Interim Climate Change Committee

Accelerated electrification

SUMMARY REPORT AND RECOMMENDATIONS
APRIL 2019

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Overview from the Committee

The independent Interim Climate Change Committee began work on 1 May 2018. Although our Terms of Reference were set by the Government, we are an independent committee. We have engaged across key sectors, industry, iwi/Māori, non-governmental organisations, the research community, agencies and commercial organisations.

Within the Terms of Reference, we were asked to answer two questions – on agricultural greenhouse gases and on electricity – and to do so using evidence and analysis.

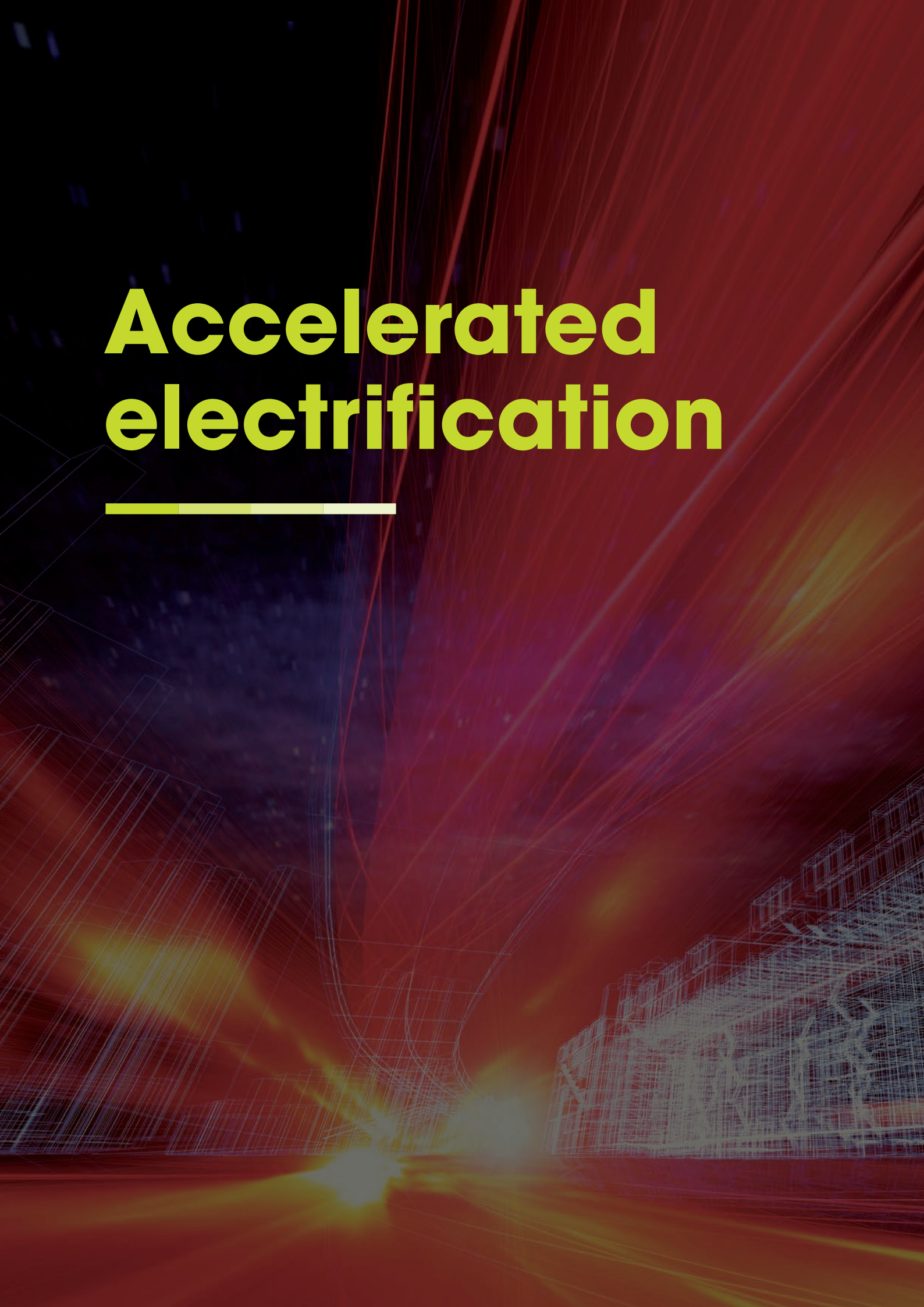
On 30 April 2019, we presented our two reports to the Minister for Climate Change:

Action on agricultural emissions

Accelerated electrification

This summary report relates to the electricity question. *Accelerated electrification* recommends a series of actions the Government can take to reduce greenhouse gas emissions in electricity, including using electricity to reduce transport and process heat emissions.

The actions we recommend are the first steps in a long journey – a journey that will stretch over decades. Continued delay is not an option. The globe is not on track to achieve the goals of the Paris Agreement. Yet almost daily, right here at home, the reality of a changing climate is apparent – whether it be coastal erosion and rising sea levels, more intensive floods, or the loss of New Zealand's glaciers.



Accelerated electrification

New Zealand has long benefited from a high percentage of renewable electricity generated from hydropower and, increasingly, from wind. As a result, electricity generation is responsible for only 5% of New Zealand's greenhouse gas emissions, whereas fossil fuels used in transport and process heat account for over 30%. There is a major opportunity to reduce emissions from transport and process heat by switching from fossil fuels to electricity. To achieve these emissions reductions it is vital that electricity is affordable in order to encourage switching.

In the electricity report we have explored a future of 'accelerated electrification' – electrifying up to half our vehicle fleet by 2035 and accelerating the amount of process heat provided by electricity instead of by coal or natural gas. This amount of electrification will need significant policy action.

Executive summary

New Zealand has set a target for reducing the country's greenhouse gas emissions under the Paris Agreement. However, without considerable change from the status quo, that target will not be met. New Zealand's commitment to address climate change also seeks to align with the ideals of kaitiakitanga – the need to care for and be active stewards and custodians of our taonga, our environment, and our planet for future generations.

As part of its efforts to reduce emissions, the Government asked the Interim Climate Change Committee to provide advice on planning for the transition to 100% renewable electricity by 2035. The Terms of Reference for this work state that the Committee must take into account the objective of minimising emissions from electricity generation, together with security of supply and affordability for consumers.

At present New Zealand's electricity system is about 82% renewable. Electricity represents about 5% of New Zealand's total greenhouse gas emissions – about 4 million tonnes carbon dioxide equivalent (Mt CO_2e) out of a total of around 80 Mt CO_2e. New Zealand is fortunate to already have such a high proportion of renewable electricity. But due to the heavy reliance of the electricity system on hydropower, its key challenge is coping with a 'dry year' when hydro inflows are low.

To investigate future possibilities for the electricity system out to 2035, the Committee commissioned a modelling exercise, the results of which form the backbone of this report.

The modelling shows that, under a business as usual future, New Zealand is likely to reach an average of 93% renewable electricity by 2035. More wind, solar and geothermal will be built, and more batteries will be deployed.

The modelling also shows that it is technically feasible to achieve 100% renewable electricity by 'overbuilding'. This means building additional renewable generation like wind and solar to cover dry years, and substantially increasing battery storage and demand response.

However, such a solution is very costly, particularly in terms of achieving the last few percent of renewable electricity. Going from 99% to 100% renewable electricity by overbuilding would avoid only 0.3 Mt CO_2e of emissions at a cost of over $1,200 per tonne of CO_2e avoided. It is also likely to result in much higher electricity prices than in the business as usual future.

The Committee investigated an alternative future, aiming to understand whether accelerated electrification of transport and process heat could achieve larger emissions reductions while keeping electricity affordable.

The modelling showed that, in this accelerated electrification future, generating the required electricity would result in about 3.6 Mt CO_2e of greenhouse gas emissions a year by 2035. However, this would be more than offset by 6.4 Mt CO_2e of avoided emissions from transport and 2.6 Mt CO_2e of avoided emissions from process heat. Added

together, the net emissions reductions would be 5.4 Mt CO_2e a year by 2035.

Under the accelerated electrification future, electricity prices remain affordable. This is vital because consumers will not switch to electricity if it is too expensive compared to fossil fuels, and so potential emissions savings would be less.

The Committee therefore recommends that the Government prioritises the accelerated electrification of transport and process heat over pursuing 100% renewable electricity by 2035 in a normal hydrological year.

Policy changes will be needed to achieve this level of accelerated electrification. These policies must fulfil the Tiriti o Waitangi principle of partnership and good faith with iwi and hapū.

The Committee recommends that the Government sets a target for reducing annual transport emissions by at least 6 Mt CO_2e by 2035. Policies to achieve this target will be needed. Such policies should also proactively enable low-emissions mobility for low-income and rural households.

The Committee recommends that the Government strongly encourages the phase out of fossil fuels for process heat by deterring the development of any new fossil fuel process heat, and setting a clearly defined timetable to phase out fossil fuels in existing process heat (with a priority phase out of coal). Government should also reduce regulatory barriers relating to electrification.

To support accelerated electrification, the Committee has identified changes needed in the resource management system and in the electricity regulatory system.

The Committee recommends that the Government ensures that the value of existing hydro to New Zealand's climate change objectives is given sufficient weight when decisions about freshwater are made.

The Government should work collaboratively with iwi/Māori to co-design solutions so that rights and interests in freshwater (including geothermal fluids) are resolved within the context of the Māori-Crown partnership. The Government should also provide for the large-scale development of wind generation and its associated transmission and distribution infrastructure.

A responsive regulatory system must facilitate changes in the market, while ensuring that appropriate consumer protections are in place. The Committee recommends that regulators be required to take emissions reductions objectives into account, as well as facilitating and enabling new generation and both market and distribution innovation.

Finally, while a future with accelerated electrification of transport and process heat should be pursued, eliminating fossil fuels from the electricity system must occur at some point. Emissions from geothermal must also be reduced.

A well-functioning New Zealand Emissions Trading Scheme will be a critical tool in encouraging the adoption of geothermal emissions capture technology.

The Committee examined ways, other than overbuilding, to achieve 100% renewable electricity and eliminate the use of fossil fuels in the electricity system. These included biomass, hydrogen and pumped hydro (with storage).

A pumped hydro scheme at a scale that could solve New Zealand's dry year problem shows promise. Such a scheme could also help manage demand peaks and increased levels of intermittency. The Committee recommends that the Government investigates the potential for pumped hydro storage to eliminate the use of fossil fuels in the electricity system.

Recommendations

100% renewable electricity

The Committee recommends that the Government:

a. Prioritises the accelerated electrification of transport and process heat over pursuing 100% renewable electricity by 2035 in a normal hydrological year because this could result in greater greenhouse gas emissions savings while keeping electricity prices affordable.

b. Investigates the potential for pumped hydro storage to eliminate the use of fossil fuels in the electricity system.

Transport

The Committee recommends that the Government:

a. Sets a target to reduce emissions from transport by at least 6 Mt CO_2e a year by 2035 and, without delay, introduces policies to achieve this target.

b. Ensures that New Zealand does not become a dumping ground for fossil-fuelled vehicles.

c. Proactively enables low-emissions mobility for low-income and rural households.

Process heat

The Committee recommends that the Government strongly encourages the phase out of fossil fuels in process heat by:

a. Deterring the development of any new fossil fuel process heat.

b. Setting a clearly defined timetable to phase out fossil fuels in existing process heat, with the phase out of coal as a priority.

c. Reducing regulatory barriers relating to electrification.

Valuing hydropower

The Committee recommends that the Government ensures the value of existing hydro generation to New Zealand's climate change objectives is given sufficient weight when decisions about freshwater are made, including by:

a. Strengthening and clarifying national direction on making trade-offs between hydro generation and freshwater objectives across National Policy Statements.

b. Working collaboratively with iwi/Māori to co-design solutions so that rights and interests in freshwater are resolved within the context of the Māori-Crown partnership.

Providing for the development of wind generation at scale

The Committee recommends that the Government provides for the development of wind generation and its associated transmission and distribution infrastructure at scale by:

a. Revising the National Policy Statement for Renewable Electricity Generation to resolve issues relating to lapsing and varying consents, and re-powering existing wind farms.

b. Developing National Environmental Standards to enable timely consenting of wind generation, both large and small, and transmission and distribution infrastructure. This should include proactively identifying which types of landscapes are likely to be particularly suitable for wind infrastructure.

A responsive regulatory system

The Committee recommends that the Government ensures that:

a. Regulators be required to take the objective of reducing emissions into account through mechanisms such as Government Policy Statements.

b. The regulatory system:

- Facilitates timely investment in the transmission network that optimises the development of new lines with the building of new power generation.
- Contains clear processes for approving, consenting and constructing new or upgraded electricity lines for process heat and electric vehicle infrastructure.
- Enables distributors and retailers to innovate and adapt to increasing levels of consumer-based technology.
- Enables consumers to get the right pricing signals to engage in demand response and make best use of new technologies.

c. Barriers to distributed and off-grid renewable generation are identified and addressed, and ways to ensure communities can participate are considered.

The full report and recommendations are online at:

www.iccc.mfe.govt.nz/what-we-do/energy/electricity-inquiry-final-report

www.iccc.mfe.govt.nz