Energy Link
decision power

# REPORT SUMMARY

## The Role of Gas in Electricity and Industry

### Purpose

Energy Link was commissioned by Energy Resources Aotearoa to provide independent analysis of the role natural gas might play in New Zealand over the long term, including:

- how much natural gas (and gas-fired generation capacity) is required to support the electricity market, including how this could change if coal-fired generation is removed from the system; and
- what New Zealand's emissions savings could be if current North Island coal-fired industrial processes were instead switched to using natural gas.

Energy Link analysed these questions using its standard long-term Price Path model, along with historical data from the last five years. The Price Path model is independently produced by Energy Link using publicly available information, its electricity-related models, and its expertise, built up over decades of on-going research into the energy markets in New Zealand.

This summary report provides a brief overview of Energy Link's findings. More detail can be found in the full report available at **energyresources.org.nz/energylink**.

# Key findings

### Switching coal-fired electricity generation to natural gas would yield significant emissions reductions

Dry weather periods since 2018, combined with reductions in gas supply and corresponding increases in gas prices, have led to an increase in the proportion of coal-fired thermal generation compared to gas-fired thermal generation. If the electricity system had used only natural gas instead of its current mix of coal and gas, emissions would have been 3.5 million tonnes lower over the 2017 – 2021 period.

Looking forward, if coal-fired generation is replaced with natural gas immediately, up to 1.1 million tonnes of emissions on average could be avoided by 2030 – but this requires gas to be available in sufficient quantities, at the right price, and with sufficient flexibility. This emissions benefit is reduced depending on how much of the existing 1 million tonnes of stockpiled coal at Huntly is burned.

### We likely have sufficient natural gas supply to replace coal-fired generation if policy settings support ongoing investment

Energy Link's analysis shows that fully replacing coal-fired electricity generation with natural gas-fired generation would require 18PJ of additional gas in a severe dry year, and up to 9 PJ of additional gas on average across all years. 18PJ is roughly equivalent to 47% of the average annual gas consumption for electricity generation from 2017 to 2021.

Analysis suggests this additional supply could be met under most scenarios, coming entirely from development drilling in existing fields. For the purposes of the Price Path, we assume gas producers continue to invest in developing new supply. Whether this happens or not, given current policy settings, could be debated, but if the lights are to stay on and the wheels are to keep turning, then there really is no alternative in the medium term.

### New gas-fired peaking capacity is required in all scenarios

As the market moves toward higher shares of renewable electricity capacity, the real need for gas-fired generation becomes centred on dry periods and peak demand to provide back-up for the intermittency of renewable generation.

All three scenarios run by Energy Link require some new gas-fired generation capacity (i.e., gas fired peaking) to keep the lights on and the wheels turning as the as the electricity system becomes increasingly renewable. This ranges from a new 200 MW plant in 2034/35 under the 'low demand' scenario, to 200 MW in 2029/30 and 120 MW in 2032/33 under the 'high demand' scenario.

| Scenario | Electricity Demand in 2037/38 | Rankine Units Retire | e3p Retires | Additional Gas-peaking Capacity Built |
|---|---|---|---|---|
| Low Demand to 2027 | 46 TWh | 2024 | 2033 | 200 MW in 2034/35 |
| Medium Demand to 2030 | 50 TWh | 2029 | 2037 | 50 MW in 2036/37 |
| High Demand to 2030 | 54 TWh | 2029 | 2037 | 200 MW in 2029/30 and 120 MW in 2032/33 |

# Key figures

By **2038,** New Zealand electricity demand could be between **46–54 TWh** (compared to 43 TWh in 2021)

New Zealand will need to build up to **320 MW** of new gas-fired power stations by **2038** to back-up to our renewable electricity system

If New Zealand had burned gas instead of coal to keep the lights on from **2017–2021**, we would have **avoided 3.5 million tonnes** of emissions

If coal was immediately replaced with natural gas in the electricity system, and half of the North Island's coal-fired industrial process heat was converted to natural gas, New Zealand would **avoid 1.77 million tonnes of emissions by 2030**

### The NZ Battery Project highlights the need to retain gas-fired generation

The NZ Battery Project team recently released its estimates of the cost and timing of the Lake Onslow pumped hydro storage project, which will cost at least $16 billion and will at earliest be completed by 2037. This strongly reinforces the need to retain gas-fired generation through to the mid 2030s, and longer if there are construction delays. Onslow's price tag will also make it more difficult to get across the line than previously thought, given other options such as large-scale storage of green hydrogen might become available over time.

### Switching coal-fired process heat to natural gas could yield some emissions reductions

Most of the 21PJ of coal burned for process heat in industry in New Zealand is burned in the South Island, where there is no piped natural gas. Total North Island coal consumption for process heat was estimated at 6PJ in 2021. Energy Link's analysis estimates that converting North Island coal-fired process heat to gas where this makes sense could reduce emissions by up to 90,000 tonnes per year.

# Recommendations

As the nation becomes ever more reliant on electricity, as transport and industry electrify, one thing is certain: the need to 'keep the lights on' and to 'keep the wheels turning' will only become more pressing. The only cost-effective way to do this under current conditions, and for at least the next decade, is to retain fossil-fuelled generation for dry years and winter peaks, adding additional gas-fired peaking capacity as and when required.

Energy Link's assessment of the better, cheaper, and therefore more likely strategy for taking electricity supply toward 100% renewable energy, and for reducing electricity related emissions, is to:

- retain gas-fired generation into the 2030s and beyond, to provide dry year and peaking support;
- switch the electricity system away from burning coal as soon as possible, which could mean burning 100% natural gas or possibly switching to wood pellets at some point in the future; and
- convert all geothermal stations to reinject $CO_2$ (assuming current trials show this is economically feasible).

This strategy is not only low cost and capable of dramatically reducing emissions from where they are today, but over time, the options for getting to 100% renewable electricity will become clearer, and cheaper, and can be implemented progressively.