

# TOWN OF WOODSTOCK CLIMATE SMART TASK FORCE

Erin Moran, Coordinator  
Kenneth Panza, Secretary

Application for 14 Points

## PE4 Action: Geothermal Installation

9 Points

14 Points

17 Points

19 Points

20 Points

Woodstock has two ground-based, geothermal heating and cooling systems: one at the highway garage and another at the town hall.

## Geothermal Heating & Cooling

In March 2007, the Woodstock Town Board adopted a resolution committing that town governmental operations would be carbon neutral by year-end 2017. The town achieved carbon neutrality in 2015 and was formally recognized for its accomplishment at the 2017 annual meeting of the New York State Association of Conservation Commissions.

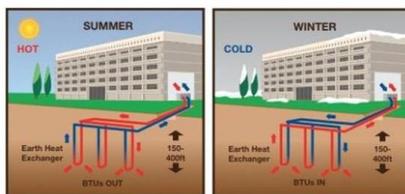
A three-pronged approach was used to achieve carbon neutrality. First, fossil fuel heating systems were replaced at the highway garage and town hall with ground-sourced heat pumps and at the community center with an air-sourced heat pump.

Second, energy efficiencies were achieved with police vehicles, the Rock City Rd restrooms, and at the water wells. By replacing 8-cylinder police vehicles with 6-cylinder models, gasoline consumption was reduced. The recent availability of hybrid police vehicles presents an opportunity for additional reductions in gasoline usage.

### Woodstock's Zero-Carbon Strategy

- Substitute Geothermal for Heating Fuel Oil
  - Highway Garage, Town Hall, Community Center
  - Appropriate Use of Solar
  - Appropriate Use of Wind Energy
- Energy Conservation
  - Rock City Rd Public Restrooms
  - Water District Well Pumps
  - Waste Water Treatment Plant
  - Use of CFL and LED Lighting
- Carbon Sequestration

### Ground-Based Geothermal



- Nearly Constant Temperature at Depth
- 400 ft. Deep Recirculating Wells
- Heat Pump Transfers Heat (Summer or Winter)
- No On-Site Fossil Fuels – Runs on Electricity

Maintenance and repair actions at the town's water wells reduced electricity consumption by about 30 percent.

Third, 500-acres of town owned forest were identified as a carbon sink available to sequester carbon dioxide emitted by town governmental operations. By year-end 2018, not only has the town reached carbon neutrality, the town has achieved Drawdown, defined as sequestering more carbon dioxide than the town emits.

Since 2011, carbon emissions from town

governmental operations have dropped by 15%, and it's expected that by 2020, the town will have reduced its emissions by 30%. And because of carbon sequestration by the 500 acres of town owned forest, the town is removing more carbon from the atmosphere than it emits.

## Highway Department Geothermal

### Woodstock Highway Garage Adjacent to Sawkill Creek

- Remove Hazardous Material
  - Diesel and Gasoline Tanks
  - Salt & Sand Moved
- Remove All Fossil Fuels from Site
- Eliminate Fuel Oil Heating
  - Ground-Based Geothermal
  - Increased Use of Electricity
- Improve Employee Facilities



During 2006, the old highway garage was demolished and replaced with a new, larger facility incorporating geothermal heating & cooling. The highway garage replacement was a multistage project requiring the relocation of the sand & salt pile to the landfill and the relocation of diesel and gasoline storage tanks to the Waste Water Treatment Facility.

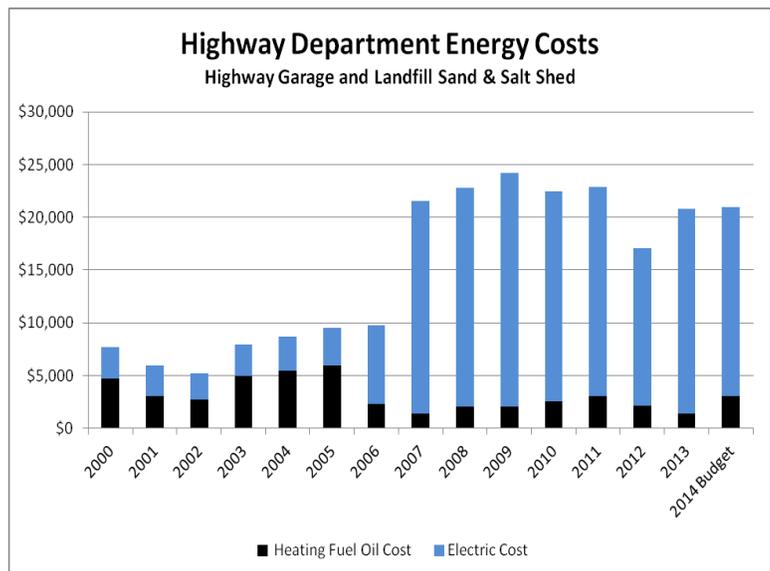
Although it's not possible to make before and after comparisons for the highway garage, it is possible to track the energy use and carbon footprint in total for highway department facilities. When looking at the

graphs below, it's useful to understand that almost all of the energy is used by the highway garage.

### Highway Garage Budget

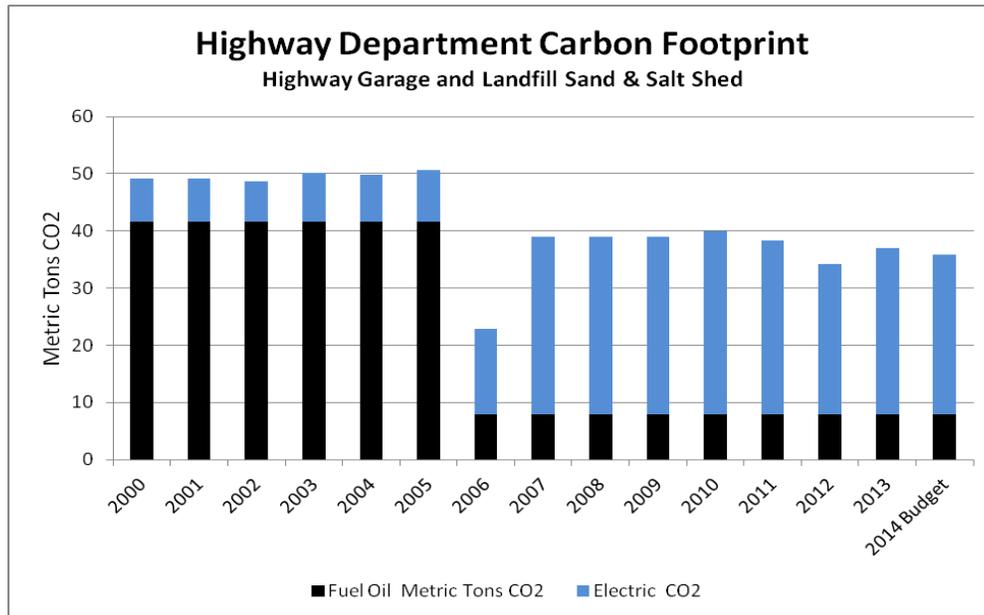
The Highway Department budget includes energy used by the highway garage, by the sand & salt shed, and the highway department storage located at the closed landfill. The chart of energy costs for the department includes all these facilities. The variances in fuel oil costs from 2000 to 2005 reflect the price of fuel oil and timing of deliveries, not the amount consumed.

The new highway garage was constructed during 2006, and became fully operational in 2007. The removal of the fossil fuel heating system and installation of an all electric geothermal heating & cooling system is reflected in the energy costs beginning in 2007. The fossil fuel component of the energy cost represents the heating fuel oil used by the highway department storage facility at the landfill.



2007 – New Highway Garage Completed  
2012 – Installation of 16.2 KW Solar Array

In 2012, a 16.2 KW solar array was installed on the highway garage generating an estimated 16,000 kWh. Coupled with a warmer than expected winter during 2012, electrical usage dropped by about 32,000 kWh. Although the new highway garage is a much larger building and the conversion to an all electric geothermal heating & cooling system increased the department’s total energy costs, the carbon footprint for the highway department decreased.



A long term analysis extending back to the year 2000 of the carbon footprint for the highway department was completed. This analysis took into account the reconfiguration of the highway garage and transfer of the sand and salt material to a new facility at the closed landfill. This analysis showed a drop of CO2 by the Highway Department from 50 metric tons in 2000 to 35 metric tons in 2013. Because of the solar vortex in early 2014, that year’s carbon footprint increased.

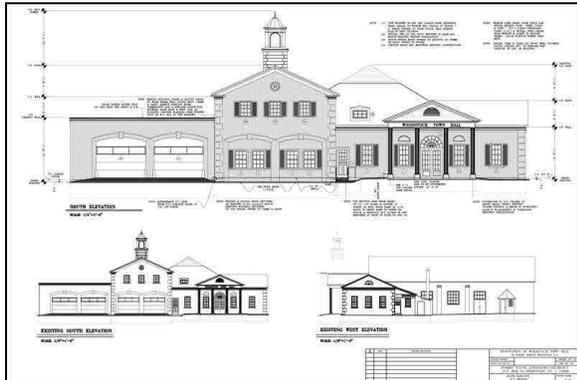
	Carbon Footprint	Technology
2000	50 metric tons	
2007	40 metric tons	Geothermal
2012	35 metric tons	Solar
2020?	9 metric tons	Hydroelectric

In the period from 2000 to 2005, the carbon footprint for the highway department was about 50 metric tons with most of the carbon contributed from heating fuel oil. The conversion to an all electric geothermal heating & cooling system reduced the department’s carbon footprint to about 40 metric tons, and the installation of the 16.2 KW solar array in 2012 removed another 4 or 5 metric tons from the department’s carbon footprint. A complete conversion to 100% hydroelectric power would reduce the highway department’s carbon footprint to less than 9 metric tons.

### Attachments

The full set of documentation is about 200 MB, and would not be very useful. Two prints showing the geothermal well field and another print showing the pumps and valves are about 18MB. Instead, a copy of the engineer’s certification is attached.

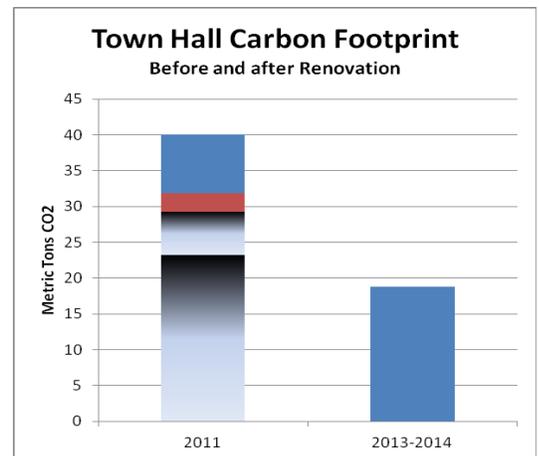
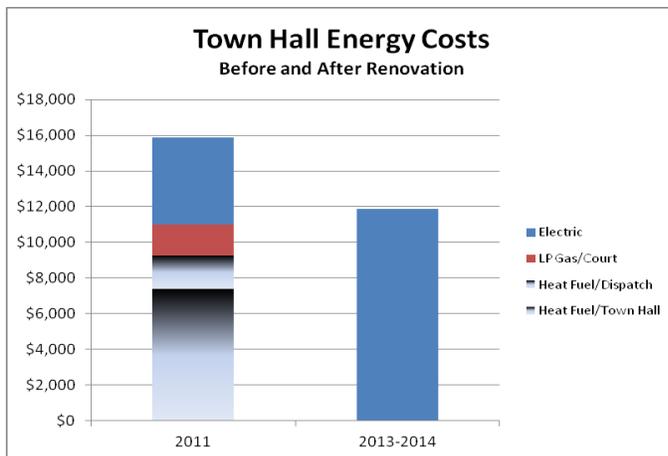
# Town Hall Geothermal



The Town Hall renovation was essentially complete in April, 2013 when the town departments were returned to the building. The renovation substantially improved the building's energy efficiency with insulation, new windows, and sealing of cracks and leaks. The fossil fuel heating systems were replaced by an integrated geothermal heating & cooling system.

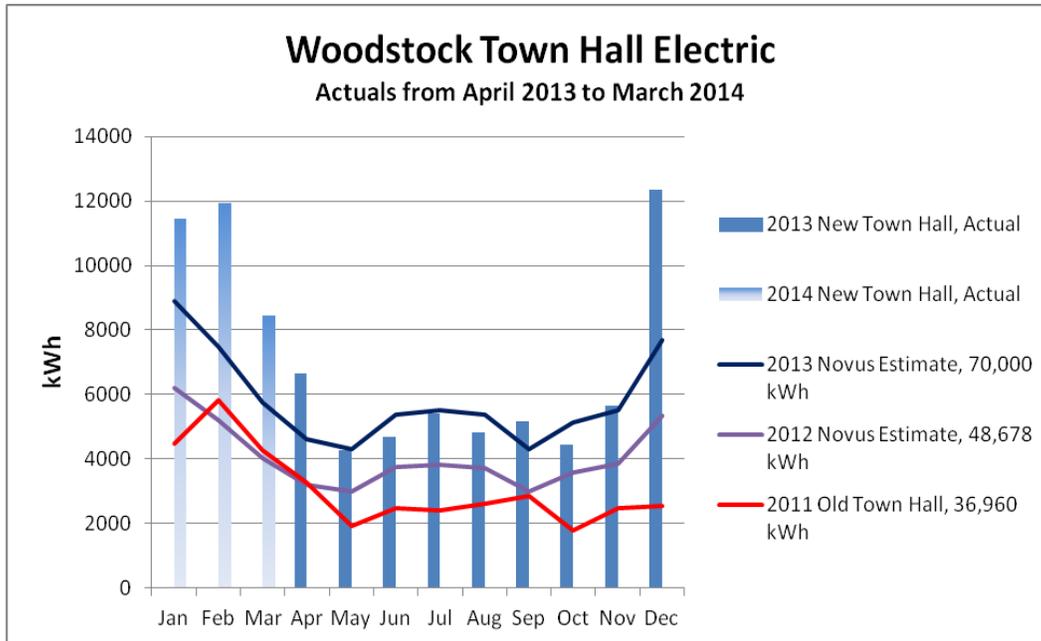
The Town Hall had three heating systems: a fuel oil system for the police, a fuel oil system for dispatch, and a propane heating system for the courts.

Combined with electric costs, the total energy cost for the Town Hall in 2011 was about \$16,000. With the new geothermal heating & cooling system, the total energy cost for the period of April 2013 through March 2014 was about \$12,000. The buildings carbon footprint dropped from 40 metric tons in 2011 to about 19 metric tons, over 50%.



Total Town Hall energy costs for 2011, the year prior to renovation, and the period April 2013 through March 2014, the first full year of operation. The Town Hall's carbon footprint dropped from 40 metric tons to 18.8 metric tons due to the conversion of the fossil fuel heating systems to all electric geothermal.

One problem was obtaining a good engineering estimate for the building's energy use before construction. In 2011, before the renovation, the Town Hall used about 37,000 kWh of electricity. The first estimate received in 2012 from Novus Engineering established the renovated building's energy requirements at about 49,000 kWh. Based on the town's experience with geothermal heating and cooling at the highway garage, Novus Engineering was asked to review its estimate. In 2013, Novus Engineering revised its estimate upward to 70,000 kWh. The actual energy usage in the period April 2013 to March 2014 was 85,000 kWh.



The Period April 2013 through March 2014 totals 85,000 kWh

## Public Information Sessions

A series of presentations, given at the Woodstock Library Forum, presented and reviewed the town's progress in implementing and achieving its carbon neutral resolution. The operations of the town's solar and geothermal facilities were included in these presentations. The Woodstock Library Forum, founded in 1986, has been described as a place for Woodstock to sound off and show off. "The Forum allows people to talk to each other on public issues. It allows people to share their talents and knowledge. My goal from the start was to offer a platform to anyone who seemed relatively sane and who might draw ten people."



Dates of Library Forums on climate change and Woodstock's renewable energy strategy.

### January 12, 2013

A presentation by Ken Panza on Woodstock's solar initiative. Some claims for the benefits of the Solar PPA: It would eliminate the town's Central Hudson bills; show a first year's extra cost of \$20,000, and provide surplus power for the Town Hall Geothermal system. Come listen, learn, and decide for yourself. Ken Panza is a Woodstock Town Councilman.

### February 22, 2014

In 2007, Woodstock adopted the Zero-Carbon initiative, declaring that Woodstock would become carbon neutral by 2017. Town Board member Ken Panza will provide an update on the status of the initiative, what has been accomplished to date, and outline a path towards net carbon neutrality. A

report on the carbon impact of the geothermal heating and cooling systems at the Highway Garage and Town Hall will be explained.

June 20, 2015

The third in a series of presentations about Woodstock's Zero-Carbon Initiative. For the past four years, Woodstock's carbon dioxide contribution from governmental sources has been carefully tracked, and this year Woodstock can claim that it has achieved net zero carbon dioxide. Ken Panza, Woodstock Town Councilman, has been working on Woodstock's Carbon Neutral Incentive for the past three years. He has a BS in electrical engineering and an MBA, both from the University of Illinois.

March 30, 2019

**Woodstock's Road to Carbon Neutrality: A Presentation by Ken Panza**

In March of 2007, the Woodstock Town Board adopted a resolution committing Woodstock's governmental operations to be carbon neutral by the end of 2017. Not only did Woodstock meet its commitment to the 2007 resolution, but it accomplished it in 2015, nearly two years before the deadline. Ken Panza's presentation will explain how zero net carbons were achieved and will cover plans for additional reductions.

Former town councilman Ken Panza was responsible for tracking the towns carbon emissions and electricity usage. He is currently the towns liaison to the Ulster County Climate Smart Committee and is an at-large member of the Ulster County Environmental Council.