

Example: 2,500 Sq Ft home with 1,500 Sq Ft used most; 180,000 BTU hot water boiler with radiant + baseboard heat loop and domestic hot water. Conversion to solar-powered primary heating via ground source heat pump w/ oil-fired backup + domestic hot water from heat pump water heater.

1) Summarize Existing Usage & Cost against a \$32/mo Target Cost in Future

Heat + Hot Water from oil boiler	1,236 gallons/2022	\$	608.73	\$/month	Avg. \$5.91/gal
Electricity	4,100 kWh/2022	\$	83.33	\$/month	Avg. NYSEG Bill
Heat + Hot Water + Electricity Cost		\$	692.06	\$/month	

2) Convert existing fuel use in gallons to estimate kWh electricity use by a 3-TON ground source heat pump + 66 gallon heat pump water heater.

Fuel Burn: 1,236 Gal/yr *82.6% efficiency	1,021 gallons/year	Efficiency loss means heat from 215 gals oil/year goes up the chimney
Heat Pump Coefficient of Performance	4.2 energy out/in	Air-to-air heat pumps may have lower COP (aka EUI) of ~3.5
Estim. energy usage of both heat pumps	243 Equiv gals/year	Ground Source Heat Pump + Heat Pump Water Heater
1:40 gallons of fuel to kWh conversion	9,723 kWh/year	Equivalent kWh to gallons of fuel oil @ ~40 kWh/Gal

3) Estimated kWh usage of Electric Vehicle 2,986 kWh/year 27 miles/day = ~10,000 miles/year. Divide by 3.3miles/kWh

4) Total estimated Annual Electricity usage 16,809 kWh/year "All in" Electricity use: Heat + Hot water + Electricity + EV charging

5) New photovoltaic (PV) solar system 16,800 kWh/year Electricity production: Adjust # of panels for annual 'net-zero' use w/o tracking, 1 kW of solar produces ~1077 kWh/year in Big Indian, NY
15.6 kW = 39 panels @400 watts each

6) Costs, Refunds, and Tax Credits	Install Cost	NYSERDA/NYSEG	Federal 30%	NYS 25% <= \$5k	Net Cost
Ground Source Heat Pump + 500' well	\$ 51,100	\$ 7,340	\$ 15,330	\$ 5,000	\$ 23,430
Heat Pump Domestic Water Heater	\$ 5,100	\$ 700	\$ 1,320	Not Avail.	\$ 3,080
Solar Photovoltaic (PV) power system	\$ 60,840	\$ 3,120	\$ 17,316	\$ 5,000	\$ 35,404
Totals	\$ 117,040	\$ 11,160	\$ 33,966	\$ 10,000	\$ 61,914
	Out of pocket	Refunds	IRS Tax Credits	NYS Tax Credits	Out of pocket after Refunds
		Total Refunds + Tax Credits -->		\$ 55,126	+ Tax Credits

7) Simple payback w/new elect bill \$32/mo 94 months 7.8 years

Assumes 1) Annual net zero kWh use. 2) NYSEG \$32 monthly meter interconnect charge, 3) No oil use.

8) Notes and benefits

NYSEG "Net Metering" turns electric meter forward when using (buying) electricity and backward when exporting (selling) electricity to the grid. Solar system was sized for "Net Zero" electricity usage (consumption = production) on annual basis. Some months more or less. Warranties: Heat pump 10 years, Heat Pump Water Heater 10 years, Solar: 25 years on panels, everything else 5 years bumper-to-bumper. Furnace sizing in cold climates --> 50 BTU/sq ft <-- This is a very rough estimate for a well insulated home. Heat Pump Sizing (1 TON = 12k BTUs) --> 1 TON/750 sq ft <-- Northeast US rough estimate; about 1/3 of furnace size per sq ft. Cold rooms will not heat up as quickly and circulators will run more often as heat pump output is ~125 Deg F vs. Boiler at 140-180 Deg F.