St Laurence Electrical Upgrades for the church heating

The first stage electrical supply upgrade will allow for 100A/phase, which will be sufficient to power the 6 Herschel Halo heaters on full power (80A/phase) leaving 14kw of capacity for lighting, kettles, additional portable heaters and organ blower. Without proper load management, this arrangement has the potential to cause a short duration (minutes) power supply outage when at peak heating loads, especially during festivals, when there are significant other loads. The opportunity will be taken to ensure the new boards and cables will be of a sufficient capacity for the second stage electrical upgrade.

The second stage electrical supply upgrade will be required when additional heaters are to be installed to heat the remainder of the church. This requires the main incoming supply from National Grid to be upgraded to around 140kVA, 200A/phase (final figure to be agreed).

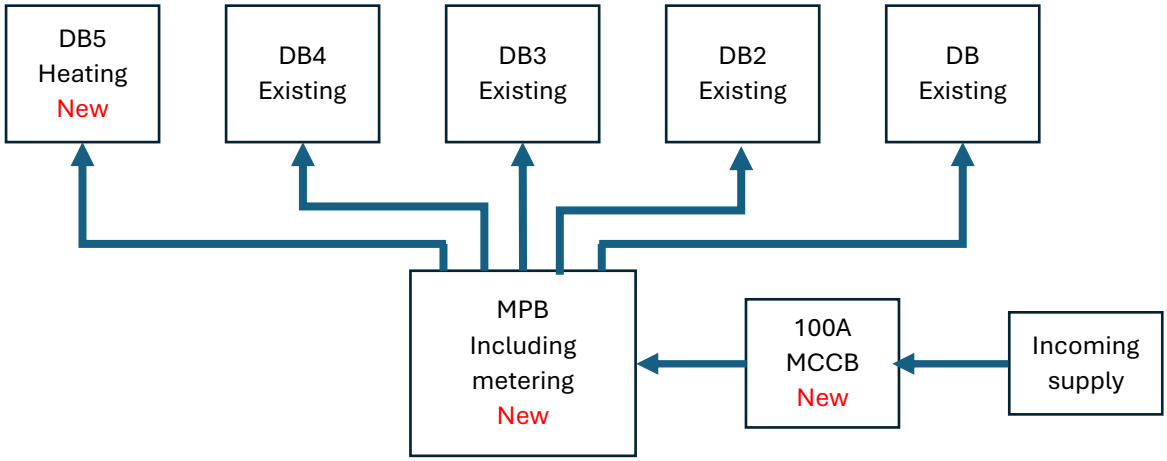
The First Stage in More Detail

The existing supply to St Laurence Church, via the National Grid, is designed to be fused at 100A/phase. However, because the tails (electrical cables) from the meter to the supply boards are only rated at 65A, the main fuses were set to protect at that level, which significantly restricts the power available to the church.

To this end:

- 100A fuses will be installed at the electricity meter cubicle to replace the 65A fuses
- The tails from the meter will be replaced with 200A capacity cables (also in preparation for the Stage 2 electrical upgrade)
- These tails will feed into a 100A MCCB (moulded case circuit breaker, with overload protection)
- The 100A MCCB will feed into a new MPB (Main Panel Board) to feed all the existing distribution panels, plus a new one (DB5)
- This new 150A distribution board (DB5) is to be installed and all Hershel Halo heaters will be supplied via this board. This board will have spare capacity to feed the future heaters in stage 2.
- Digital current flow displays will be fitted to each phase in the MPB to remove the need for guessing phase loads and allow for informed load management at critical times. Voltage and power can also be displayed.

Figure 1. Stage 1 Electrical Upgrade



Following the installation of the above with the 6 off 9.6kW Halo Heaters, in the unlikely event of exceeding 100A on any phase, the 100A MCCB would trip, leaving the main fuses intact. Resetting of the MCCB is a simple matter of switching off some loads, accessing the Slype and operating the reset lever. The period when load management will need to be most active, to avoid the tripping of the supplies, is when the six Halo heaters are all on at full power to raise the temperatures of the floor/seating areas for about 30 to 60 minutes before an event. The six heaters will then have a total load of 80A/phase, leaving over 14kW (20A/phase) of capacity for all other loads. Once people start to enter the church and adding their own body-heat to the heat radiating from the flooring and seating, the Halo heating can be turned down to two-thirds of its capacity to a total of 53A/phase (Operating information supplied by Herschel). This leaves 34kW (47A/phase) of capacity for all other loads. {*Note that the 'Days of Wonder' Festival operates from a 30A three-phase connection for sound and lighting, which has been more than sufficient. Catering took an additional 9kW (12A/ph) which, if loads can be balanced, gives sufficient to run the festival comfortably with the halos on two-thirds power*.} So, although there is little spare capacity, we believe it can be managed in cooperation with the event organisers. The MPB board metering will allow us to learn more about actual current profiles, leading to even better load management in the future.