

*Doing Our Part to Mitigate
Climate Change:*

*Electrification of Our House
1996 - Present*



**Addition
Air Source HP
1996**

**Solar Roof
2021**

**Attic Insulation
2021**

**Double Glazed Windows
2005**



**E-mower
2022**



**EV
2018**



**Battery Storage
2021**



**Ground Source HP
2008**



**Air Source HP
water heater 2021**

Ground Source HP HVAC - 2008

ClimateMaster GSHP: 38T and 26T

Electric coil back-up

Variable speed fans

Two ground loops, 375 ft deep

9000 W, 80 gal Rheem Marathon water heater

Replaced:

Oil burner furnace and water heater

Standard A/C for main house

ASHP for addition

Result:

Total cost ~\$60K

Eliminated 1000 gal fuel oil use annually.

Savings to date ~\$46K

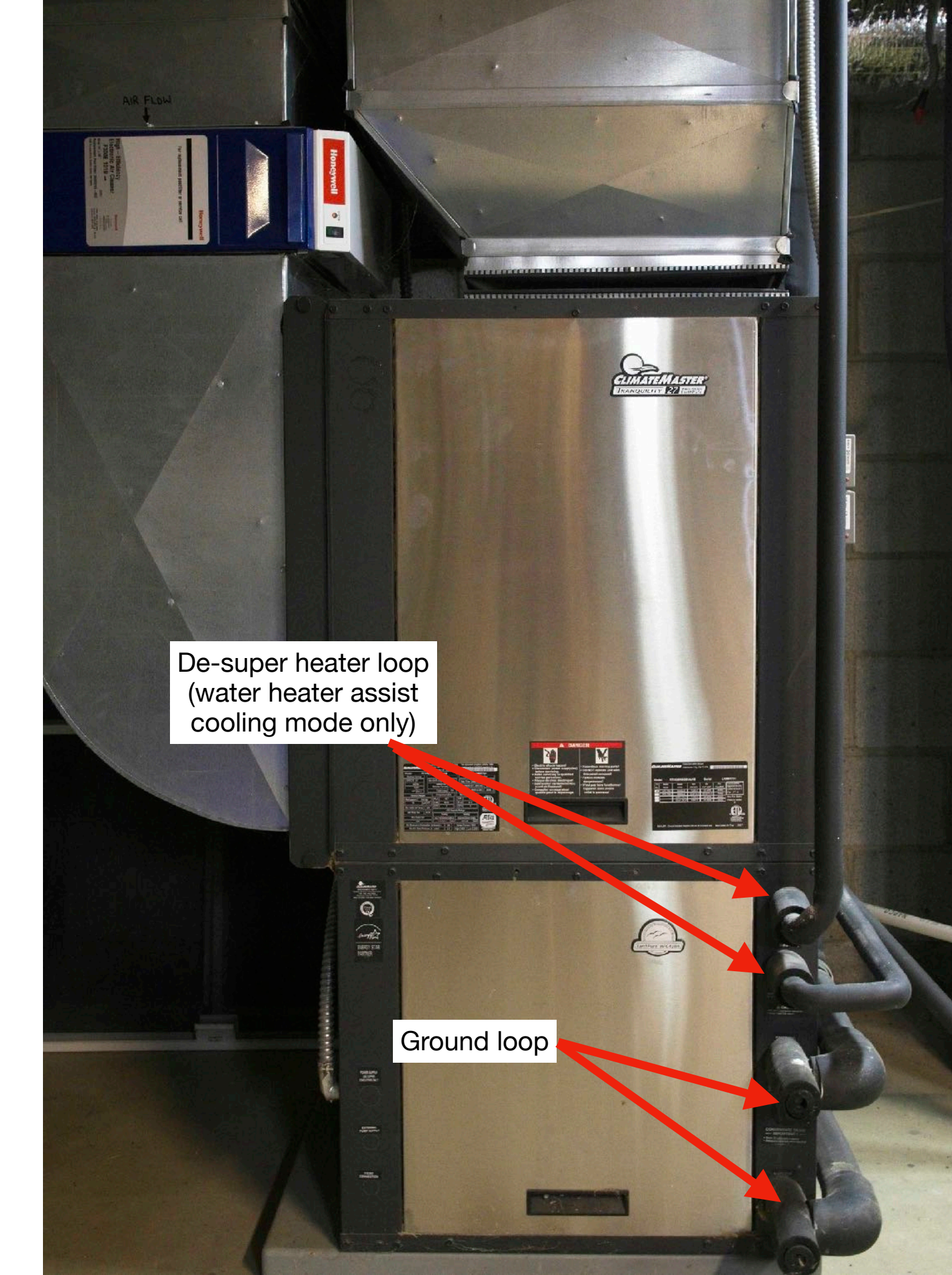
Electric bill unchanged

No regular maintenance, except air filters

Excellent HVAC performance

Nearly silent operation

Equipment indoors



De-super heater loop
(water heater assist
cooling mode only)

Ground loop

Ground Source Fluid Pump
Supplies both
heat pumps independently

Fluid Temp always 55° F

Ground loop enters basement
~4 ft underground



Air Source HP water heater - 2021

Rheem Professional Pro-Terra Hybrid Water Heater
Air Source Heat Pump
4500 W resistive heater back-up
UEF = 4.0

Cost installed ~\$4000

Replaced Rheem Marathon
9000 W resistive heater
UEF = 0.95

Energy upgrade package included attic insulation.
\$2000 rebate from NJ and \$5000 interest free loan

Heat Pump



Tank

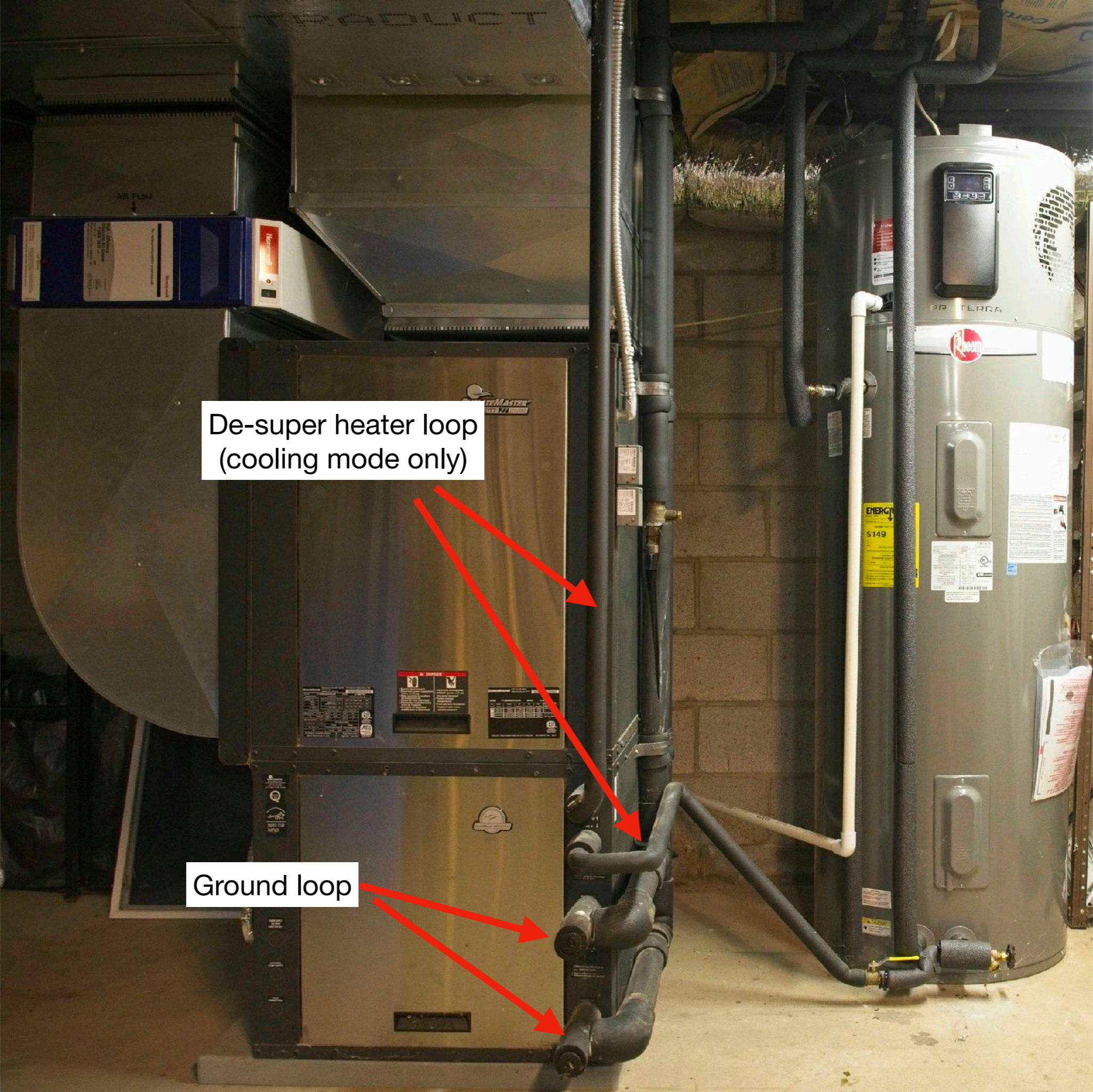


Annual Energy Cost = \$149



De-super heater loop
(cooling mode only)

Ground loop



Solar Roof - 2021

Active Tiles



196 active tiles, 58 W each
 total = 11.4 kW
 Non-active tiles in low exposure locations
 Cost = \$55,000
 Net after 26% Fed tax credit = \$40,700
 TREC payment = \$91 / 1000 kWh generated
 (Transition Renewable Energy Credits)
 Output to grid credited each month



Two 13.5 kWh storage batteries
 Cost = \$15,000
 Net after 26% Fed tax credit = \$11,100
 Seamless back-up for grid outages
 Self-powered mode (except winter)

Jul 22, 2022 KWH Reading (Estimate)	Total power from grid since Feb 2021	20,570
Jun 22, 2022 KWH Reading (Actual)		19,965
Kilowatt Hours Metered		605
KILOWATT HOURS BILLED	JCP&L	351
Jul 22, 2022 KWH Reading (Estimate)	Total power to grid since Feb 2021	4,347
Jun 22, 2022 KWH Reading (Actual)		4,093
Kilowatt Hours Out		254

Solar Roof - 2021

Active Tiles





Tesla Active Roof Tile

45" x 14"

58 w, 4.4 sq. ft.

13 w/sq. ft.

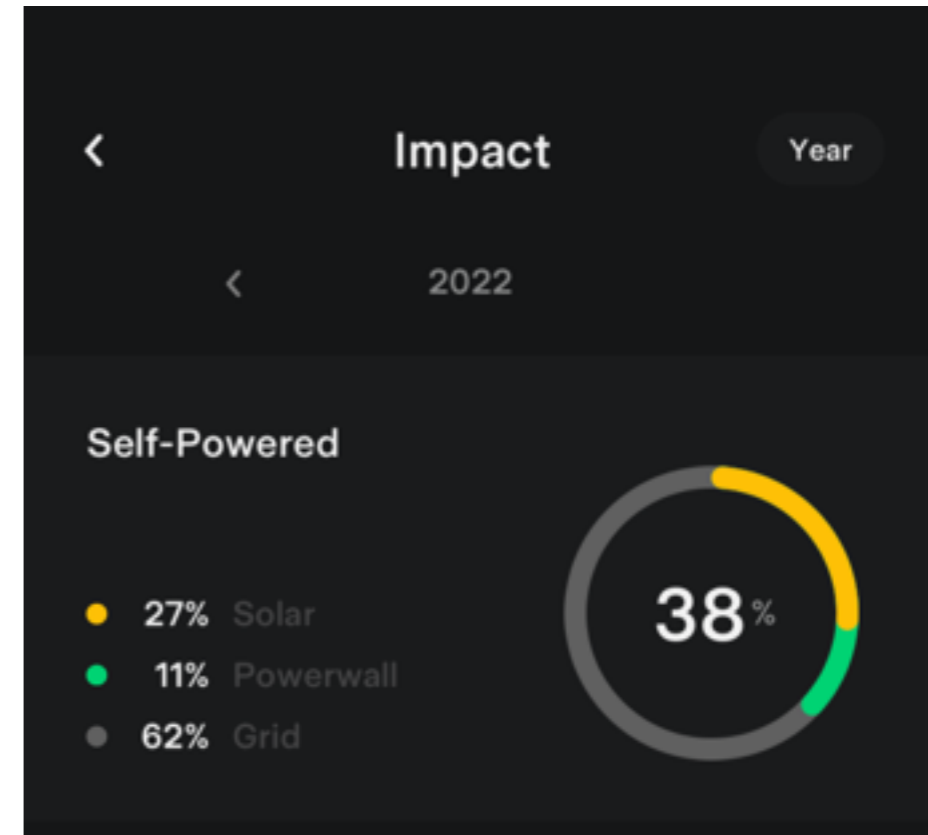
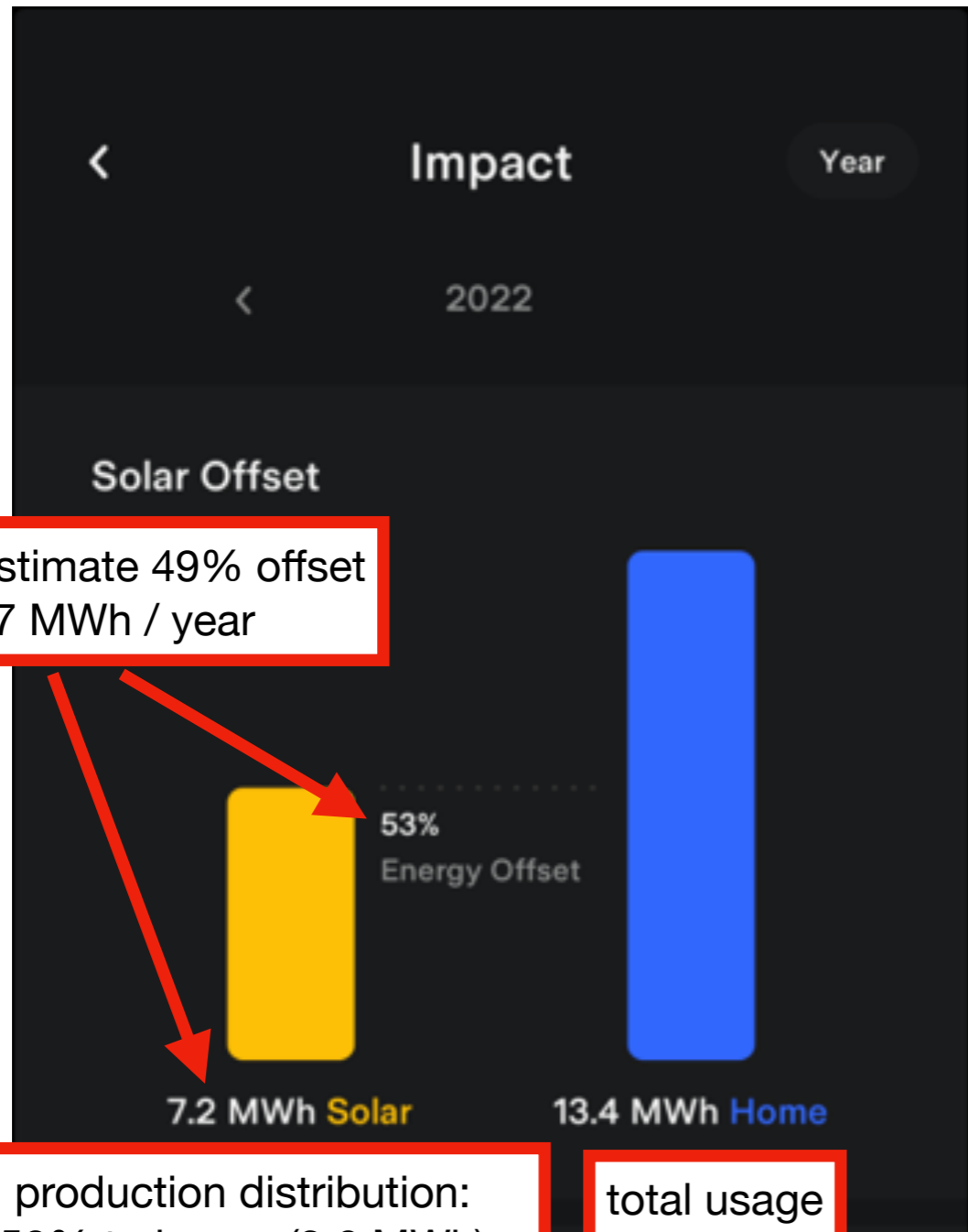
LG Solar comparison

380 w, 19.5 sq. ft. panel

19.5 w/sq. ft.



2022 Results

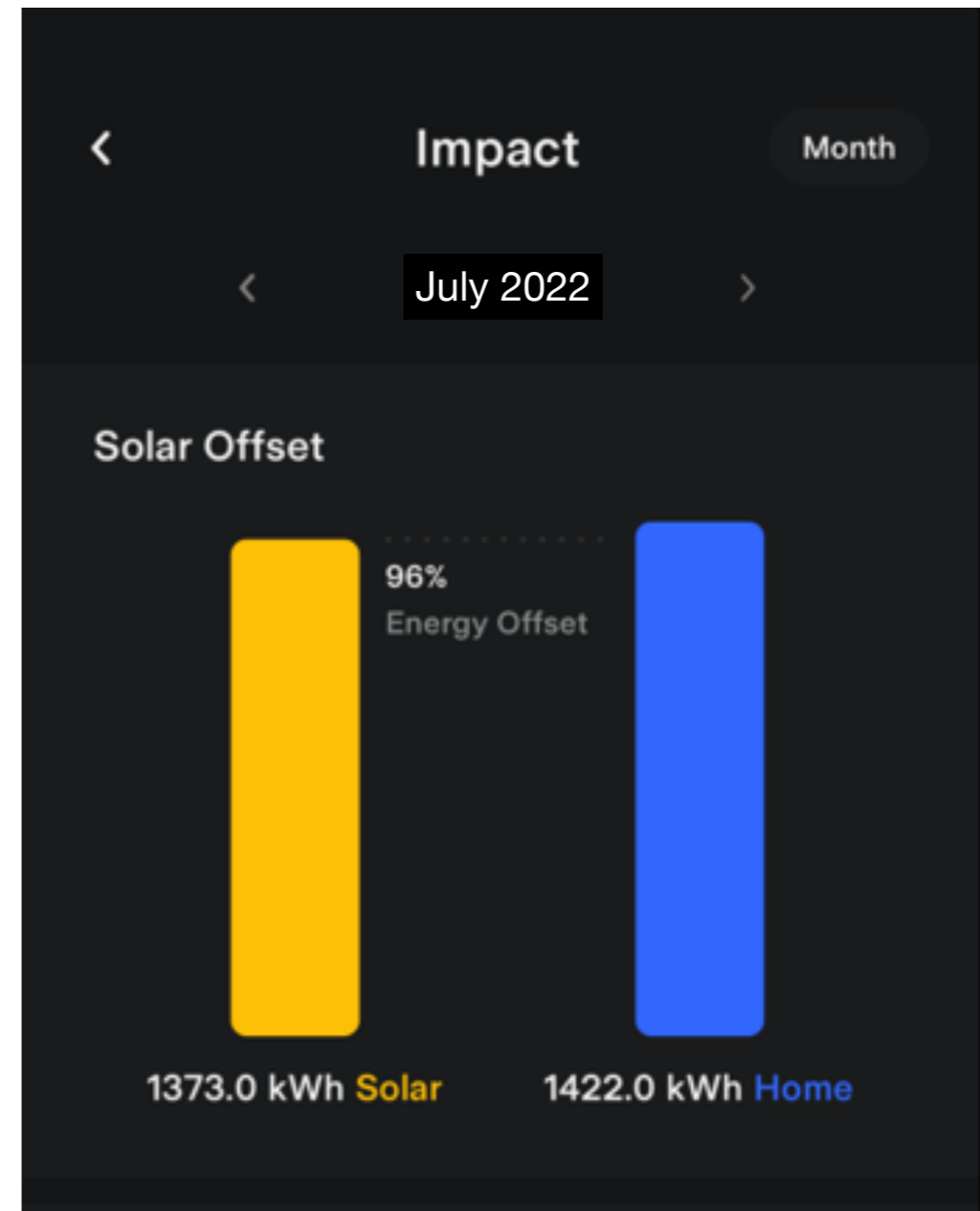
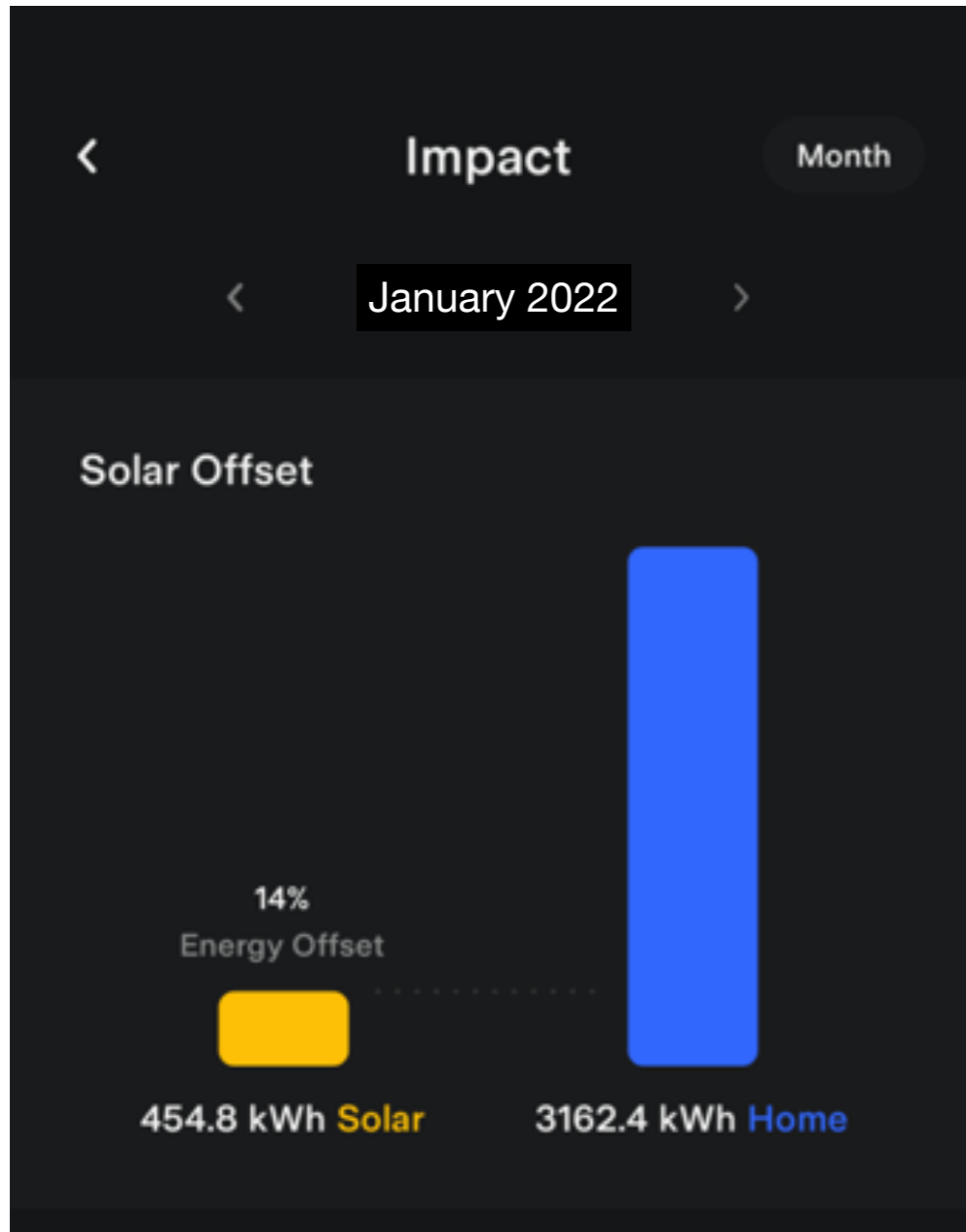


off grid operation
summer only

7 TRECs to date (\$641)
Electric bill reduced: \$251/mo to \$163/mo (-35%)

2022 payments = \$1956
Ten 2022 TRECs = \$910

Winter v. Summer



Great Blue Heron Approves of Solar Roof Tiles



Tesla Model 3
50,000 miles
4 miles / kWh
Energy cost ~ \$1750
(12,500 kWh @ \$0.14/kWh)

Subaru Outback
50,000 miles
25 mpg
Energy cost ~ \$6000
(2000 gal @ \$3/gal)



2022 Model Y
Heat Pump Equipped!

Charge while the sun is shining!
(Match charge rate to roof output)
Free charging for Duke Farms volunteers!

Summary

Since 1996 have gradually replaced fossil fuels with electricity

- 1996: installed ASHP for new addition to house
- 2008: replaced oil burner furnace and water heater with GSHP HVAC and resistive electric water heater
- 2018: replaced ICE vehicle with EV

Activities during the pandemic:

- 2020: conducted whole house energy audit
- 2021: replaced shingle roof with solar tiles and battery back-up
- 2021: replaced resistive electric water heater with ASHP water heater
- 2022: replaced ICE lawn mower with battery powered Toro



Energy Saver Kit from JCP&L

Additional Information

New Jersey's Energy Efficiency Program Transition Program: <https://njcleanenergy.com/transition>

JCP&L: https://www.firstenergycorp.com/save_energy/save_energy_new_jersey/for_your_home_nj.html

Electric Vehicle Incentive Programs: <https://www.njcleanenergy.com/ev>

Additional resources for electric vehicle drivers: https://www.njcleanenergy.com/files/file/EV/EV%20Brochure%209_24_21.pdf

What the Inflation Reduction Act Includes:

- A 30% Federal tax credit for solar panel installation.
- Rebates for heat pumps (\$8000), electric water heaters (\$1750) and electric stoves (\$850).
- A \$7,500 tax credit for EVs that are built in North America. Added incentives for battery components largely manufactured or assembled in North America. The credit could be applied as a rebate at the point of sale.
- The bill would also provide \$4,000 tax credit for the purchase of used EVs.

Source:

<https://www.axios.com/2022/07/29/climate-bill-electric-vehicle-credits>

<https://www.washingtonpost.com/business/2022/08/16/inflation-reduction-act-save-money>