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Do mini splits save money

Way back in 2008, we completed a custom home that we still live in today. In that same year, I wrote a post about my regrets of not going with a heat pump to save money on energy bills. I'm not sure if you use electric heat where you are from, but if you do, you'll know that winter heating costs can really add up. A heat pump is a heating/cooling system for a home that works very similarly to your refrigerator. When it's cold outside, it can efficiently extract the warmth out of the air, amplify it by compressing the refrigerant, and releasing the heat it into the home with a forced air system. What's neat about a heat pump is that it can work in reverse and provide air conditioning inside the home during the warmer summer periods. It's quite costly to retrofit an existing home with a heat pump due to the additional ductwork required (unless you have a furnace with the ductwork already installed). Friends of ours recently retrofitted their home that is similar to ours and it cost about \$20,000 for both the new ductwork, heat pump, and associated equipment. \$20,000 is a lot of money to spend on a heat pump retrofit and not quite worth it because it would take quite a while to pay off (if ever!). A worthy alternative to a full-size heat pump is a mini-split heat pump which has many of the benefits of a conventional heat pump but at a fraction of the cost. My kind of solution! What is a Mini-Split Heat Pump? Before I get into the merits of a mini-split - what exactly is it? It's essentially a heat pump that has an outside unit and an inside register (like the picture above) that's usually on an exterior wall. In the winter, the units will extract any warmth in the air (will get less efficient the colder it gets), and expel it the inside of your home. In the summer, the AC will extract heat (and moisture) from the inside of your home and expel outside (while also blowing cold air inside). From my research and talking to people with mini-splits, the energy savings works out to be between 15%-35% The beauty of mini-splits is that you do not need additional ductwork, but the downside is that it's only meant to heat one space/room per unit. The ideal situation for a mini-split is an open concept area that is used as the main area in the house. Oh, and you'll also need to wrap your head around the size of the inside register. Some of the biggest concerns are the "look" of the unit, which turns out to be not that big of a deal (at least to me!). The Ideal User I must admit that the mini-split technology has been good to us thus far (the numbers below), but mini-splits won't benefit everyone the same. Here are the ideal scenarios for mini-split heat pumps: Your climate needs to be temperate where it doesn't get too hot or too cold. Living in NL, I was more focused on the heating capabilities of the mini-split. Even though Newfoundland usually gets a ton of snow in the winter, ambient temperatures generally average between -5 and 0 Celsius. You can get mini splits that can function fairly well down to -25C (ambient), but note the closer it gets to -25C, the less efficient it will be. So if you live in Northern Ontario/Quebec, a heat pump may not be the most efficient solution. Also note that heat pump efficiency and operating temperature can vary widely from brand to brand, make sure to do your research! Open Concept Living - This style home works really well for mini-split heat pumps as it allows the air to fill the room without resistance of doorways etc. For us, we are fortunate in that the back of our house is an open concept which is where the mini-split was installed. We pointed the mini-split to face the foyer area with the intention of letting the hot air rise to the bedrooms. So far so good! Modern insulation. From reading power utility recommendations, insulation is your first defense against high heating bills, then your heating source comes in second. Check out your local utility for rebates around insulating your home. We built our house about 10 years ago, which was fine for insulation at the time. New building code requires additional attic insulation (R30 to R50) which I will look into over the next couple of years. Electric Heat - Let's face it, using electric heat is an expensive way to heat your home. A small 4.5-ft baseboard heater uses about 1,000W. In our family room, the baseboard heater is closer to 8-ft, which uses 1,800W combined with a 1,500W fan heater in the kitchen. Combined with the kid's rooms, the mini-split displaces about 5,500 W of electric baseboard heat energy in our home. Mind you, the electric heaters aren't always on, but they are expensive to run when you need them. Compare this with a 16,000 BTU/h mini-split that uses about 1,000 W of energy. Rising Utility Prices - While there can be energy savings with using a mini-split, the savings amplify if you are in a rising utility rate environment. A number of years ago, Newfoundland and Labrador decided to take on a large power generation project that has gone way over budget. Without getting into politics, it is anticipated that if the government does not step in with rate mitigation, electricity rates could reach as high as \$0.23/kwh. The current rate including taxes is \$0.132/kwh (that's a 74% increase). Performance and Results Let's get down to the good stuff - the numbers! Has the mini-split purchase been worth it? When is the expected pay off? Enough talk, let's dig in! Before we get started about performance, let's talk about the cost of the unit. I went with a Fujitsu Halcyon XLTH unit due to its efficiency (among the best in the industry) and incredible warranty (10/12 years depending on your installer). I found a local certified company to supply and install the unit for \$3,700 plus tax, or about \$4,250 including tax. Note that the pricing includes a \$200 rebate promotion offered at the time. Being the type of guy that likes efficiency, we were already pretty efficient with our electric heat usage. We installed programmable thermostats, heating the basement to minimum requirements, leaving some rooms unheated, opening the blinds during sunny days etc. However, it always felt cold in the house. With the boss (my wife) spending more time at home, at the very least, the mini-split would make the house feel warmer. Onto the performance table! The unit was installed in September 2018 and I have data up until January 2019. To explain the "normalized" column, I adjusted the usage based on the temperature difference between 2018 and 2019. The utility sent me an email stating that every 1C drop in temperature results in 10% greater electric heat usage. Since it's been colder in 2019, I had to adjust 2018 numbers so that the comparison was on equal footing. Energy Usage Comparison - Electric Heat vs Mini-Split Date Electric (kWh) Temperature Diff (C) Normalized Electric (kWh) Date Mini Split (kWh) Difference Savings % Sep 2017 915 0 915 Sep 2018 1048 -133 -14.54% Oct 2017 1132 0.05 1188.6 Oct 2018 1096 92.6 7.79% Nov 2017 1681 0.15 2163.15 Nov 2018 1443 720.15 33.29% Dec 2017 2787 0.2 3344.4 Dec 2018 1903 1441.4 43.10% Jan 2018 2548 0.15 2930.2 Jan 2019 1784 1146.2 39.12% Total: 9263 10541.35 7274 3267.35 31.00% From Sept 2017 to Jan 2018, the electricity usage was around 10541.35kWh with electric heat being about 70% of the culprit. Fast forward to when the mini-split was installed, resulted in usage of 7274kWh which is a 31% savings thus far. I suspect that the savings percentage may decrease over the summer if we decide to use the AC functionality (most houses in NL do not have AC and for good reason!). Payback Period So here's the point of the whole article - is a mini-split a good investment? Even though my experience thus far has been short, it's a resounding yes for me. If we can average a 25% annual energy savings, the payback period is 6.39 years (based on using 20,000 kWh per year). The payback period gets shorter as electricity rates go up. Here is what that looks like: Price per kWh Savings Years Pay Off \$0.133 25.00% 6.39 \$0.150 25.00% 5.67 \$0.170 25.00% 5.00 \$0.200 25.00% 4.25 \$0.220 25.00% 3.86 Final Thoughts As you can see, I am all for mini-split technology providing that it suits your house and area. For us, it will result in about a 25% annual energy savings which results in a 6.4-year pay off period at current electricity rates. As rates rise (as they are expected in NL), the dollar savings will increase, which will further reduce the payback period. A warmer house at a lower price - what more can you ask for? Don't let the name throw you off. Not only is a mini-split heat pump a solution for heating AND cooling your home, but there is also nothing mini about the savings it can lead to. With a mini-split heat pump, you can reduce your heating and cooling bills by as much as 30%! How? By transferring heat - rather than generating it -mini-splits are highly efficient for heating and cooling. Plus, they avoid energy losses associated with traditional ducted systems. In houses with forced-air heating and cooling systems, ducts are used to distribute conditioned air throughout the house. In a typical house, however, about 20 to 30 percent of the air that moves through the duct system is lost due to leaks, holes, and poorly connected ducts. To get the most savings, it is important to properly operate and maintain your system. Here are five tips. Know when to heat with your mini-splits When a mini-split system is installed, your existing heating system will usually be left in place as a backup. In most cases, mini-splits will be the more efficient heat source. But depending on fuel costs and outdoor temperature, it may be more cost-effective to heat with your existing system in certain situations. Here's a cheat sheet by fuel type: Electricity - Heat with mini-splits as your primary source Propane - Heat with mini-splits as your primary source Oil - If it's 25 degrees or warmer outside, heat with mini-splits Natural gas - With current prices, it is more cost-effective to heat with your gas heating system Set your comfort, not the temperature Because the temperature sensor on the mini-split unit is closer to the ceiling where the air is warmer, you'll find that setting the temperature a little higher than you're used to will deliver the comfort you want. Don't touch that dial in addition to your setting your desired temperature, keep the fan set to AUTO and the unit set to HEAT in the winter and COOL in the summer. This lets the mini-splits operate on "cruise control" - only powering up when necessary, maximizing efficiency. Go with the flow Heat up and cool down? Think the opposite. Direct warm air downward when heating and direct cool air upward when cooling. This will help circulate conditioned air throughout the room. Maintenance If your mini-split system is not properly maintained, it could use up to 25% more energy. Regularly clean the air filters. Keep leaves, debris, snow, and ice away from the outdoor unit. Have a professional service your system every year or two. Are you interested in installing a mini-split system to save on your home's heating and cooling costs? The Sponsors of Mass Save® offer rebates up to \$300 per indoor unit as well as opportunities to finance your new equipment with a 0% interest HEAT Loan. Learn more here. Heating & Cooling

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