Energy Options Report for Town of Lansing - Town Hall

By: George Aiken, and Umit Sirt, PE (Taitem Engineering)

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Building Description:

Name/Address: Lansing Town Hall, 29 Auburn Rd, Lansing, NY

Primary Property Type: Single Story Office Building

Gross Floor Area: 8,200 ft^2

Year Built: 1999

Existing mechanical and lighting system;

Heating: Gas fired condensing boiler with radiant floor distribution

Cooling: Split DX system with ducted air handlers

Domestic Hot Water: Gas fired power vented tank heater with recirculation

Interior Lighting: Mixed fluorescent T8 and LED fixtures with occupancy control

Exterior Lighting: Mixed HPS and LED wallpacks with photo-sensor control

Project Description:

The Lansing Town Hall had an energy study done in 2010 and implemented many of the measures identified then. A more recent boiler replacement has rendered much of the radiant floor heating system non-functional. The existing cooling and ventilation equipment is near or past the end of its useful life. As major investments into the HVAC system are likely, the Town of Lansing is interested in what options are feasible, particularly in regards to replacing fossil-fuel burning equipment with electrically driven equipment (building electrification).

Goal of Energy Option Report:

The goal of this Energy Options Report is to provide cost and savings estimates for specific energy conservation and electrification measures as well as an overview of the energy efficiency program opportunities and incentives available for the project.

List of Possible Incentives:

1. Solar energy: up to 30% Federal Business Energy Investment Tax Credit (via direct payment), PLUS NYSERDA NY-SUN program incentives (currently $0.35/W but dropping to $0.25/W soon). EIC OPEN C-PACE provides long-term alternative financing to fund clean energy projects in commercially owned buildings. Please note that C-PACE has not yet been adopted by the Town of Lansing government, however the Town can at any point adopt C-PACE financing. Any state municipality with tax lien authority can enable C-PACE financing by passing a local law and signing EIC's Municipal Agreement. Find out more by contacting Sarah Smiley at: ssmiley@eicpace.org or by phone at (914) 302-7300 Ext. 8105.
2. Geothermal heat pumps: up to 30% Federal Business Energy Investment Tax Credit (via direct payment).
3. NYS Clean Heat Program – NYSEG: Incentives for heat pumps for heating/cooling and hot water production.

Technology	Incentive
ccASHP	$800 - $1,200/10,000 BTUH of maximum heating capacity at NEEP 5°F
GSHP	$1,500/10,000 BTUH of full load heating capacity as certified by AHRI
Air-Source HPWH (<120 gal)	$700/unit

4. NYSEG Commercial and Industrial Program: prescriptive and custom incentives
    a. Prescriptive rebates: For specific predetermined measures such as: Lighting, HVAC, plumbing, and process systems
        i. NYSEG Lighting Rebates
        ii. NYSEG HVAC and Plumbing Rebates
    b. Custom rebates: These are performance-based rebates that require site-specific assessment and cost analysis. ($0.20/kWh saved and $1.50/therm saved)
        i. NYSEG Non-Lighting Custom Rebates
5. Electric Vehicle Charging Stations:
    a. NYSERDA Charge Ready NY 2.0: $4,000 per charging port for Level 2 charging stations at public facilities
    b. Utility EV Make-Ready Programs: The incentive levels vary depending on project criteria:

Incentive Level	Eligible Project Criteria
Up to 100%	• Publicly available DCFC projects with standardized plug types located within Disadvantaged Communities (DAC) or Disadvantaged Community Zones, as applicable. • Publicly available DCFC projects with proprietary plug types that also include an equal number of standardized plugs of an equal or greater charging capacity to the proprietary plugs located within a DAC or Disadvantaged Community Zones, as applicable. • L2 projects located at eligible multi-unit dwellings (MUD) (see Table 2). • L2 curbside projects within or adjacent to a DAC. • Enhanced incentive eligibility by utility is detailed below.
Up to 90%	• Publicly available L2 and DCFC projects with standardized plug types. • Publicly available L2 and DCFC projects with proprietary plugs that also have an equal or greater number of standardized plugs of an equal or greater charging capacity to the proprietary plugs. • Includes municipal pay-to-park locations and free parking offered while charging.
Up to 50%	• Non-public L2 and DCFC projects, such as workplaces or MUDs with restricted access and privately owned pay-to-park lots that require payment for parking while charging. • Public and non-public L2 and DCFC projects with proprietary plugs that do not include an equal or greater number of standardized plugs of an equal or greater charging capacity to the proprietary plugs.

Table is provided for illustrative purposes. Individual utilities reserve the right to make determinations regarding incentive level eligibility based on their assessment of the proposed project and available information at the time of review. Customers are responsible for all costs not eligible for incentives including the cost of chargers, maintenance, electricity, networking fees, and other operational costs. DAC areas will be defined in each utility's implementation plan filings.

The Lansing Town Hall does fall within the Disadvantaged Community boundary and is eligible for 100% cost reimbursement for the upgrade to infrastructure and for the cost of the charging stations.

c. NYSEG DC Fast Charging Incentive Program:

i. The Direct Current Fast Charging (DCFC) Incentive Program provides an annual declining per-plug incentive payable to qualifying public DCFC operators for approximately seven years (2019-2025). The NYSEG incentive initially covers most of the delivery costs associated with the charger, diminishing each year until 2025.

ii. The purpose of the incentive payment is to support DCFC while utilization is relatively low by offsetting electric delivery cost. The incentive will be paid annually after twelve months of billing and shall not exceed the billed delivery cost for that period.

iii. A separate NYSEG meter would need to be installed specifically for the DC chargers, with up to a maximum of 10kW of non-EV charger ancillary loads.

iv. Plugs with a charging capacity of 50 – 74 kW will be eligible for 60% of the prescribed incentives payment (up to the delivery cost cap), and plugs with a charging capacity of 75 kW or more will be eligible for 100% of the prescribed incentive (up to the delivery cost cap)

v. The table below shows the maximum incentive level that a customer could receive based on the year in which they qualify for the program.

	Program Year							
Fixed Annual Incentive (First Year)	2019	2020	2021	2022	2023	2024	2025	Total Incentive
2019	$8,000	$6,857	$5,714	$4,571	$3,429	$2,286	$1,143	$32,000
2020		$8,000	$6,857	$5,714	$4,571	$3,429	$2,286	$30,857
2021			$8,000	$6,857	$5,714	$4,571	$3,429	$28,571
2022				$6,857	$5,714	$4,571	$3,429	$20,571
2023					$5,714	$4,571	$3,429	$13,714
2024						$4,571	$3,429	$8,000
2025							$3,429	$3,429

6. NYSERDA Small Business and Not-for-Profit Financing: offers small business and not-for-profit organizations low-interest loan options to finance energy efficiency projects *(applies to major renovations)*.

    a. **Participation Loan:** NYSERDA partners with lenders across New York State to help small businesses and not-for-profits access low-interest financing for energy efficiency improvements.

7. Section 179D Energy Efficient Building Federal Tax Deduction: CONSULT WITH YOUR TAX PROFESSIONAL. The Inflation Reduction Act (IRA) modified the Federal tax code section 179d to allow the tax deduction to be transferred to the tax-liable designer of the system/project to allow tax exempt entities such as state and local governments to take advantage of the credit indirectly.
    a. The tax deduction is available to owners of new or existing buildings who install (1) interior lighting; (2) building envelope improvements; or (3) heating, cooling, ventilation, or hot water systems that reduce the building's total regulated energy usage by 25% or more in comparison to a building meeting minimum requirements set by code (ASHRAE Standard 90.1-2007).

	Base Credit*	Additional Credit*	Credit Maximum*
Non-Prevailing Wages	$0.57/ sq ft	$0.02 / sq ft per % reduction in EUI	$1.13 / sq ft
With Prevailing Wages	$2.83 / sq ft	$0.11 / sq ft per % reduction in EUI	$5.65 / sq ft

*Section 179D tax deduction amounts shown above include the inflation adjustment from IRS' Revenue Procedures 2022-38 and 2023-34.

8. NYSERDA, Clean Energy Communities Program (PON 3298): There are limited availability, point-based grants with funding amounts based on the following two tables:

DESIGNATION GRANTS BEFORE 10/1/24:

To earn funding at these levels, the municipality must submit the required documentation for the action(s) that qualifies them for the designation grant by 9/30/24 at 11:59 PM EST. If the action(s) is rejected, municipalities will not be eligible for grant awards at this level.

Designation Level	Number of Points	Funding for Small Municipalities (Up to 39,999 population)	Funding for Large Municipalities (40,000 or greater population)
CEC Designation - must complete 4 high-impact actions	N/A	$5,000	$5,000
1-Star Designation ★	1,000	$10,000	$10,000
2-Star Designation ★★	3,000	$50,000	$125,000
3-Star Designation ★★★	5,000	$100,000	$200,000
4-Star Designation ★★★★	7,000	$175,000	$275,000
5-Star Designation ★★★★★	9,000	$250,000	$350,000

DESIGNATION GRANTS ON OR AFTER 10/1/2024:

Designation Level	Number of Points	Funding for Small Municipalities (Up to 39,999 population)	Funding for Large Municipalities (40,000 or greater population)
CEC Designation - Must complete 4 high-impact actions	N/A	$5,000	$5,000
1-Star Designation ★	1,000	$10,000	$10,000
2-Star Designation ★★	3,000	$40,000	$100,000
3-Star Designation ★★★	5,000	$75,000	$150,000
4-Star Designation ★★★★	7,000	$125,000	$200,000
5-Star Designation ★★★★★	9,000	$200,000	$300,000

The categories are NYStretch Energy Code, Community Campaigns – Community Solar, Community Campaigns- Electric Vehicles, Community Campaigns Clean Heating and Cooling and Energy Efficiency, and Community Campaigns – Demand Response.

Other programs that do not offer incentives, but offer other additional benefits:

All programs listed below have building performance requirements that include the most relevant version of Energy Star. Green building certification (recognition), and non-energy benefits such as greener materials and lower-toxicity materials are also part of the certification requirements.

- LEED Certification: LEED is a widely-recognized green building certification.
- WELL Certification: WELL is performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing, through air, water, nourishment, light, fitness, comfort, and mind.
- The International Living Futures Institute Zero Energy and Zero Carbon certifications: focused on reducing both operational carbon and embodied carbon in buildings.

Choice of Heating and Cooling System

A major focus of current state policy is to reduce carbon emissions by encouraging electrification, most importantly through the use of heat pumps for space heating. For example, NYSERDA has recently increased incentives for heat pumps. Electrified buildings are intended to be served by an increasingly cleaner electric grid, with the grid already one of the cleanest in the nation, and with the governor targeting 70% of the grid being renewable by 2030, and 100% to be clean (free of fossil fuels) by 2040. This is also a major focus of local energy policy at the county and city/town levels. For example, the city of Ithaca's Green Building Policy encourages the use of heat pumps and phases out fossil fuels by 2026 in new buildings. NYSEG has proposed not bringing new gas supply to the Ithaca area, in response to a gas moratorium in Lansing. There is a reasonable chance that fossil fuels will be subject to a carbon tax in the future, in which case heating costs for gas-heated buildings will rise unpredictably.

Many developers are already using heat pumps. Despite residual concerns about heat pump performance left over from older technology in the 1980's, many newer heat pump installations are operating without any problems. Heat pumps do take some getting used to: They look different, get serviced differently, require attention to issues such as refrigerant leak prevention, and more. Some Ithaca-area developers report liking heat pumps for many reasons, including performance in heating and cooling, individual electric metering, affordability, and safety (no risk of gas explosions or carbon monoxide). There are many different kinds of heat pumps (air source, ground source, packaged, split, ducted, ductless, rooftop, etc.), and developers are encouraged to evaluate their installation on all projects.

Solar Energy

There are two kinds of solar energy systems, photovoltaic and thermal. Photovoltaic makes electricity, thermal makes hot water.

Solar energy can be on-site or remote. We focus our discussion on on-site solar, with a short mention of off-site solar at the end.

On-site solar can be roof-mounted or ground-mounted. Roof-mounted solar energy may be able to serve all the needs of a highly efficient building up to about four stories high.

A solar photovoltaic system can be used to offset some or all of the building's electric use. It is typically "grid-tied", and so any shortage in electricity provided by the solar system is supplied to the building by the grid, and excess solar energy is sent out to the grid. New York's "net metering" law allows this excess production to gain the owner credit from the grid, up to a limit dependent on many local factors.

The costs and benefits of solar depend on the size of system that is installed. Some people choose to size the solar to provide the equivalent of the building's total needs. This is called a zero-energy building (ZEB) or alternatively "net zero energy" building. Others choose to size a smaller system, for example a multifamily building might size a solar system so that it serves common-area loads such as exterior lighting, corridor/stairwell lighting, laundry, and hot water. Alternatively, a buildings' roof area may not be big enough for a system that covers the full annual load of the building however, a decision may be made to install it anyway, covering a portion of the annual energy bill.

Solar thermal systems can provide some, but not all, of the heat needed to heat the building's domestic hot water. They typically use one tank to preheat the water, and another tank/heater (typically electric) to provide additional heat when needed.

Off-site solar systems (only photovoltaic, not thermal) can be either owned by the client, in which case the benefits accrue even after the system is paid for. Or it can be a subscription-type service, in which case the cost of electricity is slightly discounted and fluctuates with the market rate, but there is no long-term "free energy" such as is the case if the system was owned.

Energy Star Appliances

Consider installing Energy Star appliances: Energy Star dishwasher, Energy Star refrigerators, Energy Star ASHP/Central AC

Electric Vehicle Chargers

Research has shown that the price per charging port is significantly reduced when larger quantities of chargers are installed as part of one project. In addition, the price for EV chargers is also significantly less when coordinated with other construction activities. A Rocky Mountain Institute study on infrastructure costs shows that by installing 6+ EV chargers as part of one project, costs reduced by approximately 40% to around $3,800 for each EV charger.

There are three different types of EV chargers, also known as Electric Vehicle Supply Equipment (EVSE), which are detailed below.

> Level 1 –120V AC power supply, charging is slow (3-5 miles/hour) – limited or no use for a municipal garage.
>
> Level 2 – 240V or 480V AC power connection, charging speed is about 10-20 miles of charge per hour (around 7.2 kW). Great for plug-in hybrids and topping off battery electric vehicles.

Level 3 (DC Fast Charger) – offer the fastest charging speeds available (~100 to 350 miles of charge per hour). Often 50 kW but sometimes higher (150-250 kW). There are three types of plugs: Tesla, CHAdeMO, and SEA Combo.

Some additional websites/resources that are worth checking out for more information:

Electric Vehicle Charging Station Guidebook – Planning for Installation and Operation

Electric Vehicle Charging Infrastructure – Guidelines for Cities

Other Benefits

- Energy improvements can also reduce maintenance costs. For example, well-designed LED lighting systems require less frequent lamp replacement costs. A ground source heat pump will likely have lower maintenance costs than an air source heat pump because the mechanical components are not exposed to the elements nor are they subject to the same extreme operating conditions.
- Energy improvements frequently improve thermal comfort. For example, lower infiltration means fewer drafts, and better insulation means smoother temperature distribution throughout the space.
- A high-performance building saves energy costs, is good for the environment, can be used for good community relations, and can serve as an example for the community.

Carbon reduction measures to consider

Below is a summary of all measures evaluated:

Lansing Town Hall Project Summary																
			GHG Emissions		Electric Use				Nat Gas Use		Costs & Savings				
Existing Emissions & Utility Usage			35,366 lb CO2/year		45,364 kWh/yr		18.8 kW/mo		208.5 MMBTU/yr						
Energy Conservation Measures	**Measure Type**	**Recommendation**	**lb CO2/year Reduction**		**kWh/yr Reduction**		**kW/mo Reduction**		**MMBTU/yr Reduction**		**Savings**	**GHG Savings**	**Project Cost**	**Payback Years**	**Payback w/ GHG Cost**
ECM 1 - Replace Control System	Energy Use Reduction	Recommended	(275)	-1%	1,708	4%	1.3	7%	-5.7	-3%	$ 85	$ (17)	Unknown	Long	Long
ECM 2a - Replace AC with ASHP (Keep Boiler)	Partial Electrification	Not Recommended	9,431	27%	-5,049	-11%	-5.7	-30%	89.5	43%	$ 422	$ 571	$ 44,000	104.3	44.3
ECM 2b - Replace AC and Boiler with ASHP	Full Electrification	Recommended	19,259	54%	-12,195	-27%	-25.8	-137%	186.5	89%	$ 595	$ 1,165	$ 76,000	127.7	43.2
ECM 2c - Replace AC and Boiler with GSHP	Full Electrification	Not Recommended	19,415	55%	-11,529	-25%	-20.7	-110%	186.5	89%	$ 703	$ 1,175	$ 112,000	159.3	59.6
ECM 3 - Replace/Repair ERV System	Energy Use Reduction	Recommended	2,038	6%	-768	-2%	0.0	0%	18.7	9%	$ 123	$ 123	$ 9,000	73.2	36.6
ECM 4a - Install Heat Pump Water Heater	Electrification	Recommended	2,855	8%	-1,934	-4%	-3.4	-18%	27.9	13%	$ 86	$ 173	$ 6,400	74.1	24.7
ECM 4b - Install Point of Use WH	Electrification	Not Recommended	2,671	8%	-2,721	-6%	-5.5	-29%	27.9	13%	$ 5	$ 162	$ 4,000	875.3	24.1
ECM 4c - Install Electric Tank WH	Electrification	Not Recommended	2,070	6%	-5,284	-12%	-18.0	-96%	27.9	13%	$ (328)	$ 125	$ 3,000	N/A	N/A
ECM 5 - Replace Lighting with LED	Electricity Production	Recommended	484	1%	6,921	15%	3.2	17%	-9.6	-5%	$ 450	$ 29	$ 6,600	14.7	13.8
Subtotal (Recommended Measures)			**23,485**	**66%**	**-5,300**	**-12%**	**-22.6**	**-120%**	**208.5**	**100%**	**$ 1,346**	**$ 1,421**	**$ 98,000**	**72.8**	**35.4**

NOTES:

[1] GHG savings are based on values established by NYDEC in their report "Establishing a Value of Carbon" of June 2021

[2] Incremental costs do not include depreciation of existing aging equipment or any potential state or utility incentives.

Measures are categorized as either energy use reduction, electrification, or electricity production measures. The proposed timeline for these measures is based on the ease of implementation (both cost and planning required), as well as prioritizing energy use reduction before electrification, and electrification before electricity production.

Detailed descriptions of all measures:

Below are detailed descriptions of all measures evaluated for this report.

1. Replace HVAC Control System

Description: The existing control systems are only partially functional and roughly 50% of the building is underheated in winter and undercooled in summer. As a result, electric space heaters are employed regularly during the winter. This estimate assumes that replacement/repair of the existing HVAC control system would eliminate this supplemental electric space heater use. This measure assumes that occupant behavior and building temperatures will remain the same after implementation, and thus that energy use and costs will decrease. However, it should be noted that occupant behavior may change after implementing this measure as the building will be able to be kept at more comfortable temperatures throughout the year (e.g. higher in winter and lower in summer). This change in behavior may actually cause energy costs to increase as a result.

Project costs: Unknown. The costs for replacement or repair are dependent on factors outside the scope of this report to determine.

Incentives: None.

Annual energy savings: *-57* therms/year; 1,708 kWh/year; 1.3 kW peak

Annual GHG emissions savings: *-275* lb CO2/yr (*-1%* of total)

Annual energy cost savings: $85/year; additionally *$(17)*/year social cost of GHG emissions

Payback period: Long or non-existent

2a. Replace AC with Air Source Heat Pump (Keep Boiler)

Description: The existing AC systems are near or at the end of their useful lives. Replacing them with an air source heat pump system would provide increased efficiency and performance in cooling, as well as providing primary heating in winter. The boiler and hydronic distribution system would remain in place and act as supplementary heat in winter. Note that this configuration may limit the availability of some state and utility incentives.

Project costs: $44,000

Incentives: May qualify for NYSEG Clean Heat incentives. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: 895 therms/year; *-5,049* kWh/year; *-5.7* kW peak

Annual GHG emissions savings: 9,431 lb CO2/yr (27% of total)

Annual energy cost savings: $422/year; additionally $571/year social cost of GHG emissions

Payback period: 104 years (without including the social cost of GHG emissions)

2b. Replace AC and Boiler with Air Source Heat Pump

Description: Installing an air source heat pump with sufficient capacity to heat and cool the building all year provides greater emissions reductions and cost savings and represents the best path towards electrifying the building. This option does come with higher costs than the partial replacement option outlined in 2a, however more incentives are available for total replacement that may offset this additional cost. It should be noted that some incentive programs may require complete removal of the existing boiler system.

Project costs: $76,000

Incentives: May qualify for NYSEG Clean Heat incentives. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: 1,865 therms/year; *-12,195* kWh/year; *-25.8* kW peak

Annual GHG emissions savings: 19,259 lb CO2/yr (54% of total)

Annual energy cost savings: $595/year; additionally $1,165/year social cost of GHG emissions

Payback period: 128 years (without including the social cost of GHG emissions)

2c. Replace AC and Boiler with Ground Source Heat Pump

Description: Installing a ground source heat pump provides the same advantages as option 2b, but comes with a higher project cost. There are additional incentives available for ground source systems that can partially offset this increase in cost. Energy and emissions savings are slightly higher than the air source system due to a greater seasonal efficiency. It should be noted that some incentive programs may require complete removal of the existing boiler system.

Project costs: $112,000

Incentives: May qualify for NYSEG Clean Heat incentives. May also qualify for Business Energy Investment Tax Credit. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: 1,865 therms/year; *-11,529* kWh/year; *-20.7* kW peak

Annual GHG emissions savings: 19,415 lb CO2/yr (55% of total)

Annual energy cost savings: $703/year; additionally $1175/year social cost of GHG emissions

Payback period: 159 years (without including the social cost of GHG emissions)

3. Replace/Repair ERV System

Description: The existing energy recover ventilator (ERV) system is not currently operational. It's unclear whether this is just a control systems issue or equipment malfunction. Without active building pressure control, ventilation is passive through the use of exhaust fans and natural ventilation. By replacing or repairing the ERV system, this passive ventilation can become actively controlled again, better distributing fresh air throughout the building, and taking advantage of the heat recovery aspect of the ERV system.

Project costs: $9,000

Incentives: May qualify for NYSEG Clean Heat custom incentives. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: 187 therms/year; *-768* kWh/year

Annual GHG emissions savings: 2,038 lb CO2/yr (6% of total)

Annual energy cost savings: $123/year; additionally $123/year social cost of GHG emissions

Payback period: 73 years (without including the social cost of GHG emissions)

4a. Install Heat Pump Water Heater

Description: Replacing the existing gas fired water heater with a heat pump water heater presents the best path towards electrifying the domestic hot water system of the building. Energy cost savings are minimal, so this can be considered when the existing water heater is nearing the end of its useful life. It should be noted that this heat pump water heater will remove some heat from the basement mechanical room it would be located in. If the existing boiler is replaced with a heat pump system, then there will no longer be "waste" heat from the boiler, and the heat removed from the mechanical room will need to be made up at least partially by the space heating system, reducing overall efficiency somewhat.

Project costs: $6,400

Incentives: May qualify for NYSEG Clean Heat incentives. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: 279 therms/year; *-1,934* kWh/year; *-3.4* kW peak

Annual GHG emissions savings: 2,855 lb CO2/yr (8% of total)

Annual energy cost savings: $86/year; additionally $173/year social cost of GHG emissions

Payback period: 74 years (without including the social cost of GHG emissions)

4b. Install Point of Use Water Heaters

Description: Installing point of use electric resistance “mini-tank” water heaters in each bathroom would reduce the substantial storage and recirculation heat losses. The cost of these tanks is also relatively low. However, the energy savings of this measure are also quite low, primarily due to the higher peak electric demand charges.

Project costs: $4,000

Incentives: None.

Annual energy savings: 279 therms/year; *-2,721* kWh/year; *-5.5* kW peak

Annual GHG emissions savings: 2,671 lb CO2/yr (8% of total)

Annual energy cost savings: $5/year; additionally $162/year social cost of GHG emissions

Payback period: Long or non-existent (without including the social cost of GHG emissions)

4c. Install Electric Tank Water Heater

Description: Installing a simple electric resistance water heater with storage tank also provides a path towards full electrification of the building and with the lowest up front cost, it comes with a much higher energy cost. It is presented here merely for comparison.

Project costs: $3,000

Incentives: None.

Annual energy savings: 279 therms/year; *-5,284* kWh/year; *-18.0* kW peak

Annual GHG emissions savings: 2,070 lb CO2/yr (6% of total)

Annual energy cost savings: $*(328)*/year; additionally $125/year social cost of GHG emissions

Payback period: Non-existent

5. Replace Lighting with LED

Description: While some lighting fixtures have been replaced with LED, the vast majority are still fluorescent tube. Replacing these with LED tubes or new fixtures will significantly reduce energy costs with a moderate up front cost.

Project costs: $6,600

Incentives: May qualify for NYSEG commercial and industrial lighting rebates. May also qualify for Section 179d Federal Tax Deduction (via transfer to principal designer).

Annual energy savings: *-96* therms/year; 6,921 kWh/year; 3.2 kW peak

Annual GHG emissions savings: 484 lb CO2/yr (1% of total)

Annual energy cost savings: $450/year; additionally $29/year social cost of GHG emissions

Payback period: 14.7 years (without including the social cost of GHG emissions)