2018 comments:

The identification and execution of the tasks necessary to institute residential PACE financing in New York State;

The upfront cost of heat pump installations, coupled with continued State subsidies and support for oil to gas conversions (see recommendation 13 below), remains the major barrier to market penetration for heat pump installations. NY-GEO agrees with the JU filing that NYERDA and the NY Green Bank should play the lead roles in financing under this plan.⁵⁷

As part of the overall solution to the upfront cost barrier, PACE financing could also play an important role. See our July 2018 filing in this case for basic information regarding PACE financing.⁵⁸ NY-GEO urges the utilities to be active and supportive in the communities in their service territories that are considering PACE financing. It can be a powerful supplement to their energy efficiency and GHG reduction efforts, and utility support can lend credibility to local efforts to establish PACE.

⁵⁷ 2019 05 21 JU report page 33

⁵⁸ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf - p. 41 Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

8. Worker training

Full Recommendation from NY-GEO's July 2018 comments:

The development of a worker training program whose key elements are IGSHPA training, education for building professionals and wage supplementation for on the job training

NY-GEO has been working with NYSERDA to provide training for GSHP workers which has resulted in successful IGSHPA training sessions on Long Island, in the Hudson Valley and via webinar in the past year. We are appreciative of the programs NYSERDA has set up to lower the costs of IGSHPA training and supplement the costs of internships and on the job training programs.

Clearly, much more needs to be done by our industry in cooperation with NYSERDA and our utility partners. With 67,000 installations proposed by the utilities, 83,000 by the Commission, 100,000 by NYSERDA or the annual hundreds of thousands of installations called for in the AGREE testimony cited earlier, there is an enormous need for trained labor to carry out the transition from fossil fuel heating to renewable heating.

One area NY-GEO seeks help from the utilities is in outreach to HVAC contractors who are already networked with the utilities. For both ASHP and GSHP installations and repairs, most of the needed skills are already in the possession of HVAC workers who are currently employed by companies working with furnaces, boilers and air conditioners. A minimal training and education course, such as the three day Accredited Installer course from IGSHPA, would prepare them to perform many of the elements of a GSHP installation.

In order to thrive, the heat pump industry must recruit many of those HVAC companies, as well as their workers, to renewable heating. Outreach from utilities, which in many cases have been trusted partners or contract providers, could be a very effective step in the recruitment process. NY-GEO offers to work with NYSERDA and any of the utilities to cooperate on an effective outreach strategy to those contractors.

9. Upfront costs, strong incentives, and LMI

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of substantial support subsequent to the current NYSERDA rebate program for addressing upfront costs for GSHP installations, including strong incentives, 3rd party ownership and ways to bring installations to the LMI market

NY-GEO appreciates NYSERDA's attempts to calculate "Missing money", based on the concept of "cost effectiveness", which they explain as follows:

"The analysis assumes that for a typical customer a critical factor that determines whether a heat pump would be chosen instead of another heating/cooling solution is whether a heat pump is cost effective. Cost effectiveness is modeled as delivering at least a return on investment to the customer of 16% (nominal pre-finance pre-tax project internal rate of return), except for publicly owned multifamily housing for which a 10% hurdle rate is applied.⁵⁹ The return is calculated as the return from energy bill and operational savings (Section 6.5) on the incremental net capital cost of the heat pump (the installation cost minus value of avoided counterfactual capex and any tax credits, as discussed in Section 5), over the assumed useful life."⁵⁹

A 16% IRR is equivalent to a 6.25 year payback. NY-GEO observes the following:

- This may be a reasonable payback period within a market that is established, where products are known and understood by consumers. The marketing life of heat pumps is in its infancy. A typical New York rate payer knows little to nothing about heat pumps.
- The payback period includes the impact of the current 30% federal residential GSHP tax credit. This tax credit is reduced to 26% in 2020 as the Heat Pump program takes off, then 22% in 2021 and expires on January 1 2022. NYSERDA states "In order to enable a sustainable GSHP market after the expiry of the tax credits, it was assumed that the GSHP market would be able to deliver cost efficiencies at least equal to the value of such tax credits."⁶⁰ This is clearly "optimistic". If there are other policies that count on a 30% cost reduction of a consumer product or service over a two-year period, we are unaware of them.

⁵⁹ New Efficiency-NY Analysis of Residential heat Pump Potential and Economics. – NYSERDA, January, 2019.pdf p. 55 Item Number 83 in Matter 18-M-0084

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 27

⁶⁰ Ibid p. 22

The five year period of this heat pump program is a relatively short time frame. NY-GEO requests that the federal tax credit be taken out of the missing money analysis, as it will only exist for the first year of the 2021 to 2025 program time span.

NY-GEO also has taken note that the NYSERDA update that cut projections of energy savings resulted in higher missing money numbers. The payback on a heat pump investment comes through the monetary value of the energy savings, and when those savings are projected to be lower, the ratepayer's monetary savings are less, meaning it will take longer for the savings to equal the initial investment. Under NYSERDA's missing money regimen, this would indicate the need for higher incentives. In spite of this fact, NY-GEO has pushed back on NYSERDA's reduced savings estimate in recommendation 2 above as the revised numbers don't reflect our real-world experience. It will be crucial to work from accurate data in meeting New York's climate challenge, and in our opinion, accurate data trumps possible self-interest that would be involved in ignoring over estimated missing money in order to provide a stronger rationale for higher incentives.

However, with our experience in the marketplace, we do believe higher incentives than NYSERDA's current \$1,500 per ton are certainly warranted to build that market. The recent experience in Westchester reinforces that point. When ratepayer's backs were against the wall from the Con Edison gas moratorium, NYSERDA raised the rebate incentive by 25%. When Con Edison saw a serious need for a non-pipeline alternative in the face of gas pipeline constraints, they awarded a proposal for 8,800 geothermal installations up to \$5,000 in incentives per installation on top of NYSERDA's rebates. We would argue that New York's back is against the wall to meet its 2030 40% GHG reduction goal, and that the utilities' backs are against the wall to meet the 5TBtu goal.

In addition, NY-GEO, as part of the Renewable Heat Now (RHN) campaign, regularly participates in check-n calls RHN hosts with New York's Heat Smart campaigns. These campaigns are having a difficult time producing installations using current NYSERDA incentive levels, particularly for installations that handle the full heating and cooling load of a house, which are most desirable from an energy savings and carbon reduction standpoint. NY-GEO requests that a process be developed for feedback from the Heat

Smart programs to be compiled and factored in to the calculations of incentives. It should include a survey of those who show interest in the program but who don't follow through, designed to identify the barriers to transitioning from fossil fuel use. In the meantime, input from the Heat Smart programs should be sought and valued by the utilities, NYSERDA and the Commission. Missing money calculations should be an important part of valuing incentives, but they need to be tempered by real-world market experience.

Net Zero LMI Neighborhood Proposal

The success of New York's climate program depends on the embrace of renewable, carbon free energy installations in the State's Low and Moderate Income (LMI) communities.

NYSERA estimates there are 3,511,156 LMI households in New York State, ⁶¹ approximately 40% of all households. Attempts have been made to access this market, including NY-GEO's 2017 Top Job winner, the Lockport Housing Authority. ⁶² At this point, there is some basis for hope as numerous multi-family LMI projects are in various stages of development. Multi-family housing is relatively common for LMI families downstate.

However, in upstate a far higher percentage of LMI families live in 1 to 4 family buildings. Incentives are currently too low to be effective in the 1 to 4 family LMI market. NY-GEO proposes the program below to be available to LMI residential communities across New York State as a pilot to test several concepts for which it will be important to have experience and data if renewable heating and cooling is to become common enough in LMI communities for New York to reach its GHG reduction goals

We offer the following proposal in the spirit of the following language from the JU description of the LMI portfolio design, "Market development initiatives that develop and test new solutions for enhanced access to improvements across the LMI market segment, with opportunities for integrating energy efficiency, including heat pumps, and renewable

⁶¹ <https://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/LMI-Special-Topic-Rpt---Income-Guidelines.pdf> accessed 2019 06 28

⁶² <http://buffalogeothermalheating.com/the-official-peer-reviewed-journal-of-the-american-society-of-heating-refrigerating-and-air-conditioning-engineers/> accessed 2019 06 28

energy;”⁶³

Program Overview: How Can a Low-Moderate Income Neighborhood go Net Zero while saving residents money?

Under a program designed and offered by NYSERDA, pilot projects will be selected for blocks or block groups (B/BG) across NY State. The B/BG will be less than 80 % occupied and census data will place the B/BG within NYSERDA’s LMI threshold. Projects will access a combination of conservation measures, solar panels, ground source heat pumps (GSHP) and EV charging/vehicle discounts designed to provide a minimum of a 10% reduction in overall energy costs to residents. The 80% and 10% thresholds are suggestions meant to concretize the vision being put forth here. These numbers are subject to revision as the program is designed in more detail.

Program Elements:

- **Energy Efficiency/Conservation** – measures available under NYSERDA’s Empower program (no cost for owners under 60% of median income) and Assisted Home Performance with Energy Star (incentives for under 80% of median income) will be marketed aggressively door-to-door.
- **Geothermal:** Geoexchange ground loops will be drilled at each lot on private or municipal property, by either the gas or electric utility, a 3rd party geoutility, or drillers paid under this program (with at least some of the program costs possibly recovered by through on-bill payments). Loops/thermal energy will be made available to owners who choose to install GSHP and will be available to developers of the vacant lots and future owners of homes that don’t participate at first. Rebates appropriate to the 10% energy cost reduction goal will be provided

⁶³ 2019 05 21 JU report page 38

- **Solar** – Solar panel installations will receive rebates appropriate to the 10% bill reduction goal
- **EVs** – 220 charging lines will be installed at an appropriate discount at participating households. Rebates appropriate to the 10% bill reduction goal will be provided for electric and hybrid vehicle purchases – perhaps connected to a used ev/hybrid vehicle network.⁶⁴ Perhaps an electric car manufacturer could be engaged to develop a purchase/lease program.⁶⁵ State could initiate a cash for clunkers program coupled with a used hybrid/EV program. Local transit agency should also be engaged. If a suitable EV/transit arrangement cannot be developed, transportation energy may need to be left out of the program for now.

The energy costs for owners will consist of:

- On-bill financing for the solar panels and geothermal installation after rebates
- Payment to utilities for fixed costs as well as solar undergeneration and thermal kWh if loops are utility or 3rd party owned
- Loan/lease cost for EVs
- Supported by HEAP? HEAP funds for weatherization should be maximized. It is important that a HEAP solution be developed. This program will not succeed if the loss of HEAP funds wipes out the savings to ratepayers. HEAP is basically a subsidy from taxpayers to fossil fuel companies, using ratepayers as the pass through. It can not be allowed to stand in the way of clean renewable energy coming to LMI communities. Perhaps the Low-Income Order's statewide utility bill discount program could be utilized to offset HEAP disincentives that are not able to be mitigated through revisions to the way the HEAP program is administered.

⁶⁴ <https://cleantechnica.com/2019/05/23/4000-used-plug-in-hybrid-ev-buyer-incentive-offered-by-peninsula-clean-energy/>

⁶⁵ <https://cleantechnica.com/2019/06/15/breaking-tesla-now-offers-used-model-3s-should-you-buy-one/>

Responsibilities of:

- **Utility** – Increased rebates, demand based electric rates, net metering for LMI neighborhoods?, loop ownership
- **NYSERDA** – Marketing, energy efficiency
- **Municipality** – Access to public property for ground loops, taking credit along with the Governor
- **Federal** – Equal access to HEAP funds, allocation of anti-poverty funds to help fund the program
- **EV, Heat Pump, Solar manufacturer?** – bulk discounts
- **Developer** – a guarantee for LMI owner occupancy of units as they are developed

These B/BGS will become a low-energy-cost anchor for neighborhood revitalization.

Can Test:

- The cost of establishing an LMI net zero neighborhood that meets 10% lower energy costs for residents
- Potential set-up cost savings from aggregating and concentrating drilling activities
- Municipal participation opening public space to loops
- Whole neighborhood concept – advantage here – it is voluntary for current occupants – those who won't participate provide counterfactual
- Utility ownership of loops for both gas & electric utilities
- Combining conservation, solar, EVs and GSHP, coupled with no cost or heavily subsidized EE upgrades
- Cash for clunkers concept for older gas furnaces and gas vehicles
- If desired can test a concept released July 1, 2019 by Heet and Burohappold Engineering for a GeoMicroDistrict in Massachusetts ⁶⁶
- Freeing incentive levels from the limits set in mass market programs, allowing a determination of the true incentive levels needed to animate the LMI market

⁶⁶ <https://heetma.org/feasibility-study-rfp/> accessed 2019 07 01 This RFP led to the study which was presented 2019 07 01 and for which a link was not yet available at deadline for these comments

Features:

- Places leadership of New York's move to zero carbon energy in an LMI neighborhood
- Much of NY's LMI population is in downstate areas where multifamily buildings are the norm, but there are decimated neighborhoods throughout upstate that would fit this program well.
- Provides needed efficient AC and heating for LMI residents while climate warming is producing weather extremes
- Can expand to more fully occupied blocks as pilots prove out
- Low income job training – drilling and installation
- Works in areas where gas is available – it is good to begin replacing gas in poorer communities instead of leaving them to pay for stranded assets as gas heating is phased out in order to meet NYS GHG goals

Appendix B is a geothermal “thermal microgrid” concept piece that preceded this proposal and exemplifies its potential impact in one upstate community.

10. Net zero building code

Full Recommendation from NY-GEO's July 2018 comments:

The development of a detailed glide path to a net zero carbon emission building code for New York State

NY-GEO recognizes this point is outside the scope of the Joint Utilities filing. We do ask the Commission to consider actions it can take, or direct NYSERDA to take, that will give the utilities and the building industry a clearer picture of the path and timeline for getting to a net zero building code.

In our July, 2018 comments in this proceeding we noted several promising steps being taken in this direction and asked "that they be augmented by a pledge to attain a net zero carbon-based code by a specific date with a glide path defined to reach that goal that is tied in to the 40% by 2030 and 80% by 2050 goals." ⁶⁷

Any news of further steps in this direction would be welcome.

⁶⁷ 2018 07 16 NY-GEO comments on New Efficiency NY.pdf p. 51- Item Number 25 from <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

11. Pre-screening tool

Full Recommendation from NY-GEO's July 2018 comments:

The development of a statewide online pre-screening tool so building owners can easily access data on the geothermal potential of their properties, building on models developed for New York City's Local Law 6 and the NYPA/NYSERDA Geothermal Clean Energy Challenge

The first point in the May 21 JU filing under Program Roles, Delivery and Review states:

- NY Electric Utilities will each develop or expand heat pump-specific web pages as part of their customer energy efficiency education and will cooperate with each other and NYSERDA to leverage marketing and consumer awareness campaigns;⁶⁸

NY-GEO offers to review any materials for the website for accuracy from the industry perspective. We further request the utilities to examine New York City's pre-screening tool⁶⁹ and consider developing a similar tool for their territory on their website.

⁶⁸ 2019 05 21 JU report page 27

⁶⁹ <https://www1.nyc.gov/assets/ddc/geothermal/index.html> accessed 2019 06 27

12. Watts as opposed to Btu

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of kWh as opposed to Btus as the unified Energy Efficiency unit of measurement to bring NYS in line with the rest of the world as well as with a post-electrification future dominated by electrical energy use as opposed to fossil fuel burning

The Commission responded to this point in its December 2018 order as follows:

"NY Geothermal Energy Organization and Bob Wyman urge that all targets should be articulated on a MWh basis rather than Btu. Each of these parties also endorses an all-fuels approach. Because the ultimate goals are carbon reduction and customer savings, each of which can be achieved across multiple fuels, maintaining Btu as the common standard of measurement is more practical at this time." ⁷⁰

We continue to maintain that, inasmuch as New York's vision has largely embraced a future with more efficient electrified heating and transportation sectors, it makes far more sense to embrace Watts as the common unit as opposed to Btu. In addition to allowing easier comparisons in line with the projected dominant energy source, Watts are a metric unit and will allow for less complex international and scientific conversations. The Commission may have called for the use of a "common standard of measurement" but the JU filing, as well as other materials in this proceeding, continue to use both MWh and Btu, making it hard to compare the efficiencies and values of various measures.

An example comes early in the JU filing where electric efficiency targets are expressed in MWh and gas efficiency targets are expressed in Btu. ⁷¹ Which energy savings are generally less expensive to attain? It is a more complex process to find the answer than it needs to be.

MWh and Btu are both units of energy, convertible to one another by a defined ratio.

⁷⁰ 2019 12 13 PSC Order - page 26

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

⁷¹ 2019 05 21 JU report pp. 11 and 12

Once a common standard is actually adopted, it will be much easier to recognize and compare the proportions of watts, kilowatts, megawatts, gigawatts, etc. to go across fuels, than it is currently where MMBtus or GBtus have to be translated into the equivalent Watt category and then multiplied by .293071 to make a comparison, or the Watt measure needs to be paired up with the appropriate BTU category and multiplied by 3.412.

13. Decapitalization of natural gas

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of a process to prepare for decapitalization of the natural gas utility industry that minimizes the exposure of ratepayers

This is also a topic not addressed in the JU filing, but every day it is not addressed it becomes a larger and more pressing issue.

There is a massive task before us – transitioning from burning fossil fuels to provide our energy – heating in this case – to using clean renewable sources of energy. The lives of most New Yorkers are currently intertwined with fossil fuels, whether it be as consumers, ratepayers, employees, investors or some combination of these roles. We face financial consequences in each of those roles as we disentangle ourselves from the role.

It is crucial that damaging disruptions and monetary harm from this transition be minimized. That is why a just transition is a key part of the recently passed Climate Leadership and Community Protection Act. Just transition was a key element that helped a broad enough consensus to develop on the bill, allowing it to pass. In that regard it is crucial that a process starts being developed that provides order and a just transition for the decapitalization of fossil fuels in New York State. The current death spiral of the coal industry, and the division it is creating in our country, is a good, if much smaller scale, example of what we need to avoid.

With adequate planning and dedication to a just transition, workers will be retrained for a relatively easy shift to clean energy jobs. HVAC contractors will still provide HVAC services, but for heat pumps instead of furnaces and boilers. Drillers will find incredible opportunities installing ground loops. Investors, including those relying on pension funds, will see their investments withdrawn from increasingly risky fossil fuel companies in a timely fashion.

In our roles as utility ratepayers, planning for a smooth transition is especially important. This is even more true now than it was a month ago before state law recognized the proper time frame and the full consequences of methane leakage on the global warming potential of the natural gas we use. Under New York's adopted 2030 and 2050 climate goals, much gas infrastructure will become underused, obsolete, or stranded assets long before their depreciation will be paid off. It will force remaining gas customers, most of whom remained gas customers because they couldn't afford the upfront cost to switch to heat pumps, to bear the heavy burden of an underused gas system.

The solution to this likely eventuality is not an easy one. However, one relatively small step taken now is crucial – we need to stop adding to the problem. New York laws, regulations and practices not only give a green light to increased use of natural gas, with the growing exception of natural gas constrained areas, ratepayers are actually forced to subsidize new users.

The subsidies and support for gas include the 100 foot rule, under which ratepayers provide free pipe installation for gas customers, unlike GSHP installations where the cost burden for the loop pipes is entirely on the building owner. They also include a depreciation term of 65-85 years for gas infrastructure, even though as mentioned above, much of this infrastructure will need to be largely abandoned between now and 2050.

In taking action to remove the subsidies and support for gas expansion, the Commission faces a backlash from those who feel entitled to the subsidies. In the case of depreciation, lowering depreciation terms to reflect likely asset life will tend to increase gas bills for all customers as depreciation is paid down more quickly. These are difficult choices. The alternative however leaves us with much greater problems and ultimately, a fiercer backlash. We have dug ourselves into a hole and need to start climbing out. The worst thing we can do is to keep digging.

14. Balanced and simple incentive structure

Full Recommendation from NY-GEO's July 2018 comments:

The adoption of an incentive structure that balances the importance of locational and other granular factors with the importance of encouraging market penetration by virtue of being easy for property owners to understand.

The points below, put forward in the Commission's December 2018 order, are well stated and ones we fully agree with:

The design of the heat pump program should:

- Drive market scale to produce cost reductions;
- Provide a clear and stable market signal;
- Be simple and workable from the consumer standpoint;
- Be uniform from the provider standpoint, avoiding a patchwork of incentives; and
- Provide a smooth transition from current programs to avoid disruption. ⁷²

Stability:

Regarding the first and second points we believe that this program, if maintained at the original goal of 5TBtu of energy savings, requiring approximately 83,000 installations over the course of its 5 year term, will result in cost reductions. It is impossible to project the scale of those reductions or when they might come during this relatively short 5 year period. The need for stable market signals in establishing and animating this market takes a clear priority and we recommend integrating any cost reductions from this 5 year program into plans for 2026 to 2030.

There are several places where cost reductions are counted before they've hatched, including NYSERDA's counting on a 30% cost reduction to replace the federal geothermal tax credit and several citations of declining block incentives in the JU filing. ⁷³ For NY-GEO, reduced costs are ideal, because they mean more installations, more jobs for our members, the growth of our industry, the fulfillment of our mission and more carbon reduced. However, given New York's GHG goals, and how far the heating sector is behind in helping

⁷² 2019 12 13 PSC Order - page 61 –

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 23

⁷³ 2019 05 21 JU report pp.19,22,24,35, 97 and 104

to meet those goals, as well the need for our members to make plans for growth that they can count on, maintaining a floor under the incentives that are set for this program is a crucial point. If they are set at an adequate level – perhaps one designed for a 5 year payback instead of the 6.25 in NYSERDA’s analysis, it shouldn’t be necessary to consider increasing them during the program term as suggested by Orange & Rockland.⁷⁴ It might be helpful to think of this as the first of six 5-year periods between now and 2050, leaving plenty of time to integrate cost reductions into lower incentives.

Consistency:

Regarding consistency across the state, NY-GEO agrees with the Commission and the Joint Utilities that a program that is as consistent and uniform as possible across the State surely helps with market development. It is easier to market across various lines and easier for the public to understand and embrace.

We certainly do understand the cost differences in various parts of the State, particularly the strong difference in the cost of electricity our customers face when it comes time to pay their electric utility bills after system installation. Given that reality, we believe the 4 tier system laid out by NYSERDA in its missing money analysis provides an acceptable level of variation for rebate levels.⁷⁵ Those four tiers are Long Island, New York City, Hudson Valley and Upstate/Western.

On a technology basis, we believe the rebates should reinforce the State’s goals and provide incentives that predispose consumers to choose heat pump solutions that:

- Provide maximum energy savings
- Supply the full heating and cooling load without relying on electric resistance backup heat
- Supply the largest carbon reduction

⁷⁴ 2019 05 21 JU report p.111

⁷⁵ Case 18M0084.NYSERDA HP Analysis. pp. 55-70– Item Number 83

<http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=18-M-0084> accessed 2019 06 24

- Help utilities avoid peak demand and the cost pressures peak demand put on the bills of all ratepayers

The three technologies focused on by NYSERDA are GSHPs ASHPs and Mini-splits. It is clear that GSHPs are best at fitting these policy criteria. It is also clear that consumers are predisposed to pick the last costly option, in this case, Mini-splits. We believe the best incentive policy is one that truly leaves building owners financially indifferent to any of the three options, and allows them the freedom to choose based on their needs and their desire to embrace the most complete solution.

We offer a final clarification on the structure of incentives. The JU filing states, “Incentive levels are proposed to be provided in most cases as one-time rebate payments per thermal ton of installed capacity for all residential and small-scale (up to ten tons) non-residential installations.”⁷⁶

There is a level of nuance that comes into play with this statement. The NYSERDA rebate program interprets a thermal ton to be a cooling ton, and further strictly defines a ton as 12,000 Btus per hour. Under this method, tonnage would be determined by dividing the numbers in the full load cooling capacity column below by 12,000. While generally on target, the NYSERDA rebate program yields some anomalies that reward less efficient installations with higher incentives. As the table shows.

4 Ton GSHP Heat Pumps (Good, Better, Best) & Rebates

	Cooling				Heating				Rebate
	Full Load		Part Load		Full Load		Part Load		
4 Ton Model	Capacity	EER	Capacity	EER	Capacity	COP	Capacity	COP	
Series 3	49,000	16.0	38,200	22.0	36,000	3.7	28500	4.1	\$6,125
Series 5	50,800	19.3	39,800	27.4	38,200	4.0	31,000	4.4	\$6,350
Series 7	46,000	21.7	19,000	41.0	43,000*	3.6	16,000	5.3	\$5,750

* - Rated on Speed 10, capable of 47,600 on Speed 12

⁷⁶ 2019 05 21 JU report p.19

The heating season represents the highest energy consumption (KWH) and the cooling season represents the highest demand (KW) a rebate program needs to incentivize the importance of reducing both energy and demand. Additionally, new technology, specifically variable speed compressors has created cost-effective heat pumps where the heating capacity and cooling capacity are no longer directly related. For example, the WaterFurnace Series 7 rates and characterizes the nominal tonnage on speed 9 out of 12, while the maximum heating capacity occurs on speed 12. Incentives should ideally stimulate market acceptance and reward such energy saving innovations. Demand reduction should also be incentivized be more aggressively rewarding both peak load EER and COP. The current incentive structure favors lower performance as illustrated in the table above where the lower performing Good & Better heat pumps have a higher rebate than the Best heat pump.

We offer these examples not to discourage a per ton upfront rebate. To the contrary, that is what is most helpful in moving the market. We do want the utilities and the Commission to be aware of some of the nuances in setting rebates. We offer to be helpful in reviewing the incentives as they are developed.

The Transition

The last design point in the Commission's order – that there be a smooth transition between the NYSERDA program and the Utilities' program is of crucial importance. There needs to be adequate time between when the utility program is set and clearly defined and when it begins, so that industry installers and designers, along with those who are marketing Heat Smart programs, are able to maintain momentum and follow through on projects in development between the Fall of 2019 and Spring of 2020. If the utility programs are not set by the beginning of October 2019, it will be crucial for the Commission to order NYSERDA to maintain its programs in a way that seamlessly bridges the transition.

Appendix A. Precursor concept to the NetZero LMI Neighborhood proposal

Thermal Microgrid - The Resurrection Project

The East Side of Buffalo is the epicenter of poverty in upstate New York. While Governor Cuomo's Buffalo Billion plan is clearly working its magic in much of Western New York, East Buffalo continues to decline and could stubbornly pull down the momentum of the Governor's initiative if that decline is left unchecked.

The Broadway-Fillmore neighborhood of Buffalo is a prime example of this urban decay. Broadway-Fillmore also houses treasured cultural institutions such as the Broadway Market, the Dyngus Day Parade, the Chopin Singing Society, the Central Terminal, St. Stanislaus Church, the Adam Mickiewicz Library and the more recently developed Wilson Street Farm and the Chua Tu Hieu Temple and Buddhist Cultural Center. It is in desperate need of revitalization and well worth revitalizing.

There is a 3 block area in Broadway-Fillmore, just West of Fillmore Avenue, bounded by Broadway, Wilson Street, Coit Street, and Paderewski Drive, where, of approximately 48 total residential lots, 12, 10 and 8 houses respectively remain on these blocks.



This neighborhood is where Buffalo's Polish population settled in the late 1800's as reflected in street names like Sienkiewicz and Paderewski and the existence of Buffalo's famed Broadway Market, located in the 2nd block East of Fillmore, off Broadway.

Many of the houses exemplify a unique "telescope" style of architecture where shorter and shorter additions were built on the back of the house as more and more family members arrived from Europe. The neighborhood is part of the St. Stanislaus Church parish, a bedrock on the East Side, but one that is in critical need of a resurgence in the surrounding neighborhood.

Spurred on by the Governor's Buffalo Billion, Western New York is clearly turning a corner in its resurgence. The primary area lagging behind and casting doubt on the ultimate success of the strategy is Buffalo's East Side, epitomized by this and many similar nearby neighborhoods. A clear resurrection of these 3 blocks would strike at the heart of these doubts and would spearhead the completion of the Governor's vision.

Reforming the Energy Vision (REV) could be key to this resurrection. We propose setting up a REV demonstration project for this 3 block area. The project will demonstrate 3 strengths of geothermal heat pump technology (GHP) relative to the REV goals.

GHP is an important tool for:

- Reducing peak demand by providing the most efficient air conditioning precisely when it is needed most;
- Reducing New Yorker's energy bills by increasing utilization of New York's electricity system during off peak winter months; and
- Reducing greenhouse gas emissions by eliminating the use of fossil fuels to heat buildings and provide hot water, while also reducing the amount of electricity needed to cool buildings.

Utility costs are a significant driver of poverty in Buffalo's poor neighborhoods, with heating bills being the main culprit. New York State spent \$366 million on the Home Energy Assistance Program (HEAP) last year, and current trends indicate that by the 2025 end of the proposed Clean Energy Fund, the state will be spending more to subsidize fossil fuel use through HEAP than it will be spending on clean energy.

The essence of the Resurrection Project will be to efficiently place geoexchange loops on each residential parcel in this 3 block area, providing the base for a respite from crippling and volatile utility bills. By running 48 loops in one project, drilling set up costs can be reduced. Running loops on open lots before in-fill housing is built eliminates many logistical and staging expenses. It will provide a ready-to-use source of storage for both heating and cooling energy in the ground beneath the parcels, which stays at a relatively constant temperature through the seasons. As houses are built, either as part of this project, or at a later date, the ground loops can easily be connected with heat pumps in the basements as they are constructed.

We propose that for the houses that are in adequate condition to remain on site, that a financially attractive geothermal system be offered.

The ultra-low operational costs of running GHP for heating and cooling will allow residents to focus their resources on rebuilding the neighborhood, and will leave more income available to support local food resources like the Broadway Market and the Wilson Street Farm one block South of Broadway.

The demonstration project can be paired with any number of similar 3 block areas on the East Side to provide comparable data on reducing peak loads, increasing system utilization and reducing greenhouse gas emissions.

The REV looks to create new financing models that offer an opportunity for scaling up clean energy technology, particularly in the renewable thermal sector. The Resurrection Project might provide the conditions for a power purchase agreement model, where a single owner of the geoexchange loops provides heating and cooling energy and charges an affordable rate to do so. It might even be possible to provide an “owner’s choice” model where the owner of each parcel can decide between purchasing the loop or executing a power purchase agreement.

Appendix B. NY-GEO on TRM and projected energy savings

Make sure the Heat Pump Calculations in Technical Resource Manual (TRM) accurately reflect savings.

The TRM is a basis for utilities to calculate savings for their energy efficiency programs and was previously updated and approved by the NYSDPS but is now also being transitioned to the Joint Utilities for updates. NYSERDA has also been involved in the savings analysis and recently released a report entitled: New Efficiency: New York Analysis of Residential Heat Pump Potential and Economics Updated May 2019 (Analysis). The accuracy of NYSERDA's Analysis is expected to translate into the TRM as it applies to heat pumps. NY-GEO would like to continue working with NYSERDA, DPS and Joint Utilities on this Analysis since it is critical to how heat pumps are viewed, both in utility EE programs but also as a reference source for other NYS energy and environmental initiatives.

NY-GEO is aware there are ongoing discussions by the NYSDPS, NYSERDA and Joint Utilities to find referenced sources and related calculations to the amount of energy an average Single Family residence requires annually. There are two approaches to determining the Equivalent Full Load Hours (EFLH) of a heat pump, which will in turn provide the amount of electric energy required by a heat pumps at a given efficiency. ***Changes to the methodology for calculating EFLH had the GSHP section showing significantly less savings for homes converting from heating oil to GSHP heat.***

There are a couple of reasons provided for the change. The document states on Page 5:

Manual J design loads are estimated to be 10% higher than peak site heating load. In order to derive EFLH-MJ, EFLH-peak was thus divided by 110%.

This is just the opposite of how designers of GSHP systems think about residential building loads, where the **Manual J design load is always assumed to be lower than the peak site heating load.** The design temperature for Albany is -2F but it might get as cold as -15F or lower for short periods in a given year. This lower temperature is considered to be the peak, and a linear extrapolation would result in a peak load being estimated at 19.4% higher than the Design load:

$$\begin{aligned}\text{Peak Load @ -15 F} &= \text{Design Load @ -2 F} \times ((65-(-15))/(65-(-2))) \\ &= \text{Design Load} \times 1.194\end{aligned}$$

It was also noted in NYSERDA's May 2019 Analysis the following second explanation for the revised analysis states:

It was recognized that the maximum heating capacity a heat pump can deliver is less than its nominal capacity. NYSERDA's heat pump analysis uses full load hour and load factor values that express the correlation between nominal heat pump size and annual load (FLH-nom); thus the

above EFLH-MJ values need to be adjusted. A modification of 30% was applied to reflect this effect for ground source heat pumps, and thus the above EFHL-MJ values were divided by 130% to produce the FLH-nom values

It is true that GSHP equipment has a lower heating output than its nameplate capacity, which is based on cooling capacity. For a 4-ton GSHP system, the cooling output is typically 48 KBtu/hr while in heating it's closer to 40 KBtu/hr. That will have a direct input on the resulting EFLH since you will divide the Annual Heat Load Served by 40 kBTu/hr instead of 48 kBTu/hr. It should make the EFLH larger for a given Annual Heat Load Served, since the heat pump has a lower capacity and will need to run more hours to meet the load.

In an example provided in the NYSERDA analysis for Albany, dividing the 1,748 EFLH-MJ (MJ = Manual J) by 130% to arrive at a new value of Full Load Hour Nominal number 1,345 FLH-nom (later rounded to 1,400). This adjustment results in a series of inaccuracies based on actual system performance, especially when combined with the applied counterfactual oil efficiency rating of 83%. The resulting implications of dividing the EFLH by 130% represent an Annual Load Served reduction of 22.8% and a decrease in fuel oil avoided by the GSHP conversion of 38.6%. The Net Site Energy Savings of 65 MMBtu is 41.6% lower than the previous analysis. Net Site Energy Savings in the Original Analysis was in the range of 110 MMBtu and is, again, more consistent with actual measured systems.

We suggest you derive the Annual Heat Load Served directly from a Manual J analysis and divide it by the full load heating capacity of the heat pump, or 40kBTu as noted in the example above.

Continue to Check Savings Calculations Using Actual Monitored Systems.

Aztech Geothermal located in Ballston Spa, NY provided data on 11 oil to GSHP conversions in the Upstate region. The data of Manual J heat load, prior year oil usage, and net site energy savings based on measured GSHP electric usage all agreed much more closely with the EFLH-MJ for a dual stage 4 ton system prior to dividing by 130% to produce the FLH-nom figures. The Net Site Energy Savings averaged over 130 MMBtu (>85%) vs the May 2019 Report's value of 65 MMBtu when switching from oil to a GSHP for heating in the Upstate region. Considerations were given for domestic hot water contributions to the "before" and "after" energy usage and notes regarding any building envelope/shell improvements which may influence energy savings. There are complicating factors but the data on actual measured sites clearly shows a pattern of more energy savings than NYSERDA's most recent update. These sites, and hundreds of other monitored sites from across the state should be considered before solidifying a load served methodology that appears to grossly underestimate GSHP Energy Savings and Net Site Energy Savings.

NY-GEO is seeking accurate representations of Load Served and energy savings based on the performance of the installed systems across all heating and cooling technologies and regions of NYS. Continue to allow us to be a resource for data showing actual system performance to help improve the accuracy of your calculations.

Heat pump and counterfactual technology Standardized Efficiencies should be levelized more effectively by NYSERDA, DPS and Joint Utilities for the TRM.

Most efficiency ratings have evolved to compare two pieces of equipment from the same technology or fuel source. For example, Annual Fuel Utilization Efficiency (AFUE) is helpful to distinguish the difference between two furnaces while Heating Seasonal Performance Factor (HSPF) is used to compare two ASHPs, but these ratings are not directly comparable. We realize those working on these values are aware of these differences, but some factors should be developed to help levelize these comparisons, so savings are calculated more accurately when switching to heat pumps and when comparing GSHPs to ASHPs.

GSHPs are rated in heating mode at low entering water temperatures, very close to a “worst case” condition, while ASHPs in heating are rated using weather and temperature data for much warmer climate zones than we have in NYS. So simply averaging the manufactures reported HSPF for a given ASHP type and dividing by 3.4 to convert to COP will give you an approximate “seasonal COP” for a climate zone much warmer than any in NYS. Climate corrections for the HSPF of ASHPs have been published by ASHRAE ⁷⁷ and used in efficiency comparison tables by EIA (EIA Heating Fuel Comparison Calculator) still apply and were used in making comparisons between GSHPs and ASHPs in the previous version of the TRM. Getting more stakeholder input and more monitored systems should be used to develop more accurate Standardized Efficiency values.

⁷⁷ Fairey, P., D.S. Parker, B. Wilcox and M. Lombardi, "Climate Impacts on Heating Seasonal Performance Factor (HSPF) and Seasonal Energy Efficiency Ratio (SEER) for Air Source Heat Pumps." *ASHRAE Transactions*, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., Atlanta, GA, June 2004.