PROS AND CONS OF HEAT PUMPS

FOR COMMERCIAL PROPERTY OWNERS

Heating & Air Conditioning | airtro.com

AIR-TRO INC. Since 1969

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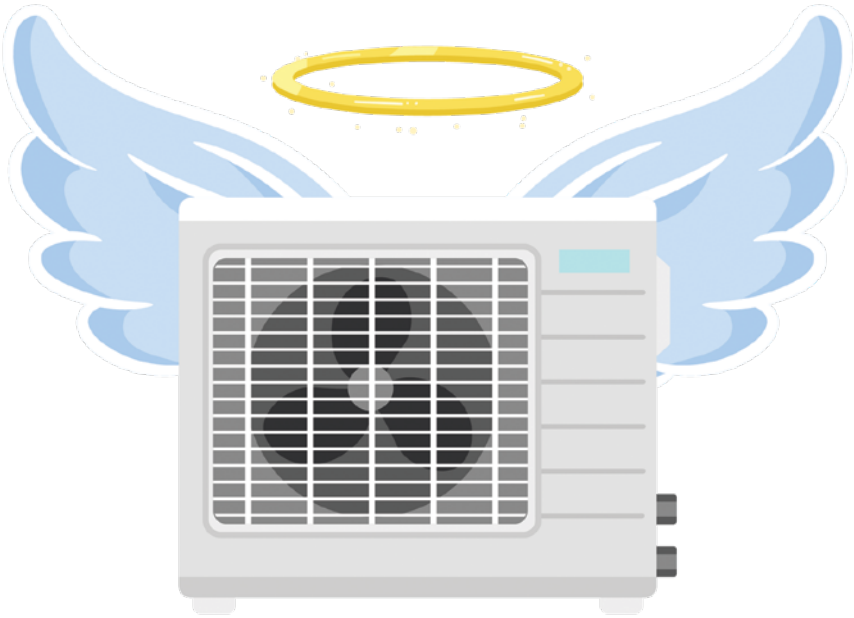
PROs and CONs of Heat Pumps
for Commercial Property Owners

Through Air-Tro, our commercial clients look for innovative ways to manage energy consumption while lowering operational costs. After all, squeezing more from less is practically the definition of energy efficiency.

In recent years, heat pumps have emerged as a much-heralded solution for commercial property owners looking to go green.

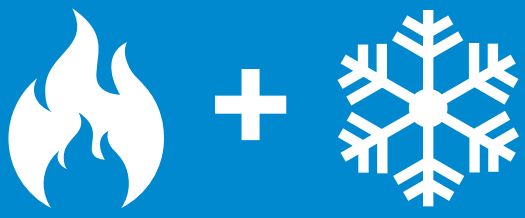


Proponents tout the heating and cooling capabilities of this kind of system while also highlighting the energy savings. But does it really make sense?

It depends. Let's take a look at the pros and cons of going with a heat pump.

First, what the heck is a **heat pump?**

Answer: for a commercial building, a heat pump is a mechanical system designed to provide heating, cooling, and sometimes, ventilation. Traditional HVAC systems and heat pumps both move heat from one place to another. Air conditioners absorb indoor heat and reject it outdoors. Heat pumps are simply air conditioning



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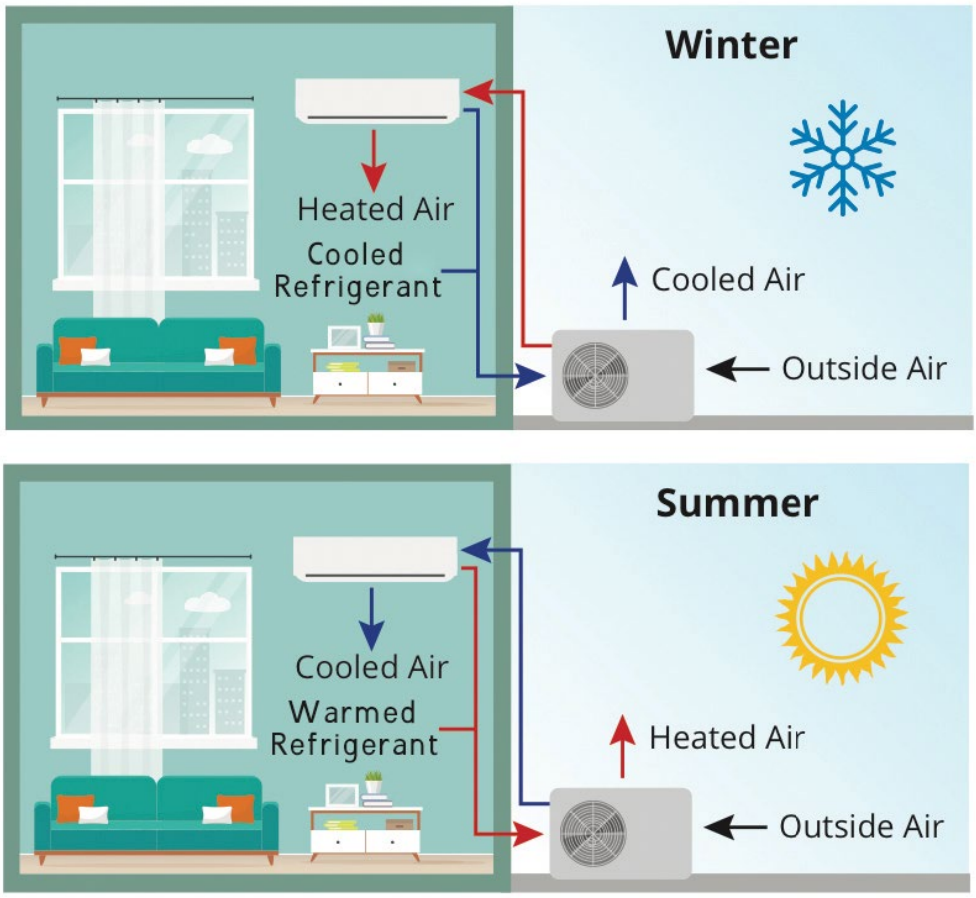
units with reversing valves. They use exactly the same components and technology for heating but swap the locations of absorption and rejection. This makes the system more flexible.

For example, on a cold day, a heat pump extracts warm air from its source (like the outside air or the ground) and transfers it indoors. Rather than requiring multiple pieces of equipment for heating and cooling, this single system does the same job.



There are different kinds of **commercial heat pumps**

Air-source heat pumps (ASHP) take heat from the outdoor air and transfer it inside your building during colder months. In the summer, the process is reversed, and heat is expelled from the building to the outdoors, cooling down the indoors.

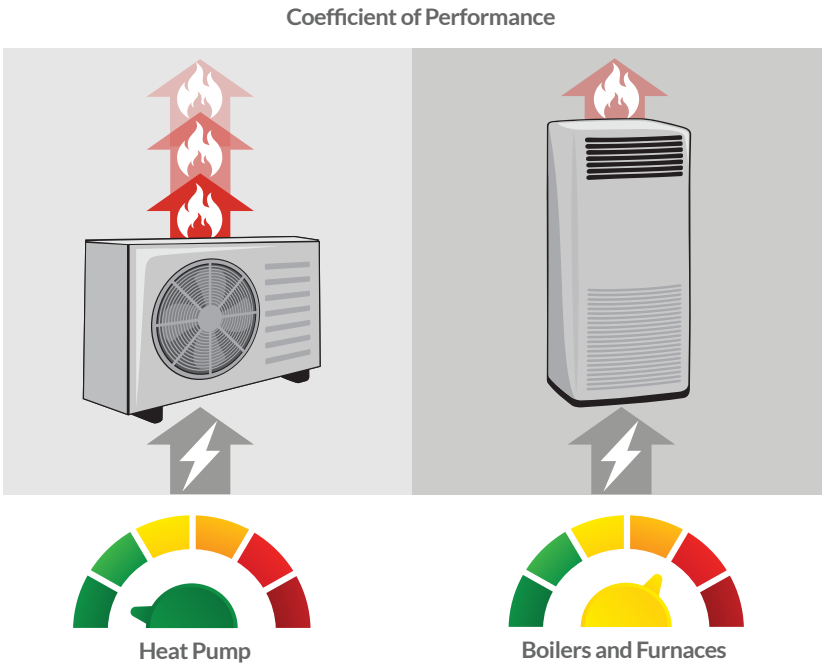
Ground-source heat pumps (GSHP or geothermal heat pumps) work differently. These heat pumps use the more stable temperature of the ground or water as a heat source in the winter, and as a heat sink in the summer. They are more energy-efficient but have far higher upfront installation costs. Furthermore, they are difficult to use in Southern California. Our soil is sandy instead of clay-based; sand insulates while clay conducts. California regulations also make putting anything near the water table very difficult.

In short, heat pumps can be useful because they promise to use less energy to do the same job as a traditional HVAC system. However, as we'll discuss further, keeping that promise depends on climate, actual outdoor temperatures, and what kind of model you're installing. A huge factor is also how you get the electricity needed to operate the heat pump. If you've installed solar, you'll get more efficiency gains than if you're relying on coal-burning power plants.

PRO: Energy Efficiency

Any discussion of the pros of heat pumps starts with energy efficiency, especially compared with more typical heating and cooling systems. What's the deal? To understand how well this kind of equipment can work for you, let's talk COPs. Not the television show, but actual **Coefficients of Performance** (COPs), a fancy term for the ratios of heat output to the energy input. It's a number that tells you how efficient your system actually is.

As we mentioned above, heat pumps transfer heat from one place to another, rather than creating heat through combustion or resistance heating. They take outside air, ground or water and bring it inside, or move inside air outside.



We measure the heat pump's efficiency by looking at the **Coefficient of Performance** (COP). To determine this number, we divide the heat output by the electrical energy input. A heat pump COP of 3:1 means that for every unit of electricity consumed, your heat pump produces three units of heating energy. Since they use far less electricity to keep your indoor temperatures comfortable, a typical COP for a heat pump is between 3—5. Strip heaters, by definition, have a COP of exactly one. Gas and propane fired boilers and furnaces never quite hit one; they usually come in at between .8 to .99 (as shown by their Annual Fuel Utilization Efficiency rating).

Along with a relatively higher COP score, heat pumps for commercial buildings are also dual purpose. They do both heating and cooling, so you don't need more equipment—or use more energy to maintain indoor comfort. With the variable speed compressor feature that many heat pump systems offer, you can also adjust output based on demand. With more precise temperature control, you can avoid use during low-demand periods. In other words, say goodbye to empty, heated conference rooms or weekend air conditioning when the building is closed until Monday.

Another detail? Geothermal heat pumps, using the pretty stable temperature of the ground, often have even higher COP values compared to air-source heat pumps. However, these kinds of systems are best suited to more extreme climate zones, and installations where there is lots of nearby open space to lay the needed piping, and local building codes that accommodate this kind of work.

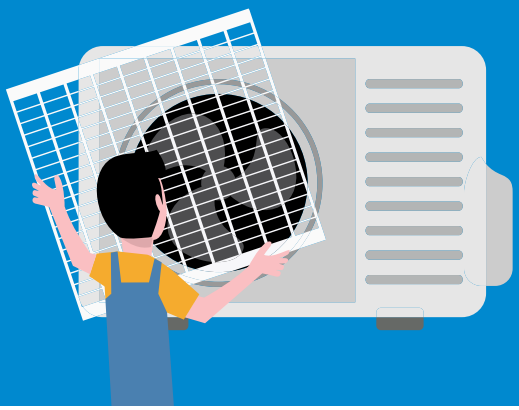
PRO: Potential Operating Costs

Assuming you have the right climate for your equipment, a great system design and appropriate sizing, as well as a quality installation, your operating costs for your heat pump over the long term may be very low. The variable speed compressor option discussed above, along with smart controls, all work together to keep systems functioning at peak performance.

But good, properly scheduled maintenance is still required, just as it is with a traditional system. A qualified technician will provide regular air filter changes and coil cleaning. They check refrigerant levels, inspect ductwork, thermostats, and the condensate drain. Maintenance will also include lubrication of all moving parts, checking belts and pulleys, and ensuring all electrical connections are tight. However, heat pumps work more months of the year than air conditioners, so frequently wear out faster.

PRO: Tax Rebates and Incentives

Incentives, rebates, and discounts for heat pumps vary based on your location and the specific program in which you're enrolling. However, here in California with an increased push toward green energy, these options are plentiful. Please speak with a qualified tax professional to explore the following options.



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Federal Tax Credits

Federal tax credits are available for the installation of energy-efficient heat pump systems. These credits can help offset the cost of purchasing and installing your equipment.

Local Utility Rebates

Many utility companies offer rebates or financial incentives for upgrading to energy-efficient heating and cooling systems, including heat pumps. For example, the Los Angeles Department of Water and Power offers a significant incentive.

State Incentive Programs

Check out the TECH Clean California Heat Pump rebate, as well as other resources offered by the California Energy Commission.

TECH CLEAN CALIFORNIA

CALIFORNIA ENERGY COMMISSION

Municipal and Local Government Programs

Many Southern California cities also provide incentives for adopting energy-efficient technologies. These include grants, tax incentives, or expedited permitting processes for businesses installing heat pumps. Research is key!

Tax Deductions for Commercial Properties

Commercial property owners may be eligible for tax deductions related to energy-efficient improvements, including the installation of heat pump systems. Consult with your qualified tax professional to find out more.

TAX DEDUCTIBLE

CONS: What You Should Know

So, what's the problem, you ask? Why doesn't every commercial building have a heat pump installed? Here's the part that many articles on heat pumps don't talk about: potential drawbacks.

CON: Cost of installation

There's no way around this. Heat pumps usually cost significantly more to put into a commercial or residential building than traditional HVAC. There are several reasons for this. First, your **system size is dependent on your square footage.** With multiple temperature zones and diverse requirements for your commercial space, you may need a more complex design and customization of the equipment to fit the specs.

Add in ductwork, smart controls and sensors, and costs can rise. Furthermore, **commercial buildings are often subject to far stricter efficiency standards** and regulatory codes than residential construction. Coupled with complicated needs for your heating and cooling, it's critically important to work with a licensed HVAC contractor familiar with heat pumps before adopting this technology for your commercial space. Far fewer contractors, architects and even HVAC specialists than you might expect are really that familiar with modern heat pump technology. This may lead to significant and expensive flaws in system design, installation, and operation.

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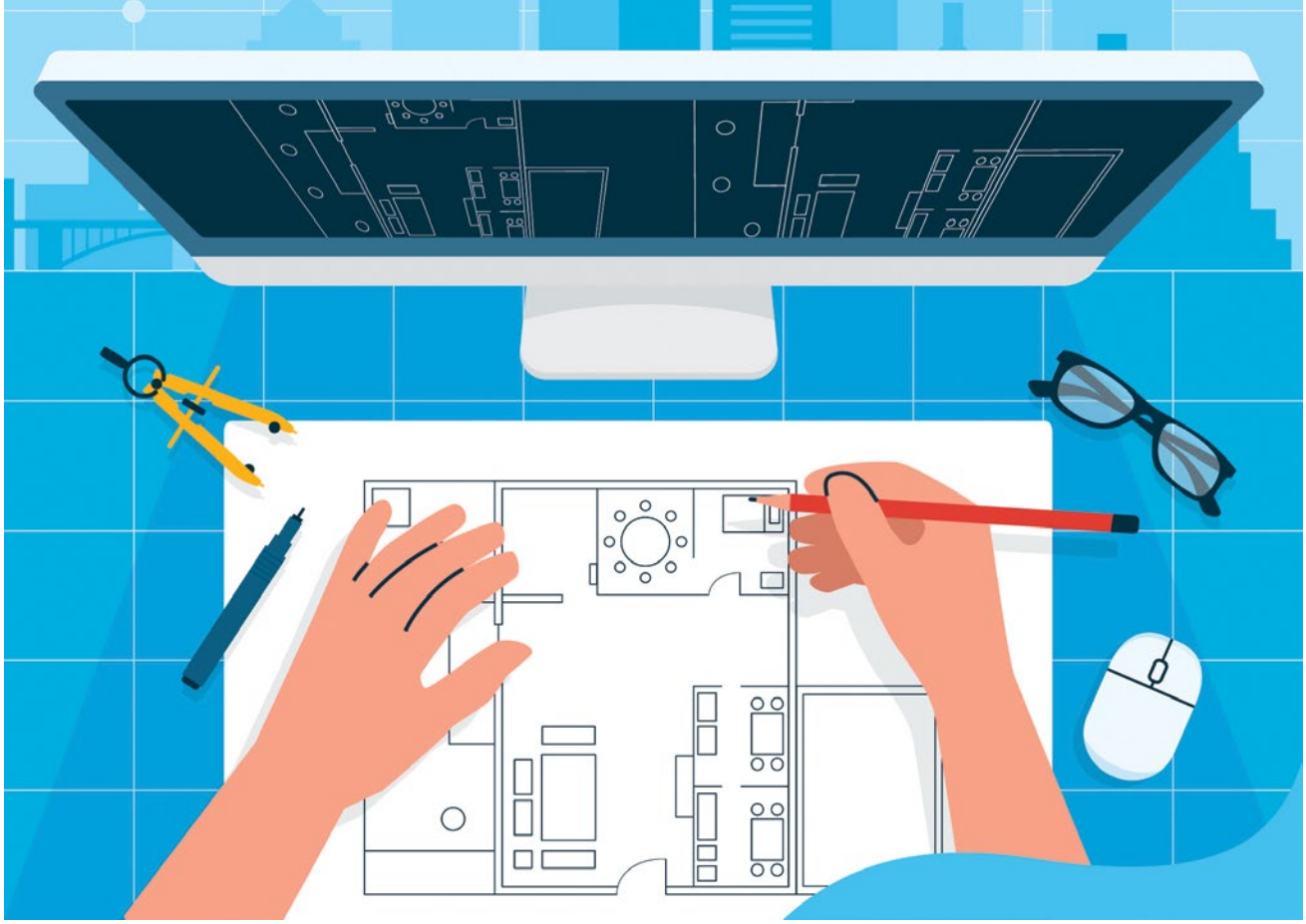
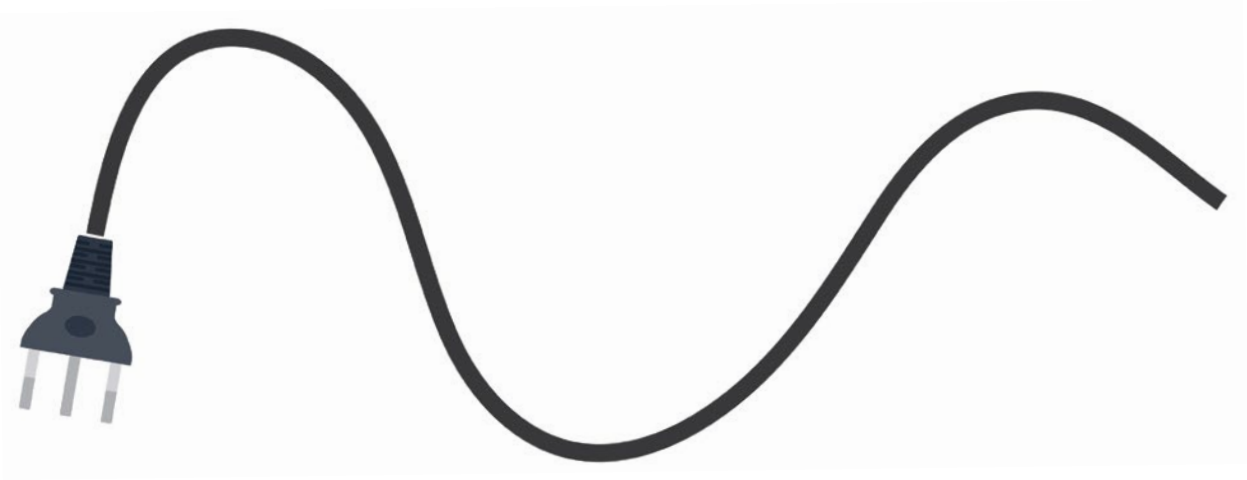


CON: Space Requirements

Heat pumps can take up more space than conventional HVAC systems. It is critically important to ensure your installation and design team knows exactly what they're doing when it comes to selecting the right heat pump technology for your commercial building. Modifications to your actual space may be necessary to accommodate the equipment.

CON: System Knowledge

For all the buzz about heat pumps these days, it seems few HVAC technicians really understand how they work, nor have they been trained well in maintaining the equipment. At Air-Tro, our team is constantly trained in the latest advancements in this dynamic technology, as well as in industry best practices for proper maintenance. Since that is not always the case for HVAC contractors and their technicians. And with heat pumps, what they don't know about heat pumps can be detrimental to your business.

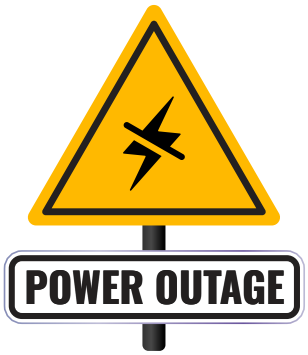


CON: Green Benefits Depend on Your Source of Electricity

Heat pumps operate using electricity, and their overall efficiency is influenced by where you're sourcing that power. If that electricity is generated from fossil fuels, the environmental benefits of heat pumps may be lessened. With the overall shift to electrical usage and electrical appliances instead of gas-powered ones, it remains to be seen how California will supply enough power to businesses and residents without contracting from other states at a major environmental cost. The answer, of course, will have an impact on how truly "green" your heat pump actually would be.

CON: Power Outages and Their Impact on Your System

With power companies concerned over the fire risk from their equipment on windy days, power outages during inclement weather have become more frequent in recent years. And while a refrigerator not working or being unable to do laundry is an inconvenience during an outage, losing heat may be an intolerable consequence for many. Installing an electricity-dependent heat pump thus means you have to have a backup plan for your heat should the power go out.



CON: Equipment Wear and Tear

With traditional HVAC equipment, your furnace stops working while your air conditioning is on, and vice versa. In other words, neither part of your system has to run 365 days a year. In contrast, a heat pump by definition means all of its components will be running all year round to heat or cool your home. This constant

functionality means parts wear out sooner, and sometimes result in more frequent equipment failure and less overall useful life. Consult your HVAC specialist for more details.

So, there you have it. Heat pumps make sense in many situations—but not all. Sizing, expert installation, system design, and local climate, as well as regular maintenance, are critical factors in the decision-making process. Discuss your options and potential savings with your HVAC specialists at Air-Tro, We're here to help you move past the hype, and towards better indoor comfort, energy savings and maximum performance, whichever design or system you choose.

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Robert Helbing, PE, is President of Air-Tro Heating and Air Conditioning Company. He is a Caltech-degreed aeronautical engineer (yes – a rocket scientist!), as well as a 4th generation contractor and 3rd generation engineer. He is a past-president of the Institute of Heating and Air Conditioning Industries (IHACI); Air Conditioning Contractors of America (ACCA) Contractor of the Year, 2011; and a 15-year member of Excellence Alliance Industries, a membership organization committed to the development and improvement of HVACR companies nationwide. Bob is also a founding member and past committee chair for the Western HVAC Performance Alliance, a council of stakeholders in the Energy industry which includes utilities, regulators, manufacturers and contractors. He currently serves on two committees for the WHPA: Commercial Quality Installation and the Existing Buildings Energy Efficiency. He can be reached at 626.357.3535 and bobhelbing@airtro.com.

For more information, visit our commercial section on the web at airtro.com/commercial