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March 23, 2009

RGGI Programs  
Attn: Dave Coup  
NYSERDA  
17 Columbia Circle  
Albany, NY 12203-6399

Re: NYSERDA Operating Plan for Investments in New York  
under the CO<sub>2</sub> Budget Trading Program and the CO<sub>2</sub> Allowance  
Auction Program

Dear Mr. Coup:

On behalf of Aztech Geothermal LLC, our partners and customers, we respectfully submit the following comments to the draft “Operating Plan for Investments in New York under the CO<sub>2</sub> Budget Trading Program and the CO<sub>2</sub> Allowance Auction Program”, published February 25, 2009 (Operating Plan).

We were encouraged to see the Operating Plan, with aggressive, but achievable near term goals and a path for long-term CO<sub>2</sub> and other Greenhouse Gas (GHG) mitigation in New York. Our comments will be primarily directed at the Residential, Industrial and Commercial Sectors and Multi-Sector Programs where Ground Source Heat Pump (GSHP) also known as Geothermal Heat Pump (GHP) implementation can directly and significantly address New York’s goals to mitigate GHGs through the Regional Greenhouse Gas Initiative (RGGI).

NYSERDA is well aware of the benefits of GSHP systems as indicated by the number of case studies in the Geothermal Heat Pump Manual posted on your website detailing a history of technical assistance and funding measures. The results of many of these projects in cost savings and the number of tons of CO<sub>2</sub> reduced are impressive.

Key points we would like to make while you are finalizing the Operating Plan:

- GSHP systems will dramatically reduce or eliminate GHG emissions and should be a cornerstone of the Residential, Commercial and Industrial Sectors proposed in the Operating Plan.
- The RGGI funds are a unique funding stream that should remain focused on GHG reductions. The marquee benefit of GSHP systems is the significant mitigation of GHG emissions. Reduction of GHG emissions is not the focus of other funding streams at NYSERDA, such as SBC, EEPS, or RP funded programs.
- New York has the infrastructure in place to design and install GSHP systems today and the ability to increase this capacity quickly, creating jobs in a number of trades through Workforce Development programs.

- Federal tax credits for GSHP installations, extending to 2016, will offset first costs and leverage any RGGI-funded activity in both residential and commercial sectors for many years to come.
- Energy customers will see savings of over 50% in Residential, Commercial and Industrial Sectors with payback periods, relative to high efficiency conventional systems, in the range of 2-5 years.

Recently the federal government, recognizing the cost-effective solution offered by GSHP systems, announced residential and commercial tax credits for GSHP installations through 2016. In October of 2008 GSHP residential installations were eligible for a 30% tax credit while commercial buildings were given a 10% tax credit. The tax credit was retroactive to the beginning of 2008. Credits were originally capped, but in February 2009 the caps were removed for units placed in service after December 31, 2008.

The Operating Plan identifies six criteria considered for selecting RGGI-funded programs. GSHP systems very directly address Criteria 1, 2, 3, 4, and 6 with potential for strong impacts on Criterion 5 depending on the extent of funding and the types of facilities addressed.

***Criteria 1: GSHPs are cost effective as measured by quantity of carbon equivalents reduced per dollar invested.***

GSHP systems dramatically decrease or completely eliminate the CO<sub>2</sub> emissions at the installation site. It is also well known that simple payback periods for additional costs versus conventional systems are often five years or less. Replacing existing heating oil and propane systems are particularly impactful for the reduction of GHGs. Installing GSHP systems for new construction will lower the installation expenses by using equipment on site to assist in loop installation.

GSHP systems are effective at GHG mitigation and enable significant cost savings for existing and new construction in residential, commercial and industrial facilities.

***Criteria 2: GSHP systems have excellent long-range potential for the technology or investment to reduce GHG emissions in New York.***

GSHP systems should become the default standard for any new building being planned or when considering the replacement of existing systems, particularly those buildings heated using oil or propane. With sufficient RGGI funding GSHP's will be the preferred heating and cooling method installed in new construction of residential, commercial and industrial buildings in New York. This will allow New York to fully leverage federal funding to significantly decrease the impact that heating systems have on GHG emissions in New York.

GSHP systems have demonstrated longer lives than conventional furnaces and air conditioners, i.e. the average life of a heat pump is 20 to 25 years. The geexchange ground loop is projected to last over 50 years—likely surviving several generations of heat pumps or even the building it supports with relatively little maintenance. Once a GSHP

system is installed in a home or commercial building the GHG emissions of the site are dramatically reduced or completely eliminated for the life of the system.

There are opportunities for Advanced Industrial Research and Development of Clean Technology for GSHP systems. Research should be focused on methods to reduce first cost and improve performance of GSHP systems. Today's GSHPs move 3 to 5 times as much energy between the building and the ground than they consume while doing so. If there were sufficient motivation, the GSHP industry could integrate the most advanced commercially available components into their heat pumps and increase this multiplier effect to 6 – 8 (theoretically the multiplier could be as high as 14). GSHP systems should be the focus area of a CLEAR Center described in the Operating Plan.

***Criteria 3: GSHPs will reduce the costs of achieving the emission reduction goals of the CO2 Budget Trading Program simply by decreasing or eliminating reliance on greenhouse gas emitting resources on a site by site basis.***

To avoid redundancy, details to support this are included in the other sections of this document.

***Criteria 4: GSHPs certainly bring additional benefits to New York, by job creation, leverages capital investment in New York to promote economic development, and provide health and environmental benefits.***

New York has unique workforce assets already in place that could jump start job development in GSHP. According to a Department of Energy (DOE) commissioned study released by Oak Ridge National Labs (ORNL) in December of 2008 (ORNL Study), New York is considered one of only 16 “Tier I States” in terms of GSHP design and installation infrastructure. This is based in part by the technical and financial support of previous NYSERDA programs. New York has a strong base of experienced designers and installers from the many successfully completed projects statewide. In addition, New York has over 400 registered well drillers that have equipment that can be converted and personnel that can be trained to install geexchange systems. New York has a great number of commercial and residential HVAC contractors who can also be trained to install and service these systems. New York has over 400 IGSHPA (International Ground Source Heat Pump Association) Accredited Installers statewide to help insure projects are installed to maximize economic and environmental benefits. Our State also has a well established construction trade with builders and general contractors that can include GSHP systems as a part of their Green Buildings. Qualified and experienced GSHP professionals in New York need to participate in the Flex Tech program to effectively evaluate proposals for geothermal installations.

Investment of RGGI funds in New York's existing GSHP asset base could also leverage federal government incentives to grow businesses and jobs in New York that could install systems in other states. GSHP will be part of the GHG emissions solution. By making these seed investments in GSHP, NYSERDA will create a skilled workforce that could deploy GSHP systems across the country, while keeping the income and jobs in New York.

***Criteria 5: GSHP systems can reduce the disproportionate cost burden and environmental impacts on low-income families and environmental justice communities.***

Since first costs are generally higher for GSHP systems they are often not thought to be viable alternatives for low-income families. This is an area where RGGI programs could be used to establish a fund for the financing of GSHP installations similar to those used by one segment of the utility industry, rural electric cooperatives (RECs). Since 2007, RECs have been able to obtain long-term loans with terms of up to 35 years at the cost of government funds from the U.S. Department of Agriculture Rural Utilities Service (USDA/RUS) to provide the outside-the-building portion of GSHP systems to customers in exchange for a tariff on the utility bill, which would be more than offset by the GSHP system's energy cost savings.

***Criteria 6: GSHP systems' primary benefit of greenhouse gas mitigation is not adequately addressed through existing SBC- and EEPS-funded programs that currently focus on electricity savings.***

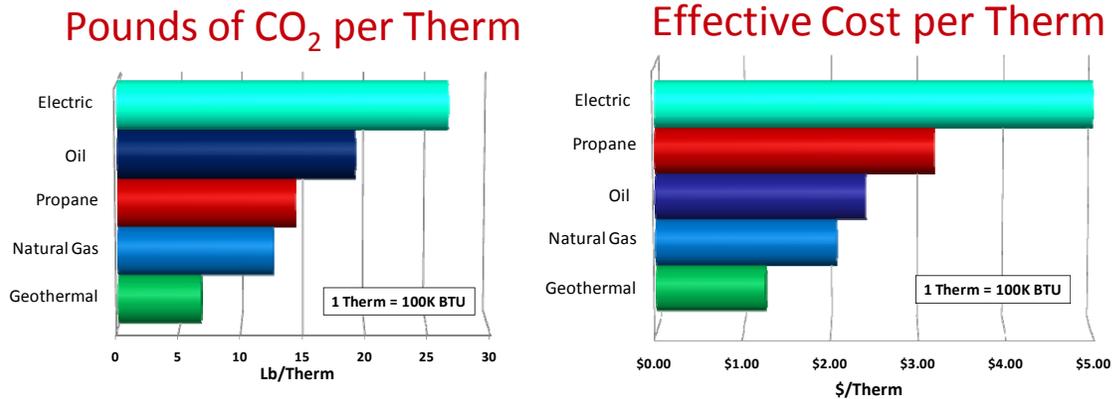
NYSERDA currently administers SBC and EEPS funds primarily focused on electric efficiency, not specifically geared towards GHG reductions. NYSERDA also offers some gas efficiency funds in some gas utility service areas to encourage high efficiency gas measures, which are also outside the scope of GSHP system installations.

RGGI funds must go beyond energy efficiency improvements for fossil fuel burning systems if it hopes to offer anything other than incremental benefits to the goals of the Operating Plan. To make rapid headway on the energy/carbon front in New York's buildings sector, existing buildings must be improved with single comprehensive deep-savings retrofits, because repeated incremental touches to the same buildings would result in large and wasteful transaction costs. GSHPs are proven to be an excellent technology for anchoring comprehensive deep-savings retrofits. GSHPs can play an important role within New York's Green Economy, but this is unlikely to happen without support from various NYSERDA sponsored funding programs.

Further, there is a current gap in policy at the state level when it comes to mitigating GHG emissions. NYSERDA's programs are almost exclusively focused on electricity and conserving electricity. GHG come from many sources. In New York the burning of oil, coal and natural gas to heat homes and businesses creates significant GHG emissions. Since the mission of RGGI is to reduce GHG, RGGI funds must be targeted in this important and otherwise unaddressed area.

**Additional Comments:**

Much of the information and data available for GSHP systems reflects national averages rather than New York specific energy prices and weather data. Aztech Geothermal has produced the following two technology comparisons for the relative cost and CO<sub>2</sub> emissions for commonly available heating systems in New York.



Assumptions: electric rate 0.17 \$/kwh @ 100% efficiency, propane 2.68 \$/gal @ 92% efficiency, oil 2.75 \$/gal @ 85% efficiency, natural gas 1.90 \$/therm @ 92% efficiency, Geothermal electric rate 0.17 \$/kwh @ COP=4

The NYSERDA Geothermal Heat Pump Manual states the following regarding the mitigation of carbon with GSHP systems:

This energy and environmental approach becomes clear when you consider that every million square feet of space conditioned with geexchange technology results in a combined savings of more than 7.6 million kWh and 38,207 MMBtus of fossil fuel. The savings will obviate the need to import approximately 20,490 barrels of crude oil per year and result in an annual emissions reduction of about 1,525 metric tons of carbon equivalents. This is comparable to 1,200 cars off the highway, or planting 764 acres of trees. Most significantly, utilities will see a 2.5 megawatt demand reduction for each of the 20 years that the geexchange system is in operation.

The ORNL Study concluded GSHPs have been proven capable of producing large reductions in energy use and peak demand in buildings and additionally:

If the federal government set a goal for the U.S. buildings sector to use no more nonrenewable primary energy in 2030 than it did in 2008, based on previous analyses, it is estimated that 35 to 40 percent of this goal, or a savings of 3.4 to 3.9 quads annually, could be achieved through aggressive deployment of geothermal heat pumps (GHPs). GHPs could also avoid the need to build 91 to 105 GW of electricity generation capacity, or 42 to 48 percent of the 218 GW of net new capacity additions projected to be needed nationwide by 2030. In addition, \$33 to 38 billion annually in reduced utility bills (at 2006 rates) could be achieved through aggressive deployment of GHPs.

Stated more simply, an average residential system is the equivalent of taking two cars off the road or planting an acre of trees in terms of CO<sub>2</sub> mitigation.

Even with all the successful installations and infrastructure in New York, first cost and long payback periods have limited GSHP system acceptance in many markets. In New York's commercial markets, GSHPs are often limited to institutional customers (federal, state and local governments, K-12 schools, etc.) that take the lifecycle view. Motivations of designers and builders to specify and install GSHP should be considered in the Operating Plan. Since the first costs are often higher and GSHP systems may be unfamiliar, commercial and residential builders tend to recommend traditional fossil fuel burning HVAC systems. Commercial and residential markets present excellent opportunities for mitigation of CO<sub>2</sub> and energy cost savings through GSHP installations but promotion and incentives should be considered for architects, system designers and builders.

GSHP systems will level seasonal electric demand. During the winter heat pump operation displaces fossil fuel use, and in the summer the heat pump operates with a much more constant electrical demand. This benefits the electric utilities by decreasing peak loads in the summer and the building owner will see the average price of electricity reduced.

GSHP technology complements Energy Efficiency Measures addressed by the SBC programs. The addition of air sealing and insulating measures in existing homes and buildings will reduce the initial installation costs of the geothermal system and provide maximum operating cost savings for many decades. Geothermal providers need to participate in the Home Performance with Energy Star (HPwES) program to ensure that a "whole house approach" is taken to geothermal installations. This is why Aztech Geothermal has qualified its first BPI Certified Contractor and other of our employees are engaged in expanding certifications to fully participate in the HPwES program.

Solar Thermal initiatives will compliment GHPS since preheated air will lower the demand on the heat pump requiring less electrical energy to operate. Even without the assistance of solar thermal a GSHP system will virtually eliminate CO<sub>2</sub> emissions from a building. Also GSHP systems will provide very efficient means of meeting the full heating loads of New York's buildings 24 hours a day regardless of the location or outside weather conditions.

While there are a range of proposed programs in the Operating Plan where GSHP systems would demonstrate benefit, it is noted that GSHP are never mentioned specifically in the list of technologies that may qualify for funding. We ask you to consider including GSHP systems in the specific program areas and as qualifying technologies in the Operating Plan. If no specific programs are developed for GSHP systems, then please ensure it is not excluded by omission.

Where possible, programs should be retroactive to January 1, 2009 to reward early adopters of initiatives that qualify for RGGI-funded programs.

Please accept these comments to the Operating Plan on behalf of Aztech Geothermal LLC, our partners and customers. We will make ourselves available to NYSERDA, if you have additional questions concerning the points outlined in this letter.

Sincerely,

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