

Electrification Resources from Dale Hulst: <https://minetzero.com>

Resources for electrifying your home, the pathway to net zero carbon emissions and a healthier home.
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1. Assess your situation:

- a. Timing matters: replace gas-fired appliances with electric (heat pump!) appliances when they're due for replacement, and/or as part of planned remodeling.
- b. Your home's envelope matters; it often makes sense to first improve it:
 - i. Measure your indoor air quality with an inexpensive meter like this: https://www.amazon.com/gp/product/B07JB8QWH6/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1
 - ii. Air sealing: can be simple things like caulk and expanding foam or more complex things like high-tech vapor-retarding/ air-sealing membranes: <https://foursevenfive.com/products/air-sealing-system/membranes/>
 - iii. Attic insulation: open cell foam works well on old bungalows, for example: <https://onlyfoaminsulation.com/icynene-foam-insulation/>
 - iv. Perhaps new windows and exterior doors: (I'm looking yet for passive house rated windows in West Michigan.) Example: [https://www.zolawindows.com/passive-house-windows?utm_source=google&utm_medium=cpc&utm_campaign=CDA-Passive-\(Search\)&utm_content=409828427203&utm_term=%2Bpassive%20%2Bwindow&gclid=Cj0KCQjwyt-ZBhCNARIsAKH11758njPD-IYdQz_4r7W6QEG9c_ODGRNofzvCzm-AzuvibdLjrUyD1o8aAoOEEALw_wcB](https://www.zolawindows.com/passive-house-windows?utm_source=google&utm_medium=cpc&utm_campaign=CDA-Passive-(Search)&utm_content=409828427203&utm_term=%2Bpassive%20%2Bwindow&gclid=Cj0KCQjwyt-ZBhCNARIsAKH11758njPD-IYdQz_4r7W6QEG9c_ODGRNofzvCzm-AzuvibdLjrUyD1o8aAoOEEALw_wcB)
 - v. Here's a nice interior storm window system for historic windows, and/or where replacement is not desirable: <https://indowwindows.com/>
 - vi. Perhaps exterior insulation and air sealing if doing new siding, for example: <https://www.huberwood.com/zip-system/insulated-r-sheathing> or <https://www.gaf.com/en-us/roofing-products/residential-roofing-products/roof-and-wall-nail-base-insulation?Action=GetGrid>
- c. Ventilation matters: as you tighten up your envelope, you should consider adding an ERV to bring in dedicated ventilaton. This WILL create a healthier home. Examples:
 - i. ERV I installed at my house: <https://na.panasonic.com/us/home-and-building-solutions/ventilation-indoor-air-quality/energy-recovery-ventilators/intelli-balancetm-100-balanced-air-solution-cold-climate-erv-50-100-cfm>
 - ii. They just came out with a bigger model too: <https://na.panasonic.com/us/home-and-building-solutions/ventilation-indoor-air-quality/energy-recovery-ventilators/intelli-balancetm-200-balanced-air-solution-60-200-cfm>
 - iii. Passive house likes this brand (best efficiencies and pricey): <https://www.zehnderamerica.com/>
- d. You may need to upsize your electrical service to handle the new electric appliances and future EV charging. This may involve both the outdoor mast and the whole indoor electrical panel. Calculator option (untested by me, sorry): <https://ask-the-electrician.com/residential-electrical-load-calculation.html>

2. The big four items for home electrification:

- a. Replace the gas furnace with a low ambient air source heat pump.
 - i. My favorite heat pump solutions are Mitsubishi/Trane. (I have the ducted air handling unit which I used to replace my old ducted furnace). <https://www.mitsubishicomfort.com/commercial/products#residential>

1. Lamphear installed mine and did a nice job: [Lamphear Service Company](#)
2. Hendricks is promoting: <https://www.hendricksheating.com/>
- ii. Alternative: put in a geothermal system: <https://www.waterfurnace.com/residential/>
- b. Replace the gas water heater with a heat pump water heater
 - i. Example (be aware: it cools the room where it is located). <https://www.rheem.com/heatpumpwaterheaters> also if DIY you can pick up the Menards store brand = [Richmond](#) and find some help for the installation on [YouTube](#).
 - ii. Example of split system (best technical solution but expensive). <https://www.smallplanetsupply.com/sanc02>
 1. Local distributor is Ferguson: <https://www.ferguson.com/search?q=sanden&search-button=&lang=default>
- c. Replace the gas stove with an induction stove.
 - i. Example: <https://www.thespruce.com/best-induction-ranges-4150612>
- d. Replace the gas dryer with a heat pump dryer.
 - i. Example: <https://www.designerappliances.com/blog/best-heat-pump-dryer/>
- e. For assistance with system layout and finding contractors, contact Will Gallmeyer here: <https://greenprojectsgroup.com/>
3. Paying for it:
 - a. New credits available thanks to the inflation reduction act; this is a BIG deal!!! <https://www.phius.org/inflation-reduction-act-savings-calculator>
 - b. Another savings calculator: <https://www.rewiringamerica.org/app/ira-calculator>
 - c. Michigan Saves: green bank / loan program: super simple to apply and close on a loan for efficiency improvement, heat pumps, and solar, etc: see this list: [Residential Home Energy Financing | Michigan Saves](#)
4. More resources from great organizations:
 - a. GreenHome Institute: <https://greenhomeinstitute.org/>
 - b. GreenHome Institute YouTube Channel: <https://www.youtube.com/c/GreenHomeInstitute/videos>
 - c. Passive House Institute US (PHIUS): <https://www.phius.org/>
 - i. [What is Passive Building | Phius What is passive house or passive building?](#)
 - ii. Intro YouTube: [\(7\) Passive House 101: Introduction to Passive Buildings, 2022 - YouTube](#)
 - iii. Four Minute Crash Course: <https://www.youtube.com/watch?v=xlrgE7PEtv0>
 - d. Rewiring America: <https://www.rewiringamerica.org/electrify-home-guide>
 - e. Carbon Footprint calculators:
 - i. EPA: <https://www3.epa.gov/carbon-footprint-calculator/>
 - ii. Climate Stewards: <https://climatestewardsusa.org/>
 - f. Indoor Air Quality Guide: <https://www.epa.gov/indoor-air-quality-iaq/protect-indoor-air-quality-your-home>
 - g. Electrify Everything: Big picture vision of energy transformation: https://www.amazon.com/Electrify-Optimists-Playbook-Energy-Future/dp/0262545047/ref=asc_df_0262545047?tag=bingshoppinga-20&linkCode=df0&hvadid=80814230729554&hvnetw=o&hvqmt=e&hvbmt=be&hvdev=c&hvllocint=&hvllocphy=&hvtargid=pla-4584413754226086&psc=1

- h. RethinkX: big picture vision of societal transformation (or collapse...):
<https://www.youtube.com/watch?v=r71yNnfY6ss> and this ongoing series:
https://www.youtube.com/playlist?list=PLxB143vg5_msNrYjoVRUv4IHphHf1Qmq
- 5. In the news:
 - a. Healthier homes:
 - i. Gas stoves may be harming us: <https://time.com/6245607/us-consumer-safety-commission-considers-gas-stove-ban/>
 - ii. More on gas stoves: <https://www.scientificamerican.com/article/are-gas-stoves-bad-for-our-health/>
 - b. Passive House: [This Maine home can stay 70 degrees without a furnace, even when it's freezing outside | Maine Public](#)
 - c. V2H and V2G: Utrecht, NL pilot project:
https://www.youtube.com/watch?v=L_BYDKz3_Jg&t=21s
- 6. Other great products:
 - a. Phantom Load Meter: [Energy Meter](#) (for finding things drawing power on standby)
 - b. Smart load panel: <https://www.span.io/>
 - c. Enphase Home Energy Ecosystem including V2H/V2G: [Enphase Bidirectional EV Charger | Enphase](#)
 - d. SolarEdge Home Energy Ecosystem including V2H/V2G: <https://www.pv-magazine.com/2023/06/16/solaredge-unveils-bidirectional-ev-charger/> and <https://corporate.solaredge.com/en/this-is-solaredge/news-and-media/press-releases/new-bi-directional-dc-coupled-electric-vehicle-charger>