Overhead Transmission Lines

V4

Construction of a new overhead line

National Grid only seeks to build new power lines in 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; or
- new connections to generators are needed.

Planning

Once planning permission for a new Overhead Line (OHL) has been agreed, the main construction activities begin with the installation of access roads. Where access is taken off the public highway, we may need to create a new access or alter an existing access road to accommodate the large machinery which has to be brought to site. The area will be fenced off and cleared to keep the public and livestock away from construction activities.

Building a pylon

We start by building the foundations. There will be a lot of heavy plant movement at this stage as piling rigs, excavators, concrete wagons and trucks will be coming to and from site.

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 then erected using a large crane which lifts the assembled steelwork into position.

Wiring/stringing

Once all the towers have been erected the installation of the overhead wires (conductors) can begin. Necessary protection is carried out at all roads, railway, and other linear crossings to safeguard these crossings during wiring. Large pulley wheels are attached to the arms of the tower or the insulator. Trees or large bushes along the route of the line are removed to allow initial light bonds to be pulled through the route. These bonds are attached to the main conductors and, through the installation of large mechanical winches located at appropriate towers, the new conductors are pulled into place. Once the conductors are in place the pulley wheels are removed and the conductors are attached to the insulators.

Post-construction

After the construction phase has been completed, the scaffolds are taken down. The access roads are removed and restored back to their original format.

Refurbishment of an overhead line

An OHL 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 OHL 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 OHL will usually go through at least one refurbishment during its lifespan.

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The refurbishment is carried out in two separate periods of work. This is because OHLs 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 OHL 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:

A) Full refurbishment

A full refurbishment involves the replacement of all the conductors and the 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 OHL, 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.

B) 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 usually less vehicle movements and the temporary works are generally reduced, as there is not normally a requirement for scaffolding protection. Access and accommodation works are also scaled down.

Upgrade

An upgrade of an existing OHL involves similar work to a full refurbishment but differs in the specification of the conductors and fittings that may change due to upgrading to 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 current line to be able to transmit more power. Typically, the upgrade to the line can involve altering the size or number of conductors, insulators and fittings, and may also require additional strengthening of the steelwork to the pylons.