

ENGINEERING

How To Save Fuel

It will be necessary for each homeowner to conserve all the heat possible this winter. But it is possible to lick both old man winter and the Japs.

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► **FUEL THAT HEATS** your home could drive machinery of war. An overheated house this winter may result in one less gun or tank for our fighting men.

By patriotism or government order, every citizen will have to conserve all the fuel possible. Warnings re-echo back and forth across the nation clear from the eastern Atlantic states to the Pacific Northwest — shortages may develop, whether it be from war needs or lack of transportation.

Here are tips on how the home owner can put steam behind the victory drive by making more fuel available for war production.

Most houses are proverbially too hot and too dry in winter, except in the Southwest where the winters are wet. Less heat and more moisture would indeed be more healthy and it should not be difficult for us to economize fuel and accustom ourselves to a more healthful temperature.

The most modern heating apparatus does make provision for moistening the air. Where this is not supplied, shallow pans of water may be placed on stoves or radiators. This will help some but a boiling kettle is much better. Humid air at 65 degrees is more comfortable than dry air at 70.

Europeans Used to Cold

In European countries, 60 degrees Fahrenheit is regarded as a comfortable winter temperature, as compared to the 68-72 degrees demanded here. This is partly due to the more humid climate abroad; but it is mostly due to the fact that Europeans have merely accustomed themselves to lower temperatures. Poorer classes get along with still less heat, or even with totally unheated rooms while the temperature may be freezing outside.

Government officials say that we must accustom ourselves to a maximum of 65 degrees by day and 55 degrees by night. How can we do it? Let's take a few tips from the Europeans.

There is a tradition in southern Europe that if the feet can be kept warm, the whole body will be warm. In railway carriages, often the only heat provided is by a long flattened metal cylinder filled with hot water and laid on the floor for your feet. You'd be surprised at the comfort it provides.

In a completely unheated room in southern Europe, you come upon the lady of the house seated with a charcoal brazier under her feet and holding another, made of earthenware and shaped like a basket, in her lap to keep her hands warm—and looking quite contented. Of course she will have a shawl about her shoulders, and be wearing much warmer indoor clothing than has been the custom here.

Keep Floors Warm

This principle of keeping the feet warm is at last becoming recognized in the United States. Some builders recently have embedded steam pipes or electric cables in the floors.

A warm cellar will also keep the floor above warm. Many heating engineers regard any heat dissipated in the cellar as wasted and, by heavily insulating the furnace and all hot pipes, seek to prevent it. But this heat is not wasted if it doesn't escape to the outside or become excessive.

Since hot air rises, all radiators, registers and auxiliary heaters should be kept as near the floor as possible. In addition it is helpful to provide baffles or deflectors above the registers or radiators to reflect the hot air or radiation downward. If a steam-heat radiator is against a wall, a sheet of metal between it and the wall will throw back the heat into the room.

The sheet may be backed by insulating material, for it is of no value to heat the wall, especially if it is an outer wall. The sheet should curve over the top of the radiator and slightly downward on the inside to direct the rising warm air downward.

Because of cheap and abundant fuel, our heating arrangements usually have not been made as efficient as they could be. Many homes are heat sieves, especially

wooden frame houses. It is as difficult to heat a porous house as to fill a sieve with water.

We like plenty of fresh air. We want open windows, especially at night. But the European home is tightly closed. Great felt blankets even stretch across windows that are never opened. How can people live, how can they sleep, in such stuffy rooms? They do—and thrive.

Although the sweeping gusts of wind from upflung windows may be desirable, physiologists tell us that much less ventilation is adequate as far as the life-giving oxygen supply is concerned.

Forego Open Windows

Let's forego the luxury of unlimited fresh air. Windows open only a crack at night, and closed most of the rest of the time! If the house must be aired, do it between two and four in the afternoon when the day is warmest.

Obviously, all leaks should be stopped as far as possible. This means weather stripping on all doors and windows, perhaps double windows, and pads on double-hung windows over the crack between the two sashes.

Heat escaping to the attic is the most important leak. The attic should be



PREVENTING LOSS—Application of glass wool or other insulation prevents loss of what heat you have.



HEAT CONSERVATION—How to keep the youngsters warm this winter with the least amount of fuel consumed, is the concern of every family in the nation. Use of double windows is just one of many devices for conserving heat.

sealed airtight. A layer of heat insulating material spread over the ceiling on the top floor is also advisable, especially if there is no attic floor. You can buy the insulation in bags and spread it yourself.

Insulation between the outside walls is helpful but not as necessary. Only 2% to 3% of the heat escapes through plaster and wooden walls. Brick and stone houses are already well insulated.

Windows are the chief avenues of escape. Even closed, sealed windows lose much heat. Glass is a poor conductor of heat, but there is only $\frac{1}{8}$ inch or less of it between the inside and the outside temperatures, as against 6 inches or more of walls.

Layer of Air

Double windows and storm doors are thus worth several times their weight in fuel. But doubling the thickness of the glass has little effect. It is the layer of air between double windows that provides the insulation. For windows that will be seldom opened, the storm window may be a single sash fastened to the outside window frame, so it can be taken down in summer. Some persons use an inexpensive double window of cellophane to hold an insulating

cushion of air. This is applied inside.

The storm door will be more effective if there is a little vestibule so that the outer door may be opened and closed before the inner door is opened. The vestibule can be made of wood and fastened to the house. In summer it is removed.

Such devices are standard equipment in the colder parts of the country. Their use could well be extended.

Clean Up

After the house has been made as nearly heat-tight as possible, let's use the most economical and efficient methods of heat production.

Stoves, grates, burners, pipes and chimneys should be cleaned. Adjust oil burners carefully. A badly adjusted burner can waste much fuel oil or gas. Soot and ash on pipes reduces heat conduction. Worn-out and inefficient heaters should be replaced by new ones, if possible, or at least be repaired.

Unused rooms should be shut off, and the other rooms heated only while in use. As far as possible the family should use only one room in the daytime.

Thermostatic control is recommended. If that is not installed, a few inexpensive

thermometers may be scattered about—then watched. When the temperature is higher than necessary, turn off the heat.

At night, fires should be banked or burners turned down as low as possible. To bank a fire, it should first have been burning brightly for some time with drafts open until all the coals are glowing. Push the live coals to one side of the furnace. Then place the fresh coal in the depression on the opposite side. Drafts and damper are closed until there is only just enough air to keep the fire going.

In the morning, the drafts and dampers are opened wide and the house is soon heated. Two feedings per day should sate the appetite of a good coal furnace. If all the family go away for the day, the fire may again be banked. Putting on ashes to bank the fire is not recommended since this is likely to generate harmful gas. Regulation should be entirely by drafts and damper.

Pile on the Coats

For the cold nights, put an extra blanket on the bed. If that isn't enough, pile on blankets, coats or whatever else may be available. Socks and flannel pajamas may not be fashionable night attire, but they're surely warm.

Increased warmth may often be obtained by putting heavy paper or other insulation beneath the bed mattress rather than war-scarce wool blankets on top. Don't think that living in a cold house will cause you to feel the cold less outdoors. Just the opposite. If you are already chilly when you start out, you will be really cold just that much sooner. So before going out, warm yourself well by getting close to the source of heat.

Electric stoves as auxiliary heaters are an expensive way of producing heat, but the fact that they can deliver a small amount just where needed often makes it possible to dispense with a much larger amount from the main source. An electric stove under the feet will work wonders. But electricity is also one of the driving forces of the war industries and must be used sparingly.

Where wood is cheap and plentiful, the open fireplace is a useful auxiliary that saves other fuel and adds cheerfulness to the home. And speaking of psychological effects, note how warm colors, bright yellows, oranges and red, add to the cheerfulness of drab winter days and give a feeling of warmth.

With spirits high and fuel saved, we're helping to lick both old man winter and the Japs.