Our Home Clean Energy Journey David and Sarah Fischell

Special Thanks To:

NJ Building Electrification Monthly Webinars,

Fair Haven Green Team, and the Lincroft Chapter of Citizens' Climate Lobby

Clean Home Energy:

Transportation Space heating & cooling **Rooftop solar** Prep for the future Water heating Cooking Building, Lighting & Appliance Efficiency **Backup Power**

Also: Laundry, Grill, Fireplace, etc.



Our Journey So Far

- Solar cut electric use
- SRECS turned cost to cash
- We love our electric car, fun, fuel saving, low maintenance, lower stress on long drives
- Minimal added cost for heat pumps to replace systems when AC systems needed to
- We have more to do!

1985 Photo of 71 Riverlawn Drive



2015 Pre-Electrification

- Three Zones of Gas Forced Hot Air Heat & AC
 - Attic Air Handler 1
 - Attic Air Handler 2
 - Central basement furnace and boiler with Boiler Mate hot water
- Natural Gas Range in Kitchen
- House is ~4,500 sq'
- 2015 Utility Bills Total \$7,140

| 2015 | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Full Year |
|---------------------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|
| Electric KWH | 2297 | 2455 | 2489 | 3842 | 1123 | 2436 | 3147 | 3136 | 3420 | 3275 | 1496 | 1354 | 30,470 |
| Electric \$ | \$ 524 | \$ 560 | \$ 352 | \$531 | \$ 155 | \$ 391 | \$ 520 | \$ 518 | \$ 566 | \$ 455 | \$ 209 | \$ 190 | \$4,971 |
| Gas \$ | \$ 367 | \$ 81 | \$ 582 | \$351 | \$ 180 | \$77 | \$ 61 | \$ 77 | \$ 76 | \$ 73 | \$77 | \$ 167 | \$2,169 |
| Total Utility \$ | \$ 891 | \$ 640 | \$ 934 | \$883 | \$ 335 | \$ 467 | \$ 581 | \$ 595 | \$ 642 | \$ 529 | \$ 286 | \$ 357 | \$7,140 |

August 2016 Solar Installation Cost After Rebates ~\$25,000

West Facing Roof

Small South Facing Roof



Original estimate was a potential savings of 40%

Impact on 2017 Electric Bill Compared to 2015*

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Full Year |
|------------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|
| 2015 \$ | \$ 524 | \$ 560 | \$ 352 | \$531 | \$ 155 | \$ 391 | \$ 520 | \$ 518 | \$ 566 | \$ 455 | \$ 209 | \$ 190 | \$4,971 |
| 2017 \$ | \$ 327 | \$ 209 | \$ 76 | \$ 81 | \$3 | \$ 16 | \$ 140 | \$ 218 | \$ 171 | \$ 222 | \$ 145 | \$ 74 | \$1,682 |
| Savings \$ | \$ 197 | \$ 351 | \$ 276 | \$450 | \$ 152 | \$ 375 | \$ 380 | \$ 299 | \$ 395 | \$ 234 | \$ 65 | \$ 116 | \$3,289 |

First full year with solar was 2017

66% savings of \$3,289

* Does not include SREC reimbursement

What are Solar Renewable Energy Certificates (SRECs)?

How they work

- Homeowners earn 1 SREC for every 1 megawatt-hour (MWh) they generate
- SRECs are sold separately from the electricity itself.

•Who buys them

- Utilities buy them to meet their state's requirements
- Corporations may buy them to offset their carbon emissions.

Availability

- SRECs are available in ~30 states,
- fewer than 10 an active SREC market.
- Good news NJ is one of them

For our 2016 Installation we get ~\$200 per SREC averaging about \$2,500 per year For new installations ~\$80 per SREC (1 MWH)

\$51,000 Electric \$ Saved over 8 years

| | | | | | | | | | | | | | | Electric | Net for | savings |
|------|----------------|---------------|--------|--------------|---------------|--------------|---------------|----------|---------------|--------|---------------|--------------|-----------|----------|-----------|------------|
| year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | SREC | Only | Year | from 2015 |
| 2015 | \$ 52 4 | \$ 560 | \$ 352 | \$531 | \$ 155 | \$ 391 | \$ 520 | \$ 518 | \$ 566 | \$ 455 | \$ 209 | \$ 190 | | \$4,971 | \$4,971 | \$- |
| 2016 | \$ 245 | \$ 309 | \$ 230 | \$176 | \$ 158 | \$ 279 | \$ 390 | \$ 526 | \$ 430 | \$ 214 | \$ 103 | \$ 102 | | \$3,163 | \$3,163 | \$ (1,808) |
| 2017 | \$ 327 | \$ 209 | \$ 76 | \$ 81 | \$3 | \$ 16 | \$ 140 | \$ 218 | \$ 171 | \$ 222 | \$ 145 | \$ 74 | | \$1,682 | \$1,682 | \$ (3,288) |
| 2018 | \$ 188 | \$ 247 | \$75 | \$95 | \$3 | \$ 46 | \$ 171 | \$ 113 | \$ 325 | \$ 186 | \$ 37 | \$ 83 | (\$4,729) | \$1,569 | (\$3,160) | \$ (8,131) |
| 2019 | \$ 307 | \$ 318 | \$ 217 | \$107 | \$3 | \$ 20 | \$ 167 | \$ 256 | \$ 247 | \$ 171 | \$ 346 | \$ 425 | | \$2,581 | \$2,581 | \$ (2,389) |
| 2020 | \$ (76) | \$ 110 | \$ 142 | \$48 | \$ 27 | \$77 | \$ 245 | \$ 429 | \$ 450 | \$ 74 | \$ 162 | \$ 162 | (\$4,776) | \$1,849 | (\$2,927) | \$ (7,897) |
| 2021 | \$ 101 | \$ 133 | \$ 377 | \$67 | \$3 | \$ 32 | \$ 124 | \$ 159 | \$ 153 | \$ 160 | \$ 11 | \$ 91 | | \$1,411 | \$1,411 | \$ (3,559) |
| 2022 | \$ 210 | \$ 188 | \$ 57 | \$3 | \$3 | \$3 | \$ 15 | \$ 280 | \$ 232 | \$ 30 | \$ 3 | \$ 18* | (\$8,631) | \$1,043 | (\$7,588) | \$(12,558) |
| 2023 | \$ 192 | \$ 138 | \$ 71 | \$4 | \$3 | \$3 | \$ 52 | \$ 361** | \$ 166 | \$ 158 | \$ 96 | \$ 239 | (\$2,472) | \$1,485 | (\$987) | \$ (5,957) |
| 2024 | \$ 289 | \$ 321 | \$ 168 | \$143 | \$ 15 | \$ 3 | \$ 122 | \$ 334 | \$ 256 | \$ 48 | \$ 20 | \$ 100 | (\$2,500) | \$1,819 | (\$681) | \$ (5,572) |
| | | | | | | | | | | | | | | | | |

* Electric Car In Service ** Heat Pumps Installed

Estimated TOTAL Saved

- Solar System Cost after tax credits ~\$25,000
- Total Saved >\$51,000
- Net Savings over 8 years ~\$26,000
- Going Forward Change from ~\$5,000 cost to ~\$1,000 net cash positive

\$(51,103)

2022 Electric Car Purchase

- Placed order for Tesla Model X in May 2022
- Car was ready in late October 2022
- Why Tesla?
 - We did not know Elon was crazy in 2022
 - Supercharger network essential for long trips
 - Needed the SUV size (Other car is 2 seater)
 - Decided to pay for Full Self Driving (Auto-Pilot)
 - Installed outlet in garage during 2020 renovation



What Is Different About our Electric Car

- Driving the Tesla
- No Gas Stations at home, just plug it in
- Minimal Maintenance
- Periodic updates added new features
- Range on the Highway is ~280 miles or 3.5 hours (15-30minutes to supercharge)
- Trip planning is different
- Huge storage, under rear deck and Frunk (no engine or transmission)
- Saves \$ (>50%) compared to Gasoline Car



Heat Pump Installation 2023

- Two of our 3 zones needed AC heat exchanger replacement in 2023.
- NJ winters too cold to not have Gas Backup because our home is not well-sealed/insulated
- Installed a Carrier Gas Furnace/Heat Pump in Center Basement to replace 15 year old furnace
- Installed new Air Handler/Heat Pump to replace Air Handler 1 and AC compresser ~20 years old.
- Total Cost \$30K
- \$4K-8K more than AC + Furnace systems

The Installation

- Took 2 days in July 2023
- Required no new wires or ducts to be run
- Got amazing new thermostats to control and manage the systems
 Heat Pump and new HP Furnace Heat Pump for Air Handler 1







Great and Easy to Use Thermostats

- Auto is set and forget will heat when <68, cool when >76
- Easy to use Scheduler to change when you are away
- You can set transition temp to gas heat (we use 25 degrees)





Scheduler

Why we like our heat pumps

- Compressors are nearly silent
- Scheduler makes it easy to change when going away and program
- Night setbacks are less needed for savings
- Heat pumps improve winter humidity over prior system with just a humidifier. This is important for comfort (no more shocks) and to our piano and my guitars.
- The installation was minimally disruptive and it worked immediately.
- FYI we only used gas to heat for several days last winter
- Has not yet shown a cost savings, but not enough data.

Summary

- Overall, these upgrades save us about \$7000 per year
- Solar cut JCP&L electric use by 66%
- SRECS etc turned \$5K per year to \$1K cash positive
- In 10 years, more efficient next generation panels will likely cover almost all our electric needs
- We love our electric car: fun, fuel saving, low maintenance, lower stress on long drives next generation will get 500 mi.
- Minimal added cost for heat pumps to replace systems when AC systems needed to
- We have more to do!

A clean energy home = an electric home.

Why electrify?

•Cut Costs

Boost Comfort

Help our Climate

Cut Costs

- Efficiency
- Better services
- Make your own electricity Rooftop Community Solar



- Disconnect from price volatile fossil function
- Incentives



Prepping for Rooftop Solar

- You make your own electricity
- Some of it goes back to the grid
- Not for every roof
- Timing: do it shortly after you replace your roof
- Excellent financial investment \$\$\$



State and Federal Incentives

• Find details via Pat and Steve Miller of NJ 50x30 Electrification

> https://drive.google.com/file/d/10XgAc dzf99gI59mFOBns4VvAk4C2oRh1/view? usp=sharing

- Includes JCP&L and federal (IRA) rebates and tax credits
- If our upgrades were 2024:
 - Rooftop Solar (30% federal tax credit)
 - EV (up to \$7.5K)
 - EV chargers (up to \$1K)
 - Heat Pumps (up to \$4K)
 - Induction Cooktop
 - HP Water Heaters & Dryers
 - Weatherization
 - Electrical Upgrades
- 50% to 100% rebates for LMI

Navigating Incentives

- Find help via...
 - Your contractor
 - Rewiring America rewiringamerica.org/calculator
 - JCP&L: residential.energysavenj.com/j ersey-central/hvac/
 - WorkMoney: 833-975-6639



Boost Comfort

Clean air

Go combustion-free, it is better! (HVAC, EVs, water heaters, stoves)

• Quiet

Variable speed electric motors are amazing (HVAC, EVs)

Safety

Fewer explosive things in your house are better







Prepping for Heat Pumps

- Try to understand heat pumps a little
- Try to have a plan for replacing HVAC w heat pumps
- Hybrid HVAC (heat pump + furnace) is a fine choice
- Heat Pump Water Heaters
- Rebates & Incentives



"EXPLAIN HOW A HEAT PUMP WORKS LIKE I'M A 5 YEAR OLD"

By Nicole Kelner



Cooking and Clean Air

- Gas stoves
 - Increases NO2 in the home
 - Increases the odds of children developing asthma and are related to respiratory problems in women
 - Venting helps
- Home gas systems can leak, and benzene is carcinogenic
- How to Improve:
 - Induction stoves
 - Kitchen exhaust fan
 - Eliminate gas in your house



Prepping for kitchen clean air

- Prep electrical for new loads
- Induction stove
- Great kitchen ventilation



Venting is key to clean indoor air

In-Line Kitchen Exhaust Fans

Install the best ventilation option with these pointers.



My favorite:

Whatever exhaust fan you have, use it. Use it every time you cook.

Help our Climate

- 42% of US energy-related emissions come from our homes and vehicles
- NJ goal = 80% reduction from 2006 baseline by 2050
- You can help:
 - What's in your garage
 - What's on your roof
 - What's your HVAC



CALIFORNIA GENERATION MIX – 11/15/24



Prepping for an EV

- If you do electrical work, run 240V outlet to your carport, garage or driveway
- If you are "service constrained", investigate special devices to switch among high capacity electrical loads



What Can You Do to Prep for the Future

- Prep to electrify your home
 - Before your AC fails or when you're doing reno
 - Make an HVAC plan to go electric (heating, cooling, and air quality); consider weatherization
 - Upgrade electrical panel as needed
- Install rooftop solar (and batteries) or get NJ Community Solar
- Prep for power outages
- Prep for EV charging, and buy an EV when the time is right
- Buy efficient appliances
- Help others prepare to "Electrify Everything"

More steps on our clean energy journey

- Air seal and insulate
- Other HVAC zones
- Heat pump hot water heater
- Revised power backup system including batteries
- Pool heater, grill, fireplaces
- Landscapers
- Keep talking about climate



Why is it important to talk about climate change?

It's warming It's us. We're sure. It's bad. There's hope.

The Worst of Times, The Best of Times



extended ranges on either side.

Sources: zacklabe.com and climateactiontracker.org

What is Citizens' Climate Lobby?

- Citizens' Climate Lobby exists to create the **political** will for a livable world
- Partner organization = Citizens' Climate Education
- Grassroots, non-profit, non-partisan, climatefocused
- Outreach: media, community, Members of Congress
- Starting place = respect, gratitude, appreciation
- Find us at: citizensclimatelobby.org





QUESTIONS?





