**Electrify Your Home: A Guide for New Jersey Homeowners (draft; updated 3/2024)**

The recently passed Inflation Reduction Act (IRA) provides financial incentives for homeowners to move from burning fossil fuels in their homes to using electricity. As the New Jersey grid, thanks to Governor Murphy, will be moving to all clean sources, by electrifying our homes we will make New Jersey a leader in fighting climate change while improving our air.

Though the IRA was passed in 2022, not all the financial incentives are yet available. What is available are the tax credits (25C-type and 25D-type). The IRS has issued a guidance for homeowners regarding these credits. Also within that document are the specifics about what may qualify for the tax credits (e.g. what are the standards that heat pumps, windows, doors etc. need to meet to qualify). This can be found at: <https://www.irs.gov/inflation-reduction-act-of-2022>.

This document has two sections, a home electrification “to-do” list for homeowners and then a section on the financial benefits the IRA provides now in tax credits and will provide soon in the form of rebates (the HOMES and HEEHRA programs).

**Part 1: To-Do List for Home Electrification**

The list below gives an overview of what actions the IRA helps you take to electrify and improve the energy efficiency of your home. There are 13 to-do items in total. These are grouped into four descriptive categories.

ELECTRICITY SUPPLY FROM THE UTILITY LINES TO YOUR HOME

* 1. Electrical panel (circuit breaker box)
	2. Wiring

GENERATE YOUR OWN ELECTRICITY AND STORE ELECTRICITY

* 1. Rooftop solar
	2. Battery storage

APPLIANCES THAT USE THE ELECTRICITY

* 1. Ground source heat pump for indoor space heating and cooling
	2. Air source heat pump for indoor space heating and cooling
	3. Heat pump water heater
	4. Heat pump clothes dryer
	5. Electric cooking (e.g. induction or resistance stove)

BUILDING ENVELOPE AND WEATHERIZATION THAT CAN REDUCE THE ELECTRICITY NEEDED TO HEAT AND COOL YOUR HOME

* 1. Home energy audits
	2. Insulation and air sealing
	3. Windows and skylights
	4. Doors

What follows is a brief description of each of the 13 items, grouped by category.

**Electricity supply from utility lines to your home**

1) Electrical panel

In order to support the electrification of your home you may need to install a new electrical panel (also called a circuit breaker box). The panel is where the electricity enters your home and is split up into multiple circuits, each with its own circuit breaker. As seen later, there is support for upgrading your panel within the IRA. Panels are sized by the number of electrical Amps they support. An electrified home will require at least a 100 Amp panel or even a 200 Amp panel. The Amps are a measure of the amount of flow of electricity. (In uncommon situations your local power utility company may need to increase the electrical supply from the street to adequately power your upgraded electrical home).

2) Wiring

Most circuits in your home will 120 volts. However some appliances that use greater amounts of electricity (usually ones that heat things) may be 240 volts (twice the voltage of a typical circuit). A central air conditioner typically uses 240 volts. Most currently available electrical appliances supported by the IRA will require a 240 volt circuit. 120 volt versions of some appliances are becoming available such as for heat pump water heaters. Appliances needing 240 volt supply will need new wiring to support the higher voltage.

In some situations the IRA provides support for upgrading wiring. If you plan to have your wiring upgraded through the IRA, you may want to upgrade all the circuits where you may eventually install a 240 volt appliance.

**Generate your own electricity and store electricity**

1) Rooftop solar

Rooftop solar can be a very valuable contribution to electrifying your home. However many homes are not suitable for rooftop solar due to things like a lack of adequate sun exposure, the structure of the roof of the house and even limitations on the installation of solar power through local ordinances. Due to these obstacles to rooftop solar this document does not cover this item in depth. However there is some material on this in the later section on the IRA 25D tax credit which does provide support for this item.

2) Battery storage

Like rooftop solar, battery backup systems can be a very valuable contribution to home electrification. However battery storage makes the most sense if used in conjunction with rooftop solar and therefore is not covered in depth here. Some material however is included in the later section on the 25D tax credit. (Battery storage can also be very useful if you will be charging electric vehicles at home and therefore may decide to install an energy management system).

**Appliances that use the electricity**

As 4 of the 5 appliances in this category are different types of heat pumps, we first provide a brief basic of heat pump technology.

\*Heat pump basics\*

The IRA provides support for these heat pumps to replace common gas burning appliances in NJ homes such as boilers and furnaces for home heating, hot water heaters and clothes dryers.

Heat pump technology has existed for decades. Your refrigerator and air conditioner are essentially heat pumps that move heat from inside to outside of your refrigerator and from the space inside your home to the outside. A main difference however is that a heat pump is designed to move heat in both directions so if you have a central heat pump instead of a central air conditioner it can in cold weather move heat from outside your home to the inside of your home to keep you warm.

The basics of heat pumps (and air conditioners and refrigerators) are a system that circulates a refrigerant fluid (like Freon) that at one point in the flow is compressed and later decompressed and this compression/decompression cycle moves heat from one location to another. The compression requires electric energy however a heat pump can move on average about 3-4 times as much heat energy as electrical energy it uses.

Another point to realize about heat pumps is that the technology has improved greatly from when they were first used in home heating. There are multiple reasons for this but perhaps the major improvement has been what is called “inverter” or sometimes called “variable speed” technology. This technology improves the energy efficiency of heat pumps but also allows heat pumps to effectively warm a home in “cold climates” like Maine, Canada or Alaska where temperatures can be well below zero Fahrenheit (however cold climate heat pumps are currently more expensive than basic heat pump systems).

Upgrading your home to a heat pump HVAC (heating, ventilation and air conditioning) system can be a complicated process. To help with the flow of this document, the full description of upgrading a home with heat pump heating is in the **Appendix** to this document.

1) Ground source heat pumps

Ground source heat pumps extract heat from the ground around your home. Because the temperature of the ground tends to be closer to a comfortable indoor temperature than the outdoor air, ground source heat pumps are more energy efficient than air source heat pumps (discussed next). This is done in two basic ways, either by deep drilling (200 feet deep or more) or by using piping buried about 6 feet which requires a large area of unused land. As with rooftop solar, many NJ homes will not be suitable for ground source heat pumps (or for a similar technology of water source heat pumps). So, similar to the rooftop solar section above, this item is not covered extensively but there is some material on ground source heat pumps later when discussing the 25D-type tax credit.

2) Air source heat pumps for indoor heating and air conditioning

These are the most common type of heat pump. These use electrical energy to move heat from outside your house to inside in the winter and from inside to the outside during the summer. As mentioned above, these are discussed more fully in the Appendix which deals with electrifying your home heating and air conditioning systems.

3) Heat pump water heaters (a type of air source heat pump)

These units often placed in a basement or in a garage and generally exchange heat with the air there. A few things to realize about these appliances are that they need to have sufficient air space around them from which to extract heat (this makes the air around them cooler and usually dryer) and they make take slightly longer to heat additional water if all the hot water is drawn off at once.

4) Heat pump clothes dryers (a type of air source heat pump)

Heat pump closes dryers extract less heat than a water heater so they do not require as much air space but they do tend to take longer to dry a load than most fossil fuel clothes dryers.

5) Electrical cooking.

Even with good ventilation, fossil fuel cooking adds harmful pollutants to your inside air (e.g. nitrous oxides, benzene). One medical condition these pollutants can aggravate is asthma, especially in children. Traditional electrical stoves and ovens use what is called electrical resistance heating. A newer type of electrical stove is an induction stove. It uses electricity so you can cook with magnetism. Induction stoves are much more convenient to cook with then a typical electric stove. The biggest advantages are that they can heat very quickly (they can boil water faster than a natural gas stove) and the stove surface does not get hot (you can remove a hot pot and then safety put your hand on the burner surface). However to use an induction stove you will need pots and pans that a magnet will stick to.

**Building Envelope and Weatherization that can reduce the electricity needed to heat and cool your home**

1) Home energy audits

These are to evaluate the overall energy efficiency of your home. This is covered in the sections below having to do with the IRA incentives.

2) Insulation and air sealing

One way heat moves is by convection which is where the air is warmed and migrates out to where it is cooler. Air sealing slows heat loss by convection by blocking air passageways. Insulating materials help by reducing convection heat loss but also reduce heat loss due to two other processes, conduction and radiation.

3) Windows and skylights

Windows are good examples of how air sealing and insulation can reduce "heat loss" in both directions to keep our homes cozy. The reduce heat loss from inside to outside in the winter and heat loss (e.g. heat penetration) from outside to inside in the summer.

4) Doors

Doors operate in a manner similar to windows but because they open and close frequently air sealing around the edges can be especially valuable.

**Part 2: IRA Incentives Programs**

Some of the incentive programs can only be used by certain income groups or have more generous benefits for lower incomes. The IRA bases the income eligibility on what is called the Area Median Income (AMI). You can find the AMI for your home by entering your address at the website below.

[**https://ami-lookup-tool.fanniemae.com/amilookuptool/**](https://ami-lookup-tool.fanniemae.com/amilookuptool/)

For the IRA, low income is defined as 80% or less of the AMI, a moderate income is then up to 150% of the AMI.

The following table shows which of the 13 to-do items are covered by each of the four programs within the IRA that provide benefits to homeowners for electrifying their homes.

The income limitations for the programs are:

* HOMES: no income limits but greater benefits for low income
* HEEHRA: low and moderate income only with greater benefits for low income
* 25C: no income limits
* 25D: no income limits

Each program will be discussed separately but it is useful to point out some information in this table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **IRA Incentives Programs** | **HPwES not IRA** | **HOMES** | **HEEHRA** | **25C** | **25D** |
| Takes effect | Current; stops in 2024 | 1/2025 in NJ | 1/2025 in NJ | Now | Now |
|  | **ELECTRICITY SUPPLY FROM THE UTILITY LINES TO YOUR HOME** |
| Electrical panel (circuit breaker box) |  | X\* | X\*\* | X\*\*\* | X |
| Wiring (e.g. prewire for 240 Volts) |  | X\* | X | − | − |
|  | **GENERATE YOUR OWN ELECTRICITY AND STORE ELECTRICITY** |
| Residential (rooftop) solar |  | − | − | − | X |
| Battery storage of 3 kilowatt-hours or larger |  | − | − | − | X |
|  | **APPLIANCES THAT USE THE ELECTRICITY** |
| Ground source (geothermal) heat pump for indoor space |  | − | − | − | X |
| Heat pump for indoor space | X | X^ | X^^ | X | − |
| Heat pump water heater | X | X^ | X^^ | X | − |
| Heat pump clothes dryer |  | X^ | X^^ | − | − |
| Electric cooking (e.g. induction or resistance stove) |  | − | X^^ | − | − |
|  | **BUILDING ENVELOPE AND WEATHERIZATION THAT CAN REDUCE THE ELECTRICITY NEEDED TO HEAT AND COOL YOUR HOME** |
| Home energy audit | X | − | − | X | − |
| Insulation and air sealing | X | X | X | X^^^ | − |
| Windows and skylights | X | X | − | X | − |
| Doors | X | X | − | X | − |
|  | \* If needed for new efficient appliances\*\* Upgrade from 60 amps or less\*\*\* Upgrade to at least 200 amps^ If replace electrical resistance appliance like baseboard electric^^ Only if replacing fossil fuel burning appliance^^^ Materials onlyHPwES Home Performance with Energy Star. $5K rebate if modeled energy improvement is > 25%  (lower rebates for smaller modeled energy improvements; income is not considered) |

**25D Tax Credit Program:**

This program only supports the two items in generate your own electricity and the appliance of ground source heat pumps while none of the three other programs support these items. These three items are not covered further in the remainder of this document except for the few points made here. Many homes may not be suitable for rooftop solar (e.g. not enough sun exposure) or for a ground source heat pump (lack of sufficient land). If your home may be suitable for these improvements (including the battery storage if solar is added) they should be seriously considered. They can be expensive but there are often generous or flexible ways to finance the projects but they are perhaps the most cost effective home electrification steps that can be taken. In addition these projects are generally undertaken by specialist contractors who can add a high level of expertise to support the carrying out of these more costly and involved projects. Other guides to help with these projects are (to be added). The 25D tax credit to help pay for these projects allows a tax credit for 30% of the cost. There is no income limit for the tax credit and if 30% of the cost of the project is greater than federal taxes owed for the year of the installation, unused credit can be carried forward to subsequent tax years until the entire 30% credit is received.

**Home Energy Audits:**

Of the IRA programs, only the **25C** tax credit can be used for this. However this is usually a relatively low cost item (often only $100-$150 and in some towns in NJ even less). In general if you are considering any home electrification efforts then you should have a home energy audit done. In general the auditor will assess the weatherization of your home (insulation, air leaks, including something called a blower door test) and examine your major energy using appliances. The auditor may do this as part of an existing program in NJ called Home Performance with Energy Star. This program can provide up to $5,000 in cash rebates and up to $15,000 of zero percent financing. How this program will operate with the IRA remains to be determined. This program is carried out by your utility provider but also by private contractors who also often are HVAC contractors. The home energy audit will be valuable in planning your home electrification. Some sources explaining this are….

**Heat Pumps:**

Another thing to point out in the table is about heat pumps. The **HEEHRA** program will only provide support for the replacement of a fossil fuel burning appliance by a heat pump. Therefore it will not support replacing an electrical resistance appliance such as 1) electric heating (e.g. electric baseboard heating) 2) an electric water heater 3) an electric clothes dryer or 4) an electric stove. This is true even though heat pump versions will use much less electricity. The situation with heat pumps and the **HOMES** program is practically the opposite. The HOMES program targets reducing home energy use. Replacing an electrical resistance appliance with a heat pump version will save significant energy, and for that reason, homeowners with electrical resistance appliances (and especially home heating because it requires the most energy) may want to consider taking advantage of the HOMES program.

**HOMES Program:**

The HOMES program is also referred to as a "whole house" discount or a "retrofit" discount. It is a **single** discount given for costs related to improving the overall energy efficiency of your home. The homeowner engages a contractor who evaluates the home and proposes a set of energy efficiency improvements. Home Performance with Energy Star (HPwES) will be discontinued in 2024. An upgraded program, HOMES, will begin in 2025 in New Jersey. Because the objective of the HOMES program is to reduce the whole house use of energy the emphasis is on weatherization. Therefore homes lacking good insulation and air sealing are good candidates (generally older homes). As was described above in the paragraph on heat pumps the HOMES discount can include costs for installing appliances that provide a significant reduction in energy use. This also includes costs for any necessary updates to the electrical panel or wiring to support new appliances.

If your home is likely to require a significant expense for optimizing levels of weatherization such as new attic or wall insulation and air sealing, the HOMES program may be the best option for this. As will be seen in a subsequent table, both the HEERA and the 25C tax credit programs provide for home insulation, however the limits are relatively low ($1,600 total for HEERA and $1,200/year for 25C). The table below shows the various rebates for the HOMES program. The rebate size depends on whether modeled or measured energy reduction is used, the size of the energy reduction and household income. As can be seen the rebate caps are larger than those for HEEHRA and the 25C tax credit.

|  |  |  |
| --- | --- | --- |
| **HOMES Rebates** | Modeled | Measured |
| Energy reduction (%) | 20-35% | >35% | >15% |
|  | Rebate | Rebate Cap | Rebate | Rebate Cap | Rebate | Rebate Cap | Or $/1% decrease | Rebate Cap |
| Low income household | 80% | $4,000 | 80% | $8,000 | 80% | None | $200 | None |
| All other households | 50% | $2,000 | 50% | $4,000 | 50% | None | $100 | None |

**HEEHRA and 25C Tax Credit Programs:**

These are the IRA programs most likely to be used by homeowners. The HEERHA program is available to homeowners with incomes as high as 150% of the Area Median Income while the 25C tax credit has no income limits. Further, for homeowners where the HEEHRA program does not cover the entire cost of the item, the remaining out of pocket cost can then be used towards the 25C tax credit.

The following table gives the overall dollar limits for the programs. For HEEHRA, the maximum for all rebates combined is $14,000, no matter how long it takes to reach the maximum. For the 25C tax credit the maximums only apply for money spent in 1 calendar year. The maximum for all heat pumps combined in 1 year is $2,000 and for all other items combined the maximum is $1,200.

|  |  |  |
| --- | --- | --- |
| HEEHRA and 25C Tax Credit Programs | HEEHRA | 25C-type tax credits |
| Start date | 1/2025 in NJ | In effect |
| Eligible income levels | Low + moderate levels only | All income levels |
| Dollar limits on rebate or tax credit | $14,000 total for all items.Can be over more than 1 year | $2,000/year for heat pumps.$1,200/year for the rest. |
| Time frame for rebate or tax credit | Can be over more than 1 year | Cannot carry unused credit to subsequent years. |

The following table gives the per item dollar maximums for these two programs.

|  |  |  |
| --- | --- | --- |
| HEEHRA and 25C Tax Credit Programs | HEEHRA | 25c-type tax credits |
| Limit on per item rebate or tax credit (lesser of the two) | $ cap below ORIf moderate income 50% of cost | $ cap below OR30% of item cost |
| ELECTRICITY SUPPLY FROM THE UTILITY LINES TO YOUR HOME |
| Electrical panel (circuit breaker box) | $4,000\* | $600\*\* |
| Wiring (e.g. prewire for 240 Volts) | $2,500 | − |
| APPLIANCES THAT USE THE ELECTRICITY |
| Heat pump for indoor space | $8,000^ | $2,000 |
| Heat pump water heater | $1,750^ | $2,000 |
| Heat pump clothes dryer | $840^ | − |
| Electric cooking (e.g. induction or resistance stove) | $840^ | − |
| BUILDING ENVELOPE AND WEATHERIZATION THAT CAN REDUCE THE ELECTRICITY NEEDED TO HEAT AND COOL YOUR HOME |
| Home energy audit | − | $150 |
| Insulation and air sealing | $1,600 | $1,200^^ |
| Windows and skylights | − | $600 |
| Doors | − | $250/door$500 max.  |
| \* Upgrade from 60 amps or less\*\* Upgrade to at least 200 amps^ Only if replacing fossil fuel burning appliance^^ Materials only |  |  |

As a reminder, the HEEHRA rebates are one time per item, with a running total rebate maximum of $14,000. The 25C tax credit limits can be used every year (e.g. could do $2,000 for heat pumps three years in a row).