



Thermal Upgrading

What is thermal upgrading?

Thermal upgrading increases the maximum allowable operating temperature of the conductors (wires) of a transmission line, to allow more current (or power) to pass on them.

Operating at a higher temperature causes the conductor to sag more, which has the potential to impact on the required safe distances between the line and the ground/structures underneath. These distances are set out in the New Zealand Electrical Code of Practice 34:2001 (NZECP34).

What sort of work is required?

To maintain safe clearances after a thermal upgrade, Transpower may undertake minor alterations to conductor, tower and/or the landscape underneath. The types of activity that might be undertaken as part of a thermal upgrade are set out in the table below:

Work	Description
Nip & Tuck/minor tightening/retensioning of the conductor	Involves cutting out small lengths of conductor within a span and re-joining and adjusting the resulting sags by re-clipping (straightening) the insulators. This reduces the sag of the conductor at this higher temperature.
Changing existing insulator assemblies to floating strains	Involves converting the vertically hanging disc insulator strings to a horizontal "floating strain" or tension insulator arrangement. This raises the conductor at the tower by about 1.5 to 2 metres (see illustration over page).
Replacing hanger brackets with twisted barrel tongues (TBT)	Involves removing the triangular brackets that are used to attach vertical suspension insulators to the tower cross-arms and replacing them with a much smaller fitting known as a twisted barrel tongue. This typically raises the conductor at the tower by about 0.6 metres (see illustration over page).
Bored pile foundation conversion	Involves moving the tower onto new upstand concrete pile foundations. This raises the tower by about 2.5 metres.
Tower and foundation strengthening	An engineering analysis is carried out on all towers where there are floating strain and nip and tuck works. In some situations, minor changes in tower loading may require: minor tower strengthening, which generally involves replacing existing steel members with larger steel members, or installing some additional strengthening members; and/or foundation strengthening, which generally involves excavation of the foundation earth backfill, and replacing it with concrete, followed by reinstatement of the surface.
Vegetation trimming and earthworks	Involves tree trimming and earthworks to ensure safety distances are maintained.
Lowering undercrossings and undergrounding low voltage lines	Where the transmission line crosses a lower voltage line, the low voltage line may be lowered, relocated or undergrounded to maintain a safe distance.

Does thermal upgrading change the voltage of the line?

No. Thermal upgrading does not change the voltage of a line.



Would there be any other impacts from this work?

Electric and magnetic fields (EMFs) are present wherever there is electricity – including in the home, office and worksite. The electric field from the conductor would not change as the voltage of the line would remain the same. The magnetic field will increase as utilisation of the line increases but will still remain within the international guidelines set by the International Commission for Non-Ionizing Radiation Protection, which are endorsed by New Zealand’s Ministry of Health.

The safety of the public and our employees is fundamental to our business and this project has been designed to comply with these guidelines. For more information on EMF, refer to www.transpower.co.nz/emf.

Typical tower changes for thermal upgrading work

