Fuel economy in hospitals and institutions.

MINISTRY OF FUEL AND POWER

DOMESTIC FUEL PLANNING COMMITTEE

FUEL ECONOMY IN HOSPITALS AND INSTITUTIONS

DOMESTIC FUEL MEMO. P 3/12

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1. NATURE OF FUEL CONSUMPTION IN HOSPITALS AND INSTITUTIONS.

Hospitals and Institutions vary widely in size, in equipment, and in the purpose which they serve, but in so far as fuel economy is concerned they have many features in common. These common aspects will be dealt with first, and notes on the economical running of special equipment will be dealt with later.

The following table represents the approximate relative consumptions of the various fuel consuming services used in hospitals and institutions during winter months, expressed in terms of " fuel units ".

A " fuel unit " is equivalent to ½ cwt. of coal, coke or anthracite, or 50 units of electricity, or 500 cubic feet of gas.

Kind of Service	Percentage of Fuel Units consumed (during the winter)
Heating	43
Hot Water	17
Laundry	10
Main Kitchen	5
Ward Kitchens	10
Lighting	1
Power	2
Theatre Equipment—Sterilizers, etc.	2
Miscellaneous services such as disinfectors, ward sterilizers, laboratory services, etc.	10

The actual percentages shown above may not correspond precisely with any particular establishment, but the order of importance shown for the various services as fuel consumers is of general application. The important point brought out by the table is that the most fruitful field for economy is to be found in the efficient control of heating and hot water services.

2. APPOINTMENT OF FUEL ECONOMY OFFICER.

In order that the fuel economy efforts of the establishment may be properly directed and co-ordinated, it is suggested that a Fuel Economy Officer should be appointed, whose responsibilities should be clearly defined. Where the establishment is of sufficient size to employ an engineer for maintenance purposes, it is suggested that he should be the Fuel Economy Officer, but in smaller establishments a non-technical person may be appointed provided that such a person is familiar with the routine of hospital administration. Hints for the guidance of Fuel Economy Officers will be found in Fuel Efficiency Bulletin No. 7.

3. WEEKLY RECORD OF CONSUMPTIONS.

It is important to keep regular weekly records of the consumption of fuel-using services, such as steam coal, fuel for heating and hot water independent boilers, gas, water and electricity. These records should be in such a form as to show the comparison with the previous week and if possible also with the corresponding period of the previous year.

These weekly records should be the basis of regular discussion between the Fuel Economy Officer and the principal Officers of the establishment so that the fuel consumption is constantly under review. Sub-metering of various services is most helpful in checking waste, and if any establishment is not properly equipped with measuring appliances, it is suggested that they be provided in the following order of importance.

(1) Weighing or measuring of steam coal or solid fuel used for independent solid fuel fired hot water heating and hot water supply boilers.
(2) Measurement of boiler feed water (if steam boilers installed).
(3) Measurement of steam to heating systems if these are fed by steam heated calorifiers, or of the live steam type.
(4) Measurement of hot water consumption by metering the make-up cold water feed to the system.
(5) Sub-meters for gas and electricity in places using large amounts of these services.
(6) Sub-meters for water (hot and cold) to laundry.
(7) Sub-meters for cold water.

4. ECONOMY IN HEATING OF HOSPITALS AND INSTITUTIONS.

The table on Page 1 shows that nearly half the fuel consumed by a hospital or institution during the winter months is required by the heating system. There are many ways in which such establishments may be heated, but the following facts apply to all methods.

The first is that if premises are heated to a temperature of only 1° F. higher than that really necessary for the well-being of the occupants, it involves a waste of heating fuel of between 3–5 per cent.

The second is that if wards, corridors or other rooms are ventilated to an excessive degree an even more serious waste of fuel may occur. Each additional air change per hour above that *really* necessary means a waste of heating fuel of about 20 per cent.

It is suggested that a temperature necessary for the proper functioning of any part of the premises should be fixed, so that all concerned know the stipulated conditions, and can draw the attention of the Fuel Economy Officer to any variation from them.

The above considerations in regard to room temperature and ventilation make it clear that real economy in heating can only be obtained by a measure of control of temperature and degree of ventilation. These two aspects will now be discussed.

Control of Temperature of Wards, Offices, Etc.

If the heating of the establishment is by a forced or gravity circulated hot water system, fed by steam heated calorifiers, control of the temperature of the water in the system can be obtained in one of two ways. The first is fully automatic, i.e., any variation in the outside air temperature is automatically transmitted to a special valve supplying steam to the hot water heating calorifier whereby the temperature of the circulating water is varied directly according to outside air conditions to maintain the minimum desired temperature within the premises. A second but much less satisfactory method of control of the temperature of the hot water heating system is by an adjustable thermostat fitted to the calorifier whereby at intervals hand adjustment of the thermostat may be made to vary the temperature of the hot water leaving the calorifier.

Some hospitals and institutions are heated by low pressure steam heated pipework and radiators. This system is not so economical as hot water heating, as close control is impossible. Much can, however, be done by shutting off entirely one or two radiators in rooms so as to maintain a temperature not higher than that laid down.

In the case of premises heated by solid fuel or oil fuel fired hot water heating boilers, it is not practicable to control the temperature of the water so closely as with steam heated calorifiers, but much can be done by constant attention on the lines of the suggestions given in booklet P. 3/6.

Full advantage should be taken of the heat insulating effect of *black-out conditions*, by lowering the temperature of the water in hot water heating systems at night, and except in severe weather, shutting off entirely the steam to steam heated systems during the greater part of the night.

Additional hints on thermostatic control of hot water and steam will be found in Fuel Efficiency Bulletin No. 11.

Control of Ventilation of Premises.

The degree of ventilation of most hospital premises is by adjustment of window opening. Excessive ventilation is a most wasteful matter, but care should be taken to give the amount of ventilation essential for the well-being of patients and staff. The practice of adjustment of high room temperature in the winter by permitting excessive ventilation by opening of windows and doors should be strongly discouraged, and steps taken to reduce room temperature by reduction in the amount of heat supplied by the heating system.

5. ECONOMY IN HOT WATER SUPPLY SYSTEMS.

Quite apart from good maintenance of taps to prevent leakage, considerable economy can be obtained by *close regulation of the temperature* of the hot water circulating within the system.

If the circulating temperature of the hot water is too high the radiation losses from the pipework of the system will be excessive. If the temperature is too low there is a tendency to wash and to wash-up crockery, etc. in running water. The optimum temperature appears to be about *125–140° F. at the tap*, at which temperature the water is too hot to enable hands or crockery to be washed in running water. A thermostat should be fitted to the system to maintain the temperature.

6. KITCHEN COOKING EQUIPMENT.

This should be regularly inspected, and particular attention paid to the covering of exposed hot surfaces by insulating material.

The fitting of gas governors to gas heated equipment often saves 10 per cent. of the gas consumed, and advice should be sought from the local gas undertaking as to which apparatus would benefit in this respect.

In the case of coke and coal fired equipment, firebars should be maintained in good condition to prevent loss of combustible material through the bars. A sieve should be provided so that cinders can be used again.

Additional hints are given in Memoranda P. 3/2A and P. 3/2B.

7. LAUNDRIES.

It is important to maintain hydro extractors in good condition so that the maximum amount of water is extracted in these machines before the work is forwarded for ironing or drying. It is much more economical to remove water by hydro extractors than by steam heated ironing machines or dryers.

The beds of ironing machines and the heating batteries for dryers should be heated only when the machines are in use.

Steam, hot and cold water valves and waste valves to washing machines should be maintained in tight condition.

If the machinery of the laundry is shaft driven, every endeavour should be made to see that the work in the laundry is balanced so as to avoid the necessity for running large motors and long lengths of shafting for perhaps only one or two small machines.

Further notes on laundry machinery will be found in Fuel Efficiency Bulletin No. 22.

8. GAS

In the majority of hospitals only about one-fifth of the gas used is consumed in the main kitchen. Most of the gas used is for ward kitchens and because of the shortage of matches and the difficulty in obtaining gas lighters there is a natural tendency for gas rings to be left alight for long periods without any useful purpose being served.

Gas Undertakings can supply and fit a proper pilot light from which all burners of gas stoves and hot closets can be lit, and which will not burn more than ½ cubic foot of gas per hour.

Gas heated hot closets in main kitchens and ward kitchens are often fitted with an excessive burner capacity. Great economy can be obtained without sacrifice of efficiency by removing some of the burner capacity. In addition it is suggested that instructions be given that for plate warming purposes hot closets should be lit only at specified times for specified periods.

Further notes on the operation and maintenance of gas burners will be found in Fuel Efficiency Bulletin No. 14 and in general, the advice of the local gas undertaking should be regularly sought to ensure efficient maintenance and operation of all gas appliances.

9. ELECTRICITY.

Economy in the use of electric light can be obtained by using lamps of low consumption (15 and 25 watt) in sanitary annexes, corridors, staircases, etc. A general survey of all the lighting in the establishment is well worth while from this point of view.

The maximum demand for electricity in hospitals and institutions is between 9 a.m. and 11.30 a.m. and there is a lesser peak between 3 p.m. and 6 p.m. Since these coincide with the general maximum demand upon the power stations, it would be helpful to the national effort if the Fuel Economy Officer surveyed the electrically operated plant of the establishment to cut out those items of equipment which need not necessarily be used within these periods.

Electricity can be saved by educating the staff in the more careful use of lifts, i.e., by asking them to walk upstairs if not going up more than two flights, and by always walking downstairs, rather than calling for the lift.

The careful use of refrigerating plant will also help in the consumption of electricity, i.e., by seeing that doors are only open for the minimum of time, that defrosting is carried out properly, and that the temperature within the chamber is maintained at a figure not below that really necessary.

The water from the cooling condenser of refrigerating plants often goes to waste. This can often be recovered quite readily for use in the kitchen or other adjacent water using equipment.

Further advice on electrical equipment should be obtained from the local Electricity Undertaking.

10. SPECIAL PLANT.

So far in this pamphlet attention has been directed to those aspects of fuel economy which are common to most hospitals and institutions. The following notes refer to equipment not common to all, but which are of great importance where they are installed.

Steam Boiler Plant. Fuel Efficiency Bulletin No. 1 gives practical hints for the economical raising of steam in steam boiler plants.

The economical distribution and use of steam is dealt with in Fuel Efficiency Bulletin No. 22.

Steam Driven Electricity Generating Plant. There are some Hospitals in which the electricity supply is obtained from a steam driven generating plant on the premises, the exhaust steam from which is used for heating and hot water supply purposes.

In many cases it is found impossible to make use of all the exhaust steam in the summer time for hot water supply purposes, and if for this reason, any is wasted, endeavour should be made to use the surplus exhaust steam in the laundry for dryers and washing machines, in the kitchen for steam jacketted pans and elsewhere where a supply of low pressure steam is desired.

Closing down of steam and other services to various Departments. The steam and hot water mains serving the kitchen, laundry and out-patients departments should be fitted with a stop valve where practicable close to the steam boilers and calorifiers so that these mains can be shut off nightly in the case of the kitchen and out-patients departments and at night and over the week-end in the case of the laundry. Wards or other buildings temporarily out of use should be isolated from the general services where practicable so as to save radiation losses from unused steam and hot water pipework.

Open Fireplaces. Much can be done to economise in the use of house coal by placing firebricks at each side of open grates to reduce the grate area, and by the daily issue of a specified quantity of fuel for each fire, which although sufficient for the purpose will not permit of waste.

11. CONCLUSION.

Long experience in fuel economy has shown that a great deal can be done without the necessity to spend money on new equipment. If after taking all possible steps to obtain economy with old equipment it is felt that further substantial economy can be obtained by the installation of extra equipment, the Ministry of Fuel and Power is generally prepared to support such a scheme provided that the capital cost of the new installation would be recovered within a period of two and a half years.

It is for the authority concerned to consider whether a lowering of the normal standard of amenities in Hospitals and Institutions would be justified by the fuel economy obtained. For example, hot water can be saved by restricting the number of baths per week permitted to the staff, and by the amount of hot water permitted to be used. Again the reduction in heating of offices and residential quarters offers scope for economy but as previously stated the Ministry feels that these are matters which must be left to the discretion of the authority concerned.

The Ministry of Fuel and Power is anxious to assist all those responsible for fuel economy, and to this end Regional Controllers have a competent staff ready to visit and advise on either administrative or technical problems. The address of your Regional Controller may be obtained from the Regional Coal Officer.

FURTHER COPIES OF THIS MEMO. MAY BE OBTAINED, FREE OF CHARGE, ON REQUEST FROM THE MINISTRY OF FUEL AND POWER, 2, LITTLE SMITH STREET, S.W.1.

TECHNICAL PUBLICATIONS

In view of the urgent need for economising in the use of fuel the following publications have been prepared and copies may be obtained free of charge from the Ministry of Fuel and Power, 2, Little Smith Street, S.W.1.

A. *Fuel Efficiency Bulletins.* (*Large Scale Plant*).

No. 1. Steam Production and Consumption. (F.E.C. 39/2.)
No. 2. Heat Insulation (lagging). (F.E.C. 53.)
No. 3. Correct Methods of Condensate and Air Removal. (F.E.C. 54.)
No. 4. How to make the best use of Condensate. (F.E.C. 55.)
No. 5. Practical Economy Points for Industrial Gas Users. (F.E.C. 79.)
*No. 6. How to make a Simple Steam Meter for use in Factories. (F.E.C. 81.)
No. 7. The Appointment and Responsibilities of Fuel Watchers. (F.E.C. 111.)
No. 8. Bonus Schemes for Fuel Economy in Industry. (F.E.C. 112.)
No. 9. Combustible Material in Ashes. (F.E.C. 113.)
No. 10. Control of Excess Air on Steam Raising and Central Heating Plants. (F.E.C. 114.)
No. 11. Thermostatic Control for Hot Water and Steam. (F.E.C. 138.)
No. 12. Thermal Insulation of Buildings. (F.E.C. 121.)
No. 13. Fuel Economy by Saving Electricity. (F.E.C. 122.)
No. 14. Operation and Maintenance of Gas Burners. (F.E.C. 139.)
No. 15. The Effect of Variations in Output on Heat Consumption. (F.E.C. 124.)
No. 16. Superheated Steam. (F.E.C. 142.)
No. 17. The Insulation of Furnaces. (F.E.C. 168.)
No. 18. The Sensible Use of Latent Heat (Part I). (F.E.C. 169.)
No. 19. The Sensible Use of Latent Heat (Part II). (F.E.C. 170.)
No. 20. Cooling Fire-bars in Industrial Furnaces and Boilers. (F.E.C. 172.)
No. 21. The Construction of a Factory Heat Balance. (F.E.C. 183.)
No. 22. The Utilisation of Steam. (F.E.C. 63/8.)
No. 23. Heavy Oil Engines. (F.E.C. 176.)
No. 24. The Industrial Use of Liquid Fuel. (F.E.C. 177.)
No. 25. Steam for Process and Heating. (F.E.C. 201.)
No. 26. Peak Steam Demands: Cause, Effect and Cure. (F.E.C. 202.)
No. 27. The Control of Air for Combustion. (F.E.C. 215.)
No. 28. Flash Steam and Vapour Recovery. (F.E.C. 228.)

* Out of print.

B. *Domestic Fuel Memos.* (*Domestic Appliances*).

P2/1 How to get the best out of small oil burning appliances.
P2/2 Oil Fired Central Heating and Hot Water Plant Boilers.
P2/3A Combination Grates.
P2/3B Solid Fuel Cookers.
P2/4 Domestic Gas.
P2/5 Domestic Electricity.
P2/6 Open Fires.
P2/7 Lighting.
P2/8 The Black-out and Fuel Economy.
P2/9 Fuel Economies in Cooking.
P2/10 Domestic Routine and Fuel Economy.
P2/11 Coal Slack and Briquettes.
P2/12 Domestic Fuels and their uses.
P2/13 National and Domestic Fuel Budgets.
P2/14 Insulation or Lagging of Domestic Hot Water Tanks and Pipes.
P2/15 Operation of Domestic Hot Water Boilers.
P2/16 Prevention of Freezing.
P2/17 Fuel required for War Weapons.

P2/18 Specimen Rates of Consumption of Domestic Appliances.
P2/19 Choice of Fuels for Domestic Room Warming and Water Heating.
P2/20 Fuel Saving Hints—General Summary.
P2/21 Cooking Utensils.

C. *Domestic Fuel Memos.* (*Controlled Establishments*).

P3/1 Avoidance of Freezing in Central Heating installations during banking or non-firing periods.
P3/2A Fuel Economy in Catering Establishments—Notes for the guidance of the Management.
P3/2B Fuel Economy in Catering Establishments—Guide to maintenance.
P3/3 Advice to occupants of buildings with Central Heating and domestic hot water services, including flats and offices.
P3/4 Fuel Economy—Advice to Landlords and Estate Managers of flat and office buildings with Central Heating and Domestic Hot Water supplies.
P3/5 Instructions for the firing of hand-fired hot water boilers.
P3/6 Operation and maintenance of Central Heating boilers.
P3/7 Repair and maintenance of Central Heating and Hot Water Supply boilers and calorifiers during the summer season.
P3/9 Points to be noted when inspecting Central Heating and Hot Water plants.
P3/10 Notes on the Burning of Coke and Anthracite in Large Plant.
P3/11 Fuel Economy by Local Authorities.
P3/12 Fuel Economy in Hospitals and Institutions.
P3/13 Fuel Economy in Public Baths and Wash Houses.

Additional Publications are in the course of preparation.

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