

Heating and its Control in Churches

The main purpose of a church is of course worship. In respect of that alone it will not be the optimum if members of the congregation of all ages are either too hot or too cold to maintain attention during a service. Also, economy in the use of fuel, of whatever kind, is of great importance, not only because of its cost but also in view of impending world shortages and global warming. It would become any church to show a good example in this respect.

A problem is that the usage of a church is very different from what is encountered elsewhere. Heating specialists are familiar with domestic requirements, where the temperature needs to be the same each day and perhaps discontinued only during the night. A school or an office block is little different. It may also be correct for a historic church with many visitors and perhaps also for a modern multi-purpose church. But where a church is used only for Sunday services and occasional weddings and funerals, which are (unfortunately) more common, different forms of heating, may be preferable, and control of it is a dominant factor.

Thermal insulation. First, however, consider what costs nothing to run. Insulation of walls and roofs is very necessary for domestic situations and for the smaller rooms of churches too, but for a church itself or a large hall it is usually difficult and probably not cost-effective. Conventional double glazing is often not allowable for a church. Prevention of draughts is important, though. Search for them on a windy day with smoke. Leaded-light windows are often leaky but the external plastic sheeting sometimes installed as an anti-vandal measure may also serve to reduce draughts. So will sealing strips on doors. At the main entrance, when the street doors are open so that newcomers may at least be within shelter, they should be followed by double doors to make an air-lock. Insulation of the congregation (!) with cushions and carpet strips in the pews is an important contribution to perceived comfort. Any radiator mounted on an outside wall should have foil insulation behind it.

Types of heating unit. Most types of heater can be used in churches. Underfloor heating, water or electric, is barely possible for existing buildings and in any case it takes so long to heat up that it is really only suitable for churches with frequent visitors or where it is used just to provide low-power setback heat. Conventional central heating with water-filled radiators is widely used although it too is somewhat slow to warm up. Overhead radiant units (preferably medium-temperature "black heat" type) enable parts of the building to be heated separately, but they do not heat feet which are underneath a pew. They should therefore be used in conjunction with fan convectors which blow at floor level, though these will not help if the pews are boxed-in. (Before purchasing fanned heaters, listen to units in use; some types are too noisy to run during a sermon or prayer. Also remember that gas heaters need flues). Small heaters on or under pews are sometimes disappointing.

A blowing heater over the entrance door is good for giving a warm welcome, but to be effective it must be quite powerful. The cost of running one will not be serious, so long as it

is for short periods only, though extra wiring may be needed.

One form of heating a whole building is to provide a large unit mounted outside to blow in hot air. That gives dramatically rapid, quiet, and uniform heat, but can deposit moisture in cold corners.

Control of the main heating. Some types of heater, especially overhead radiant units, are rapid acting and it may be sufficient to turn them on when the building is opened up, together with a "Count-down Timer" which turns the heating off again after the service, or even slightly sooner.

For types of heating with a slower action, and electrical timer based on a clock is essential, as the correct start-up time may well be in the middle of the night. Accurate setting of the timer will require considerable care and actual trials. The advance time needed will vary with the temperature from which the building starts. Electronic controls capable of working out the time needed for heating ("Optimisers") are available. A thermostat is essential, located where it will pick up the temperature which the congregation experiences, not screwed to a stone wall.

Heating a church between services. The minimum possible amount of energy is of course consumed if heating is turned off when not required - right off, not merely turned down. The heating equipment should be relatively powerful so as to be rapid-acting. It should be turned on at such a time as will give comfort conditions just as occupants enter and turned off again as they leave. But there may be practical factors which make something other than such a regime more desirable.

Obviously, any exposed water pipes and cisterns should be lagged and they may even need to be fitted with their own heating elements. More subtle is the protection of masonry, woodwork, and furnishings from the effect of moisture or of temperature cycling. This is very important, but better ventilation may be sufficient or the heating of vulnerable areas only. You may need specialist advice. A pipe organ is a particularly critical item, but advice is that neither cold nor, within reason, damp is likely to damage it, though violent temperature changes or perhaps *inadequate* humidity may do so.

Another reason for heating between major occupancies is the need for reasonable conditions for cleaners/caretakers, music practice and such things as arranging flowers. It is certainly pleasant to be able to do these things under warm conditions, but it must be realised that it is expensive. It may be possible to schedule the functions to take place during the heating or cooling periods, but that is not easy if these are as short as is being advocated. Or one may be able to heat only the part of the building being used. Otherwise, one must accept the cost of heating for weekday work, though preferably only at certain times and/or to a lower "Set-Back" temperature.

"Set-Back". This means having one or more additional thermostats giving a lower temperature, either controlling the main heating units or separate ones. So long as these units are located where any vulnerable items are actually protected and are continuously in action throughout cold weather they will safeguard the structure and furnishings much better than periodic bursts of full heat. Note that if the outside temperature is a typical winter one of 4°C, keeping the church to a setback of, say 8°C during the week will need only a quarter of the energy that 20°C would take. Also, setback heating will simplify the control, in that it will make the time to bring the building from the set-back temperature up to full heat the same whatever the outside temperature. All timers can be overridden when there is a need for heat for a special event such as a funeral.

Ancillary rooms. These are likely to be used at various times during the week and for differing periods. They probably make a significant contribution to the total energy consumption and, as with the church itself, the aim should be to heat each space only when it is really needed. Central programmers are available permitting control of this kind for each room separately or for zones of several rooms, though for ultimate economy a new setting operation is needed for each week's bookings. Smaller rooms, for which the heat-up time is much the same as for domestic premises, may be controlled locally by a leader or caretaker; when, again, a "Count-down Timer" should preferably be used.

General. For most heating, the fuel may be gas, oil or electricity, or possibly wood chips. Electrical energy is basically more expensive, but the better control possible and the easier installation may compensate for this, especially if an off-peak tariff is available. Hot water for washing or washing-up, in the church situation, is much better provided by local "instant" heaters than by having a tank connected to a central heating system.

A word about lighting, although its cost is usually much less than that of heating. Fluorescent tubular units are energy-efficient, but generally only suitable for a hall or corridor. Their long life will save a lot of money where scaffolding is needed to replace bulbs. But they take a long time to come to full brightness and should not be used for toilets or stairs, where compact fluorescent units or ordinary bulbs should be used, preferably with infra-red occupancy sensors to avoid their being left on.

It has to be said that the effort required for setting up these recommendations and for carrying them out regularly is quite considerable, though the savings are usually very significant. With any installation, careful monitoring of its performance is very important. The bills for fuel (and water) should be considered separately and compared with those for the same period in previous years. This may show whether there has been any misuse or incorrect setting of the controls.

There have been a few proposals for equipping a church with a modern form of renewable energy, such as photovoltaic panels or a heat pump. However, at present prices these are barely cost-effective for continuously-used premises and rather far from that for a church, although some PV installations can provide savings by feeding electricity back into the mains when not needed. But conversion to sustainable power will be increasingly necessary in the future and it would be very commendable for a church to create a

demonstration installation to lead the way, or to support a community wind turbine.

For all these possibilities, try to get enthusiasm from the members of the congregation and make sure that the older ones have homes which are adequately insulated and heated. The Energy Saving Trust will supply free literature or perhaps send a speaker (sometimes with free samples!). Consider whether you could aim to engage with the Operation Noah campaign, or become an Eco-congregation.

For Reference:

- *Heating Your Church* by Bordass & Bemrose £6.50 incl p&p, Council for the Care of Churches, Fielden House, Little College St, London SW10 3SH
- *Energy Efficiency in Community Buildings* National Energy Action
St Andrew's House, 90-92 Pilgrim Street, NEWCASTLE UPON TYNE, NE1 6SG
0191 261 5677
- *Church Heating and the Organ* Inst of British Organ Building, 13 Ryefields, Thurston, Bury St Edmunds IP31 3LD
- *Maintenance and Equipment News* Quarterly, Free. Crown Wood Pub'ns, PO Box 249, Ascot, Berks, SL5 0BZ
- *Parish Pump*, Periodical, Free. the Conservation Foundation. 1 Kensington Gore, London SW7 2AR
- *Controls and Energy Savings, Fuel Efficiency Booklet 10* and many other publications, Building Research Establishment, Watford WD2 7JR
- *Eco-congregation* Arthur Rank Centre, Stoneleigh Park, Warwickshire CV8 2LZ
- *Energy Saving Trust* 21 Dartmouth St, London SW1H 9BP

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