nationalgrid

factsheet

Overhead line construction /refurbishment

Construction of a new overhead line

National Grid only seeks to build power lines in new locations where:

- the existing infrastructure cannot be upgraded technically or economically to meet system security standards and regulatory obligations
- forecasted increases in demand for electricity will not be met by other means
- new connections to generators are needed.

Planning

Planning consent is required for any new overhead line, and many factors will be considered at this stage, such as system requirements, environmental issues and how easy it is to build.

Once consent for a new overhead line has been granted, the main construction activities begin with the preparation and installation of access to the site. We may need to enlarge existing accesses from public highways, due to the size of construction vehicles, or create temporary new accesses. On agricultural land we may install temporary access tracks, using crushed stone or trackway panels, to protect soils, depending on the ground conditions. The area will be fenced off and cleared to keep the public and livestock away from construction work.

Building a pylon

First we build the foundations. We use excavators to dig holes for the foundations, and in certain ground conditions we will use specialist piling rigs. Pre-mixed concrete will then be delivered to site in wagons along with steelwork for the foundation frames and bases.

National Grid does not generate electricity, but it is our role to connect power stations, wind farms and other large generators to our transmission network. An overhead transmission line transmits power from the generating source into the national grid network, and also on to substations that provide power to homes and businesses.

The main steelwork is then delivered to site and the pylon is assembled in sections. The number of sections will vary, according to the size of the pylon being built. The pylon is put up using a mobile crane which lifts the assembled steelwork into position.

Wiring/stringing

The wires (conductors) which carry the electricity are usually installed in sections of about 10 or more pylons at a time. First, pilot wires are run at ground level (and over temporary scaffolding protecting obstacles, roads etc) along the full length of the section, between the 'pulling site' and the 'tensioning site' where the new conductor is positioned.

The pilot wires are then lifted and fed through running wheels on the cross arms of all the towers in the middle of the section, and then fed around a special machine at the pulling site. In order to keep the wires off the ground and avoid any damage to property, the tensioning site has a similar machine that stops the wire running freely when the pulling machine 'pulls' the pilot wire. In rare cases where it's not possible to run the wires from ground level, we may use helicopters to pull them through. When the new wire is fully 'run out', it is then installed at its finished tension and height above ground.

Reinstatement

Once the overhead line is constructed, reinstatement of all the temporary accesses will take place. The work will be similar to the installation phase, but in reverse.

Refurbishment of an overhead line

An overhead line is constructed using a variety of materials, from concrete and steel for the foundations, steelwork for the pylon and aluminium and steel for the conductors. All these materials have an expected lifespan, which varies depending on how the overhead line is used and where it is located.

Typically, the pylons will last for about 80 years, whereas the conductors, insulators and fittings normally last for about 40 years. Therefore each overhead line will usually go through at least one refurbishment during its lifespan.

The refurbishment is carried out as two separate periods of work. This is because overhead lines have two circuits, one on each side of the pylon, so work is carried out on one side only, in order that the other side can be kept 'live'. Once all the work has been completed on one side of the overhead line, the circuit is re-energised, and the opposite side is switched off so that the work can be carried out on that side.

There are two main types of refurbishment:

Full refurbishment

A full refurbishment involves the replacement of all the conductors and earth wire, the insulators and all the steelwork that holds the conductors and insulators in place. It may also include painting or replacing the pylon steelwork, although this can be done at other times.

During a refurbishment there is a lot of activity along the overhead line, especially at angle pylons (where the line changes direction) and where the new conductor is installed and the old conductor taken down. This includes vans carrying workers in and out of site, tractors and plant for doing the work, and trucks taking new materials and equipment into site and removing the old materials.

We also carry out additional temporary works over the whole route length, such as scaffolding to protect roads, railways, distribution power lines and buildings, access and accommodation works to enable vehicle and plant access to site, and site establishment yards to house the staff, equipment and materials for the works.

Fittings-only refurbishment

If the conductors are still in good condition, then a 'fittings only' refurbishment may take place. We remove and replace the insulators, the fittings steelwork holding the wires, and the spacers that keep the conductors separate in the spans between pylons. During a 'fittings only' refurbishment, there are less vehicle movements and the temporary works are reduced, as there is not normally a need for scaffolding protection, and access and accommodation works are scaled down.

Upgrade

An upgrade (increasing the powerflow along the overhead line) of an existing overhead line involves similar work to a full refurbishment, but differs in that the specification of the conductors and fittings may change due to changes in the rating (power) requirements of the line. This may include upgrading the line from 275,000 volts to 400,000 volts, or increasing the capacity of the existing line to be able to transmit more power. Typically, the upgrade to the line will involve increasing the size or number of conductors, insulators and fittings, and may also require additional strengthening of the steelwork to the pylons.