

## Assessment of Environmental Effects - Air

An Assessment of Environmental Effects (AEE) is a requirement under the Resource Management Act (RMA) for any proposed industrial activity.

Detailed research ensures thorough understanding of the effects of any new activities on the areas where we live, work and play, and identifies where it is necessary to avoid, remedy or mitigate these effects.

Independent experts have researched the predicted effects of the Te Ahi o Maui geothermal power plant and concluded that the effects of this plant on the environment will be extremely minimal. You can read more about this research in the Te Ahi o Maui fact sheet series.

### Air effects from Te Ahi o Maui

The Te Ahi o Maui geothermal project air scientists have created a computer-based model, called an 'atmospheric dispersion model', to predict effects associated with air emissions (discharges) from the proposed power plant. The computer model takes into account the timing and volume of the predicted discharges and combines this data with information about common weather conditions from the National Institute of Water and Atmospheric Research (NIWA), such as wind strength and direction and the surrounding topography, such as hills and low-lying areas.

A number of locations (also known as receptors) that could be considered sensitive to emissions were included in the research. Sensitive receptor sites include early childhood centres, marae, hospitals, schools, aged care facilities and sensitive ecosystems. The predictions from the computer modeling were then compared with air quality criteria from the Ministry for the Environment and the World Health Organisation (WHO) guidelines. The predictive modeling research shows that the air pollution and dust nuisance effects on the people, plants and animals in the area near the proposed plant will be extremely minimal.

### Geothermal gases

Both natural geothermal activities and geothermal extraction create a number of condensable (can be cooled and turned to fluid state) and non-condensable gases (NCGs) that are released into the air. NCGs are gases that naturally occur within the geothermal field, and during

the energy creation process the majority of the NCG is released from the steam and discharged into the air. The remaining steam then goes through the power plant and is later re-injected into the geothermal reservoir.

The final design of the Te Ahi o Maui power plant and its cooling systems is yet to be decided, but whichever design is chosen, the NCG discharge will be the same. During the cooling process, the NCGs will be mixed with warm air, which will assist with its dispersion and will discharge upward, as will the steam.

The main NCG of concern is hydrogen sulphide ( $H_2S$ ). Other minor gases released from geothermal activity include ammonia, mercury, arsenic, fluoride and carbon dioxide. As part of the predictive modeling, experts reviewed results from hydrogen sulphide monitoring stations in Kawerau, Te Teko, Edgecumbe and at the Tasman Mill.

The WHO guideline limit for  $H_2S$  is  $15,000 \mu g/m^3$ . The expected levels of hydrogen sulphide discharge from the Te Ahi o Maui plant are not likely to exceed 300 micrograms per cubic metre ( $\mu g/m^3$ ) of air, which is fifty times less than the WHO standard. There are six other industrial sources of hydrogen sulphide in the area near the proposed Te Ahi o Maui power plant, and these industrial sources contribute to the high ambient (existing background) levels in the Kawerau area. Even if the highest background concentration of hydrogen sulphide recorded at the Tasman Mill is added, the total amount is still significantly less than WHO guideline limits.

### What does hydrogen sulphide smell like?

Just like visiting Rotorua, the rotten egg smell of hydrogen sulphide can usually be identified, but after a short period of time we become 'desensitised' to the odour, meaning we can no longer smell it. There must be a really big change in the level of hydrogen sulphide concentration before our sense of smell will recognise the increase. The quantities emitted by the Te Ahi o Maui power plant will be so insignificant that we will not notice any difference.

The highest off-site concentration of hydrogen sulphide will be along the south-west boundary of the proposed site, which is currently covered in scrub and pasture and is not populated. Likewise, at the nearby Parimahana Scenic Reserve, the maximum ground-level concentration will also be very low and will have no effect on the condition





of the land, plants or animals. The highest concentration of hydrogen sulphide within the site boundary is predicted to occasionally have a noticeable odour, but is still well below health effect levels. Predicted concentrations for all of the other minor gases are also well below air quality limits and, therefore, will not result in any adverse effects on the environment or on people's health in the area.

During well construction and testing, it is predicted that air discharges will be similar to those during operation and are unlikely to produce any negative effects.

### Visibility of air emissions

Of the two geothermal cooling technologies under consideration, only the wet-draft cooling option has the potential to produce significant plumes (clouds of steam coming out of cooling towers) that can be seen.

Results from a computer modeling system show that if this type of plant were used, a plume rising 200m above the plant would only be visible for 25% of the time during daylight hours, throughout the year. There may be some difference in visibility throughout the year; for example, the plumes will be seen less frequently during summer when the air is warmer and drier. As the site is about 40 metres below a ridge, any plume will be obscured from viewpoints to the east and southeast.

During maintenance of the power plant, some geothermal fluid will be discharged directly into the air via a bypass vent. This release will create a larger than normal plume of steam, but only for about one hour per month.

Overall, researchers have determined that it is unlikely the Te Ahi o Maui geothermal project will significantly affect the visual features in the Kawerau area, especially in comparison to the surrounding larger industrial sites.

### Dust

The earthworks and activities associated with the construction of the Te Ahi o Maui power plant buildings, pipelines and well platforms have the potential to cause dust. The largest potential for dust nuisance is throughout the estimated four to five months of earthworks during the two-year plant construction.

As the final design of the plant is not yet decided, Te Ahi o Maui has used a qualitative approach that considers five factors of potential dust nuisance - frequency, intensity, duration, offensiveness and location. Particle size and density, and wind speed and direction, are also taken into

consideration when determining dust nuisance effects. NIWA information shows the main winds are expected to be south and south-westerly and of a low to moderate intensity.

Because the site is such a large distance from the nearest receptor (more than one kilometre), and Te Ahi o Maui will use best practice and industry standard dust minimisation techniques, it is unlikely any off-site dust nuisance will be created. Likewise, Ministry for the Environment guidelines show dust nuisance effects only occur within 300 metres of unmitigated dust sources.

Material from the Bay of Plenty Regional Council has been considered when creating the dust minimisation plan, which includes such mitigation measures as:

- short carrying distances when transporting cut fill which will be used elsewhere
- covering temporary stockpiles that will not be disturbed for more than three months with vegetation or hydro seed, and locating these stockpiles in low wind areas
- ensuring minimal heights for fill stockpiles
- using water carts on access and site roads to dampen any material that has potential to cause dust nuisances
- creating specific access roads which will reduce the potential for dust nuisance (even when it is not the most direct route to the site)
- restricting vehicle speeds to 15 kilometres per hour on access roads
- using aggregate on roads where vehicles will be moving over fine volcanic soils
- using a comprehensive complaints system.

Due to the combination of these factors, it is unlikely there will be any off-site dust nuisance effects created by the Te Ahi o Maui geothermal project.

### Questions? Please contact us

The Te Ahi o Maui Geothermal Project is a partnership between Eastland Group Limited and Kawerau A8D Ahu Whenua Trust.

For more information:

Visit [www.taom.co.nz](http://www.taom.co.nz) or call 07 308 2574

