NY GEOTHERMAL ENERGY ORGANIZATION

December 8, 2014

Via e-mail

Ms. Kathleen H. Burgess
Secretary, NYS Public Service Commission
Agency Building #3
Empire State Plaza 12223-1350

Re: Case 14-M-0094 – Proceeding on Motion of the Commission to consider a Clean Energy Fund
Initial Comments of NY-GEO, the New York Geothermal Energy Organization

Dear Secretary Burgess:

NY-GEO respectfully submits the attached comments on NYSERDA's September 23, 2014 Clean Energy Fund proposal.

The New York Geothermal Energy Organization (NY-GEO**)** writes as a party to the Clean Energy Fund proceeding. We are a non-profit organization representing geothermal heat pump (GHP) installers, manufacturers, distributors and industry participants from throughout New York State.

Sincerely,

Bill Nowak

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Re: Case 14-M-0094 – Proceeding on Motion of the Commission to consider a Clean Energy Fund Initial Comments of NY-GEO, the New York Geothermal Energy Organization

Dear Ms. Burgess

The New York Geothermal Energy Organization (NY-GEO) submits these comments as a party to the Clean Energy Fund proceeding. We represent geothermal heat pump (GHP) installers, manufacturers, distributors and industry participants from around New York State. NY-GEO has joined the Reforming the Energy Vision (REV) and Clean Energy Fund proceedings to articulate the advantages of GHP technology in assisting New York State to address the following goals, among others:

- cutting peak summer cooling demand
- increasing non-peak electric system utilization
- increasing fuel diversity in NYS and
- reducing Greenhouse Gas (GHG) emissions

Per the PSC's November 6th Notice Soliciting Comments, we will organize our comments using the recommended section headings:

Collections, Budgets, Expenditures, Allocation Methodologies

NY-GEO understands that the REV and CEF proposals are aimed at moving the dynamic in New York State to one where "*private market investment will incrementally take the place of ratepayer funding." (CEF p. 6).* In general NY-GEO recognizes the benefit of this course, as well as the danger of maintaining incentives past their beneficial lives. Perhaps the best examples of this are the many taxpayer subsidies given to fossil fuel interests, particularly at the federal level.

There is a danger, though, of "throwing the baby out with the bath water". New York has important policy goals set to benefit the citizens of the state that are clearly and repeatedly enunciated throughout the CEF proposal. Among the most important of these are:

- saving ratepayers the unnecessary expense of maintaining extra generating capacity by reducing peak load
- protecting New Yorkers against price volatility by maintaining fuel diversity, and
- saving us all from the worst ravages of climate change by substantially reducing greenhouse gas (GHG) emissions.

NYSERDA is engaged in a balancing act of strategically encouraging private markets to fund projects that help meet those goals, while maintaining funding and incentives for projects that are necessary to meet those goals where the private market is not yet ready to provide funding.

Throughout these comments, NY-GEO will be stressing that GHP technology has major potential to help New York meet these goals and that GHP technology needs to come front and center in the CEF proposal.

The following page is a colorful, pared down description of the benefits GHPs offer. NY-GEO recently prepared this benefits one-pager as a summary for NY State policy makers. We will expand on these benefits in this document and are prepared to provide fuller documentation as desired by NYSERDA.

Geothermal Heat Pumps (GHPs):

A Great Fit for New York State's Energy Goals

NY GEOTHERMAL ENERGY ORGANIZATION

Reduces Summer Peak

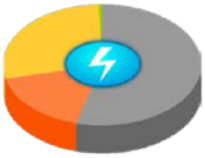
- Best HVAC option for reducing peak air conditioning demand

Improves Winter Grid Utilization

- Increases base load during non-peak winter periods

Least GHG Emissions

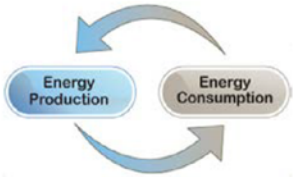
- Highest renewable component of practical HVAC systems
- Leverages NYS's clean electric grid capacity



Contributes to Fuel Diversity

- Reducing State's dependence on fossil fuels and related price volatility

Shortest Path to Net Zero Energy



- Lowest non-combustion HVAC powered by renewable solar PV

Local Labor – Creates and Retains Jobs

- Straightforward training for any mechanical contractor
- Relies on local drillers and excavators

Broadly Applicable

- Can be installed in practically any building in NYS

A Solar Technology

- GHPs access the solar energy stored in the ground
- Renewable solar energy accessible 24·7·365

GHPs Offer the Greatest Savings Potential for Many NYS Buildings

- 50% savings on AC for buildings with natural gas access
- Additional 50% savings on heating cost without natural gas service

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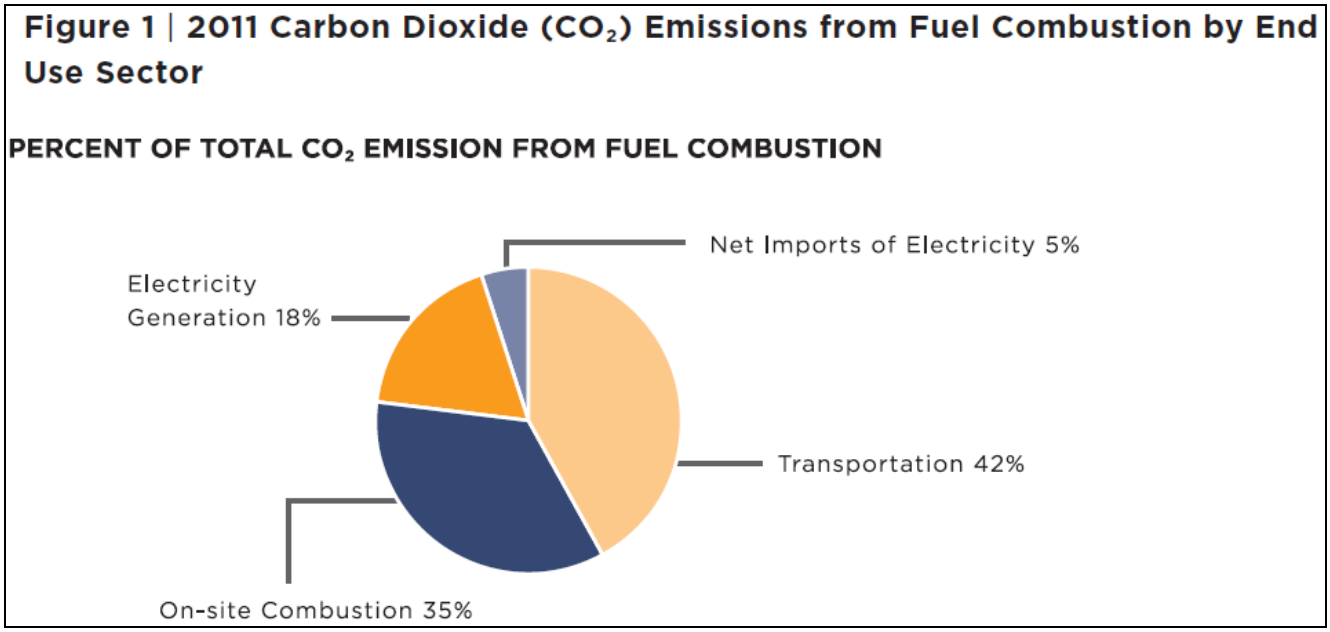
We contend that the geothermal heat pump (GHP) industry is in a phase similar to where the solar PV industry was 10 years ago. In the intervening 10 years, federal and state tax credits and tax exemptions, meaningful rebates, and focused support by NYSERDA and the PSC in breaking down market barriers, have enabled the PV industry to mature. Today the solar industry is thriving and the CEF is proposing a transition to where the PV industry can be entirely financed through the private market while that industry continues to thrive. With similar support, the GHP industry can undergo a similar transformation.

Some of the similarities between "Solar then" and "GHPs now" include:

1. GHPs hold tremendous potential to help New York meet its goals just as solar did a decade ago
   - 10 years ago, with the adoption of the Renewable Portfolio Standard, New York recognized the need for its electric generation system to transition away from dirtier, GHG intensive fuels like oil and coal (almost 30% of New York's mix in 2004) to clean renewables. Figure 1 below is from the 2104 Draft New York State Energy Plan [1]. It shows that electricity generation in NY now produces a smaller volume of greenhouse gases than on-site combustion - used primarily to heat our homes and buildings.

Figure 1 | 2011 Carbon Dioxide (CO_2) Emissions from Fuel Combustion by End Use Sector



If New York is to meet it's goal of an 80% reduction in GHGs by 2050, deep cuts in

[1] Volume 2 of the 2104 Draft New York State Energy Plan, page 11

transportation and heating emissions will need to take place. GHPs eliminate the on-site burning of fossil fuels. When coupled with conservation and energy efficiency improvements, they it give us the best chance to make the deepest cuts in heating emissions.

New York State's December 1, 2014 comments to the USEPA on the 111D proposed carbon pollution emission guidelines reinforce this point. [2]

> Requiring New York to seek dramatic reductions in the electricity generation sector may also have unintended consequences in broader GHG emission reduction policy and strategy. New York's draft 2014 State Energy Plan identifies a goal of reducing the carbon intensity of its energy economy 50% by 2030. This intensity reduction equates to an approximately 40% reduction by 2030 on a mass basis. New York, like many other cold-weather states, has a large space heating (or "thermal") load, the vast majority of which is met through fossil fuel combustion. Unique to New York is the significantly large portion of this thermal load that is met through petroleum distillate (i.e., "heating oil"); in the residential sector this distillate thermal load approaches 30% of all housing units in the State. When compared to New York's electricity sector, the thermal load sector is considerably more GHG-intense. To meet the State's overall GHG reduction policy, New York will be looking to make more "productive" investment in the thermal load sector, achieving greater levels of GHG reduction per dollar of investment. One potential undesired consequence of EPA's proposal is that, if New York is asked to dedicate a disproportionate amount of its limited investment resources in seeking less productive emissions reduction in the electricity sector, this is likely to sacrifice a level of investment in the more intensive thermal load sector, eroding progress towards overall GHG emission reductions.

- One of the rationales for strongly backing Solar PV is that it can help cut NY's summer cooling peak load. GHPs, an ultra efficient cooling technology, can play the same role in a more consistent fashion, as GHP cooling is available 24/7/365 and doesn't run into solar PV's problem of diminished evening production just as families are coming home and running lights and appliances. In 2010 the Oak Ridge National Laboratory looked at the potential impacts of wide-scale home retrofits to GHPs. They projected a significant beneficial impact on peak demand. The figure below is the Northeast section of a table that estimates a national total potential peak load reduction of 202.1 GW. [3]

[2] http://www.dec.ny.gov/docs/administration_pdf/nyscomments.pdf, accessed 12/6/24, page 3

[3] Assessment of National Benefits from Retrofitting Existing Single Family Homes with Ground Source Heat Pumps, June 2010, Xiaobing Liu, Oak Ridge National Laboratory (page 27, table 10) http://www.energy.ca.gov/2013_energypolicy/documents/2013-03-21_workshop/background/Liu_GSHP_Report_8-30-2010.pdf accessed 12/06/14

Reduced summer peak electrical demand from GHP retrofits for existing US single family homes

Census Region	SH-SC-WH System Types	Number of Single-Family Homes that Have Space Cooling	Percentage of Various Equipments Used for Space Cooling	Regional Average of Installed Space Cooling Capacity for the Reference Building	Normalized Peak Electrical Deamd for Space Cooling of Existing SC Systems	Normalized Peak Electrical Deamd for Space Cooling of the GHP System	Reduction in Normalized Peak Electrical Deamd for Space Cooling from the GHP Retrofit	Percentage Reduction of Peak Electrical Deamd for Space Cooling from GHP Retrofit	Estimated Regional Peak Electrical Demand for Space Cooling by Existing Systems	Estimated Regional Potential in Reduction of Peak Electrical Deamd for Space Cooling				
										20% Market Penetration Rate for GHP Retrofit	40% Market Penetration Rate for GHP Retrofit	60% Market Penetration Rate for GHP Retrofit	80% Market Penetration Rate for GHP Retrofit	100% Market Penetration Rate for GHP Retrofit
		(millions)		Ton	kW/ton	kW/ton	kW/ton	%	GW	GW	GW	GW	GW	GW
Northeast	Space Cooling	11.1	100%	2.0	2.7	1.0	1.8	64.9%	60.7	7.9	15.8	23.6	31.5	39.4
	Central air conditioner	4.95	44.4%		2.3	1.0	1.4	59.0%						
	Room air conditioner	6.10	54.8%		3.0	1.0	2.1	68.5%						
	Both central and room AC	0.10	0.9%		2.7	1.0	1.7	64.4%						

Source: Assessment of National Benefits from Retrofitting Existing Single Family Homes with Ground Source Heat Pumps, June 2010, Xiaobing Liu, Oak Ridge National Laboratory (page 27, table 10)

New York's share of the Northeast peak reduction, if it were proportional to the state's population within the region, would be 2.8 GW for every 20 % of GHP market penetration. 2.8 GW is over 8% of New York's peak demand in the years 2010-2012.

2. Ten years ago most New Yorkers had little conception that solar was feasible in our state The same is true of GHPs today, and with a concerted effort, a similar transformation in public awareness and enthusiasm is possible. GHP is a similar technology to solar PV in that it is a largely a customer-cited, behind the meter measure that cuts operating costs dramatically. Even more than solar PV, it has very little in the way of aesthetic impacts. This combination of low impacts, residential scale, and cost savings, promise to make GHPs - like solar PV - a very popular technology, reflecting well on those who have a hand in bringing it to market.

3. Ten years ago most of those who were aware of solar's potential assumed it was too expensive for widespread adoption. Today consumers are clamoring for solar installations as a way to save money. GHP installations are actually in a similar total cost range to solar PV for most home and business owners across the state, yet GHPs lack the tax credits, tax exemptions, up-front rebates, financing options and ratepayer supported momentum that the solar PV industry has enjoyed.

4. One of the key premises in supporting the transition to renewables, and solar PV in particular, has been its potential to create good jobs and retain wealth in our state. This premise has been realized in the development of the solar PV industry. The Solar Energy Industries Association website notes that " There are currently more than 422 solar companies at work throughout the value chain in New York, employing 5,000 people." [4] GHPs have perhaps greater on-shore job

[4] http://www.seia.org/state-solar-policy/new-york, accessed 12/6/14

creation potential, as most heat pumps installed in the U.S. are manufactured in the U.S. There are about 200 HVAC companies in New York State that have installed GHP systems. For most, this is currently a small part of their business and most GHP jobs are done by 25 of these companies. NY-GEO estimates there are currently 1,000 NY workers employed in GHP marketing, sales, system design and installation. Thousands more employees across a variety of industries provide necessary products and services, including plastic pipe, tools and equipment, installation, engineering, drilling and excavation—jobs that can't be outsourced to other countries. GHP jobs are generally well paying, family sustaining jobs.

Another economic consideration is that effective state policies that judiciously cut the impact of GHP's upfront costs would help reduce the 36 billion dollars that leave New York every year in out-of-state fuel costs.

Table 2 | Energy Expenditures that Leave New York's Economy in 2012

FUEL TYPE	TOTAL ENERGY EXPENDITURES	PERCENTAGE OF ENERGY EXPENDITURES THAT LEAVE NY	AMOUNT OF ENERGY EXPENDITURES THAT LEAVE NY
Electricity	21,825	31%	6,766
Natural Gas	8,084	50%	4,042
Coal	127	85%	108
Gasoline	18,691	80%	14,952
Other Petroleum	12,305	85%	10,459
TOTAL	**61,031**	**60%**	**36,327**

Source: NYSERDA. *Patterns and Trends: New York State Energy Profiles* (1997–2011). June 2013. 2012 values based on EIA preliminary estimates.

Given these similarities to the solar PV industry, NY-GEO believes it is important that enough resources are available over the life the Clean Energy Fund to provide support for GHP similar to that which has allowed solar PV to make such strong inroads in New York State. We are concerned that the projected substantial declines in the CEF from $933 million in 2016 expenditures to $336 million in 2025, may make such support impossible. However, we have identified Market Development as the CEF sector that is most likely to be used to support GHP and we note that the Market Development budget stays relatively constant over the life of the CEF (Table 6 - page 44 of the CEF).

Table 6: Funding Requests (in Millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Request for Program Authorization											
Market Development Programs	$265	$265	$265	$265	$265	$240	$240	$240	$240	$240	$2,525
Innovation Programs	$68	$68	$68	$68	$68	$68	$68	$68	$68	$68	$679
Other Initiatives Included in Proposed CEF Budget											
NY-Sun	$120	$120	$120	$120	$120	$120	$120	$120	$-	$-	$960
NYGB[22] (including $195M in 2015)	$195	$195	$195	$-	$-	$-	$-	$-	$-	$-	$782
Total	**$648**	**$648**	**$648**	**$453**	**$453**	**$428**	**$428**	**$428**	**$308**	**$308**	**$4946**

While noting the danger of declining revenues drying out the pool needed to support GHP as a key technology, NY-GEO looks forward to working with NYSERDA to develop an appropriate mix of rebates, tax credits, financing options, Low to Moderate Income programs and other mechanisms to allow GHPs to help New York State reach it's major goals of reducing peak load, increasing fuel diversity and cutting GHGs.

While New York is in the process of gradually phasing out rebates for solar PV, it is important to recognize that rebates are an important part of the process that brought solar PV to the point where market self-sufficiency is now within sight. If GHP technology is to grow to a point where it can have significant impacts on peak load reduction, low and moderate income energy affordability and GHG emissions, NY-GEO believes that rebates are an important support for that growth. We urge NYSERDA to look closely at Maine's Home Energy Savings Program [5], which offers incentives up to $5,000 for geothermal systems, at PSEG Long Island's Utility 2.0 program [6] which provides per ton rebates for residential and commercial systems, and the Massachusetts Clean Energy Center/ Department of Energy Resources geothermal rebate program[7] which gives $2,000 a ton up to $10,000 for GHP installations.

Section 9 of the CEF (pp. 53-54) proposes a reallocation of existing funds:

[5] http://www.efficiencymaine.com/at-home/home-energy-savings-program/hesp-incentives/ accessed 12/7/14

[6] www.psegliny.com/files.cfm/2014-07-01_PSEG_LI_Utility_2_0_LongRangePlan.pdf accessed 12/7/14

[7] www.google.com/#q=dsire+massachusetts+geothermal+rebates accessed 12/7/14

NYSERDA requests to reallocate a total of $37 million, comprising $2,240,753 from EEPS1 (Gas) and $34,759,247 from SBC3, to the following EEPS2 (Gas) programs in the following amounts:

Industrial Process:	$13,000,000
MPP Market Rate:	$2,500,000
MPP Low Income:	$7,500,000
Assisted Home Performance with Energy Star:	$3,000,000
Empower:	$11,000,000
Total Reallocation Request:	$37,000,000

NY-GEO requests consideration that fuel neutrality and the importance of thermal renewables be part of the reallocation of unexpended fund balances.

CEF Support for NY-Sun

> *"...continuation of NY-Sun from 2016 through 2023 was authorized by the Commission in April, 2014, when $960,556,000 was allocated to fund, implement and administer the initiative." (CEF p. 21)*

NY-GEO encourages support for the NY Sun Program. GHP is, after all, a solar technology. The vast majority of heat harvested by GHP systems is solar energy absorbed by the earth's surface. In addition, NY-GEO sees net-zero buildings as an important market for GHP in New York State. Using only on-site resources, in New York's climate the most efficient and effective way to reach net-zero combines solar PV with GHPs for heating and cooling. As New Yorkers experience the advantages of solar PV we expect them to expand their horizons to look at how they can renewably heat and cool their homes.

We urge NYSERDA, NYPA and the PSC, when developing programs such as NY-Sun, Solarize NY [8] and K-Solar, to include geothermal in the program design. GHP is a solar, renewable technology.

> *"Historically, high upfront capital costs for solar or wind dampened interest at the consumer level -- it was easier and cheaper to continue purchasing power from the central power grid. However, this dynamic has changed in the past decade with the advent of the clean energy power purchase agreement (CEF PPA) and third-party lease models through which the PV industry has realized unprecedented gains. ... As leases, PPAs and other financing mechanisms chip away at the issue of clean energy's high up-front price tag; the focus of the CEF can shift to addressing customer acquisition, installation, permitting, and other soft costs." (CEF p. 14)*

NY-GEO looks forward to working with NYSERDA and the Green Bank to develop financing mechanisms that chip away at high up-front price tags. We also remain cognizant that rebates and tax credits have been crucial to the establishment and viability of those financing mechanisms. In order for NY State to maximize GHP's power to help cut peak demand and reduce greenhouse gas emissions, both "old school" rebates and tax credits and "new school" financing mechanisms will be necessary over the 10 year period of the Clean Energy Fund.

In that regard, the Megawatt Block program may offer a model for taking GHP technology from its current state, through a period of rapid growth, to a self-sustaining end state.

> *"Through the MW Block approach, the NY-Sun incentive program has been designed to drive market penetration on a large-scale basis, allocating MWs to specific regions of the State, breaking those regional MW targets into blocks to which incentives are assigned and awarding incentives based upon the block in effect at the time. As the blocks are filled, incentives decline. This approach enables a self-sustaining industry in the long run."(CEF p. 39)*

[8] https://www.governor.ny.gov/news/governor-cuomo-launches-new-effort-boost-solar-implementation-communities-across-new-york-state, accessed 12/6/14

Market Development Strategies

We will address Market Development Strategies in the order they appear in the CEF proposal. NY-GEO is looking to participate in NYSERDA's efforts to knock down clean energy barriers and guide clean energy technologies to market self-sufficiency. We are also looking to participate in NYSERDA's ongoing funding programs. As a renewable thermal technology, GHPs have largely been locked out of those programs. NY-GEO is looking to the REV and CEF proceedings as our key to unlock the door to full support for GHP technology in proportion to its ability to help NY reach its energy goals.

Given the following statement, NY-GEO understands that GHP fits well in the Market Development section of the CEF:

> *"The Market Development portfolio will principally include activities facilitating the market for on-site, behind-the-meter clean energy including: energy efficiency, on-site distributed generation, renewable thermal, as well as storage, micro-grids and other supporting energy technologies." (CEF p.20).*

Indeed, GHPs are well described as "*on-site, behind-the-meter clean energy including: energy efficiency, on-site distributed generation, renewable thermal, as well as storage"* and GHPs hold enormous potential for strengthening and increasing the efficiency of microgrids.

As such, NY-GEO intends to be as actively engaged in the Market Development program as possible and requests to be represented on all relevant Advisory Groups as delineated below:

> *"NYSERDA recommends the creation of new Advisory Groups to help inform the evolution of the CEF portfolio. NYSERDA's current Advisory Group for the SBC-funded Technology & Market Development (CEF T&MD) portfolio has been successful in providing technical expertise, insights and direction, and has enhanced the T&MD program performance and design. New Advisory Groups targeted for each of the Market Development and the Innovation portfolios could be designed to build on the success of the T&MD Advisory Group." (CEF p7)*

NY-GEO is actively engaged in an on-going dialogue with NYPA. At NYPA's invitation we are currently working to submit a "one-pager" on geothermal for the NYPA's municipal and other service customers. We are exploring participation in NYPA's Energy Efficiency Innovation Collaborative. NY-GEO believes that a major efficiency opportunity was lost when GHP technology wasn't initially integrated with the K-Solar program and we are seeking to explore how GHPs can be part of follow up efforts, particularly as K-Solar stimulates interest from the schools to the surrounding communities.

> *"NYPA programs will reach the extensive state facilities and municipal buildings market, providing a $200 million per year "lead by example" platform, BuildSmart New York, which commits to reduce energy consumption in New York State buildings by 20% by 2020….To deploy these resources strategically, NYPA will continue to offer low-cost clean energy*

financing as well as a new suite of energy consulting and advisory services to municipal and other customers depending on particular areas of community need and priorities.

Through the CEF, NYSERDA will act as a market-maker, stimulator, and aggregator of clean energy demand, both in market-ready sectors as well as in promising areas of the market that need public investment as a bridge to market readiness or among populations that the market is unlikely to serve, such as rural or low- to moderate-income communities." (CEF p. 15)

NY-GEO understands that utilities will be asked to play a major role in initiating and funding Distributed Energy Resources (DER) and seeks guidance and support from NYSERDA and the PSC in accessing a role in the utility programs that will result. At the same time NY-GEO looks forward to helping NYSERDA follow through on this statement from page 21 of the CEF:

"NYSERDA supports the directional shift in the Department of Public Service (CEF DPS) REV Straw Proposal which calls for utilities to engage more comprehensively in DER, including energy efficiency, and to take primary responsibility for assuring deployment of these technologies within their service territories mainly though resource acquisition and procurement approaches. While this shift is necessary and appropriate, resource acquisition programs alone will not be sufficient to meet the State's broader energy policy goals. As noted in this Proposal, the market for energy efficiency, as for several other behind-the-meter solutions, is not yet fully enabled. In this context, the effective deployment of public, ratepayer funds shifts to funding the preconditions for adoption. A government agency, like NYSERDA, is best positioned to operate more upstream and work to enable more regional-scale market interventions and transformations, to take more risk, to adopt a longer-term strategy, and to target market transformation. Public ratepayer funds will also be used to support clean energy among segments (such as lower income populations) that the market will not likely serve readily, for reasons of both equity and the attainment of the State's climate and energy goals." (CEF p.21)

NY-GEO takes encouragement from the following statement spanning pages 23 and 24 in the CEF proposal:

"NYSERDA will seek to address, among others, the following barriers currently facing clean energy technologies:

- *Financial impediments, such as issues of first cost, and of workable financing, compounded by debt aversion on the part of many customers; (CEF p. 23)*
- *NYSERDA will continue to provide incentives to end users and/or suppliers where necessary, and in doing so will aim to use market-mobilizing mechanisms (e.g., auctions, step-downs). There are three situations when incentives are most appropriate:*

  1) As a temporary bridge to an incentive-free market solution;
  2) Where the incentive creates public accessible infrastructure (e.g., a "pilot",

or a beta-version);

3) Where market gaps occur even in efficient markets and a subsidy may be necessary (e.g. Low/Moderate Income (LMI), rural)." (CEF p. 24)

First cost is definitely an area where NYSERDA can be helpful by "continuing to provide incentives to end users". Consumer debt aversion is definitely calmed where incentives are provided to scale back the size of debt. NY-GEO is particularly interested in the 3rd situation mentioned. Rural sites, many of which are not serviced by natural gas, present a key opportunity for both the State and the industry, as dirtier and more expensive fuels are often used to heat homes. In addition, LMI households are the ones hardest hit by volatile fuel prices in our state. GHPs can be particularly helpful for these sites and we look forward to working with NYSERDA to increase the effectiveness of our outreach to both rural and LMI New Yorkers.

On page 25, the CEF addresses the consumer mindset and proposes several ways to "*impact energy use practices in the residential single family sector".* NY-GEO agrees that this an important way for NYSERDA to contribute to the transition to clean energy, contends that GHPs should be a prominent option offered in any materials developed, and requests to be consulted in the development of those materials for residential, multifamily and commercial sector uses.

NY-GEO is particularly interested in partaking in the Net-Zero initiatives noted in the CEF proposal on pages 26 and 28:

- *"Accelerate the move to Net-Zero in new multifamily buildings by engaging engineers, architects and designers early to ensure vanguard projects succeed, and by supporting marketing efforts to communicate the benefits of these buildings. Build structure for information sharing among early adopters of these projects (e.g., forum to share best practices and business case examples)." (CEF p.26)*

There are rare circumstances in New York's climate where GHPs won't be the most effective heating and cooling option for net-zero buildings.

Regarding the LMI sector, NYSERDA is right on target with the following statement. GHP should be a first tier option in any deep energy retrofits:

"The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the LMI sector:

- *Provide direct end-user incentives to increase energy efficiency and distributed generation adoption;*
- *Educate and convince affordable housing property owners/managers and their tenants of the financial benefits of energy efficiency investments (e.g., demonstration projects with*

> *performance guarantees). Facilitate on-site training for building managers. Target landlords with portfolios of multiple affordable housing properties to drive scale. Facilitate execution of deep energy retrofit projects (potentially incorporating both efficiency and distributed generation measures) at points of refinancing/recapitalization;" (CEF p27)*

NY-GEO looks forward to participating in PACE financing programs as PACE is an excellent tool for softening first-cost barriers.

> *"Additionally, local governments are in a position to promote and implement a wide range of demand-accelerating and soft cost reducing measures including: project aggregation, standardized permitting and inspections, Property Assessed Clean Energy (PACE) financing, and zoning." (CEF p. 30)*

NY-GEO is currently engaged with NYSERDA's Energy Analysis section regarding major problems with the treatment of GHPs in New York Energy Efficiency and Renewable Energy (EE/RE) Potential Study. As such, we believe that none of the Potential tables on pp. 59, 62, 68, 71 and 76 include contributions from GHPs and this is a major omission. We respectfully request that the tables in the final CEF proposal be amended to show the substantial petroleum and natural gas savings contributions that GHPs will be making during the CEF life cycle.

NY-GEO proposes that there is a substantial opportunity for NYSERDA and the PSC to work with the Home Energy Assistance Program (HEAP) to begin transitioning HEAP resources from a permanent subsidy of the fossil fuel industry to using them to increase the numbers of low and moderate income homes equipped with GHPs - a permanent solution providing the lowest possible operating costs for space conditioning.

In NYSERDA's October Low Income Forum on Energy (LIFE) program, it was reported that New York spent $366 million on the HEAP program last year – more than the annual projected CEF Market Development program, and about what is projected to be spent annually on the total CEF program after 2018. NY-GEO realizes that HEAP includes life-saving measures, and that the funds are from federal taxpayers. But the reality is that after 2018, the CEF will leave New Yorkers spending about as much public money to subsidize fossil fuel companies to keep greenhouse gases spewing out of our chimneys as we do to develop efficiency and clean, renewable energy in our state.

On page 60 of the CEF NYSERDA rightly proposes "equipment failure or underperfomance" as a "window of opportunity". HEAP provides a Heating Equipment Repair or Replace (HERR) program. During the October LIFE session it was stated that the $3 million allocated to HERR last year was exhausted by January 31, 2014. After that point, HEAP partnered with NYSERDA's Empower program to pay for repairs and replacement of equipment. NY-GEO proposes that NYSERDA and the PSC set up a working group to develop a pilot program for transitioning a given number of HEAP homes each year from ones where oil and gas suppliers are subsidized to models of sustainable low and moderate income living.

The HERR program can also install air conditioners in eligible households. Space cooling is a medical necessity for many New Yorkers, but GHP can cool air in a way that minimizes peak cooling demand rather than inefficiently expanding it.

Moving on, page 61 in the Residential Single Family section of Appendix B notes the conditions where direct financial incentives are appropriate, mentioning renewable thermal, and net-zero. NY-GEO welcome s these criteria .

> *"2. Providing direct financial incentives with an explicit focus on motivating service providers and product suppliers to capture latent demand and, where needed, to build nascent markets that offer high carbon reduction potential.*
>
> - *Invest in market actor enabling initiatives, consistent with the "bridge" model, where incentives are used to build demand and infrastructure to a point where incentives are no longer needed. …*
> - *Continue to support the renewable thermal industry, with incentives to enable the market to develop, attract providers, and build the infrastructure and approach the scale necessary to create a self-sufficient market.*
> - *Incentivize builders, architects and designers to build demand for, and develop, Net Zero homes." (CEF p. 61)*

This section goes on to advocate for PACE and other finance and repayment options. Once again, NY-GEO finds these welcome actions. We propose adding GHPs to the 3rd bullet:

> *"3. Serving as a policy advocate to improve codes, standards and mandates*
>
> - *Greater access to better finance mechanisms such as on-bill recovery with a broader lender base and Residential Property Assessed Clean Energy structures.*
> - *Work with municipalities to upgrade single family building codes and support the enforcement of existing codes.*
> - *Continue and reinforce support for standardized permitting and inspection forms and processes for solar electric projects, and expand these efforts to address other technologies/measures (e.g., solar thermal, home efficiency projects).*
> - *Work to increase access to and availability of finance options and repayment mechanisms." (CEF p.* 62)

Similar positive items are proposed in the Multifamily Residential and Commercial sections as well and we propose GHPs as a prime consideration when NYSERDA needs to act on these proposed measures.

The LMI RESIDENTIAL (SINGLE FAMILY AND MULTIFAMILY) section starting on page 65 contains some excellent language that should indicate GHPs have a solid role to play in this sector. As NYSERDA continues to develop its LMI program, NY-GEO requests an active role in exploring opportunities in this sector:

> *"Approximately 2.2 million of NYS households have incomes at or below 60% of the State Median Income (CEF SMI), while nearly 700,000 households have incomes between 60% and 80% of the SMI. This market segment represents nearly 40% of all New York households, an indication that the LMI sector is a substantial customer base to be served. As a subset of the Residential Single Family and Multifamily sectors, the achievable energy savings potential of the Low / Moderate income segment is most concentrated in the end-uses of thermal comfort (CEF e.g., shell/envelope) and space heating. Both of these end-uses present the opportunity to target the combination of energy savings, health and safety benefits. These findings guided NYSERDA to focus its market research in the LMI sector on key barriers and decision points for these main end uses, due to the higher savings potential.*
>
> *Of note in this sector is the heightened value that energy performance improvement can offer to these buildings and residents. If the considerable barriers can be surmounted, the economic and quality of life rewards available through improved living conditions and through improved energy costs matter here more than in most sectors." (CEF p. 65)*

In addition the LMI sector probably contains the highest percentage of households without air conditioning, and that may well become a serious health threat as the climate warms and heat waves increase. The New York State Climate Action Plan Interim Report Fact Sheet [9] leads with the statement that:

> *"Climate change has already put in motion certain environmental impacts in New York and further changes are likely:*
> - *Average air temperatures are projected to increase form 5 to 7.5 degrees on average by 2080 and heat waves are expected to become more frequent and intense…"*

No one in New York State wants to be seen as the person who draws the line between who will be eligible for air conditioning as the climate warms. But supporting anything less than the most efficient method of space cooling is counterproductive to all of NYSERDA/PSC's efforts to reduce peak demand and cut greenhouse gas emissions in New York. Only GHP technology can fill the role as the most efficient method of space cooling.

The RENEWABLE THERMAL section of the CEF proposal starts on page 75 and includes "*biothermal, solar thermal and heat pumps (CEF ground-source/air source*)." Regarding solar thermal, it states:

[9] The New York State Climate Action Plan Interim Report Fact Sheet, New York State Climate Action Council, appointed by Governor David A Patterson

> *"... the State's RPS program was expanded to include solar thermal systems and a small consumer information program has been launched by NYSERDA. The initiative has been supplemented with some RGGI funding to allow for inclusion of solar thermal systems to replace petroleum. Since program launch, 4 MW of solar thermal systems have been developed with approximately $7M of public funds, plus approximately equal private funds...NYSERDA has recently commenced discussions with the industry to chart a path forward to a more vibrant solar thermal market consistent with the goals and strategies of the CEF."*

The renewable thermal section notes last summer's announcement by the governor of the "Renewable Heat NY" program for wood heating equipment. Also of note is NYSERDA's Solar Thermal Incentive Program [10] for displacing electrically heated domestic hot water, and New York's Refundable Heating Fuel Tax Credit [11] for biomass. Between these initiatives and the state's testimony on the EPA 111D plan cited earlier in this document, New York appears to be rapidly moving to embrace the renewable thermal field.

In order to make the most of this o pportunity, NY-GEO proposes a similar set of discussions with NYSERDA to the ones mentioned above for solar thermal in order to chart a path forward to a more vibrant geothermal heat pump market.

In the HEAT PUMPS section on page 76, NY-GEO welcomes the opening statement that:

> *"These technologies present significant opportunities to reduce on-site fossil fuel use and save customers money. NYSERDA proposes to include these technologies as part of the CEF. "*

However, the potential savings data in the table that follows pertain only to air source heat pumps (ASHP). As NY-GEO analyzed this table, we noticed that the ratio between electricity used and petroleum saved in the table on page 76 indicate a Coefficient of Performance (COP) in the neighborhood of 4 for most of the applications cited. This is a reasonable COP for GHP systems in New York, but is very high for ASHPs, which rapidly lose efficiency at high and low temperature conditions, which are typical in New York's climate. The DOE's Energy.gov website states: [12]

> *"Geothermal heat pumps (GHPs), sometimes referred to as GeoExchange, earth-coupled, ground-source, or water-source heat pumps, have been in use since the late 1940s. They use*

[10] http://www.nyserda.ny.gov/Funding-Opportunities/Current-Funding-Opportunities/PON-2149-Solar-Thermal-Incentive-Program.aspx accessed 12/6/14.

[11] http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY54F&re=0&ee=0 accessed 12/7/14

[12] http://energy.gov/energysaver/articles/geothermal-heat-pumps accessed 12/6/14

the constant temperature of the earth as the exchange medium instead of the outside air temperature. This allows the system to reach fairly high efficiencies (300% to 600%) on the coldest winter nights, compared to 175% to 250% for air-source heat pumps on cool days."

In contacting NYSERDA with this analysis, we learned that the tables in the CEF are based on NYSERDA's Energy Efficiency/Renewable Energy Potential Study [13] As mentioned earlier in this document, NY-GEO is currently engaged with NYSERDA's Energy Analysis section regarding major problems with the treatment of GHG in this study. We entered into these discussions in order to correct underlying assumptions and misinformation, and one of our prime goals is to help NYSERDA give an accurate assessment of GHPs economic potential in the CEF proposal as it is finalized.

One important factor that should be included in the next iteration of the thermal renewable section is the crucial and unique capacity of GHP as a thermal renewable technology to reduce peak electricity usage. According to the Draft Generic Environmental Impact Statement for the REV and CEF. [14]

"Increasing system efficiency such that if the 100 hours of greatest peak demand were flattened, long-term avoided capacity and energy savings would range between $1 billionand $2 billion per year."

Exhibit 2-4 from the DGEIS - 2013 ELECTRICITY DEMAND, BY NEW YORK CONTROL AREA LOAD ZONE is taken from data on page 21 of the 2014 NYISO Gold Book [15].

[13] http://www.nyserda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Energy-Prices-Data-and-Reports/EA-Reports-and-Studies/EERE-Potential-Studies.aspx accessed 12/6/14

[14] http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-m-0094&submit=Search+by+Case+Number pdf of the DGEIS is available at this site – accessed 12/6/14

[15] http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2014_GoldBook_Final.pdf accessed 12/6/14

EXHIBIT 2-4 2013 ELECTRICITY DEMAND, BY NEW YORK CONTROL AREA LOAD ZONE

STATE SUB-AREA	NYCA LOAD ZONE	2013 ANNUAL ENERGY USAGE (GWh)	PEAK DEMAND (MW)	
			SUMMER	WINTER
Upstate	A (West)	15,790	2,549	2,358
	B (Genesee)	9,981	2,030	1,645
	C (Central)	16,368	2,921	2,781
	D (North)	6,448	819	848
	E (Mohawk Valley)	8,312	1,540	1,415
	F (Capital)	12,030	2,392	1,989
	G (Hudson Valley)	9,965	2,358	1,700
Downstate	H (Millwood)	2,986	721	625
	I (Dunwoodie)	6,204	1,517	974
	J (New York City)	53,316	11,456	7,810
	K (Long Island)	22,114	5,653	3,594
Upstate Subtotal		78,894	14,609	12,736
Downstate Subtotal		84,620	21,705	14,703
TOTAL		163,514	33,956	25,738

Source: NYISO, 2014 Load & Capacity Data "Gold Book." Page 21.

It documents that of New York's 13 load zones, 12 experienced summer peaks in 2013. These summer peaks are generally caused by spikes in air conditioning during hot weather periods. GHP performs efficiently on hot days because the cool earth acts as a heat sink for GHP systems. This contrasts with conventional air conditioners, which exhaust their heat inefficiently into hot outside air.

The 2010 Oak Ridge National Laboratory study[16] mentioned in the first section of this document estimated the peak electrical demand for cooling single family homes in the Northeast at 60.7 GW. The study estimated that a 20% market penetration of GHP would bring a 7.9 GW reduction in peak demand throughout the region. As we noted earlier, New York's share of the Northeast peak reduction, if it were proportional to the state's population within the region, would be 2.8 GW for every 20 % of GHP market penetration. 2.8 GW is over 8% of New York's peak demand in recent years.

The lone NYISO zone which experienced a winter peak in 2013 was Zone D in the Northeastern corner of Upstate New York. Zone D had a winter peak of 848 MW and a summer peak of 819 MW. In many cases winter peaks can be caused by the use of electric resistance heat, a phenomenon which is encouraged by the very inexpensive NYPA hydropower available to New York's 47 municipal electric systems. Electric resistance heating has a COP of 1. In these cases, GHP systems, with COPs of 3 to 6, could be used to

[16] Assessment of National Benefits from Retrofitting Existing Single Family Homes with Ground Source Heat Pumps, June 2010, Xiaobing Liu, Oak Ridge National Laboratory http://www.energy.ca.gov/2013_energypolicy/documents/2013-03-21_workshop/background/Liu_GSHP_Report_8-30-2010.pdf accessed 12/06/14

address winter peaks by cutting electricity used for heating down to a 3rd or a 6th of current demand.

The CEF proposal goes on to identify barriers, including "*Higher capital costs relative to alternatives/Limited access to financing"* and poses potential future strategies.

> *"NYSERDA will prioritize the applications above with the greatest GHG emissions reduction potential, customer benefits, and market growth potential. This will be recalibrated over time based on observed market trends. NYSERDA will direct its interventions at specific barriers to adoption. NYSERDA will explore three strategic market development roles in this sector:*
>
> - *Providing direct financial incentives where needed, likely in a step down function over time. This will be done to stimulate demand as a temporary bridge to a market solution.*
> - *Enabling solutions for other market actors. This will focus on working with private and public partners to reduce soft-costs, standardize product offerings, document and create awareness of system performance and system integration with other on-site clean energy measures, develop a quality service-provider base, and explore financing and new business model options.*
> - *Serving as a Policy Advocate. NYSERDA will work with municipal and local government partners to advance permitting and siting practices that can encourage customer-sited renewable technology. "*

NY-GEO requests to be an active partner with NYSERDA in planning and executing these strategies.

The section ends with:

> *"In addition, as part of NYSERDA's Innovation mission , we will explore working with private partners and academia in New York to advance technological innovation that could drive down costs of these systems. Where critical industrial assets exist, we will seek to develop a manufacturing/supply chain in New York, thereby providing economic development opportunities for New Yorkers. "*

NY-GEO members make up much of the GHP supply chain in New York State, and we stand ready to work with NYSERDA on its Innovation mission.

Technology and Business Innovation Strategies

Appendix D of the CEF lists 5 STRATEGIC PRIORITIES AND TARGET AREAS for the Technology and Business Innovation, which is proposed for annual funding of $68 million throughout the 10 year life of the CEF GHPs are a powerful tool for addressing several of these priorities, as follows:

> *"(1) High-Performance Buildings: New York's building stock accounts for 55% of energy consumption and 50% of direct and associated upstream GHG emissions in NYS. Accordingly, investments in this area are essential to drive the deeper energy retrofits and net zero energy new construction practices that will be needed to achieve the State's 80 by 50 objective. These investments will enable greater energy efficiency, explore the potential synergies of combining efficiency with various distributed energy resources (e.g., building specific CHP and/or renewable thermal technologies), and reduce emissions intensity. Sample target areas included are space heating and cooling, and building control systems. An analysis of market potential, based on the NYS Potential Study, as well as analysis of EIA data for the nation as a whole, identified space heating in commercial and residential buildings as the greatest area for potential energy savings. Additionally, NYS has high fuel oil usage, which is a State-specific issue that requires additional focus. "*

In spite of the fact that GHPs are not mentioned in this paragraph, NY-GEO contends that GHPs will be key to tackling this priority. GHPs are New York's most potent tool for cleanly and renewably addressing building space conditioning and should be the first tool examined when considering high performance buildings. As far as net-zero buildings are concerned, it is difficult to conceive of many circumstances where net zero can be attained in New York's climate without a combination of GHP and renewable electricity.

It is very encouraging to see NYSERDA more and more clearly recognizing space conditioning as the next major area New York needs to focus on, as exemplified in this priority, as well as in New York's agency response to 111D. It will be crucial for NYSERDA/NYPA and others to effectively support GHP technology if we are to successfully shrink the carbon footprint of our building stock in order to approach the 80% by 2050 goal. In particular, we propose a crash program for substituting GHPs for oil heating statewide.

(2) Energy System Resiliency:

In most cases in New York, when electric power is cut, heating systems become inoperable. This is true for GHPs as well. Backup generators that can restore power to fossil heating systems, can also restore power to GHP systems. Battery storage systems coupled with DER power generation such as solar PV allow for continuous operation of GHP systems. Secure power source inverter technology is also being developed that will allow PV systems to continue supplying power even in the case of an outage. [17] As

[17] A Ray Of Light Amidst Grid Outages: Standby Power For Homeowners
http://www.solarindustrymag.com/e107_plugins/content/content.php?content.12719 accessed 12/7/14

this technology improves it may eventually reach appropriate wattages to maintain GHP system operation.

Natural disasters and resulting power outages are the first phenomenon one thinks of in relation to resiliency. On a practical level, buffering against price volatility from a lack of fuel diversity also has an important role to play in resiliency initiatives. As the DGEIS for the REV and CEF notes on page 2-11 [18]

> *"Although much of New York's electric energy has historically been generated by base-load hydroelectric, coal, and nuclear units, currently the units that set the market clearing prices are usually natural gas units… Power plants fueled primarily by natural gas account for more than half of the electric generating capacity in New York State, making the market sensitive to natural gas supply and price volatility. Natural gas prices for utilities are particularly volatile due to the structure of contracts used."*

and on page 2-17

> *" In particular, the portion of New York State's generating capacity from gas and dualfuel (gas and oil) facilities grew from 47 percent in 2000 to 55 percent in 2014, while the segment of generating capability from power plants fueled solely by oil dropped from 11 percent in 2000 to seven percent in 2014. The expansion of dual-fuel generation may be driven in part by the volatility of natural gas prices, as discussed earlier. In addition, dual-fuel plants play a role in meeting reliability requirements. During periods of high electricity usage, reliability rules require many of these plants to switch to burning oil. Outside of peak times, generators can choose to run on whichever fuel is less expensive."*

At the same time New Yorkers are becoming increasingly reliant on natural gas for electricity generation, Ngas also dominates home heating in the state as shown in this table from NYERDA's *Patterns and Trends Report* [19].

[18] Draft Generic Environmental Impact Statement in CASE 14-M-0101 - Reforming the Energy Vision and CASE 14-M-0094 – Clean Energy Fund http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=44991 - accessed 12/7/14, available on this website as a pdf – listed with the 10/24/14 items

[19] Patterns and Trends - New York State Energy Profiles:1998-2012 – NYSERDA Final Report, November 2014, table B-2, page B-2

Table B-2 Space-Heating[4]

	Households[2] (MM)	Average per Household using the fuel as main heating source	
		Consumption	Expenditure
Electricity	0.5	1,440 kWh	$241
Natural Gas	4.1	59 Mcf	$873
Fuel Oil	2.1	461 gallons	$1,173
LPG[3,5]	0.2	847 gallons	$2,406

4.1 million households represent 56.9% percent of New York's 7.2 million total.

New York's increasingly singular reliance on natural gas leaves us dangerously vulnerable to spikes in volatile gas prices. This passage from page ES-10 from the Executive Summary of the REV/CEF DGEIS is instructive:

> *"Increasing fuel diversity will make customers less vulnerable to price spikes; the estimated total cost to New York customers from the gas-driven price spikes of the winter of 2013-2014 was over $1.0 billion."*

New York's fuel diversity strategies to date have focused on increasing diversity in electric generation by increasing the percentage of renewables in the generation mix It has also focused on maintaining dual fuel generating plants, combining gas generation with oil, and even coal generation capacity, in order to be able to cut Ngas generation during reliability events.

Another strategy which deserves urgent consideration is to turn to thermal renewables such as GHP to reduce the state's reliance on Ngas for space heating. The figure below from NYSERDA's *New York State Energy Fast Facts* [20] shows that residential and commercial buildings - GHP's prime markets - burned 627.9 billion cubic feet of Ngas in 2012 compared with electric generation's 499.1 billion cubic feet.

NATURAL GAS

Consumption increased 0.5% from 2011

Consumption (4.8% of U.S. total) (billion cubic feet)		1,223.1
By sector:		
Residential	(29.3%)	357.7
Commercial	(22.1%)	270.2
Industrial	(6.1%)	74.6
Transportation	(1.8%)	21.5
Electric generation	(40.7%)	499.1
In-State production (billion cubic feet)		26.4

[20] 2012 New York State Energy Fast Facts produced by NYSERDA

> *"(3) Renewable and Distributed Energy Resource Integration: An internal NYSERDA analysis has determined that if NYS is to reach its goal of 50% reduction in GHG emission intensity by 2030, then 60% of the energy mix at that point in time will need to be resources other than traditional utility-scale fossil fuel central generation assets. The primary goal of this priority is catalyzing new solutions to enable a low-carbon distributed system platform framework and competitive renewables – at scale. Existing hydro and other resources, including supply-side renewables, will contribute to the replacement of traditional generation, but greater deployment of distributed generation will be required, including solar PV and solar thermal, wind, biomass, demand response, energy storage, anaerobic digestion, district heating systems and CHP. …Storage will play an increasingly important role as well in incorporating the increased DER into the grid, and reducing the impact of intermittency and peak loads."*

This point is a valid one. NY-GEO requests that "geothermal heating and cooling" be added to the series of distributed generation measures in the third sentence. Regarding storage, we note that GHP technology uses the earth as a storage medium and provides both heating and cooling in an efficient manner 24/7/365. We believe we have a very effective technology for "reducing the impact of intermittency and peak loads".

> *"(4) Digital Energy Solutions*:
>
> *(5) Advanced Sustainable Transportation: 40% of NYS GHG emissions come from the transportation sector; improving the efficiency of this sector is essential to the State reaching its energy and environmental goals. Today's transportation modes and electric grid are increasingly interconnected and a comprehensive integrated approach is necessary to ensure that the system as a whole becomes more efficient and reduces emissions. … Much of this improvement will come from accelerated electrification of the transportation sector which can enable simultaneous innovative improvements to the electric grid, building energy management, and resiliency through vehicle based energy storage, vehicle to building (V2B) and grid (V2G) power transfer."*

NY-GEO has consistently pointed to the parallels between GHPs and EVs as positive technologies that need to be better integrated into New York's energy regulatory framework:

- Both address more significant sources of GHG emissions in New York State than electricity generation, given New York's relatively clean generation mix
- In comparison to electricity generation, both have taken a seemingly remote back seat in New York's clean energy efforts
- Both have received inadequate support in the form of rebates and incentives from New York to date to allow significant market penetration
- Both have relatively high up front costs while providing significantly lower operating costs
- Growth of both technologies will allow NY to cut peak demand: EVs by allowing reversible storage

when charging in low-demand hours and making power available to the grid in high-demand hours, and GHPs by cutting peak cooling load as GHP's cooling efficiency is far superior to conventional central AC and ASHP *precisely in the hot weather hours of peak demand*

- Growth of both technologies will even out electric system utilization in the state
- Both will increase electricity use in New York State while significantly reducing overall energy use – particularly fossil-fuel use
- Both fit poorly in a silo driven regulatory framework that values reduction in electricity use over reduction in energy use
- Both will improve their environmental benefits as New York's electricity mix becomes even cleaner
- Both are key to New York's ability achieve an 80% reduction in GHG emissions by 2050.

To end our review of this section of the CEF Proposal, NY-GEO seeks guidance from NYSERDA on how the GHP industry can best integrate with the Technology and Business Innovation program of the Clean Energy Fund. If an advisory board is set up for this fund, NY-GEO certainly seeks a seat.

Grid-Tied (RPS Main Tier) Transition

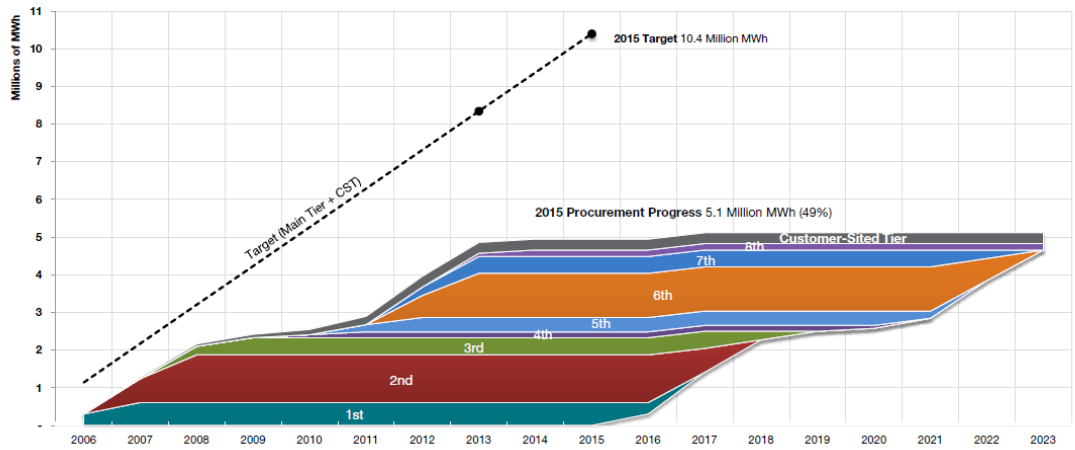
NY-GEO supports more rigorous goals and enforcement mechanisms for the RPS Main Tier. Because GHP uses a relatively small amount of electricity to pump exchange fluid, power the heat pump and distribute warm and cool air, we have a strong interest in making the grid's mix as clean as possible to make GHP's total impact even cleaner. We are aware that the RPS Main Tier is the RPS' most effective way to bring on new clean generating capacity. We also note with alarm that in its final few years the RPS has gotten stuck at under 50% of its goal of 10,398 GWh of new renewable generation as shown in the two charts below taken from page 10 of NYSERDA's latest annual performance report for the RPS. [21]

Table 1. NYSERDA 2015 RPS Procurements and Energy Targets (in MWh) and Progress as of December 31, 2013

	Target	Progress[48]	Progress as % of Target
Customer-Sited Tier	878,089	500,596	57%
Main Tier	9,519,765	4,601,070	48%
Total	**10,397,854**	**5,101,666**	**49%**

[21] New York State Renewable Portfolio Standard Annual Performance Report through December 31, 2013, NYSERDA, March 2014

Figure 2. NYSERDA Progress Toward 2015 Target



Cerbin, Et Al, Pace Energy And Climate Center, New York's Renewable Portfolio Standard: Where To From Here? Page 10 (2013).

We note also that NYSERDA's 2012 report using data as of December 31, 2011, pegged progress at 47% of the 10,398 GWh goal, indicating very little recent progress.

NY-GEO is hopeful that the 9th Main Tier Solicitation on July 28, 2014 offering contract terms of up to 20 years for fixed price RPS attributes succeeds in restarting significant RPS progress, and urges NYSERDA to maintain a strong, well supported Main Tier program.

Goals, Metrics, and Benefits

Much of NY-GEO's input on the goals of the CEF proposal are laid out in the first section of this document as part of the rationale for points related to the CEF budget. If NYERDA's objective in requesting that comments follow the proscribed format as laid out in this document is to be able to compile the comments from all or various sectors of parties in a single place by topic, we respectfully request that the Collections, Budgets, Expenditures, Allocation Methodologies section be included with our text from this section

NY-GEO is in general agreement with the metrics and benefits delineated in the CEF proposal. On page 5, the proposal states:

> *"The CEF is designed to pursue three long-term outcomes. First, the CEF seeks to achieve greater levels of scale for clean energy in the State economy. Second, the CEF will be oriented to achieve scale, not only through the investment of public funds, but to foster new investment opportunities to attract private capital to invest in clean energy in New York. Initiatives oriented for scale and private capital attraction will then result in the third desired outcome: significant reduction in greenhouse gas (GHG) emissions from New York's energy sector." (CEF p5).*

This is a reasonable statement of goals, although it may place too much underlying faith in Wall Street as the key to success. It is commendable that NYSERDA recognizes the limits of current approaches as shown in this statement on page 8:

> *"The CEF, as an integral part of New York State's evolving energy policy, responds to the recognition that the State's current approaches alone will likely not realize the environmental, economic development, and affordability goals and policy objectives stated in the draft 2014 State Energy Plan: a pathway to 80% GHG emissions reductions by 2050, at-scale investments from the private sector in the clean energy economy, supporting overall State economic development and lower electricity bills." (CEF p. 8)*

NY-GEO notes a broader view of the goals on age 18:

> *"As the Commission considers the CEF, the critical focus must be on outcomes, including the primary outcomes of GHG emissions reductions and private investment in New York's clean energy industry…. The CEF must also be considered in the context of broader State energy policy. This broader policy identifies multiple goals that can be realized by engaging in clean energy activities, and includes energy goals such as reliability, resilience, and affordability; environmental goals such as emissions reductions; and economic goals such as job creation and support and improved gross domestic product." (CEF p.18)*

To these we would add peak demand reduction, increasing fuel diversity and increased system utilization.

Regarding metrics, page 19 lists the following:

> *"....metrics as benchmarks of progress:*
>
> - *Reduced total GHG emissions;*
> - *Accelerated growth in the State's clean energy economy, measured by total public and private investment in clean energy technologies and solutions;*
> - *Energy savings due to reduced energy use, as measured by reductions in customer energy bills;*
> - *Improved statewide energy efficiency, measured by the total increase in energy efficiency from 2010 levels; and*
> - *Increased fuel diversity, measured by the overall proportion of renewables in the electricity mix." (CEF p.19)*

NY-GEO respectfully requests that NYSERDA add thermal renewables to the last bullet point, given growing recognition of the increasing relative importance of the heating load in New York's GHG emissions. Perhaps it could read "in the electricity and thermal load mix".

On page 54 the CEF Proposal comes to brass tacks by requesting a PSC order. We will make relevant comments on elements of the request in the order they are listed on pages 55 and 56.

> *"As stated herein, NYSERDA respectfully requests a Commission order that:...*
>
> - *Endorses the following metrics from which the CEF can benchmark progress towards those stated goals, as appropriate, including:*
> - *Reduced total GHG emissions;*
> - *Accelerated growth in the State's clean energy economy, measured by total public and private investment in clean energy technologies and solutions;*
> - *Energy savings due to reduced energy use, as measured by reductions in customer energy bills;*
> - *Improved statewide energy efficiency, measured by the total increase in energy efficiency from 2010 levels; and*
> - *Increased fuel diversity, measured by the overall proportion of renewables in the electricity mix."*

NY-GEO commends NYSERDA in the 3rd bullet point for moving from the "electricity

bills" emphasis in the 2014 draft State Energy Plan to a focus on "energy bills", a category that makes room for thermal renewables and electric vehicles. We repeat our request that thermal renewables be added to the 5th bullet point.

- *"Establishes new ratepayer collections caps to support the CEF through 2025.*
  - *Lowers total collections in 2016 to $700 million, and sustains this annual collections level for 3 years through 2018. Further lowers collections in 2019 to $650 million, and in 2020 to $625 million. For the years 2020 through 2025, the collections cap would be established at $400 million per year. To fully realize the program impacts and anticipated expenditure schedule for the fully authorized CEF, collections in the amount of $400 million in 2026 and $174 million in 2027 are necessary…"*

As noted at the beginning of this document, NY-GEO is wary of the specific funding levels proposed. In some ways it seems that GHPs, and other effective and promising technologies such as wind, have gotten caught in the solar tsunami, wherein the finance community has found a way to get a grip on solar development and has opened a way to market self-sufficiency.

On the ground, wind projects still need stable, long term state REC subsidies and federal tax credits and GHPs, like solar, need rebates, tax credits, tax exemptions and accessible low-interest financing. Unlike solar, GHP technology is generally not receiving these incentives in New York despite the critical impact thermal load has on peak load demand, consumer bills and state GHG emission levels. It is crucial that NYSERDA carefully weighs the costs of its emphasis on market self-sufficiency relative to other goals critical to the success of the CEF and REV initiatives.

Regarding reallocation:

- *"Authorizes the use of existing unexpended fund balances to meet currently authorized program activity for SBC, EEPS, RPS and T&MD programs, and apply to new CEF program activity."*

NY-GEO requests consideration that fuel neutrality and the importance of thermal renewables be part of the reallocation of unexpended fund balances.

- *"Directs NYSERDA to develop, with external input from stakeholders, a Program Investment Plan for the Market Development and Technology and Business Innovation*

portfolios, to be submitted to the DPS Office of Energy Efficiency and Environment.

- *Authorizes NYSERDA to convene Advisory Groups for the Market Development and Technology and Business Innovation portfolios, in a manner that will inform the evolution of the CEF portfolio over time."*

As noted earlier, NY-GEO requests full participation as a stakeholder in both these processes

- *Authorizes the use of all funds collected through the CEF to be applied on a fuel neutral and statewide basis.*

NY-GEO's comments on the fuel neutrality issue will follow in that section of this document

- *"Approves the reallocation of funds, as stated earlier in this proposal, to move $37 million of EEPS1(CEF Gas) and SBC3 funds to support the continuation of identified EEPS(CEF Gas) programs, in order to maintain valuable energy efficiency services for various customer sectors for existing programs into 2015 and foster an orderly transition from the EEPS portfolio into the new CEF."*

NY-GEO once again requests consideration that fuel neutrality and the importance of thermal renewables be part of the reallocation of unexpended fund balances.

Fuel Neutrality

GHP has been difficult to fit into New York's regulatory silos, despite the fact that it holds enormous potential to mitigate one of New York's thorniest sectors relative to GHG's, peak demand, and affordability - the heating and cooling of buildings. The table below from NYSERDA'S *Patterns and Trends Report* [22] shows once again the relative significance of residential and commercial petroleum and natural gas emissions in New York's total.

Table A-2: CO_2 Emissions from Fuel Combustion by Fuel Type (in million metric tons carbon dioxide)[4]

Fuel Type	Transportation	Electricity Generation	Residential	Commercial	Industrial	Total CO_2 Emissions	Percent of Total CO_2 Emissions
	(million metric tons CO_2)						(%)
Other Petroleum	0.39	N/A	1.21	0.40	1.86	3.85	2.3
Net Imports of Electricity	N/A	9.43	N/A	N/A	N/A	9.43	5.5
Diesel Fuel (Distillate)	10.39	N/A	N/A	N/A	N/A	10.39	6.1
Residual Oil	3.19	0.22	N/A	2.00	0.27	5.67	3.3
Jet Fuel	3.98	N/A	N/A	N/A	N/A	3.98	2.3
Heating Oil (Distillate)	N/A	0.17	9.44	3.70	1.07	14.39	8.5
Coal	N/A	4.51	0.00	0.00	2.45	6.95	4.1
Gasoline	48.72	N/A	N/A	N/A	N/A	48.72	28.6
Natural Gas	0.25	27.23	19.57	14.79	4.88	66.72	39.2

One of the biggest barriers GHP has faced is an inability to access support for projects to retrofit buildings that had been heated by natural gas , propane or fuel oil based on the PSC/NYSERDA prohibition on fuel switching. We applaud the proposed new Fuel Neutrality policy inasmuch as it promises to remove this barrier. We wholeheartedly agree with the statement introducing the Fuel Neutrality concept in the CEF Proposal on pages 6 and 7.

> *"Key to the success of market transformation approaches is the ability of State initiatives to be immediately responsive to market dynamics, needs and conditions as they arise. For the CEF to capture emerging opportunities, NYSERDA will require and requests that the Commission grant greater levels of flexibility to move funds within each of the CEF portfolios, as well as between the Technology and Business Innovation and Market Development Portfolios. In addition, NYSERDA also requests that the Commission allow investments to be pursued on a fuel neutral basis. Research demonstrates that energy consumers approach solutions to their energy needs holistically, looking for bill reductions and clean energy options that meet both electricity and on-site fuel uses, whether natural gas, heating oil, other fuels or combinations*

[22] Patterns and Trends - New York State Energy Profiles:1998-2012 – NYSERDA Final Report, November 2014, table A-2, page A-2

of fuels. While NYSERDA has had limited ability to utilize multiple funding sources to reach a range of consumer needs, this past approach has not met all customer needs, and has left some GHG emissions reductions opportunities unrealized. A fuel neutral approach, crediting all public CEF dollars with achieving the portfolio's emissions reductions progress, would better maximize the GHG emissions reduction productivity of public dollars spent on clean energy initiatives." (CEF p6-7)

The following paragraph from page 41 of the CEF proposal also provides a strong rationale for removing the fuel switching barrier, with the exception of the 3rd sentence:

"Approximately 18 percent of commercial energy consumption, 35 percent of industrial energy consumption, and 34 percent of household heating consumption is derived from fuels other than electricity and natural gas. This consumption is responsible for 21% of residential GHG emissions 18% of commercial emissions, and 43% of industrial emissions. In many cases, the use of petroleum and other fuels is necessary as natural gas service is not universally available. Currently, opportunities are limited for those customers to address first cost barriers to achieve energy and bill savings, improve comfort and quality of life, as well as contribute to environmental benefits. Low income households, in particular, could benefit from significant reductions in heating costs, lowering their overall energy burden and enabling them to better manage their budgets and meet utility bill obligations. A fuel neutral policy approach could thereby satisfy other utility policy needs." (CEF p.41)

NY-GEO was shocked to read the statement "*In many cases, the use of petroleum and other fuels is necessary as natural gas service is not universally available."* GHP technology in particular renders the use of petroleum unnecessary in the absence of natural gas service. A good percentage of the geothermal installations in New York State are directly related to the absence of natural gas service and the expense of oil, propane and other fuels.

NY needs to reduce the number of homes and buildings that are heated with expensive, fuel oil and propane. In most cases, GHP is the best technology for replacing those GHG producing fuels without putting New Yorkers in an increasingly vulnerable position relative to Ngas price volatility.

NY-GEO requests that this sentence be recast. Perhaps the authors meant to say, "Without viable, well supported renewable thermal options, the use of petroleum and other fuels is necessary…"

Moving on, the following CEF Proposal statement reinforces the importance that heating load plays in the lives - and budgets - of New Yorkers.

"Clean energy programs would be in a position to address all of the renewable energy and energy efficiency needs of the electric customer, benefitting the customer by reducing their energy consumption overall – not just their electricity consumption. This is critically important for residential ratepayers, as heating load typically represents a significant portion of their total energy expenses." (CEF p.42)

NY-GEO agrees with the concept of a statewide CEF.

> *"As the funding approach for fuel neutral programs is developed, care must be taken to avoid the disqualification of customers who contribute to the SBC through a natural gas bill, but do not pay an electric SBC, including gas customers of National Grid on Long Island, certain NYPA electric customers, some customers of certain municipal electric service providers, and certain other customers. NYSERDA proposes to address this issue by establishing a truly statewide clean energy portfolio, founded on the same societal benefits and outcomes as the CEF, and providing equivalent opportunities for customers who are in the same market as those who pay the SBC on their electric bills. To effectuate this "Statewide" CEF, NYSERDA will supplement the clean energy surcharge-funded programs with additional Regional Greenhouse Gas Initiative funds". (CEF p. 42)*

However, the approach of limiting the SBC to the bills of electric ratepayers raises problems.

> *"NYSERDA believes that the more effective collection mechanism to support a fuel neutral approach is to reduce the surcharge on natural gas customers over time, ultimately eliminating the natural gas surcharge and collecting the entirety of clean energy funding from electric customers. As all electric customers in New York State use heating systems, this approach is the most equitable as it will minimize cross-subsidy arguments for efficiency programs that are funded by a single fuel, and provide the greatest options to all customers, irrespective of that customer's access to any single heating fuel." (CEF p. 42)*

Putting the entire burden of funding the SBC on consumers as electric ratepayers sends the wrong economic signal, especially as electricity generation in New York becomes cleaner and the burning of fossil fuels for residential and commercial heating becomes a bigger part of the state's greenhouse gas emissions.

Other

Legislative initiatives:

In the upcoming legislative session, NY-GEO will be supporting legislative initiatives to break down the barriers for New Yorkers to access GHP technology. These initiatives are a way to help NY meet its important energy goals without impacting New Yorkers as ratepayers. We respectfully request NYSERDA and the Department of Public Service to include support for these measures in any legislative program or recommendations that may result from the REV and CEF process.

The bills will include:

Senate Bill S01343 and Assembly Bill A01411 to amend the tax law to exempt both sellers and purchasers of geothermal systems from sales and use taxes for materials.[23] LI-GEO's support memo for this bill is included as Appendix A.

NY-GEO also anticipates introduction of a bill to clarify GHP's eligibility for a tax credit equivalent to the 25% solar energy equipment tax credit. Under the current law, solar-energy equipment is defined as *"an arrangement or combination of components utilizing solar radiation, which, when installed in a residence, produces energy designed to provide heating, cooling, hot water or electricity."* [24] Of course, NY-GEO considers GHP technology to fall squarely within this definition. Lawmakers are proposing a bill that would codify GHP's eligibility for this credit.

Finally, in the "other" category, NY-GEO is an organization that wants the REV and CEF processes to succeed in reducing carbon emissions and cleaning New York's energy mix. As such, we urge NYSERDA and the PSC to make sure all outreach bases are being covered. The REV and CEF proceedings have attracted exemplary numbers of parties who have the means and professional interest to closely follow these proceedings. The public at-large however, is not aware of the proceedings and the media have done little to educate the public on the profound changes that are being proposed. NY-GEO is aware of rumblings in some of the communities that we service, that these proceedings are an exercise taking place without much public input or scrutiny. We would hate to see the many positive proposed changes drowned out by resentment at a lack of broad public input in these proceedings.

[23] http://openstates.org/ny/bills/2013-2014/A1411/ accessed 12/6/14

[24] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY03F&re=0&ee=0

Appendix A.

LI-GEO
Long Island Geothermal Energy Organization

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Memo in Support of S.1343 and A.1411

May 20, 2013

The Honorable George Maziarz
NYS Senator
Room 708, Legislative Office Building
Albany, NY 12247

The Honorable Ellen Jaffee
NYS Assembly Member
Room 650, Legislative Office Building
Albany, NY 12248

Mr. Maziarz and Ms. Jaffee:

The Long Island Geothermal Energy Organization (LI-GEO, www.LI-GEO.org) is a nonprofit association specifically tasked with supporting and promoting the use of energy efficient ground-source heat pumps (GHP) to heat and cool residences and buildings on Long Island.

I am writing to you today in support of Senate Bill # S01343 and Assembly Bill # A01411. These bills exempt sales and use taxation on the materials utilized in the installation of these geothermal HVAC (heating, ventilation and air conditioning) systems for the heating and cooling of structures within both the Long Island region as well as the entire State of New York. Please see the attached LI-GEO Memo in Support of the Sales Tax Exemption for Geothermal Heat Pump Systems and feel free to contact me in regard to this highly important measure as required.

Respectfully Submitted,

William Feldmann
LI-GEO Founding Member and Legislation Committee, Sales Tax Task Force Chair
Long Island Geothermal Energy Organization (LI-GEO)
Phone (631) 589-2528 Email bill@empirecleanenergy.com

Enclosures: LI-GEO letter to Gov. Cuomo
LI-GEO White Paper in Support of the Sales Tax Exemption for Geothermal Heat Pump Systems

Cc: NY Senate Finance Committee Members and Clerk
NY Assembly Ways and Means Committee Members and Clerk
NY Senate Energy and Telecommunications Committee
NY Assembly Energy Committee

LI-GEO
Long Island Geothermal Energy Organization
www.li-geo.org

LI-GEO White Paper in Support of the New York State Sales Tax Exemption for Geothermal Heat Pumps S1343 / A1422

May 15, 2013

Geothermal Heat Pump Systems

Buildings are the largest single opportunity available for cutting thermal loads and improving the demand side efficiency of electrical energy use. According to the U.S. Department of Energy (DOE), buildings are the largest single sector of total U.S. energy consumption, accounting for 41% of primary energy use in 2010. Approximately 24% of the nation's total energy use is for space heating, cooling and water heating. GHPs—or ground source heat pumps—are a unique renewable energy technology that is available today, and has great potential to dramatically reduce these thermal energy demands of buildings across the United States.

These "thermal loads" in homes, schools, churches, commercial, industrial and institutional buildings represent a huge cost, both in terms of energy supply and environmental impact. These loads also contribute to the high electric grid peak demand during the hottest days of summer, requiring the utilization of inefficient peaking power plants and the purchase of off-grid power from outside vendors. These costs are then passed on to New York residents 365 days a year.

Energy efficient heating and cooling systems like GHPs can greatly benefit both by tapping abundant, free renewable energy in the ground under our feet. However, unlike other technologies—such as the deep borehole drilling utilized in "fracking" or geothermal electrical power production—GHP boreholes are relatively shallow (normally 23' to 200' deep) and do not utilize or introduce any potentially harmful fluids to the environment or pose other geological risks.

A GHP is a central heating and cooling system that pumps heat to or from the ground instead of the air like conventional HVAC systems. GHPs take advantage of the relatively constant and moderate temperatures in the ground to boost efficiency and reduce operation costs. During the winter, GHPs transfer heat energy from the ground to buildings for warmth. In the summer, they provide cooling by exchanging unwanted heat from buildings back to the earth, while providing free hot water.

GHPs hold profoundly positive potential for energy efficiency, lowering costs and preserving our nation's environment. According to the U.S. Environmental Protection Agency (EPA), "GHPs are number two among the most efficient and comfortable heating and cooling technologies currently available…" In addition, EPA's Energy Star program website says that, "…qualified geothermal heat pumps are over 45 percent more energy efficient than standard options."

Yet despite their potential benefits, GHPs are still a relatively nascent technology that has been slow to catch a foothold in the broader HVAC market. At current rates of installation (<100,000 average 3-ton capacity residential units per year), GHPs represent less than 2% of the total HVAC marketplace. Reason? Higher "first cost" incurred by drilling or excavation to place its ground-source heat exchange loop system near the structure that a GHP system serves.

Sales Tax Exemption for GHP Systems

With their life-cycle energy cost savings, the proposed New York State sales tax exemption will make GHP systems more attractive to both residential and commercial HVAC consumers. The tax credits will assist the GHP industry increase sales and would go far in helping GHPs win a greater market share as a reviving economy spurs new development and construction. And more GHPs mean more benefits accrued to building owners and the state with the renewable energy they produce; energy cost savings; flattening of electric utility load patterns; and reduction of pollution from burning fossil fuels.

New York State legislators have the option to encourage this technology with the passage of Senate Bill S01343 and Assembly Bill A01411, both of which amends the tax law to exempt both sellers and purchasers of geothermal systems from sales and use taxes for materials. Eliminating this tax will lower the cost of installing a GHP system and advance the geothermal industry in the same fashion the solar PV industry was assisted.

GHP Benefits for Consumers and the State Economy

GHPs are truly American products that not only save money and protect the environment, but create jobs across the country.

- According to DOE, nearly three quarters of homeowners' monthly energy bills is for heating, cooling and producing hot water. GHPs can reduce residential and commercial heating and cooling bills by 40 to 70 percent. That money flows back into the pockets of consumers, bolstering the larger economy.
- GHP industry expansion will create new jobs in "green" manufacturing and ancillary products, as well as marketing, sales, system design, and installation of GHPs.
- Many (or most) GHPs are "Made in the USA," with thousands of U.S. employees involved in manufacturing, distribution and sales. Thousands more employees across a variety of industries provide necessary products and services, including plastic pipe, tools and equipment, installation, engineering, drilling and excavation—jobs that can't be outsourced to other countries.
- For homes and businesses heated by fossil fuels GHPs eliminate on-site carbon monoxide (CO, a deadly poison) and carbon dioxide (CO_2) emissions which have been linked to climate change. The reduction of these on site emissions will also help to curb the associated particulate emissions that have been linked to increased incident of asthma in New Yorkers as well.

GHP Renewable Energy and Efficiency Benefits for Utilities

GHPs create unique opportunities for electric utilities to conserve power and reduce pollution, while promoting use of renewable energy. By utilizing GHPs, every electric utility in the state can improve its load factor; mitigate power price increases; reduce the strain on transmission grids; forestall the need for new generation capacity; reduce carbon emissions; and foster satisfied ratepayers with improved conditioned space.

- While fossil fuel based heating systems (heating oil, natural gas or propane) struggle to achieve 90% or better utilization of the fuel source, for every single unit of electrical energy used to power a GHP, 300% to 500% more energy is produced by GHPs which utilize the exchange of thermal energy just below the earth's surface.
- GHPs provide highly efficient on-site (distributed) renewable energy for consumers. They do not need to be piped to the usage location nor stored onsite there.
- Renewable energy produced from the ground by GHPs can reduce the amount of electricity and pollution produced by coal, oil and natural gas fired power plants.
- GHPs reduce utility peaks during the summer, and build load during the winter. This levels out demand throughout the year, helping make utility operations more efficient.
- GHPs help reduce the need for polluting power plants and costly transmission lines. According to Oak Ridge National Laboratory, every ton of installed GHP capacity equals 0.65 kilowatts of avoided electricity generation capacity.
- On Long Island alone, for example, there are approximately 60,000 furnaces and air conditioning units which *must* be replaced every year due to end-of-life span of the equipment (normally a 20-year lifecycle) and as such there is a baked-in market for GHP retrofits every year which, unlike Photovoltaic cells, requires a the consumer to make a extra ordinary decision to purchase.
- If 20% of those Long Island HVAC replacement units were GHPs (with a average size of 3-tons) that would equate to a 23,400 kilowatts or 24 megawatts of peak load generation reduction and 240,000 kilowatts or 240 megawatts of peak load reduction over a 10 year period. That would reduce the need for the construction of new power plants to meet growing electric demands and reduce the demands (and costs) of the power provider, LIPA in this case.

GHP Environmental Benefits for the State

According to DOE's Office of Geothermal Technologies, nearly 40% of all U.S. carbon emissions are a result of using energy to heat, cool and provide hot water for buildings. This number nearly equals emissions from all the cars, trucks and trains in America.

- GHPs have unsurpassed thermal efficiencies and produce zero local emissions. They produce 3 to 5 times the energy they consume.
- EPA says that GHPs can reduce energy consumption—and corresponding emissions—up to 44% compared to conventional air-source heat pumps, and up to 72% compared to electric resistance heating with conventional air-conditioning equipment. Recent advances in GHP efficiencies only buttress these facts.
- GHPs offer significant fossil-fuel emission reductions potential, particularly where they are used for both heating and cooling—and when electricity is produced from renewable resources.

- A typical 3-ton residential GHP system produces approximately one pound less CO_2 per hour than a conventional HVAC system.
- According to Oak Ridge National Laboratory, 100,000 average GHP installations reduce greenhouse gas emissions by almost 1.1 million metric tons of carbon during their average 20-year life spans. That's the equivalent to taking nearly 60,000 cars off the road or planting over 120,000 acres of trees.

Please contact the LI-GEO Legislation Committee, Sales Tax Task Force members:

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for any further information or questions.