Diocese of Ripon & Leeds
Diocesan Advisory Committee
Guidelines

HEATING YOUR CHURCH

Choosing the best method of church heating always involves compromise. The ideal system to help preserve the fabric of the building is unlikely to provide the optimum level of comfort we would expect in our own homes.

Heating people directly from a **radiant source** is more economical in the short term in energy cost than heating the space about them, but is seldom as comfortable as convection heating or as beneficial to health. Sudden intermittent heat falling on fabric, woodwork or stone is destructive and is a characteristic of high temperature radiant heat.

Heating space by naturally **convected heat** aims to provide a benign all round and comfortable background warmth with the benefit of air movement though by and large the installation and running costs are greater. **Central heating** by warm water is a proven, familiar and friendly system and compared with all others will give the longest and most trouble free life, though initially the capital cost will be greater than with other systems.

The benefits and disadvantages of the options available are summarised here in an order of preference that gives equal weight to personal comfort and to the well-being of the building. The architectural form and the fuel available will have a direct bearing on the preferred choice. Your professional adviser will know of examples of each and should be consulted.

Central Heating: Modern wet systems have little in common with the traditional systems of coke-fired, gravity-fed boiler, large diameter pipes and cast iron radiators installed around a hundred years ago, except for the benefits of the latent warmth provided by both. Draughts, humidity and condensation must be borne in mind when choosing a system. It is a characteristic of central heating that the low temperature warmth given and the convection movement of the air that result materially reduce the effects of draught and condensation. The transfer of warmth from the air and the direct radiant heat from the pipes and radiators passes as latent warmth into the fabric of the building. No other system of heating can match this important benefit, for not only does the heat stored reduce the amount of energy required next time the space is heated but it reduces the humidity in the air and this affects condensation. Thermal shock, the effect that sudden heat has on building materials and furniture, is rarely a problem that can occur with convected heat but is a factor with forced draught and electric radiant heaters. With annual maintenance boiler life should be fifteen years or more, radiators and pipework twice this period. These types of system usually incorporate a pressurisation system and the church insurers might insist on these being tested or inspected annually. For this purpose they may fall under the Pressure Vessels Regulations for which annual inspection is a legal requirement for industrial premises. This inspection can form part of the annual boiler maintenance and can normally be done by the same person.

When renewal of heating is being considered as part of a large scheme of improvement involving the removal of fixed seating and new flooring, consider the possibility of **underfloor heating** installed as heating coils incorporated into the floor itself. This principle uses the floor area as a large radiator giving radiant warmth to the body and rising warmth to the surrounding air that stacks from the floor rather than rising rapidly to ceiling level by convection currents. The floor acts as a storage mass with walls and woodwork gaining and retaining heat also. As the system builds up heat slowly, it is better suited for spaces that are used frequently. This system is not to be confused with electrical underfloor heating.

Individual gas fired convector heaters with balanced flues or powered flues discharge warm air to the interior and the products of combustion to the outside. The heat may be naturally convected or fan assisted. If gas has to be extended to the church, the cost is a significant factor. The unit cost of the individual heater is also high when the life of the unit is considered, ten years being an average length of time before replacement or major overhaul is required. This type of heater is rarely satisfactory where a church has aisles as the nave receives insufficient heat from the units mounted on the outside walls. The fixing of flues through ancient masonry and the appearance of external stainless steel grilles are factors to consider. Convector heaters with fans become increasingly noisy with age and if they are not of the variable speed type are disturbing during the quieter moments in a service.

Electric heating is of a limited use and is inflexible. To be effective the heat source has to be mounted relatively close to the seating and because of this can be visually intrusive if a radiant source. Suspended infra-red tubes are now rarely used because of this and the discomfort of a hot head and cold feet.

Quartz ray electric lamp heaters are instantaneous, and cheap to run but unrelieving in the intensity of heat if you are unfortunate to sit too near. The "cosy warm" pink light given off by earlier fittings has now been tempered to a light straw colour but still requires using with care and discretion. It should be noted that quartz ray type heating is not normally permitted in Grade 1 and 2 listed churches.

Pew Heaters provide local heat, being fixed below the seat or above the kneeler to give radiant heat as well as locally convected warmth. Being tube or flat panel in shape, when fixed to woodwork, an adequate space for ventilation between the wood and metal should be maintained as the surface temperature is high. The disadvantages are relatively high initial and running costs, relatively short equipment life, and potentially, damaging to quality woodwork and the prying fingers of children!

There are two types of **gas fired heater** used for industrial space heating which have been tried in the church environment and found to be seriously wanting.

Direct gas fired warm air works on the principle of air being drawn over a large gas burner. No room air is recirculated, fresh air being drawn form the outside and forced over the burner by a single fan in large quantity, but at relatively low speed, until the pressure inside is greater than that outside the building. Two safety factors, though covered by British Standards, are considered by many to be unacceptable risks in a church environment, namely, gas safety against flame failure or overheating, each controlled by automatic devices and the potential dangers of blowing the products of gas combustion into the church.

Plant failure risk may be negligible, as long as maintenance and testing is carried out rigorously at intervals of not less than once each year. The health aspects of breathing the chemicals produced by combustion, although greatly diluted, are of some concern and may cause the British Standards to be reviewed. Oxides of nitrogen are likely to react with damp stone, particularly limestone. Increased levels of carbon dioxide, carbon monoxide and aldehydes do no-one any good. As the compromises are so great with this system, it cannot be recommended.

Black Heat gas fired radiant heaters also acceptable in an industrial situation have been tried and have failed elsewhere. They are fundamentally ugly as they are only effective when suspended close to the seating. The heaters are directly fired and unless each has a chimney, the combustion chemicals enter the heated space. Large amounts of water vapour are released on burning natural gas and unless this is flued away will condense on windows, roof structures and even organs.

In the search to reduce heat output and economise on cost, the use of Punka fans has been experimented with. To recirculate the heat that rises to the roof and back to the floor is eco-friendly as well as making economical sense, but caution first. To work satisfactorily without the effect of cold draughts, the temperature of the air at the ceiling should be 8^0C above that at seat level. To be sure, temperature readings in both positions over a period are required. The higher the ceiling, the more air turbulence and fan noise will be generated, which can cause difficulty for the hard of hearing.

When installing a new heating system:

Draw up a list of your needs in terms of services and meetings, and define the areas of the church that require heat. This information may suggest the zoning of the building when discussing your requirements with the professional adviser and heating engineer.

Visit churches that have the kind of system you are thinking of; talk to members of the congregations and ask about running costs. They will tell you if it works. Discuss the installation with your professional adviser before making the faculty application and ask him/her to draw up a scheme plotting radiator positions and sizes on a plan, which should show the alignment of pipes related to fixed furniture, screens and monuments.