Stoves and Outdoor Cooking

The following is from Mountain Equipment Co-op's web site.

http://www.mec.ca/AST/ContentPrimary/Learn/Hiki ngAndCamping/StovesAndFuel.jsp

CHOOSING A STOVE

The most important consideration when purchasing a stove is where and how you plan to use it. If you're going ultra-light and ultra-high your requirements are different from someone who wants to produce three-course masterpieces on a west-coast beach.



The principal difference between stoves is the type(s) of fuel they burn.

WHITE GAS

A popular choice, white gas stoves are generally inexpensive to operate, come in lightweight models, and burn very efficiently. White gas (also called naphtha or camp fuel) is widely available in North America, Australia, and New Zealand. It is volatile, evaporates quickly and leaves little residue. White gas is the best choice for extremely cold conditions and high altitude camps. These stoves, however, are relatively complicated to operate, and can require a fair amount of maintenance.

LPG (LIQUID PETROLEUM GAS) CANISTERS

Canister stoves burn compressed gas, often combinations of butane, isobutane, and propane. Most canister stoves are easy to use and require relatively little maintenance (the only moving part is a valve).

The fuel comes in pressurized metal canisters that are common in most parts of the industrialized world. Cold temperatures affect the performance of LPG stoves. Canisters can't be refilled (but they can be recycled). Once emptied, you'll have to carry the canister until it can be properly disposed of. It can be difficult to gauge the amount of fuel left in a canister, so you may end up carrying extra in order to be sure that you have enough fuel.

METHYL ALCOHOL

These stoves use the same burners found in fondue kits. They burn a poisonous wood derivative called methyl hydrate (also called alcohol, marine stove fuel, gasoline antifreeze, or methanol). It is the only stove fuel that burns without pressure, making these stoves fairly safe and silent. Fuel is common in North America and can be found in hardware stores and some gas stations It may be more difficult to find in other parts of the world. Although it doesn't burn very hot, it is perfect for simmering stews and stovetop baking.

KEROSENE

This fuel burns as hot as white gas, and travellers off the beaten path will find kerosene (paraffin) more readily available than most fuels. Its strong odour clings to belongings and eventually suffuses an entire pack. If spilled, it leaves a greasy stain that is difficult to remove. When cooking with kerosene, keep pots tightly covered to prevent fumes and soot from getting into your food. Kerosene also requires a separate priming agent.

DUAL OR MULTI-FUEL

Stoves that burn more than one type of fuel are usually more expensive than others models. In spite of the price, they are prized where the availability, type, and quality of fuel varies. Dual-fuel stoves are usually white gas stoves that can be adapted to burn kerosene. Multi-fuel stoves are capable of burning white gas, kerosene, and liquid petroleum as well as exotic fuels including diesel, aeroplane gas, and solvent. When using automotive gas, select unleaded fuel with the lowest possible octane rating.

TRAVEL

Transporting stoves and fuel by air is regulated by aviation organizations and most fuels are not permitted aboard aircraft. Airline companies must comply with these regulations or they may be prosecuted and fined. Ferry systems in Canada also consider white gas and propane to be dangerous cargo. The number of fuel bottles (including empty ones), the amount of fuel, and the types of containers used are regulated. Foot passengers are not permitted to carry white gas on Canadian ferries. As each airline and ferry company will have a specific procedure for washing and certifying empty fuel bottles, it's best to check with them before you travel.

STOVE DESIGN

Once you have decided on the type of fuel that suits your needs, take a look at the design and performance of some specific models.

- **Cooking**: Is it suitable for the type of meals you plan to cook? Heat adjustments are necessary for simmering. Stoves with small integrated pots won't suit cooking for large groups or melting vats of snow. Some styles (such as alcohol stoves) are much more efficient when used for small quantities.
- **Fuel**: Will you be able to buy fuel where you plan to go? Pressurized fuel canisters often have shipping restrictions, and many airlines and ferry services limit the types of fuel and containers you can bring aboard.
- **Stability**: Can your stove be set up on uneven ground? Will your pots balance on top? Will a large pot make it tippy?
- **Ease of use**: Is the stove easy to set up? Can the fuel supply be removed and re-attached? Is it difficult to light and re-light?
- **Maintenance**: Is the stove easy to maintain in the field? Do you have to carry replacement parts, tools or manuals?

STOVE OUTPUT AND BTU RATINGS

BTU (British Thermal Unit) is a measurement of energy. One BTU is the amount of thermal energy required to raise the temperature of a pound (0.45kg) of water by one degree Fahrenheit (0.56 degrees Celcius).



Most manufacturers list their stove output in BTUs per hour. The higher the BTUs, the hotter the stove. For comparison a candle flame puts out about 100-300 BTU/hr, a backyard barbeque creates 25,000 BTU/hr. Stoves generally operate somewhere between 3000 and 10,000 BTU/hr. But, these measurements reflect stoves operating at maximum output and in perfect conditions. In the field, cold, wind, altitude, and carbon deposits in your stove can reduce its output. Pressure within the fuel bottle or canister will also effect the amount of heat generated.

BOIL TIMES

Stove descriptions also include the time required to boil a litre of water. Hotter stoves can generally produce faster boiling times, but there other factors that contribute to field performance. How well the stove reflects heat, and whether the stove can be effectively screened from wind will effect boil rates. Canister stoves that attach directly to the burner cannot be enclosed with a wind screen as reflected heat can dangerously overheat the pressurized canister. Alcohol stoves require air intake, they can actually be less efficient when tightly screened.

When comparing figures, keep in mind, the stove with the fastest boil time may not be the most fuel efficient. And, if you're more likely to be simmering a pot of sauce, rather than melting large quantities of snow, having the hottest flame might not be your first concern.

FUEL CONSUMPTION

As a very general guideline, liquid stoves burn approximately 120ml (4oz.) of fuel per person per day for quick-cooking meals and hot drinks. If you're melting snow as well as cooking, you should double this estimate. Extreme cold and high altitude will increase the fuel required.

One medium sized LPG canister (225-250g) will generally provide fuel for two people over three days in summer conditions. It's best to pack extra fuel until you're sure of your own requirements.

TIPS FOR EFFICIENT COOKING

- Use a wind block or windscreen. Follow the manufacture's directions for screening the stove.
- Keep pots covered to retain heat.
- Use the recommended LPG canister for your stove.
- Keep the canister warm. Put it in your pocket or curl up with it in your sleeping bag.
- Use clean fuel. White gas degrades over time and when it is exposed to air. Store your fuel in an airtight container.
- Remove carbon build-up from liquid fuel stoves. Carbon builds up faster when you're burning old or dirty fuels (kerosene) and at altitude, where stoves tend to burn rich.
- Pump to the recommended pressure. As the fuel burns, the air space in bottle grows larger, and pressure decreases. You'll have to pump more to maintain the same pressure.

Read <u>Camping Stove Fuel</u> for information about the benefits and drawbacks of each stove design.

STOVE SAFETY AND TRANSPORT

The best way to learn about a new camping stove is to read the manual that came with it. Once you've done your reading, practice lighting your camping stove in the backyard before you take it into the backcountry.

- Use only the fuel(s) that your stove is designed to burn. For liquid fuel stoves, don't use old fuel that has been stored for a long period of time.
- Fill the stove or fuel bottle only to the safe fill line.
- Ensure the pump is well-lubricated and functioning.
- Check for leaks before lighting.
- Never cook inside a tent or in a confined space. Fire and carbon monoxide poisoning are significant hazards.
- Clear away any flamable debris near the stove before lighting.
- Empty your stove before you store it.

REFUELING

- Always fill your stove (or change the fuel canister) outdoors, never inside a tent or cabin.
- To avoid lighting spilled fuel, don't light the stove in the same place you filled it.
- Don't refuel your stove while it is still lit this is extremely dangerous. Take special care with alcohol stoves, they make no noise when burning and can burn with an almost invisible flame. Wait until your stove is stone cold before refuelling.

CANISTER STOVE REPAIR

Canister stoves burn pressurized fuel that emerges from the canister in a vaporized state. As a result, they are much less prone to clogging and are generally extremely reliable. On the downside, they do not operate well below zero degrees Celsius.

Fuel mixtures containing propane, iso-butane, and butane are designed to keep the output constant as the pressure inside the canister decreases. High pressure propane burns first and then lower pressure isobutane and butane. Mixtures that contain propane also tend to perform better at lower temperatures.

Although canisters from different manufacturers may share the same type of valve, your stove is designed to burn a particular fuel mixture. MEC recommends that you use only the canisters designed for your stove. The wrong blend of fuels can clog your stove, cause flare-ups or fuel leaks, and may burn dangerously hot.

REPAIR

If your canister stove stops functioning due to a food boil-over, try pricking the jet with a wire tool to restore its function. If you notice an unusual gas-like smell, or notice fuel leakage due to a seal failure, do not use the stove! Check that the attachments are sound and that the canister is screwed on properly. Bring it by an MEC store for immediate attention.

OPERATING TIPS

- Test your brand-new stove at home to make sure you know how to operate it and that you have all the necessary parts.
- Low vapour pressure can stop your stove from working properly. Warm the canister by putting it your pocket before use.
- When cooking, insulate the fuel tank from snow or other cold surfaces with a small piece of foam, or set it in a pan of water.
- When you get home, mark partially used canisters with the number of hours burned. You can also weigh the canister on a postal scale to determine the amount of fuel remaining.