



# PLANNING GUIDE

## The Barndominium Process

Section 13:  
HVAC + Energy  
Sources

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# HVAC + ENERGY SOURCES

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In this section we will cover:

**General Overview + Energy Sources**

**Forced Air HVAC**

**Geothermal**

**Mini Splits**

**Radiant In Floor Heat**

**Fireplaces + Wood Stoves**

HVAC stands for heating, ventilation, and air conditioning. No matter where you are building, you'll need to decide on heating and cooling options. There is not a one size fits all option. Many factors should be considered including geographic location, access to energy sources, and more.

# GENERAL OVERVIEW

## + Energy Sources

The need for heating and cooling options varies drastically depending on the climate where you are building. Some areas will necessitate both, some one option, and mild areas may not have a strong need for either.

Barndominiums offer some excellent efficiency options, and that extends to being able to heat and cool them for maximum cost savings and maintenance.

You'll want to keep in mind throughout this section your access to energy sources, limitations physically, and the prolonged times of hot or cold temperatures where you'll be located.

### **Some of the basic energy sources available will be:**

#### **Liquid Propane (LP)**

This fuel source is popular in rural areas and you'll have a tank on site that is filled to power whichever appliances or other mechanical equipment you choose.

#### **Natural Gas**

This is a very common energy source for cities and higher populated areas and neighborhoods. The line will be run from a central location to your dwelling to power appliances and other mechanical equipment.

#### **Electricity**

Solar and wind energy converts into electricity to power chosen appliances and mechanicals.

#### **Wood or Pellets**

Mechanical equipment is available that can be powered by one or both of these natural sources. The availability of these depends on your location.

# GENERAL OVERVIEW

## + Energy Sources

When purchasing HVAC equipment make sure that they support the energy source you plan to use.

Clarify if the unit will require a conversion kit or will come ready to use.

### **Energy Sources Available to Me:**

*(list in order of priority)*

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

What questions do I have about energy sources that need to be answered before I can make final decisions?



## FORCED AIR HVAC

The system that almost everyone is familiar with will be a forced air HVAC. This can be combined for heating and cooling or standalone depending on your climate.

Forced air system typically refers to a system that has a furnace used for heating a space. Central air is commonly used for the cooling portion. Both will use a system of ductwork to move the hot or cold air throughout the space.

There is a great deal that goes into an efficient HVAC setup. The size of the project and distance from the mechanical room are major factors in determining the size of the ducts and units.

The way that you've insulated your barndominium can also be a factor in how your unit operates. People talk about the "tightness" of a home. New construction tends to have less air leakage than older homes. That can make the air inside stale since less fresh air comes into the home.

**Heat Recovery Ventilator (HRV)** is an option that some homeowners will use to pull fresh air into the home and pre-heat it in order to reduce energy costs.

**Energy Recovery Ventilator (ERV)** is an option that pulls fresh air in, pre-heats/cools, but also can increase or decrease the humidity levels in the home.

Both HRV and ERV are units that can be added to a system, giving you the option to see if you need them depending on your finished build.

A professional HVAC contractor will be able to build a system that fits your project, and answer questions about efficiency and if units like the HRV or ERV will be needed. If you're planning to hire this trade out they will put together a bid for materials and labor. If you'd rather DIY you can offer to pay for consultation and/or to prepare a materials list.

Mechanical engineers are an option to hire. They will usually ask for a DWG file of your plans and insert the units and ductwork into the floor plan view.

Since this system requires unit placement in an attic or mechanical room, you'll want to make sure that your design has sufficient space to house and service. For two-story designs or plans with vast open areas in the middle of the house having dual mechanical rooms can be a great option for maximum efficiency.



# FORCED AIR HVAC

Ductwork placement is a major consideration when putting together your design. If you are not able to use attic or below grade areas to run ducts, you'll want to understand where the ductwork will have to go leading from the mechanical room to each area of the house. This can lead to lowered ceiling heights, long runs that lower efficiency, and other negatives if not planned out in advance.

Typically a furnace system will be powered by gas or an outdoor wood boiler. Central air systems usually use electricity to run.

Heat sources can be powered by electricity, but it isn't always an efficient option for colder climates. Areas that have prolonged and below freezing temperatures should consider an energy source other than electricity for heating.

## Commonly Used:

- These systems can be used in all climates and areas

## Pros:

- Qualified contractors are usually in any build area
- Upfront cost is considered standard
- The system can be used to both heat and cool
- DIY option for those with knowledge and skill
- Can be used in a passive home

## Cons:

- Requires ongoing maintenance of equipment
- Ducts will need to be cleaned every few years
- Ductwork and units take up space
- Efficiency is diminished with long runs



See our full install playlist to learn more!

## GEOTHERMAL

The geothermal HVAC system rose in popularity as people desired to increase the efficiency of their homes. Government programs made it an affordable option for some. It uses duct work and operates similarly to a traditional HVAC system. They use a very low amount of energy to run, making them a cost efficient option over time. However, the upfront cost is significantly higher than a traditional system which may not make it the ideal option for those on a tight budget. It is also not DIY friendly to install due to the drilling that's required to install the pipes.

### Pros:

- Low ongoing energy costs
- Can be used in passive homes

### Cons:

- High upfront cost to install
- Duct and units take up space
- Ongoing maintenance

## MINI SPLITS

A mini split system can be used ductless or with duct work depending on what you purchase. A ducted system is not going to have as many benefits since you'll still need to go to the expense of adding ductwork.

This is a heat pump operation that uses electricity to operate.

### Commonly Used:

- Shops or garage spaces separate from living
- Southern states where cooling is more of a priority
- Small builds

### Pros:

- Can heat/cool spaces separately
- Ductless option is available
- Units do not need space in a mechanical room
- Quiet operation
- Can be used in passive homes
- DIY friendly install
- Lower cost equipment than traditional systems

### Cons:

- Ductless units will be visible when mounted
- May have difficulty keeping up during periods of low temperatures

See our full  
install  
playlist to  
learn more!



# RADIANT IN FLOOR HEAT

This is not your “heated bathroom floor” option found in luxury builds. While that is an in floor heat, it is not the same as a radiant in floor heat system used as a main heat source.

The radiant floor heat system uses a series of loops that run back to the main mechanical area. Water or glycol is forced through the tubes using a boiler and pump system. The loops are placed in or below the concrete slab, and the purpose is to heat the entire mass of concrete and create a consistent temperature envelope.

This type of system can be used in basements or barndominiums on a slab. It can also be used with a floor joist system for builds on a crawl space or multi levels. However, using the loops in this way will not be as efficient of a result as when paired with the concrete.

You can have multiple zones for your system that give you temperature flexibility throughout the project. It's common to use one temperature for living space and another for shop spaces.

You can use gas or electricity to power the boiler and pumps making it versatile. There are some cooling options available using the loops, but those aren't as common.

MR Post Frame recommends installing the loops to the below grade insulation board prior to the concrete pour. The loops can be installed and capped off until a later date should someone want to wait to install the control panel and boiler.

## Commonly Used:

- Northern areas that have prolonged winter as a supplemental heat source
- Primary heat source when in a mild climate that has cool temperatures for prolonged periods, but not severe winter weather

## Pros:

- DIY friendly install
- Can install loops and wait to install controls
- Efficient heat source
- Controls are mounted on a wall vs floor
- Can be used for cooling too
- Can be used in a passive home

## Cons:

- Doubles HVAC costs when using in addition to a forced air system + hiring out
- Ongoing maintenance for controls

**See our full  
install playlist  
to learn more!**



# FIREPLACES TYPES

Fireplaces are commonplace and have been used for decades. They can be wood burning, gas, or electric. The type of fireplace you choose will increase or decrease its efficiency when used as a heat source.

## Wood Burning Fireplaces

These will do their best heating the room they are located in. They often do not have the capacity for multiple areas of a home. An electric blower can be added to increase the capacity.

### **Pros:**

- Low cost options available
- Great for ambiance
- Little ongoing cost if wood is available
- DIY friendly install

### **Cons:**

- Is not a whole house heat source
- Can be costly to build chimney, hearth, etc.
- Ventilation considerations for passive homes
- Needs power to run blower for additional heat

## Gas Fireplaces

Plan to have connection to LP or natural gas to operate. They use a blower to push heat into the space that they are located. Like wood burning fireplaces they aren't typically used to heat more than one area of the home.

### **Pros:**

- Provides ambiance and heat with little effort
- Relatively low cost
- Can be used in a passive home

### **Cons:**

- Not DIY friendly for all aspects of install
- Higher cost to operate
- Maintenance

# WOOD STOVE TYPES

## Wood Burning Stove Inserts

These will look like a regular fireplace but they are intended to be used as a broader heat source. It operates more efficiently and with lower or close to zero emissions.

### Pros:

- Provides ambiance with a legitimate heat source
- Aesthetic is similar to traditional fireplace options with a chimney, hearth, etc.
- Lower environmental impact than traditional fireplaces
- Can be used in passive homes
- Does not require electricity to operate

### Cons:

- Can be costly to build a chimney, hearth, etc.
- Not as efficient as freestanding stoves

## Freestanding Wood Stoves

For the most efficient option and “off grid” option to heat your barndominium is a freestanding wood stove. The heat is able to radiate off of all sides of the stove. The top surface is usually flat enough to use for boiling water or heating something in a pot or pan. There are models designed specifically to serve as the heat and cooking source for off grid properties.

### Pros:

- Efficient way to heat an entire house (sized properly)
- Heating and cooking flexibility
- Low maintenance
- Low to no cost to operate with access to wood
- Can be used in passive homes with proper considerations

### Cons:

- Less of an aesthetic option
- Some spaces will be too large to heat with just a stove



See our full  
install  
playlist to  
learn more!

**In conclusion, using a fireplace or wood stove option in your barndominium can have amazing benefits. Your goals for efficiency, ambiance, or maintenance can help you decide which choice is right for you.**



# MY HVAC + ENERGY

## Notes

Most Commonly Used Choices in my Area:

Which Heating Options am I Considering? \_\_\_\_\_

Which Cooling Options am I Considering? \_\_\_\_\_

Which Options will I be Hiring Out? \_\_\_\_\_

Are There Contractors Readily Available in my Area? \_\_\_\_\_

What Would I Like to DIY? \_\_\_\_\_

What Questions or Challenges do I See with my HVAC Preferences?

## ADDITIONAL NOTES

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