FUELS and HEATING SYSTEMS

for Alaskan homes

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A wide variety of fuels available in Alaska, their range in cost, and a diversity of heating applications often make the selection of a fuel an important and sometimes difficult task. While cost is important, other factors such as convenience, cleanliness, and adaptability to automatic control sometimes over-ride cost considerations, especially for home heating or crop drying.

Fuels for home heating include solids (wood, coal), liquids (furnace or stove oil) and gases (natural or liquid petroleum). While not really a fuel, electricity is being employed in numerous heating applications; it can easily be compared to other heat sources and is therefore here considered a fuel.

COAL was early recognized as an important Alaskan resource, much of it being placed in naval reserves. Healy and Matanuska Valley coal beds were both known before gold was discovered in the Territory. Construction of the Alaska Railroad was partially justified to tap this fuel making it available to developing Pacific naval and mercantile fleets. Homer was established as an ocean vessel coaling point. For many years coal has been readily available to both Anchorage, Fairbanks and nearby military establishments as a commercial and domestic fuel and power source.

Advantages of coal include ease of transport and storage, and adaptability to semi-automatic control. Its disadvantages, especially for home heating, are high labor requirement for moving fuel to furnace or stove and for removing ashes. A coal heating system requires attention at least once or twice daily. Handling both coal and ashes generates dust and fly ash to be combatted by the housewife.

STOVE OIL and furnace oil until recently were shipped into Alaska at higher cost than locally obtained fuels. They have captured a considerable portion of the domestic market because of their adaptability to completely automatic control. An oil heating system can operate several days or weeks without attention. In addition, liquid fuel can be delivered from trucks through hoses into underground steel tanks with little disruption of the home routine. Not to be overlooked is the oil dealer's excellent "keep full" service which may include annual burner inspection and adjustment.

WOOD is still the sole heat source in many Alaskan homes, especially in rural areas where logs are available with little or no cash outlay. Wood is still increasingly popular as an auxilliary heat source in both urban and rural homes containing

fireplaces.. While wood is bulky, usually requiring some outside storage, it can be stored without a great deal of cost where space is available. A neatly stacked woodpile can even add to the overall landscape effect of a well planned yard. Many Alaskans have come to appreciate the cheery warmth offered by a fireplace. Many rely on wood for heat during electrical power outages when automatic systems fail to operate. Gathering wood also offers many city dwellers an opportunity to escape into Alaska's forests for exercise and relaxation.

PROPANE, or liquified petroleum gas, is currently limited to applications in which convenience is more important than cost. It is an excellent portable source of heat for camp trailers or infrequently occupied cabins. It quite widely supplies heat for cooking, but seldom for home heating. Natural gas is currently available in Anchorage and a few other Alaska communities. Where available it is competitive in cost to fuel oil. Its advantages are similar to those of oil in that it is clean and automatic. Disadvantages are its explosive nature and frequent difficulty in detecting the source of leaks.

ELECTRICITY is becoming the sole source of heat in an increasing number of Alaskan homes. Considered by many as the ideal fuel its great disadvantage is high operating cost. Major electric utilities in Alaska offer a special reduced rate to "all electric" homes, but even when reduced its operating costs are higher than for competing fuels. High operating costs are somewhat offset by lower installation costs resulting in reduced interest, insurance, and depreciation. Electric systems require less maintenance, repair, adjustment, and attention than others. The homeowner may value the reduced labor compared to solid fuels while the homemaker will enjoy individual room temperature control, freedom from odors, smoke, dust and noise associated with other systems. New houses planned for electric heat usually have additional insulation installed to lower heating costs to nearly that of other systems.

EFFICIENCY OF HEATING SYSTEMS

In addition to the cost of fuel, the user must consider the efficiency with which it can be converted to usable heat inside the house. Automatic control improves efficiency by delivering heat only when required. Efficiency of a heating system also depends upon such factors as burner adjustment, soot inside furnace, draft control, air adjustment, and degree to which the system may be overloaded. Generally efficiency ranges from 50% for space

heaters to 80% for automatic oil fired furnaces. Electric current is 100% convertible to heat. Efficiency of a number of fuels in various systems is as follows—

Wood space heater, hand fired	50%
Coal space heater, hand fired	55%
Coal furnace, hand fired without controls	55%
Coal furnace, automatic controls	65%
Oil space heater, hand controlled	60%
Oil conversion furnace, automatic controls	70%
Oil or gas furnace, automatic controls	80%

Methods of distributing heat through a house and the ability of individual families to tolerate temperature differences throughout the house also influence fuel costs. A simple space heater warms only the surrounding area. It does not adequately circulate heat to remote bedrooms or basements. A controlled central heating system provides heat to all parts of a house. A family can save up to 25% by closing off unused rooms in winter, reducing indoor temperature a few degrees, and reducing temperature at night.

The heating efficiency of a fireplace in a modern home is probably near zero because more heat escapes up the chimney when it contains no fire than is gained during time of use. No fuel saving is usually obtained by installing a fireplace in a home.

FUEL COST COMPARISONS

To compare the cost of two fuels it is necessary to employ a common basis. Since quantities of heat are usually measured in British thermal units (Btu's) a good method is to convert both fuels to the cost per Btu. A Btu is such a small unit that it is easier to visualize differences in cost per million Btu's. The table below compares a number of fuels, assumes a cost and heating value and presents the purchase cost for a million Btu's of heat. To determine the relative cost of heat delivered inside a house its system efficiency is applied; the overall heat cost is presented in the far right column.

ANNUAL HEATING COSTS

Many other factors must be considered in calculating an annual cost for heat. While system costs such as for furnace, heat ducts and fans, hot water piping and radiators are easy to visualize, other cost differences are more obscure. For instance, taxes on a home are likely to be higher if it contains central heat than if it is served by a space heater. When a new system is to

Cost comparisons of various feuls for stated heating plant efficiencies (E)

Fuel	Heat content	Unit	Heat per unit	Fuel cost per-- Unit	Fuel cost per-- Btu†	E	Heat cost in house†
	1,000 Btu		1,000 Btu			%	
Coal*	12.0/lb	Ton	24,000	$16.00	$0.67	65	$1.02
				18.00	0.75	55	1.36
Birch**	6.0/lb	Cord	21,000	12.00	0.57	50	1.14
				20.00	0.95	50	1.90
Spruce**	6.4/lb	Cord	16,000	12.00	0.75	50	1.50
				20.00	1.25	50	2.50
Furnace oil	137/gal	100 gal	13,700	23.80	1.74	80	2.18
Stove oil	137/gal	100 gal		25.00	1.82	70	2.60
				27.00	1.97	60	3.28
Electricity	3.4/Kwh	1000 Kwh	3,413	16.00	4.69	100	4.69
				25.00	7.34	100	7.34
Propane gas	21.7/lb	100 lbs	2,168	16.00	7.38	80	9.23

*Coal is lignite

**Assumed density of birch is 3,500 pounds per cord, of spruce 2,500 pounds

†Per 1,000,000 Btu

be installed, investment interest is an important cost. Cost of housing the heating system is often overlooked. If a homeowner must reserve a portion of his housing space for a furnace room, then the cost of that portion should be charged against the heating system. Housing cost become even more important in a solid fuel system where bin space must also be provided. Cost of the fuel tank for oil must likewise not be neglected. Electricity is probably unique in that it takes almost no space, requires no chimney, and requires almost no maintenance.

WHICH FUEL TO CHOOSE

Two generally different situations require a choice between two or more fuels. Perhaps the easiest is in planning a new house. The other is in modernizing an old house already served by a heating system.

Two components are involved, the cost of the system and the cost of fuel. The low cost system will be cheapest for the first few years, while that system with the lowest cost fuel will be less expensive in the long run. Cost of interest, insurance, taxes and housing modify the time required for the low first cost system to become more expensive than the cheap fuel system.

Interest and taxes will be higher in a more expensive heating plant and offset some benefits of cheaper fuel. To determine annual heating costs, the costs for depreciation, interest on investment, insurance, taxes and housing allowance (including costs of chimneys and plumbing where electricity is to be compared) are added to fuel costs to arrive at a total. Any difference in cost must be compared to the added comfort, cleanliness, reliability, convenience, reduction of labor or saving of space that the more desirable system may offer. Only after comparing all factors can a good choice be made.

When a heating system becomes old or worn out, a change must be made. The decision in this case is much the same as for a new house except that only the cost of those items to be replaced need be counted. Cost of a chimney already installed will be lost to an electric heating system. If the original system is still serviceable but is to be replaced to obtain a fuel saving then the entire cost of the new system will have to be returned from the fuel saved. Benefits such as reduced maintenance and of course greater comfort and convenience must be evaluated in this case. Each change is unique. Each must be considered on its own merit using the principles outlined above, and being sure to include all the appropriate costs to each system.