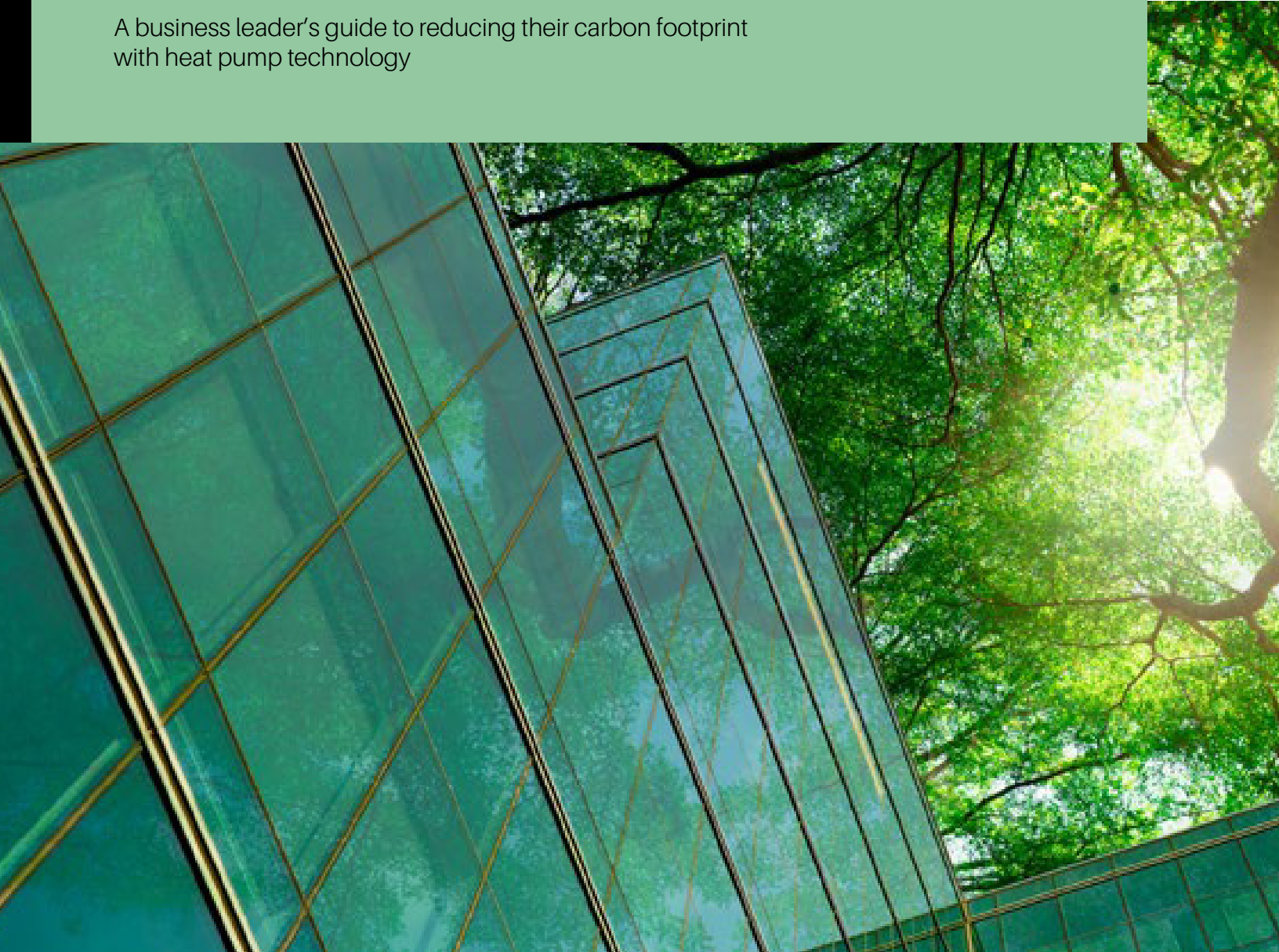


Advancing electrification of heating

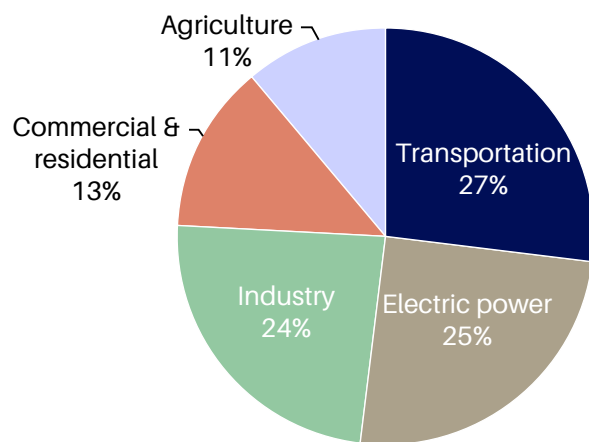
A business leader's guide to reducing their carbon footprint
with heat pump technology





Commercial and residential buildings are responsible for 13% of total greenhouse gas (GHG) emissions in the U.S. alone - primarily due to the fossil fuels burned to generate heat and hot water. While we can't go without heat and hot water in most instances, there's a solution every business leader should consider to reduce their GHG emissions and drive progress toward their net zero goals: the electrification of their heating technologies. Check out the information below to learn more about how electrification can help you decarbonize your operations.

Total U.S. greenhouse gas emissions by economic sector in 2020



U.S. Environmental Protection Agency (2022). Inventory of U.S. greenhouse gas emissions and sinks: 1990-2020

The role of electrification in reaching net zero

Around the world, as the population grows, so too does the demand for energy. Traditional heating methods for commercial and residential buildings are delivered through heating technologies that involve burning fossil fuels—heavy emitters of GHG.

Continued widespread use of many traditional residential and commercial heating systems, which typically rely on fossil fuels, will not enable countries to meet their emissions reduction targets as defined in the Paris Agreement, a collection of long-term goals established at the 2015 UN Climate Change Conference (COP21). The agreement aims to reduce global GHG emissions across countries, industries and individual companies as a means to limit the global temperature increase this century to 2°C while pursuing efforts to limit the increase even further to 1.5°.

As homeowners and business leaders alike strive for more sustainable energy sources and the world looks to limit global warming in alignment with the Paris Agreement, efforts to decarbonize heating technologies are gaining momentum, resulting in increased investments in more environmentally friendly, electrified solutions.

The electrification of heating decreases the amount of GHG emissions, particularly when combined with investments in renewable and zero-carbon electricity generation. But to make a significant impact, adoption of heating technologies that rely on electrification—such as heat pumps—must increase significantly. In fact, to reach net zero by 2050, as called for in the Paris Agreement, [The International Energy Agency \(IEA\)](#) estimates that the share of clean heat technologies—including heat pumps, district heating, renewable energy and hydrogen—will need to more than double to 50% of sales by 2030.

Key trends driving heat pump adoption

As homeowners and business leaders discover the environmental and economic benefits of heat pump technology, adoption is growing. In 2021, [almost 190 million](#) heat pumps were in operation worldwide, with record growth in heat pump sales in the United States, China and Europe. However, heat pump use is only at 10% globally and more than 20% in Europe. Additional growth is expected to continue due to heightened energy independence goals.

Coupled with the decarbonization trend and worldwide focus on net zero goals is the shift to more energy-efficient solutions, including heat pump technology. As the demand for energy increases, it will be critical to ensure systems maximize the value out of each unit of energy consumed, in turn reducing their carbon footprint and saving on energy costs.

To further encourage heat pump adoption, innovation and policy support are vital for reducing up-front costs, making renovations easier, improving energy efficiency and eliminating high-global warming potential (GWP) refrigerants from traditional air conditioning and heat pump systems.

In particular, when it comes to innovation, heat pump technology is evolving to meet the needs of colder climates. Developing cold climate heat pump technology unlocks an entirely new market for heat pumps. HVAC manufacturers have developed [specialized cold climate heat pumps](#) that incorporate advanced designs to operate with greater capacity and efficiency at low outdoor temperatures. The U.S. Department of Energy's residential Cold Climate Heat Pump Technology Challenge has spurred major original equipment manufacturers (OEMs) to explore development of heat pump systems that operate with greater capacity and efficiency at low outdoor temperatures.

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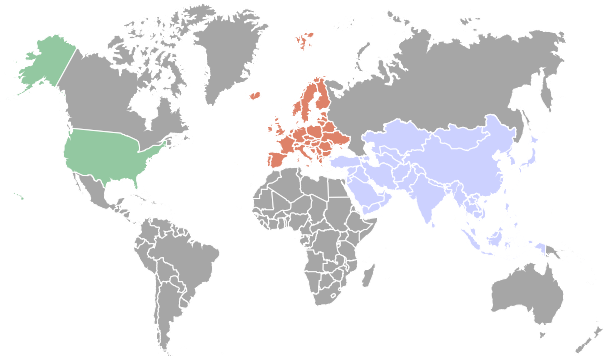
Global policy drivers and incentives for mass heat pump adoption

In addition to innovation, legislation and government incentives that support heat pump adoption are critical. In most of the world, regulation changes are the core drivers for both energy efficiency and the transition to lower-GWP refrigerants. With these regulations, companies and consumers are more incentivized and typically required to switch technologies at time of replacement.

U.S.: The Inflation Reduction Act includes point of sale rebates for low- and moderate-income families and tax credits toward the purchase of higher efficiency heat pumps, designed to increase heat pump adoption in new and existing homes and buildings. For more details about incentive programs for heat pumps, visit our [rebate finder tool](#).

Europe: Through the European Green Deal, Europe is striving to be the first climate-neutral continent; REPowerEU encourages joint action for more affordable, secure, and sustainable energy; gaining energy independence is driving a faster transition to clean energy.

Asia: The Chinese government launched a five-year Clean Heating Plan in 2017, with the goal of transitioning 70% of northern households from coal to cleaner heating options, backed by government incentives to adopt electric heat pump technology.



Challenges of widespread heat pump adoption

Despite the huge growth of heat pumps being used around the globe, there are some challenges that are slowing the speed of widespread adoption. Performance in colder climates, installation costs, inconsistent government policies, and the need for skills training for HVAC technicians, are all hurdles for mass heat pump adoption. However, there are solutions to each of these pain points.

Heat pumps in harsher climates

Despite the widespread advancements and use of heat pumps in harsher climates, there is still a perception of heat pump technology not being able to function properly in cold climates. Organizations such as the U.S. Department of Energy have started initiatives like the [Residential Cold Climate Heat Pump Technology Challenge](#) to incentivize ongoing efforts of improving ducted heat pump technology. These efforts are fighting the stigma of heat pumps not working efficiently in cold climates.

Installation and operating costs

Retrofitting heat pumps into existing homes or buildings can be difficult and require integrations with existing systems that can be costly. While the infrastructure updates often needed to add a heat pump can increase upfront costs, a whole-building approach can help owners to realize long-term savings. Additionally, there are several utility and government incentives to help mitigate the higher upfront costs typically associated with heat pump installation.



Inconsistent policies and incentives

Home improvement policy incentives come in a variety of forms, but some inconsistent policies around fuel switching and dual fuel systems are leading challenges to heat pump adoption. However, as the U.S. grid continues to use more renewable resources and technology advancements are made, especially around heat pumps that operate efficiently in cold climates, we expect decarbonization policies to become more unified.

Heat pump skills training and sales tools

The HVAC industry is focused on recruitment and training of technicians due to labor shortages. Ongoing programs to support the training and development of next-generation skilled tradespeople is key. Training programs including the National Coalition of Certification Centers (NC3) help arm new technicians with the information they need to be successful.

Additionally, HVAC sales teams need to better understand the advantages that heat pumps offer in terms of energy savings and efficiencies to sell this solution to their customers. Sales tools and materials can help communicate the advantages, including the recently launched [Residential Heat Pump Rebate Finder](#), a valuable tool to help customers find cost-savings from rebates and tax credits for more efficient, sustainable heat pump systems.



Future outlook

As global temperatures continue to rise and the world looks for ways to decarbonize, consumers and companies are looking to reduce their carbon footprint to support a healthier, more sustainable world. Heat

pumps are a critical piece of that equation. Through the adoption of heat pump technology worldwide, consumers and companies can significantly contribute to reducing GHG emissions and drive progress toward global net zero goals.

Heat pumps have the potential to completely replace boilers and furnaces across the residential, commercial and industrial markets, and in every application including comfort, water heating and light industrial applications.

Electrifying heating through solutions like heat pumps will cut GHG emissions and improve system efficiency and long-term affordability. Through industry stewardship, governmental regulations and incentives, and input from all key stakeholders, transitioning from fossil fuel burning heating systems to electric heat pumps will make the entire industry and planet much more sustainable.

Heat pumps are emerging and our industry experts can help you reach your company's sustainability goals.

To learn more, visit [copeland.com](https://www.copeland.com)

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