



P-12 & Municipal Buildings: Anchoring GSHPs in Communities

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THE GEOTHERMAL NATIONAL
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K to 12 Schools as the “Anchor Tenant” for the Ground Loop Heat Exchanger (GLHP)!



Geothermal Heat Pump Technology a “Renewable Thermal Asset”!

US DOE states that building energy use accounts for **over 40%** of the primary energy used in the US and **40% of the total energy used in those buildings is for space conditioning & water heating.**

Geothermal Technology is finally being recognized as a valued **Renewable Thermal Asset** by US DOE (Consolidated Appropriations Act 2021), this along with the “Climate Change” narrative should have opened the flood gates for this technology.... But it hasn’t. We are still having to fight the **lack of awareness** for not only the technology but more importantly the many benefits these systems bring to the table. **How do we change that?**



The Answer is K to 12 Schools

K to 12 Schools are the **second largest public infrastructure investment** in the US & are one of the biggest energy consumers in the public sector. They spend over **\$8 billion annually on energy**.

K to 12 Schools also consume about 8% of all energy used in commercial buildings and emits as **much carbon dioxide as 18 coal powered generating plants**.

The average age of a K to 12 school in the US is 42 years old but in the **Northeast that number jumps to 49 years old**.

By the time a student **graduates High School** they have spent **15,600 hours inside a school**, 2nd only to the time spent at home. (a somewhat **CAPTIVE audience**)



The K to 12 School Market Opportunity

There are over **130,000 Public & private K to 12 schools** in the US with **3.3 million public school students** and **300,000 private school students**.

NY has 731 Public School Districts with 4,856 Schools, Housing 2,599,096 Students & 1,334 Private Schools with 358,193 Students. The total is almost 3 million students and over 6 thousand schools.

According to the NSBA the **average age** of a K to 12 school in the US is **42 years old** but in the Northeast that number jumps to **49 years old**.

In a report by the US Government Accountability Office (GAO) there are **36,000 K to 12 schools** with HVAC systems in need of replacement or repairs



Reports from **research done by both Harvard and Yale** point to the fact that **higher relative humidity (between 40% & 60%) impedes the transmission of respiratory viruses.**

Heating only schools have a relative humidity between **10% & 20%**

Installing a geothermal system in a school **increases the relative humidity levels to 40% to 55%** which improves the health and safety of both students and staff and gives the students a much better learning environment



K to 12 Schools the “Anchor Tenant” for Networked Geothermal!

The concept is to use the **K to 12 school building** as the “**Anchor Tenant**” for the **networked geothermal system** which would not only give the school a safer, healthier energy efficient and environmentally sensitive HVAC system, it would also serve the surrounding homes or commercial facilities.

It would also provide the needed **space for the ground loop heat exchanger (GLHE)** as most schools have open areas (e.g. soccer, baseball or football fields, parking lots or green spaces) and allow for the diversity that this design provides.

This concept should be **attractive to a utility** as the ownership of the ground loop provides the utility (electric, gas or water) with a **renewable thermal asset** that is a **Distributed Energy Resource (DER)** that is also a **non-wires, non-pipeline alternative** that will deliver a **Return on Investment (ROI)** guaranteed for over 50 years.



Why would this work and what impact does it have on the GHP Industry?

This concept has a number of advantages one is **taking advantage of the diversity that this design offers**, e.g when the school is in session the homes are typically not occupied and when the school is closed the homes are typically becoming busier. This is especially true in the summer break when we are into our heaviest cooling season.

The design of the school will be done keeping the existing fossil system in the school but tying it into the ground loop and not the school, this allows for additional heat being added to the loop, if necessary, during extreme weather conditions. This will still all but eliminate the use of fossil in the school.



What impact will this have on the GHP Industry?

This initiative will address the issue that I stated on the first slide and that is **“Lack of Awareness”** by exposing this technology to the future leaders of our country, the school students. It has been my experience that once a system is installed in a school it causes a number of things to occur.

First, it eliminates the **“I’m too hot ... I’m too cold”** syndrome. Comfort levels are increased in most cases giving teachers their own environment.

Second, **lower rates of absenteeism** both in students and in staff since this technology also increases the health and safety of the building

Third, **Each student becomes a mini sales force** for the technology which is no longer a mystery but a renewable technology that they talk about to anyone who will listen.



NEXT STEPS

There are a number of steps that have to be taken in order for this to, not only work for the school but to be financially viable for either a utility or a 3rd party owner.

There is also a number of rule changes that are necessary to allow for this to be attractive to neighboring communities.

AND

There has to be a commitment by the entire geothermal industry (designers, installers, drillers, manufacturers & trade associations etc) to support and aggressively deploy this initiative throughout the US.

I would welcome the opportunity to discuss this further with interested parties.



THE GEOTHERMAL NATIONAL & INTERNATIONAL INITIATIVE.

IF YOU HAVE ANY QUESTIONS...

Or need further information,
Please contact me at **610-659-4998**
or email me at **jdienna@geo-nii.org**



Direct Pay

➤ Elective Payment of Applicable Credits-§6417 (2023-...)

- Some Gov't and Not-for-Profit can benefit from the credit
 - “(i) any organization exempt from the tax imposed by subtitle A,
 - “(ii) any State or political subdivision thereof, (**NOT FEDERAL PROJECTS**)
 - “(iii) the Tennessee Valley Authority,
 - “(iv) an Indian tribal government (as defined in § 30D(g)(9)),
 - “(v) any Alaska Native Corporation (as defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602(m)), or
 - “(vi) any corporation operating on a cooperative basis which is engaged in furnishing electric energy to persons in rural areas.
- **3 ways to avoid 10% Haircut** §48(a)(13) → (§45(b)(10))
 1. <1MW or
 2. Meets Domestic Content or
 3. Start of Construction prior to 1/1/24
 - » Otherwise, 90% (some exceptions exist)
- **Up to a 15% haircut for projects paid for with Tax-Exempt Bonds** §48(a)(4) → §45(b)(3)
- **Lily Batchelder – Treasury Assistant Secretary for Tax Policy** (Tea Leaves - In 4-8 weeks)

Alternative Energy Credits-§48, ITC (2022-...)

Technology	Base Credit	5x Bonus Credit (2022)	Domestic Content (2023)	Energy Community (2023)	Low Income (2023)	Range
Solar Technologies (2022)	6%	30%	2%/10%	2%/10%	10%/20%	6%-70%
Small Wind (2022)	6%	30%	2%/10%	2%/10%	10%/20%	6%-70%
Ground Source Heat Pump (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Microturbine	2%	10%	2%/10%	2%/10%	0%	2%-30%
CHP (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Microgrid Controller (2023)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Standalone Energy Storage Systems (2023)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Thermal Energy Storage Systems (2023)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Fuel Cell (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Geothermal (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Biogas (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Waste Energy Recovery (2022)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Interconnection Property (2023)	6%	30%	2%/10%	2%/10%	0%	6%-50%
Electrochromic Glass (2023)	6%	30%	2%/10%	2%/10%	0%	6%-50%

Alternative Energy Credits-Bonus

➤ **5 Times Bonus (6% x 5 = 30%) (2022-...)**

- Project with a Net Output of less than 1 MW (284 Tons?) or
- Meets the Prevailing Wage and Apprenticeship (P+A) Requirements (IRS Notice 2022-61) or
- Projects that begin Construction prior to January 29, 2023

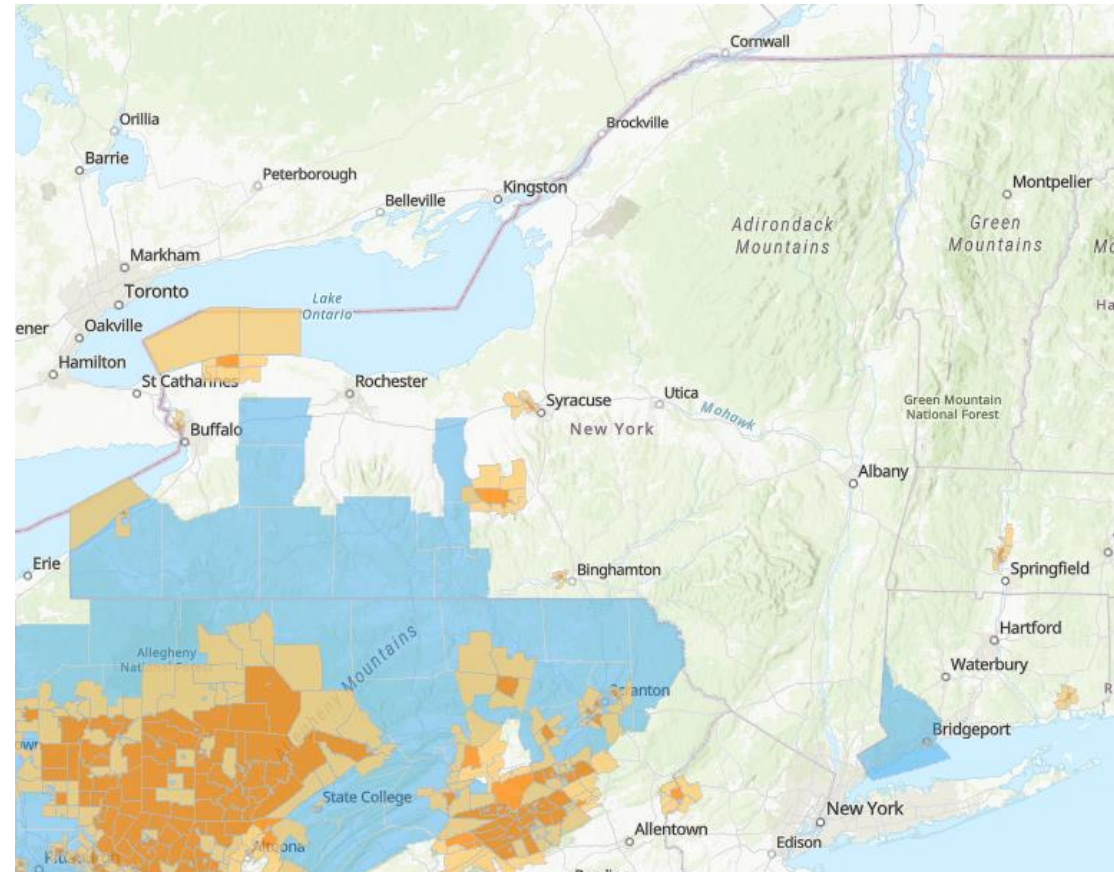
➤ **Domestic Content Bonus (2% or with 5x Bonus 10%) (2023-...)**

- 100% of the cost of steel and iron and 40% of manufactured product (49 CFR § 661.5) is produced in USA
- Lily Batchelder – Treasury Assistant Secretary for Tax Policy (Tea Leaves - In 1-2 weeks)

➤ **Energy Community Bonus (2% or with 5x Bonus 10%) (2023-...)**

- Census Tract or adjoining tract with a Coal Mine closed since 2000 or
- Census Tract or adjoining tract with Coal Fired plant closed since 2010 or
- Area with 0.17% direct employment related to Coal, Oil or NG and higher than avg unemployment (**Based on Start of Construction**) or
- Brownfield Site (42 U.S.C. 9601(39))

Map of NY Energy Communities



<https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d>

Ground Source Heat Pump (6% Base Credit)

- **Typical Qualified Equipment(Upstream of Heat Pump)**
 - Bore Field
 - Heat Pump

- **At least 75% energy used by equipment must be from ground source (Tax Interpretation (§1.48-9(c)(10)(iv))**
 - If not, equipment does not qualify as Ground Source Heat Pump Property
 - This may include downstream (after heat pump) items:
 - Pipes
 - Ductwork
 - Heat Exchangers
 - Diffusers
 - Items that do not use ground source energy do not qualify

- **Construction must begin before 1/1/35**

Prevailing Wage Requirement For 5x Bonus & 179D (IRS Notice 2022-61)

- **Prevailing wages can be found at www.sam.gov**
- **Wage Determination for Unlisted Categories, IRAprevailingwage@dol.gov**
 - the type of facility,
 - facility location,
 - proposed labor classifications,
 - proposed prevailing wage rates,
 - job descriptions and duties, and
 - any rationale for the proposed classifications
- **Records required (Taxpayer's employees, contractors and subcontractors)**
 - identifying the applicable wage determination,
 - the laborers and mechanics who performed construction work on the facility,
 - the classifications of work they performed,
 - Apprentice/Journeyworker
 - Hours worked in each classification,
 - And the wage rates paid for the work and fringe benefits.

Apprenticeship Requirement For 5x Bonus & 179D (IRS Notice 2022-61)

Projects Started:	Apprentices make up:
Before 1/1/2023	Exempt from Requirement
In 2023 1/29/23 and later	12.5% of Total Labor Hours
After 12/31/2023	15% of Total Labor Hours

- If a project has 4 or more workers, at least 1 is required to be an Apprentice
- Apprentice-to-Journeyworker ratio must be met DAILY
- Apprentice must be part of a registered apprenticeship program (3131(e)(3)(B))
- Good Faith Effort Exception
 - The taxpayer requests qualified apprentices from a registered apprenticeship program in accordance with usual and customary business practices for registered apprenticeship programs in a particular industry.
 - The taxpayer must maintain sufficient books and records establishing the taxpayer's request of qualified apprentices from a registered apprenticeship program and the program's denial of such request or non-response to such request

P-12 Schools - Clean Green Schools Initiative

PON 4924

Hannah Morgan, Senior Project Manager
Efficiency Planning & Engineering Team

4-27-23



NYSERDA

Overview of Clean Green Schools Initiative

- **Budget:**
 - \$59M
- **Program Goal:**
 - The goal of the program is to help under-resourced public schools decarbonize their building portfolio and improve indoor air quality (IAQ) across their buildings.
- **Eligibility:**
 - All **existing** public school buildings across NYS that are designated as High-Needs by the New York State Education Department or located in a disadvantaged community.
 - System Benefits Charge (SBC) contribution is not required for participation in this program.

Program Structure

- This program provides funding in two tracks to support a school's pathway towards decarbonization.
 - **Track I Planning: Open Enrollment (accepting apps until 12/30/25)**
 - Provides funding for services which will help schools evaluate, plan for and facilitate energy reduction projects, clean energy projects and indoor air quality projects.
 - **Track II Installation: Competitive (first round closed on 7/27/22)**
 - Provides funding to implement construction projects which will help schools decarbonize their buildings.
 - **Clean Energy Educational and Professional Development Opportunities:**
 - NYSERDA will provide funding to support a range of workforce development and student educational activities for P-12 students that explore, support or promote decarbonization efforts in their schools and communities. This is an optional service in Track I and Track II.

Track I Planning: Eligible Projects

- **Eligible services include, but are not limited to:**
 - Engineering & Architecture Services
 - Energy Benchmarking
 - Energy Studies
 - Energy Efficiency and Clean Heating and Cooling Design Services
 - Energy Master Planning and Decarbonization Roadmaps
 - Clean Transportation Studies
 - Indoor Air Quality Evaluation and Management
 - On-Site Energy Manager
 - District level or across districts
 - Services Associated with Clean Energy Projects
 - Grant Writer
 - Fiscal Advisor
 - Clean Energy Educational and Professional Development Activities
 - *This must be paired with an above bullet and is ineligible as a standalone project.*

Track I Planning: Funding

Track I NYSERDA Caps	District Annual Energy Spend Less than \$500,000	District Annual Energy Spend More than \$500,000
Building Caps	\$150,000	
Energy Benchmarking ¹	\$500	
Metering (hardware costs only) ¹	not to exceed 10% of Track I services	
Fiscal Advisor and/or Grant Writer ²	\$30,000	\$60,000
On-Site Energy Manager ³	\$100,000	\$200,000
Building Clean Energy Educational and Professional Development Activities Cap ⁴	\$10,000	
Maximum Building Caps	\$260,000	\$360,000
District Caps		
District Caps	\$300,000	\$500,000
District Clean Energy Educational and Professional Development Activities Cap ⁴	\$50,000	
Maximum District Caps		
Maximum District Caps	\$450,000	\$750,000
1. The cap is included in the Track I NYSERDA Cap of \$150,000.		
2. The cap is included in the Track I NYSERDA Cap of \$150,000. This is the Building and District Cap.		
3. This is a standalone cap and is in addition to funding for other Track I services. This is the Building and District Cap.		
4. This is a standalone cap and is in addition to funding for other services.		

Track I Planning: Eligible Activities

- **Energy Studies:**
 - Energy studies may be targeted on specific energy consuming systems or comprehensive whole building evaluations.
 - Eligible studies include the evaluation of energy efficiency measures, clean energy projects, renewable generation, retrocommissioning, and strategic planning to reduce carbon footprint.
- **Energy Efficiency and Clean Heating and Cooling Design Services:**
 - Energy Efficiency – Eligible Energy Efficiency design costs include the design of clean energy and energy efficiency improvements, energy modeling and analysis, and integrated project delivery.
 - Clean Heating and Cooling Design Services – Eligible design projects include GSHP, ASHP, and VRF system designs.
- **Energy Master Planning:**
 - Eligible services include coordinating a comprehensive evaluation of existing energy systems, current and future energy needs, and long-term energy goals, resulting in an energy master plan. The energy master plan will serve as a roadmap, or action plan, with a minimum two-year outlook that identifies and prioritizes recommendations to improve energy efficiency and reduce greenhouse gas emissions.

Track I Planning: Eligible Activities

- **Clean Transportation Studies:**

- Eligible studies include assessing the feasibility of transitioning bus fleets to zero-emission alternatives, such as battery-electric or hydrogen fuel cell buses.

- **Indoor Air Quality Evaluation and Management:**

- Studies must predominantly focus on developing solutions that improve the performance of energy related building systems. Analysis shall ensure that there is adequate ventilation, and that ventilation is compliant with applicable code requirements and building system best practices, such as ASHRAE Epidemic Task Force Core Guidance. Examples include but are not limited to:
 - Baselineing
 - Retrocommissioning
 - Continuous Monitoring
 - IAQ Certification Program Participation

Track I Planning: Eligible Activities

- **On-Site Energy Manager:**
 - Eligible activities include, but are not limited to:
 - Initiate and develop an energy management plan that works towards the facility provided energy goal.
 - Develop and/or maintain an energy tracking and monitoring system.
 - Conduct walkthrough audits and reports that identify savings opportunities for further investigation.
 - Review maintenance operational schedules and procedures to identify operational savings opportunities and develop preventative (rather than reactive) maintenance plan.
 - Develop and propose energy and productivity projects.
 - Coordinate a variety of sustainability activities and projects to help students and staff reduce waste, reduce energy use, reduce water consumption, improve air quality and increase green space.

Track I Planning: Application Requirements

- **A complete application package includes the following:**
 - Track I Program Application
 - Scope of Work
 - Budget
- **Applicants may be either the school or an authorized representative of the school.**
- **Applicants may include one or more Track I services in their Scope of Work.**
- **Applicants may submit one application on behalf of multiple buildings within a district.**
- **Template documents are available on the Clean Green Schools Initiative documents and resources website.**

Track II Installation: Eligible Projects (Future Round TBD)

- **Clean Heating and Cooling Projects:**
 - Ground Source Heat Pump
 - Air Source Heat Pump
 - Variable Refrigerant Flow System
- **Capital Projects to Move Towards Decarbonization:**
 - Comprehensive retrofits that impact energy consumption and overall building load
 - Electrification of building systems (e.g., kitchen equipment & domestic hot water heaters)
 - Building electrification readiness projects:
 - High performance building envelope (e.g., air sealing, insulation, window film)
 - Heating/cooling projects
 - Conversion of distribution systems (e.g., steam to hot water) to support potential future electrification
 - Transition to low carbon fuels (e.g., biofuel blends)

Ineligible Projects:

- System conversion to natural gas
- Full system replacement to new fossil fuel-based system

Clean Energy Educational and Professional Development Opportunities

- **NYSERDA will provide funding to support a range of workforce development and student educational activities for P-12 students that explore, support or promote decarbonization efforts in their schools and communities.**
- **The Educational and Professional Development Activities Pathway document, which is located on the Clean and Green Schools Initiative documents and resources website:**
 - Should be consulted for assistance in designing these activities
 - Includes existing programs, tools, and resources
- **Eligible activity costs include, but are not limited to:**
 - Curriculum development, program/license fees, software subscription fees, project supplies/tools/equipment, field trips, promotional material, speakers, teacher stipends, internship wages, textbooks, signage, clean energy toolkits, registration/entrance fees (conferences, camps, workshops), space rental, consultants/trainers fees, professional development fees, food, travel and lodging.
- **Track I Planning:**
 - Per Building – \$10,000
 - Per District - \$50,000

Important Resources

- **Clean Green Schools Initiative Website**
 - Visit the Clean Green Schools Initiative website to see the most current list of Program resources, specific to eligibility, template documents, guidance documents and more.
 - [Link - nyseda.ny.gov/P-12-Clean-Green-Schools](https://nyseda.ny.gov/P-12-Clean-Green-Schools)

FlexTech Program (PON 4192)

- **Summary**
 - NYSERDA will provide a cost-share up to **75%** for Energy Studies, Energy Master Planning and Clean Heating and Cooling Studies.
 - Cost-sharing for each of these efforts is capped at \$500,000 per project or 10% of annual energy expenditure (whichever is less).
- **Eligibility**
 - Eligible project sites include publicly or privately-owned buildings that provide P-12 education.
 - Buildings must pay into the Systems Benefit Charge (SBC) on their electric utility bill.

Questions

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