Getting Your Home Heat Pump Ready

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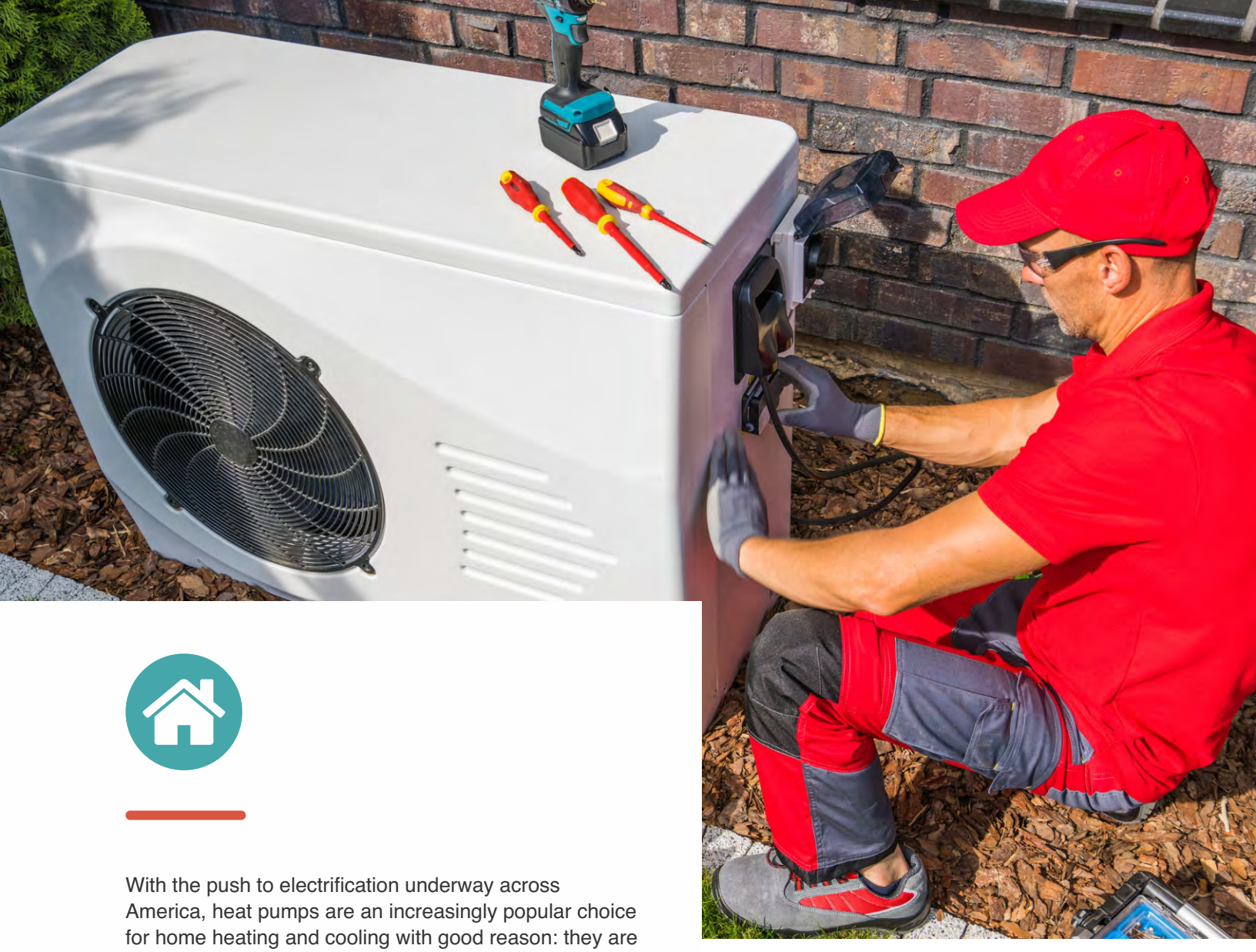


With the push to electrification underway across America, heat pumps are an increasingly popular choice for home heating and cooling with good reason: they are more efficient than electric resistance heating, reducing electricity needed for heating up to 50 percent.[1]

Heat pumps use electricity to transfer heat from a cool space to a warm space, making the cool space cooler and the warm space warmer. During heating season, heat pumps pull heat from the air outdoors into a home, and during the cooling season, they act as a conventional AC system, moving heat from your house to the outdoors.

More homeowners are considering heat pumps because of the financial incentives available through the Inflation Reduction Act (IRA), including up to $8,000 in tax credits for installing a heat pump.[2] And while there are significant benefits to installing a heat pump, doing so without first tackling the building envelope has some serious limitations.

[1] https://www.energy.gov/energysaver/heat-pump-systems
[2] https://www.whitehouse.gov/cleanenergy/

The Benefits of a Good Building Envelope

In the past few decades, building scientists have learned a great deal about how to improve the energy performance of existing homes. Among the most critical findings is that the number one step in a home energy efficiency retrofit should be to improve the thermal integrity of the building envelope by air sealing and adding insulation.

Improving the thermal envelope in a home before adding a heat pump has many advantages. Homeowners who conduct this work will require a smaller heat pump, thereby saving money and upfront costs.[3] Another benefit of doing this work before purchasing a heat pump is that you'll require less heat from the system during cooling months, which will result in savings each year on heating bills. Moreover, upgrading your air sealing and insulation will make your home more comfortable and create a healthier indoor environment, according to the U.S. Department of Energy.[4]

Air Seal and Insulate Before Installing a Heat Pump

Heat pumps must be properly sized to provide optimum performance. However, sizing depends on the thermal integrity of the building envelope – which basically means how well the home is air sealed and insulated.

If a heat pump-equipped house is subsequently retrofitted with additional air sealing and insulation, then the heat pump will be oversized and provide less-than-expected performance for both heating and cooling. Oversizing can also reduce the life expectancy of the unit since it will turn off and on more frequently.

Also, because heat pumps will add a significant electrical load to the house, your home may need to upgrade its electrical system dependent on the exact size of the heat pump. This can add significant costs to the overall upgrade.

The Life Expectancy of Heat Pumps vs. Insulation

Heat pumps are mechanical devices that consume energy and operate for thousands of hours each year, most of which will occur during winter months when they are exposed to harsh operating conditions. Like all mechanical devices, they require periodic servicing, maintenance, or repair if they are to operate with optimum performance. Most manufacturers recommend servicing once a year, typically at a cost of a few hundred dollars.

Assuming such conditions are met, they still have a finite life expectancy – generally around 15 to 20 years for newer units. Some units will last longer, although their performance will degrade over time.[5] However, a study of fiberglass batt insulation installed in homes showed that the insulation performed at 95.5 percent of labeled R-value in samples as old as 40 years.[6] One study puts the life expectancy of fiberglass or mineral wool insulation at more than 100 years.[7] Moreover, the insulation will require no maintenance.

Retrofitting your home for energy efficiency is always a good idea, but before this work gets underway, homeowners should have a clear understanding of what the priorities should be and how to get started.

[3] https://www.energyvanguard.com/blog/will-a-heat-pump-work-in-an-old-house
[4] https://www.energy.gov/energysaver/air-sealing-your-home#:~:text=Reducing%20the%20amount%20of%20air,create%20a%20healthier%20indoor%20environment.
[5] https://termo-plus.com/blog/life-expectancy-of-heat-pumps/
[6] https://insulationinstitute.org/wp-content/uploads/2017/09/NAIMA-Aged-Insulation-Evaluation-Report_23FEB2017.pdf
[7] https://www.nachi.org/florida-life-expectancy.htm?web=1&wdLOR=c05B8B73A-FA99-D748-9EE6-CB35219CFD39

Prioritizing Home Energy Efficiency Retrofit Projects

The IRA provides significant tax incentives and credits to homeowners who undertake energy efficiency retrofits. However, these retrofits should be prioritized to maximize the energy efficiency boost in homes.[8]

Here are some projects you can undertake to improve your home's energy efficiency, starting with the building's thermal envelope, and details about incentives attached to those retrofits:

Seal air leaks

Air leaks around doors, windows, and other openings in your home's envelope can waste a lot of energy. Sealing these leaks with weatherstripping, caulking, or foam sealant can improve your home's energy efficiency and comfort. Get a blower door test to identify air leaks.

Incentive: Up to 30 percent of insulation and air sealing materials up to $1,200. This credit is available on a yearly basis through December 31, 2032.[9]

Insulate the attic, walls, basement, and crawlspace

Add insulation to your attic, crawl space or basement, and exterior walls. This is one of the most cost-effective ways to improve home energy efficiency. Insulation reduces heat transfer between the inside and outside of your home, keeping it warmer in the winter and cooler in the summer. You can hire a professional insulation contractor or do it yourself.

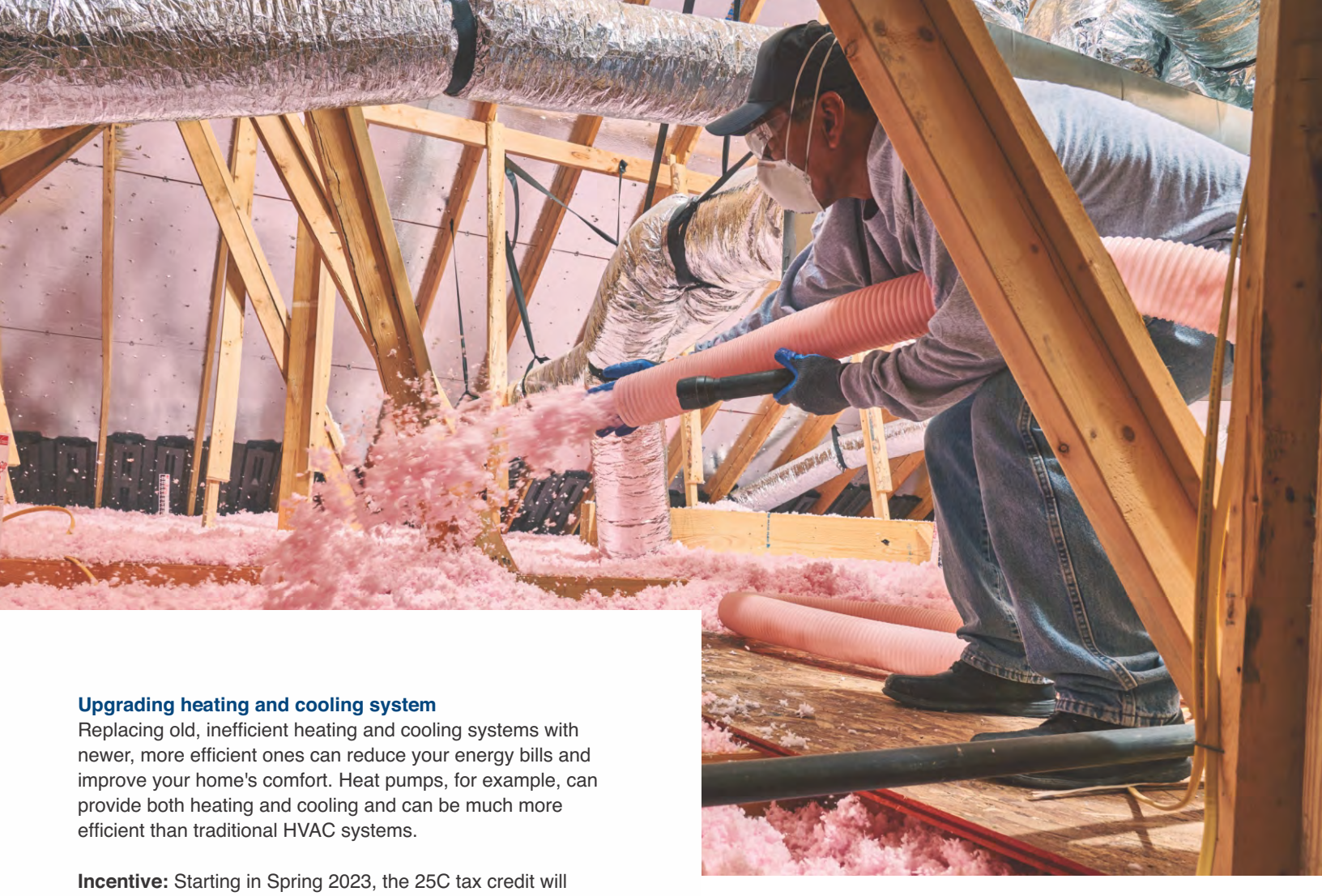
Incentive: Up to 30 percent of insulation and air sealing materials up to $1,200. This credit is available on a yearly basis through December 31, 2032.[10]

Upgrade windows and doors

Replacing old, inefficient windows and doors with new, energy-efficient ones can improve your home's energy efficiency, reduce drafts, and increase comfort. Look for windows and doors with a low U-factor and a high R-value.

Incentive: Families can claim up to $1,200 per year for installing efficient windows and doors.[11]

[8] https://www.energy.gov/eere/why-energy-efficiency-upgrades
[9] https://www.whitehouse.gov/cleanenergy/
[10] Ibid.
[11] Ibid.



Upgrading heating and cooling system

Replacing old, inefficient heating and cooling systems with newer, more efficient ones can reduce your energy bills and improve your home's comfort. Heat pumps, for example, can provide both heating and cooling and can be much more efficient than traditional HVAC systems.

Incentive: Starting in Spring 2023, the 25C tax credit will provide up to 30 percent of the cost of buying and installing a heat pump, up to $2,000, including support for any electric system upgrades needed to make the home heat-pump-ready. The IRA also authorizes up to $8,000 in rebates for heat pumps under the electrification rebate programs. However, states will have the latitude to design the rebate program as they see fit. These programs will be operational in 2024.[12]

Install energy-efficient appliances and lighting

Upgrading to energy-efficient appliances and lighting can also reduce your energy bills and improve your home's energy efficiency. Look for appliances and lighting with the ENERGY STAR label, which indicates that they meet high-efficiency standards.

Incentives: In 2023, state programs will begin to offer rebates on electric appliances and home retrofits, which will reduce household energy bills each month. All households can access rebates of up to $4,000, while low-income households could receive up to $8,000 for home efficiency. Low- to moderate-income households can access rebates covering up to 100 percent of the cost of installing electric appliances like heat pumps, water heaters, and clothes dryers.[13]

The 25C tax credit also allows a homeowner to claim both a $2,000 tax credit for a qualifying heat pump and a $1,200 tax credit for insulation improvements in the tax year. This allows the homeowner to invest in both measures at the same time, which will optimize the performance of the heat pump, improve comfort, and maximize utility bill savings. Not undertaking both measures in tandem could adversely affect your utility bills.

Air sealing and insulation are the most effective changes you can make to improve your home's energy efficiency. The potential energy savings from reducing drafts in a home range from five to 30 percent per year, and the home is generally much more comfortable afterward.[14]

[12] Ibid.
[13] Ibid.
[14] https://www.energy.gov/eere/why-energy-efficiency-upgrades

Getting Started on Your Home Energy Efficiency Upgrades

To get started with your home energy efficiency retrofit projects, homeowners should do the following:

Get a home energy audit – A home energy audit can help you identify where you're losing energy and prioritize which projects to tackle first. Homeowners can claim a $150 tax credit for getting a home energy audit, which can point out ways they can improve their overall home energy efficiency. It can also help you prioritize the improvements that should be made to your home.[15]

Research incentives and financing options – The IRA has made significant incentives available for homeowners. Visit insulationincentives.org to learn more.

Hire a professional contractor – For some projects, such as upgrading your HVAC system, it may be best to hire a professional contractor. Look for contractors who are experienced in energy efficiency retrofits and have good reviews.

By prioritizing improvements to their home's energy efficiency, homeowners can ensure that their upgrades are based on a solid foundation and prioritized properly before adding a heat pump.

[15] Ibid.

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NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Its role is to promote energy efficiency and environmental preservation through the use of fiber glass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials. Through the Insulation Institute™, we leverage the collective insulation expertise of our organization and our members to empower homeowners and professionals to make informed insulation choices. Our mission is to enable a more comfortable, energy-efficient and sustainable future through insulation — and we are constantly working with building professionals, homeowners, government agencies, and public interest, energy and environmental groups to realize that vision.

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