

THE DILEMMAS OF ENERGY SECURITY FOR A SMALL STATE

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Policy brief no. 28 | June 26, 2018

Presented at the Small States and the New Security Environment (SSANSE) International Conference at the University of Iceland

Large scale electrification of New Zealand's energy system is a positive step to reducing the country's carbon emissions but adds new challenges to maintain energy security. Policy makers will need to carefully balance policy settings to ensure these risks are effectively managed.

Key findings

- New Zealand must contend with a number of challenges to maintain energy security as the country transitions toward electrification of its energy sector.
- These risks could potentially be exacerbated by government actions to reduce greenhouse gas emissions
- The government will need to carefully balance its priorities to ensure the transition to electrification does not jeopardise the nation's future energy security.

Executive summary

New Zealand has an abundance of renewable energy resources and generates a large portion of electricity from these sources, but at present still depends on imported oil and oil products to meet a significant portion of total energy demand. The government's aim to fully electrify New Zealand's energy sector, enabled through further utilisation of these renewable energy resources, would therefore appear to both reduce the country's greenhouse emissions and improve its energy security – an uninterrupted availability of energy sources at an affordable price. However, as a geographically isolated state without a grid connection to another country's energy resources, this transition will require an increasing reliance on the nation's electricity system, and thus represents a concentration of risk. In addition, the transformation process creates new issues, and heightens existing issues that must be resolved to maintain a resilient and reliable electricity system. Actions to achieve increased levels of energy sector electrification within certain timeframes in order to meet emissions targets may increase the risks associated with these issues and make New Zealand less energy secure overall. The New Zealand government will therefore need to ensure that policy settings do not unnecessarily weaken national energy security.



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Analysis

New Zealand holds an abundance of renewable energy resources which have been successfully utilised to meet a relatively large portion of the country's electricity demand; approximately 80% of the country's electricity generation comes from renewable sources at present. The New Zealand government has committed to ambitious greenhouse gas emissions reduction targets through the Paris Climate Agreement and intends to further utilise the country's renewable energy resources to meet these targets. The government's emissions reduction strategy involves further utilisation to achieve 100% renewable electricity generation by 2035, and transformation of the energy sector through electrification of transport and industrial heat systems and processes. Targeting energy sector emissions is both due to the sector's significant emissions volume (40% of gross emissions), and because of the technical and economic difficulties associated with reducing emissions from the agriculture sector, which is the largest emissions producer but largely underpins New Zealand's economy.

The newly elected government has signalled that it will be strongly committed to tackling climate change. Recently the government enacted a ban on new permits for offshore oil and gas drilling, and is in the early stages of introducing a zero carbon act that could commit New Zealand to net zero carbon emissions by 2050 and set legally binding emissions targets. Previous government policies to incentivise electric vehicle (EV) purchases look set to continue, although EV penetration is expected to significantly increase on its own accord; current estimates suggest EVs will account for over 40% of the vehicle fleet by 2040.¹

At present, New Zealand depends on imported oil and oil products to meet a significant portion of total energy demand.¹ Oil dependence is particularly acute within the transport sector where oil products meet 99% of energy requirements. Given the inherent risks and uncertainties associated with the global oil market, reducing dependence on oil imports through electrification of the energy sector is often touted as a move that will improve national energy security, as well as reduce emissions.² However, while large scale electrification will reduce oil dependence, the transformation process will create new issues, and heighten existing issues that must be resolved to maintain energy security. Two issues are particularly significant:

- Electrification of the transport sector and the industrial sector will result in significant increases in electricity demand. By some estimates New Zealand's electricity demand will at least double by 2050 assuming continued electrification occurs. This will require significant and timely investment in New Zealand's energy supply. Transpower, a state-owned enterprise that owns and operates the national transmission grid, anticipates that from 2025-2050 utility-scale investors will need to construct approximately 2 terawatt hours (TWh) of new generation per year to meet demand. The average utility scale over the past decade in New Zealand has been substantially less than this figure; approximately 0.5 TWh.³
- Energy storage is and will likely remain a particularly acute issue for New Zealand. Despite having an abundance of renewable energy resources, New Zealand has a low level of

ⁱ While New Zealand does have some indigenous oil production, almost all of it is exported due to it being grade that earns a premium overseas, and because New Zealand's sole refinery is geared to refine lower grade 'sour' crude.



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energy storage capacity which the electricity suppliers must regularly contend with during dry years when hydro stores are low, and cold winters when New Zealand uses the greatest amount of electricity. Supply shortage risks will become an increasingly significant issue for New Zealand because of increased sector penetration and inherent variability of solar and wind generation, and continued reliance on existing hydro assets.⁴ A recent assessment of potential technical solutions to this future supply gap found that none that appeared feasible and economically attractive, though some emerging technologies appeared promising. Retaining gas or coal thermal plants was identified as a solution, but this would run counter to the government's emissions reduction policy. Whether New Zealand's gas reserves will be sufficient to meet demand is also highly uncertain.⁵

As New Zealand goes through the process of energy sector electrification, the country will have to contend with these risks, while managing risks associated with other energy sources. In addition, the transformation process will ultimately change the dynamics of the country's energy system:

- New Zealand's geographic isolation means that it does not have a grid connection to another country's energy resources and is unlikely attain a connection in the near future. The country therefore will not be able to rely on other nation's energy resources to meet supply shortfalls.
- As New Zealand meets more of its energy needs through electricity, the consequences of failing to adequately address risks to supply will become more severe. Ensuring the resilience and reliability of the electricity system will become increasingly vital.

It is not suggested here that electrification of the energy system will necessarily reduce New Zealand's energy security, but the transformation does bring with it a great deal of uncertainty, and could make the task of maintaining energy security more complex into the future. However, government actions to increase the pace of energy sector transformation, or restrict access to existing energy generation options, do have risks associated with them. If such actions are taken at unsuitable times, it will likely result in New Zealand becoming less energy secure. By the same token, inadequate planning by government and industry for the expected pace and scale of change in the energy sector will also result in reduced energy security.

What should New Zealand do?

- Maintaining energy security is of vital importance for New Zealand. The Government needs to ensure coordination exists between the state and the energy industry into the future, and a clear direction forward for New Zealand's energy sector is identified. This should include maintaining policy and regulatory settings that reflect the risks and uncertainties associated with transformation of the energy sector to ensure sufficient industry investment occurs where it will be required.
- The government must be careful to ensure that policy decisions made today to reduce greenhouse emissions do not negatively impact New Zealand's energy security in the future. Emissions reduction targets may have to be revised, or new emissions reduction approaches considered if they appear likely to jeopardise the nation's energy security.



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Conclusion

The transformation of New Zealand's energy sector brings with it a number of uncertainties and challenges, but also opportunities. To achieve a secure energy future, New Zealand will need to carefully navigate this transformation to ensure that challenges are met, and opportunities are taken.

¹ Ministry of Transport (2017) New Zealand Transport Outlook: Future State, p.33,

<https://www.transport.govt.nz/assets/Uploads/Research/Documents/GOTO-Future-State-A4.pdf>

² See for instance: B Barton & P Schütte (2015) Electric Vehicle Policy: New Zealand in a Comparative Context, Centre for Environmental, Resources and Energy Law, University of Waikato, Hamilton, p.4, https://www.waikato.ac.nz/__data/assets/pdf_file/0007/278080/Electric-Vehicle-Policy-New-Zealand-in-a-Comparative-Context.pdf

³ Transpower (2018) Te Mauri Hiko – Energy Futures: White Paper 2018, p.48,

<https://www.transpower.co.nz/sites/default/files/publications/resources/TP%20Energy%20Futures%20-%20Te%20Mauri%20Hiko%20%2025%20May%2718.pdf>

⁴ Ibid, p.16

⁵ Ibid, p.54



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