

Heating Load

In the spring of 1942, the War Service Committee of the Society was appointed and immediately focused attention upon the importance of fuel conservation as a war measure^a and recommended a program which included Ten Ways to Save Fuel and Improve Heating Plant Efficiency which are enumerated herewith:

Fuel saving percentages are based on the total heat loss of a typical two-story detached residence^c without storm windows, insulation, or other fuel conservation measures, and are not necessarily cumulative but will often total 60 per cent in practice if all precautions outlined are adopted.

1. INSTALL STORM WINDOWS AND DOORS

- a. Application of storm windows and doors will save from 20 to 25 per cent.

Tightly-fitting storm sash enables the maintenance of higher indoor relative humidities without window condensation. Reduces down-draft of cold air at windows and together with increased glass surface temperature improves comfort of the occupant. The addition of humidity permits a reduction in dry-bulb temperature for equivalent comfort conditions, but this condition does not result in fuel saving.

If you want to install storm windows and doors, call your builder, lumberman, hardware dealer, or window manufacturer, who will give you an estimate of the cost. Some dealers maintain a stock of standard sized windows, which can be fitted to your window with a minimum of work. It is advisable to have the storm windows installed with hinges so that they can be partially opened during mild weather, and also to facilitate cleaning. However, when the storm windows are closed they must fit tightly against the window frame to be effective. A strip of felt placed in this joint will prevent air leakage.

The locks on the inside windows should be closed, as these tend to pull the windows tighter. If condensation appears on the

^aWar on Fuel Waste Week—Fuel Conservation (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, September, 1942, p. 558). War on Fuel Waste, by B. M. Woods (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, November, 1942, p. 699). See also War on Fuel Waste—How To Do It published by A.S.H.V.E. and available in pamphlet form.

^cThe heat losses through a typical two-story residence will be distributed approximately as follows: 30 per cent through the side walls of the house, 26 per cent through the windows and doors, 20 per cent through air leakage, 15 per cent through ceilings and roof, and 9 per cent through the floors. Percentage values abstracted from paper—Automatic Gas Burners, by C. G. Seeger (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932, p. 548).

inside of storm windows it may be necessary to bore a small hole in the bottom of the sash to allow for the entrance of a small quantity of air between the windows.

In the case of those windows where the introduction of light is not important, it is possible to nail panels of rigid insulation board to the window sash, or make such panels easily removable. A cloth window shade fully drawn at a window, or the pulling of window length drapes across the window, will also materially reduce the heat loss through a window.

2. INSULATE YOUR HOME

- a. Ceiling insulation will save from 10 to 15 per cent.
- b. Wall insulation will save from 12 to 20 per cent. Application of insulation will improve inside wall surface temperatures, thus increasing the comfort conditions.

Call an insulating contractor and have him prescribe the proper treatment and give you an estimate of the cost. One method of insulating an accessible attic is to blow loose fill insulation evenly spread to a depth of several inches into the space between the rafters; another is to apply batts or blanket insulation; and another is to apply rigid insulation boards.

To apply wall insulation to an existing structure, it is generally necessary to use a loose fill insulation, which may be poured or blown into the outside walls by removing sections of clapboards, brick, or other exterior materials.

3. ADD WINDOW AND DOOR WEATHERSTRIPPING

- a. Installation of weatherstripping will save from 5 to 10 per cent. Savings are greater when applied to loose-fitting windows and doors.

There are weatherstripping contractors and dealers who are equipped to make proper installations. Partial results can be obtained by the use of felt strips tacked on the upper and lower sash, where they come in contact with the window frame.

In case there may be some windows in the house that can be permanently closed for the winter, it is possible to caulk the openings with strips of heavy cotton cord or similar material. Also, inexpensive tape can be applied as a seal around all the cracks of the window to prevent infiltration.

Air leakage can also be reduced by caulking cracks around windows and door frames, which have been caused by the gradual shrinkage of the wood frame from the exterior building materials or concrete foundation. This is an important item in your fuel saving program.

4. AVOID OVERHEATING

- a. Install thermostatic control for the maintenance of uniform temperatures between 65 and 70 F, and adapt suitable clothing for comfort at these temperatures.

If you have a thermostat, be sure that it is functioning properly and that it is located at some place in the house, where it is not subjected to unusual cold drafts. Good controls can be adjusted to operate automatic firing equipment, so as to maintain room temperatures within one degree above or below the thermostat setting. If you convert your heating plant from oil to coal, have your thermostat arranged so that it will operate the draft dampers on the boiler or furnace.

5. LOWER TEMPERATURES

- a. Reduce temperatures at night to about 60 F and fuel savings will range from 5 to 10 per cent.

If the thermostat setting is lower than 60 F, fuel savings will diminish due to the necessity of reheating the house from an abnormally cold condition. Reducing the temperature from 72 F at 10:00 p.m. to 66 F and bringing temperature back to higher level at 5:30 a.m. made a saving of 10 per cent of the total fuel used in a test house^d.

- b. When away for a weekend or several days set the thermostat at about 50 F which will prevent damage from freezing.

6. DO NOT HEAT UNUSED ROOMS

- a. Disconnect or turn off the heat in the garage for the duration of the war. In the case of steam, this can be done by merely turning the valve to the radiator. With hot water heating systems, there is still a small circulation of water through the radiator even though the valve is closed and it is therefore necessary to disconnect the radiator and plug the pipe branches at some place within a heated space to avoid freezing. Drain radiator carefully.
- b. Most sun rooms have an excessive amount of heat loss due to the number of windows and for that reason it is recommended that the radiators in these rooms be disconnected. Then, tightly seal this room from the rest of the house by the use of doors or the application of panels of insulating board.
- c. As all warm air tends to rise, it is important to keep all doors and hatches tightly closed to attic spaces and unused rooms. If you are in the habit of opening bedroom windows for sleeping, be sure and turn off the heat and close the doors to the warm portions of the house. In most cases, a window raised from 6 to 10 in. will provide all the cooling and outside air needed at night in a bedroom.
- d. All fireplaces burn fuel inefficiently, but during the mild seasons of the year they can be used for necessary warmth instead of turning on the principal heating plant for the residence. When a fireplace is not in use, it

should be properly sealed, or the dampers should be closed tightly to prevent the loss of heat up the chimney from other sources in the house. Many fireplaces have no dampers.

- e. Avoid keeping all outside doors open or standing and talking in an open doorway.

7. INSULATE HOT WATER HEATER

- a. If your hot water storage tank is bare, call your local heating contractor and have an adequate amount of insulation applied to conserve heat. This should be done even though an auxiliary heater such as electricity or gas is used to heat the hot water.
- b. Call the plumber immediately and have him repair all leaky hot water faucets, because this wastes both water and fuel.

8. IMPROVE RADIATOR EFFICIENCY

- a. Purchase an inexpensive long handled brush and remove all the dirt collections in the pockets of the radiators. If possible, remove the fronts or cabinets of all convectors and clean all the dirt deposits in the radiator unit. With closely spaced fins in the radiator section of some convectors, obstructions such as dirt will reduce the air circulation to the extent that the efficiency is seriously impaired.
- b. It is important to keep heavy drapes and curtains away from all radiators and the outlet grilles of convectors, because they restrict the free circulation of air over the unit. Homemade wooden shelves and grilles surrounding or partially enclosing radiators act in some cases like dampers and should be removed or replaced with a correctly designed radiator shield or enclosure. A properly designed cover or shelf over the top of a radiator will deflect the heated air and prevent it from immediately rising.
- c. Many radiators have been painted with bronze and aluminum finishes. The application of ordinary oil paints to such radiators will improve their efficiency as much as 10 per cent.
- d. Place a surface having a high reflectivity behind each radiator which will reflect the heat back into the room that is normally absorbed in the wall at this point.

9. CHECK FURNACE COMBUSTION EFFICIENCY

- a. Removal of soot from inside surfaces of furnace or boiler will save about 5 per cent. Soot accumulation clogs the passages and reduces the draft. The soot and fly-ash located on the inside of a furnace or boiler can be removed with a long handled stiff wire brush. Also the smoke pipe connection between the furnace or boiler and the chimney should be taken down and the soot removed. It is a good plan to clean the chimney if this has not been done for some time and be sure and remove the soot dislodged from the chimney through the cleanout door at the chimney base.

^dOperation of the Research Home with Reduced Room Temperatures at Night, by A. P. Kratz, W. S. Harris and M. K. Fahnestock (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, December, 1942, p. 743).