Natural Gas Heating

Natural gas is the #1 choice for home heating among American consumers. For new homes, 70% of homeowners chose natural gas for heating compared to 27% for electricity and 3% for fuel oil. Of all homes in the United States, 51% use natural gas as the primary heating source.

Because your home's heating and cooling system is the largest user of energy in your household, it's important to have an efficient and reliable system. Nothing keeps your family warmer than natural gas heat. Natural gas heating systems are available in many different sizes, types and efficiency ratings so you should have no problem finding a system that meets your family's needs as well as your budget.

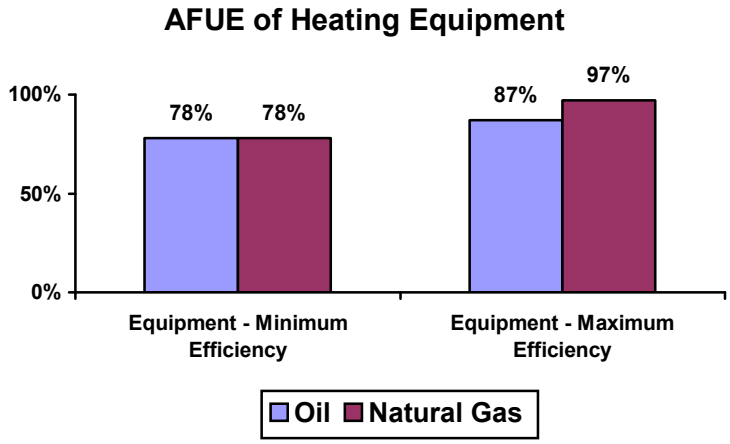
Economics

So, why is a natural gas heating system the number one choice across America? On average, a high efficiency gas furnace costs 50% less to operate than an electric heat pump, 60% less to operate than electric resistance baseboard heating, and 15% less to operate than a standard oil heating system. Unlike heat pump systems, natural gas furnaces and boilers do not require back-up or supplemental heating systems. Also, natural gas furnaces have a higher average life expectancy than electric or oil furnaces or heat pumps. Natural gas furnaces can last six years longer than heat pumps, five years longer than oil furnaces and three years longer than electric furnaces. Natural gas keeps you comfortable and saves you money!

Efficiency

The efficiency of any heating system is measured in terms of its "Annual Fuel Utilization Efficiency" (AFUE). The AFUE is a percentage and measures the ratio between the amount of energy that goes into a heating system versus the amount of energy that comes out as usable heat. The heat losses that can occur during start up and cool down, as well as the unit's efficiency while it is operating are all taken into account. While most older natural gas furnaces and boilers have efficiencies below 65%, today's natural gas heating systems feature efficiencies that range from 78% to 97%.

The chart below shows the efficiencies of today's new natural gas and oil heating systems. Remember, older heating equipment will operate less efficiently.



While electric heating equipment boasts efficiencies of 100% or higher, the efficiencies of electric equipment cannot be equally compared to the efficiencies of oil or natural gas heating equipment as shown above. The process of generating and transmitting electricity from the power plant into your home is inefficient. By the time electric power has reached your appliances, as much as 70% of the energy used to generate it has been lost. With natural gas, almost no energy is lost between the gas well and your home. In fact, by the time natural gas has reached your appliances, the total energy lost is less than 30% (compared to the 70% lost during electricity's travels).

Cost Comparisons

When shopping for a new heating system, compare the purchase and installation price, the annual operating cost and warranty information of different systems. A higher efficiency system may cost more money but will pay for itself through lower energy bills. To compare units, use the federally mandated yellow EnergyGuide label found on most appliances. For heating systems, the EnergyGuide label will show annual operating costs using national average energy prices. It will also show how a particular model compares with other similar models in terms of energy consumption.

Lifetime Value

Is it worth paying a higher purchase price for a heating system in order to gain additional efficiency? The Department of Energy recommends that people who live in cold climates invest in the highest efficiency system available.

You can calculate the "payback" period for buying a higher efficiency model. (This is the number of years until you "pay yourself back" for the initial higher cost.)

- Using the EnergyGuide label, compare the annual operating costs of all models you are considering.
- Look at the price premium (additional cost of higher efficiency unit).
- Divide the price premium by the annual operating cost savings. A result that is less than one is a fraction of a year (.5 equates to 6 months).

Alagasco

AN ENERGEN COMPANY

Natural Gas Heating

Reliable.
Comfortable.
Convenient.

Warm. Reliable. Gas Heating.

Natural gas furnaces keep you comfortable. The air from a natural gas furnace is up to 35 degrees warmer than air from an electric heat pump. This makes your family feel warmer faster. Electronic monitoring systems on two-stage furnaces and high-efficiency systems maintain your home's temperature within one degree of the thermostat setting, which means less of a hot or cold temperature swing. Finally, natural gas heating systems are built to last. The average life of a natural gas system is longer than the average life of an electric heat pump. Year after year, depend on the comfort and efficiency of natural gas heat.

Natural gas heat has many advantages over other energy choices:

- Select the type and size of system best suiting your needs.
- Stay warmer while spending less.
- Utilize the cleanest-burning fossil fuel available.

Simple.

- Requires no backup system

Warmer.

- Warmer heat - up to 35 degrees

Durable.

- Gas furnaces usually last longer than electric heat pumps

Clean.

- Cleanest burning fossil fuel available

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Did you know >>

Annual Fuel Utilization Efficiency (AFUE) is a measure of how well an appliance such as a furnace converts fuel into heat. For example, if a furnace has an AFUE rating of 90%, that means that 90 cents out of every energy dollar spent ends up as useful heat.

Terasen Gas

A quick guide to high-efficiency furnaces and boilers

Buying a new heating system is a major investment, that's why it's important to have all the facts before you make your purchase – and Terasen Gas can help. This information sheet on high-efficiency furnaces and boilers may help you to make an informed decision, improve the comfort of your home, and reduce your home heating energy use.

Why buy high-efficiency?

Age matters

If your furnace or boiler pre-dates the 1990's, you should seriously consider an update. Today's systems are built with a much higher efficiency rating. Now, you have two basic choices: mid-efficiency (non-condensing) natural gas furnaces or boilers, with a minimum AFUE rating of 78% and 80% respectively. Or, high-efficiency (condensing) furnaces and boilers which typically have an AFUE rating of 90% or greater, indicating they are more than 90% efficient.

Long-term savings

A high-efficiency natural gas furnace or boiler reduces the amount of heat escaping up your chimney. A lower loss of energy means more can be used to actually heat your home. This more efficient use of energy translates into reduced heating costs for you.

Home renovation help

If you've recently renovated your house, consider having a heat loss calculation performed by a qualified professional. It determines the size of system you need to adequately heat your living space. If your existing furnace or boiler doesn't fit the bill, a high-efficiency appliance may be the solution.

Safety

High efficiency furnaces and boilers feature sealed combustion. Sealed combustion systems draw in the air required for combustion directly from outside your home, thereby providing an extra measure of safety so that combustion products don't find their way into your living space.

Easier on the environment

Natural gas is the cleanest burning fossil fuel. Making efficient use of natural gas in your heating system is a wise and responsible choice, because you'll be minimizing the effect on our environment.

What is Efficiency?

It's a measure of how well your furnace or boiler uses fuel to deliver heat to your home. The Annual Fuel Utilization Efficiency (AFUE) rating system helps consumers compare energy efficiencies.

ENERGY STAR®

ENERGY STAR® labeled products are typically 10% - 15% more efficient than standard models, ENERGY STAR® labeled furnaces are typically 90% or higher AFUE and boilers are 85% or higher AFUE. Look for ENERGY STAR®-labeled natural gas furnaces and boilers. Terasen Gas promotes ENERGY STAR® qualified natural gas furnaces and boilers.

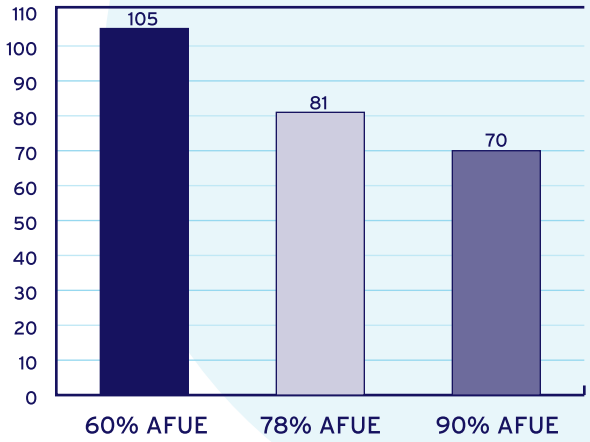
The ENERGY STAR® mark is administered and promoted in Canada by Natural Resources Canada.

What difference does efficiency make?

A lot, actually. For example, take a standard pre 1990's furnace operating at 60% efficiency. It burns about 105 gigajoules* of energy a year to heat the home of a typical Terasen Gas customer. A high-efficiency furnace running at 90% efficiency only burns 70 gigajoules of energy a year. Translate that into dollars saved, and you'll easily see the difference.

**In general terms, one gigajoule (GJ) is about enough energy to heat a 2,000 square foot home on a very cold day.*

Energy required (GJs/year)



What to consider before you buy

So you've done it. Made the big decision. You're going high-efficiency. Now what? Here are some key considerations before you buy:

- Have a heat loss calculation performed by a recognized professional to determine what size furnace or boiler you need to heat your home most efficiently.
- When you compare the energy efficiency ratings, remember: the higher the rating, the higher the potential for you to save energy and money.
- For furnaces: look at the motor. It drives the furnace's blower. Some motors such as Variable Speed high-efficiency motors run more efficiently than others, and could save you more in electricity costs.
- For boilers: to ensure maximum efficiency when upgrading to a high-efficiency 90%+ AFUE natural gas boiler, your contractor must verify that your home's existing heat distribution system can provide the return water to the boiler at a temperature no greater than 55°C or 130°F.
- Ensure the system comes with a solid warranty.
- Cost is a key consideration but remember there's a right size system for every space. The key is to choose a model and size that heats your home most efficiently. You don't need to pay extra for a system that provides more than your home really needs.
- Choose a contractor wisely — one that is trained in performing heat loss calculations and is knowledgeable on proper duct design and installation. The contractor should be registered with the provincial Gas Safety Program and employ licensed gas fitters, be bonded and insured, offer you a warranty and provide references as well as follow-up service. Always get several quotes, and make sure you understand everything that's included in the price.

Questions? Need more info?

Call us at 1-888-224-2710 and ask for a free copy of the *Heart of your home* brochure — our complete guide to high-efficiency heating systems. Or visit Terasen Gas at www.terasengas.com.

For more information

This Terasen Gas info sheet is one of a series. For more information on other natural gas topics, please visit Terasen Gas (Lower Mainland/Interior) at www.terasengas.com, or call us at 1-888-224-2710.

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HEF guide 07/03 501 2054 MKTG-03-13

Terasen Gas

The heart of your home

A guide to high-efficiency natural gas heating systems

We're here to help

If you're in the market for a new heating system and don't know where to start, this booklet is for you. Inside, you'll find helpful advice to make your new heating system as efficient as possible.

Visit www.terasengas.com for helpful information on a variety of natural gas topics. Or call the Terasen Gas number for your area and one of our customer service representatives will be pleased to help you.

Lower Mainland and BC Interior

Customer service 1-888-224-2710

Vancouver Island and Sunshine Coast

Sales 1-866-442-4456

Customer service 1-800-667-6064

Call before you dig

For natural gas line location information call:

BC ONE CALL..... 1-800-474-6886

On cellular: *6886

Table of contents

The intent of this booklet is to provide general information only. For comprehensive information and answers to specific questions, please speak with your heating contractor.

The heart of your home

Warm winter nights and cool summer days — welcome to the comforts of home. Your heating system is at the heart of your home, keeping you comfortable inside regardless of what the weather's like outside.

Considering that about half of your energy bill comes from space heating, choosing an efficient natural gas heating system is just good sense. But, efficiency is not just about saving money, it's also about creating a comfortable environment in your home.

Whether you choose a high-efficiency natural gas boiler or a furnace, the payback on your investment and the overall performance of your heating system depends on good design, installation and maintenance. Follow these principles and you'll be on your way to a more comfortable and efficient home.

Replace or repair?

Buying a new heating system is a major investment. It's often worth your while to maintain and repair your old system until it's necessary to replace it. However, if your furnace is more than 12 years old, upgrading to a high-efficiency furnace will save you energy and may save you money. That's because older furnaces tend to run at about 60 per cent AFUE, whereas new high-efficiency furnaces run in the 90 per cent – 97 per cent AFUE range.

Regular inspections and maintenance help to keep your heating system operating safely at its original efficiency level. You can do many things yourself (see page 13), but a licensed gas contractor registered with the BC Safety Authority should inspect and service your heating system at the intervals recommended in your owner's manual.

What's AFUE?
AFUE stands for Annual Fuel Utilization Efficiency. It's a measure of how well an appliance converts fuel into heat. If your furnace has an AFUE rating of 90 per cent, that means that 90 cents out of every dollar you spend on fuel ends up as useful heat.

Before you buy a new system

Explore your options

If you're building a new home, you can choose a forced air or hydronic (hot water) natural gas heating system.

If you are replacing an old system, it's usually easiest to replace a furnace with a furnace upgrade, and a boiler with a boiler upgrade.

Here's what you need to know about each option:

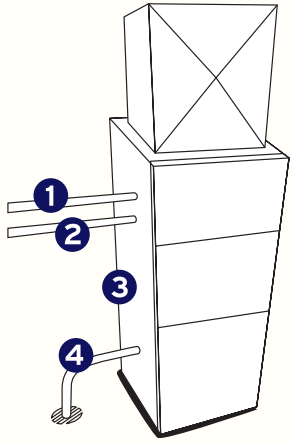
Forced air furnaces

If you haven't shopped for a furnace lately, you may be surprised when you hit the showrooms. All new furnaces must have an AFUE rating of at least 78 per cent. The old standard furnace (60 per cent AFUE) is no longer available. There are two choices when it comes to new furnaces — non-condensing furnaces, which have AFUE ratings between 78 per cent – 82 per cent, and condensing furnaces, which have AFUE ratings between 90 per cent – 97 per cent.

A high-efficiency furnace is called a condensing furnace because it has a second heat exchanger. This heat exchanger squeezes more heat from the fuel by condensing water vapour (condensate) from the combustion products. A drain disposes of the condensate. The more energy you use with a lower efficiency furnace now, the greater your potential savings with an upgrade to a high-efficiency furnace.

Up close: high-efficiency furnaces

Here's a look at what makes high-efficiency natural gas furnaces different from regular furnaces.



1. Air intake – "sealed combustion" or "direct vent" units use outside air for combustion and keep already-heated indoor air inside your home. This feature saves energy and adds safety.
2. Exhaust vent – in high-efficiency furnaces, exhaust gases are blown directly outdoors through a dedicated vent after fuel is burned.
3. Secondary heat exchanger (inside your furnace) – heat that normally goes out the vent in a regular furnace is captured by condensing water vapour produced during combustion. What's left over is called condensate, which goes out the drain.
4. Drain – condensate produced by the secondary heat exchanger drains here.

Why buy a high-efficiency natural gas central heating system?

Energy savings. When you're saving energy, you're saving money.

Safety. Features like sealed combustion and the use of corrosion-resistant materials help keep you safe and ensure that combustion products don't find their way into your living space.

Environment. By choosing high-efficiency natural gas equipment and using it wisely, you help protect our environment by reducing greenhouse gases.

Boilers
(hydronic heating systems)

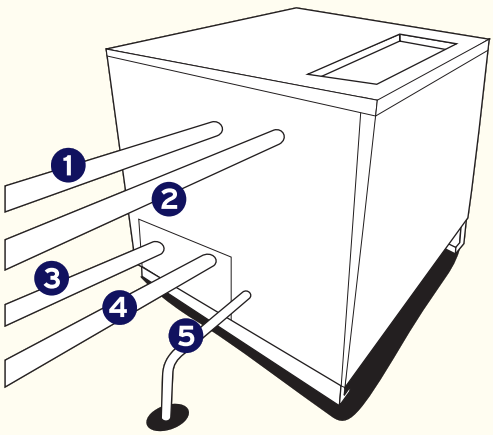
Hydronic (hot water) natural gas heating systems offer many ways to combine comfort, air quality and hot water needs in one system. These systems range from 80 per cent to 90 per cent or greater AFUE.

Before you buy, make sure your heating system designer and heating contractor will size, select and install heating components to match your home's requirements.

Up close: high-efficiency boilers

A boiler creates hot water to heat your home. This heat can be distributed through a system of pipes to a baseboard heater (a low-profile hot water heating device needing minimal space) or a radiant floor panel manifold (to distribute hot water to individual floor panels).

Some of the standard features on high-efficiency boilers:



How can you be sure your furnace or boiler is properly sized?

Have a heat loss calculation done. An appliance that's properly sized, installed and maintained will have a long life and keep your home comfortable.

Heat loss calculations, duct and pipe design, and installation practices should follow standards set out by the Residential Hot Water

Consider these options:

- Use a hot water baseboard and radiant floor manifold to divide your home into "zones" for heating particular areas of your home at a time.
- Another option is to consider a forced air fan coil unit. It circulates warm air through ducts the same way a conventional forced air system does, except the fan coil gets heat from the boiler. Benefit: you can use the boiler for heating, and also add air filtration and air conditioning.
- Make hot water from your boiler do double duty as a domestic hot water heater. A separate heat exchanger transfers heat from your boiler to a domestic hot water storage tank. The big bonus to this method: your tank efficiency will approach your boiler efficiency (water heaters are usually less efficient than the main boiler or furnace).
- Your system can also be designed to heat your pool or hot tub, or melt snow off your driveway. Your heating contractor can provide you with more information on the options available to you.

1. **Air intake – as with high-efficiency furnaces, "sealed combustion" or "direct vent" units use outside air for combustion and keep already-heated indoor air inside your home. This feature saves energy and adds safety.**
2. **Exhaust vent – in high-efficiency boilers, exhaust gases are blown directly outdoors through a dedicated vent after fuel is burned.**
3. **System supply piping – heated water leaves the unit here for circulation through the piping system to the rest of the house.**
4. **System return piping – once the heated water has circulated through the system, it comes back to the boiler for reheating.**
5. **Drain – condensate produced by the heat exchanger drains here.**

Heating Association (RHWHA); Heating, Ventilating Cooling Industry Association of B.C. (HVCI); American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE); Heating, Refrigerating and Air Conditioning Institute of Canada (HRAI) or other recognized heating association.

Options and accessories

Air filters – an electrostatic or high-efficiency particulate-arresting (HEPA) filter can reduce the amount of dust and allergens in your home.

Programmable thermostats – the easiest way to control temperature and save extra energy. Time the settings to lower the temperature of your home while you're asleep or away and save as much as 20 per cent on your heating bill.

Heat recovery ventilators (HRVs) – ventilators remove stale air that becomes contaminated by cooking and living in the home and bring fresh outdoor air in to replace it. HRVs warm the fresh air with heat from the stale air before venting the stale air outside.

Air conditioning – ideal with forced air systems, a central air conditioner can control both indoor temperature and humidity levels.

Zoning – your heating system can be "zoned" to provide different levels of heating or cooling to different areas of your home, saving energy and improving home comfort. If your home is larger, or has different exposures, you'll find zone heating especially useful.

Three steps to a new system

Step 1: design

Design is often the most critical and overlooked element of the planning process. Here are a few ideas to think about:

Size matters. Your furnace or boiler must be sized to your home. If your heating appliance is too small, it won't meet your needs. Too big, and you'll be paying for more than you need and your installation costs will be higher. You'll also shortchange yourself in the long run. An oversized appliance uses more fuel and cycles on and off more frequently, causing temperature swings, reduced comfort, excessive noise and a shorter life for the appliance.

Look for high-efficiency. The higher the AFUE rating, the more efficient the appliance. A furnace with a 78 per cent AFUE rating converts 78 per cent of the fuel it uses into useful heat. Likewise, a 92 per cent AFUE boiler converts 92 per cent of the fuel it uses into useful heat.

Look into options and accessories. A wide range of options and accessories can add comfort and efficiency. Options include air filtration, humidifiers, air conditioning, zoned heating, programmable thermostats and ventilation systems.

Don't forget venting and ducting. High-efficiency condensing appliances require special venting to protect against corrosion. Ask your contractor to inspect your ducts and include any changes to venting and ducting in your quote. Your ducts should be properly sized to match your new appliance's heating capacity. Insulate ducts that pass through unheated spaces.

Consider your home renovation plans. If you'll be remodelling, consider how renovations could affect your choice of a new heating system. For example, if you upgrade your windows or insulation, you may be able to reduce the size of the appliance you need as these improvements make your home more airtight and reduce the amount of heat lost from

your home. Plan for natural gas prepiping when you're in the planning stages of your renovation.

Consider true costs. The true cost of a new heating system usually involves more than the appliance itself. The benefits though, can outweigh the costs of upgrading. Consider:

- **Appliance cost** – the purchase price of a high-efficiency condensing model can be higher than a non-condensing model.
- **Installation cost** – depending on the system, upgrades may include changes to the venting, ducting systems, or drainage.
- **Energy costs** – over time, you'll save money by saving energy with a high-efficiency model.
- **Maintenance costs** – be sure that your layout allows adequate space and access for servicing. You'll pay less for labour if a technician can easily access your system.

Step 2: install

Installation is the second critical aspect of a new heating system. Even a top-of-the-line system won't perform to its potential if it is not installed correctly. Heating contractors are not necessarily designers and vice-versa. Ask your contractor to confirm which association's guidelines have been used to design your system (see page 7). A good contractor will take the time to explain how your system operates and how to keep it functioning as designed.

When choosing a contractor, remember: least expensive isn't always best — take the time to check references. Here are a few tips:

Choose a licensed contractor who is registered with the BC Safety Authority and employs licensed gas fitters.

Get quotes from more than one contractor. Ensure all quotes are in writing and include the cost of a gas permit, heat loss calculation, venting, drains, disposal of old equipment, and any other costs unique to your home.

Look for contractors who:

- have been trained by the manufacturer to install and verify proper start-up of the appliance you've selected
- will provide heat loss and duct sizing calculations to determine the proper size of appliance needed to heat your house most efficiently
- promote quality at a reasonable rate
- are bonded and insured for public liability and property damage
- offer a warranty that covers equipment, materials and labour (indicating who is responsible for honouring that warranty)
- provide customer references
- offer maintenance and service after the warranty is expired

Choose a contractor you feel comfortable with. Speak with more than one contractor and select the one that gives you a fair price (not necessarily the highest or the lowest), understands the importance of heating design and installation, and considers your home's individual size, age and layout when making recommendations.

Make sure you understand what you're signing. Prices quoted should be all-inclusive to avoid any unpleasant surprises.

Step 3: maintain

Maintenance is a little thing that can make a big difference. If you take care of your heating system, it will take care of you for a very long time.

- When your system is installed, ask your contractor or builder to explain the system's operation as well as the manufacturer's suggested maintenance schedule. Your contractor should also supply operating and maintenance instructions for any accessories that were added to the system.
- Keep all warranties and maintenance instructions near your furnace or boiler for easy reference.
- Many manufacturers will have a condensed maintenance sheet for you to follow. If you aren't comfortable doing some maintenance on your own, ask your heating contractor for a service contract. You'll feel better knowing your system will get regular attention and maintenance to keep it operating at its best.

What can you do yourself?

- Change or clean filters as recommended in the manufacturer's guidelines. **Be sure to shut off the electricity at the appliance switch and breaker panel first!** Keep the fan compartment door tightly closed.
- If your appliance has a fan belt, inspect it for cracks or signs of wear (and replace if necessary) when you change the filters.
- Keep vents and air returns clear of furniture, lint, dust or pet hair.
- Check the chimney and appliance vent system at least once a year. Check that the pipe is connected securely, that there are no signs of corrosion or damage, and that nothing has fallen into the base of the chimney or into the flue.
- If you have a battery-operated thermostat, check and replace batteries as necessary.
- If your furnace motor has oiling points, apply one or two drops of SAE 20 non-detergent oil every heating season. But don't over-oil!
- Keep the areas around your heating equipment clear of anything that can catch fire, especially paints, cleaning solvents, oily rags, gasoline containers and propane cylinders. Never store or use flammable materials near gas appliances.
- Don't enclose your appliance without the help of a licensed gas contractor registered with the BC Safety Authority.

Benefits of using natural gas

When it comes to choosing an efficient, safe, and reliable energy source, the benefits of natural gas are hard to beat. Here are a few reasons why so many people choose natural gas to heat their homes:

- Versatile – use it for heating, cooking, or drying your clothes.
- Convenient and reliable – it's piped right into your home, so you'll never run out of fuel.
- Economical – dollar for dollar, natural gas gives great value for your energy dollar.
- Safe – natural gas is one of the safest forms of energy available.
- Clean burning – natural gas is one of the cleanest burning fuels, making it easier on your appliances, and easier on the environment, too!

For more information

If you would like more information on other natural gas topics or to learn more ways that using natural gas can add comfort and efficiency to your home, visit www.terasengas.com or call the Terasen Gas Customer Service number that serves your area:

Lower Mainland/Interior
Customer service 1-888-224-2710

Vancouver Island/ Sunshine Coast
Sales 1-866-442-4456
Customer service 1-800-667-6064

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