



COVERSHEET

Minister	Hon Dr Megan Woods	Portfolio	Minister of Energy and Resources
Name of paper	Transitioning to more affordable and renewable energy: the energy markets work programme	Date of issue	16 July 2019

List of documents that have been proactively released		
Date	Title	Author
27/6/2019	<i>Transitioning to more affordable and renewable energy: the energy markets work programme for 2019.</i>	<i>Oshan Jayawardena</i>
27/6/2019	<i>ENV-19-MIN-0026</i>	<i>Cabinet Environment, Energy and Climate Committee</i>
	<i>MBIE recommends the proactive release of the Cabinet paper and supporting documents with some information withheld consistent with the following sections of the Official Information Act 1982:</i> <i>➤ Confidential advice to Government - Section 9(2)(f)(iv).</i>	<i>Ministry of Business, Innovation and Employment</i>

Information withheld

Some parts of this information release are not appropriate to be released and, if requested, would be withheld under the Official Information Act 1982 (the Act). Where this is the case, the relevant sections of the Act that would apply have been identified and are listed below. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

Section of the Act	Reason for withholding
<i>Section 9(2)(f) (iv)</i>	<i>Confidential advice to Government.</i>

In Confidence

Office of the Minister of Energy and Resources

Chair, Cabinet Development Committee

Transitioning to more affordable and renewable energy: the energy markets work programme

Proposal

1. This paper is to inform Cabinet of my work programme for energy markets for 2019 and beyond. This work programme will establish the regulatory and policy settings to enable the long-term transition of our economy to more affordable and renewable energy.
2. This proposal should be considered alongside my Cabinet paper, "Proposed response to Interim Climate Change Committee Recommendations on Accelerated Electrification".

Executive summary

3. My renewable energy strategy begins with a vision for affordable, secure, and sustainable energy system that provides for New Zealanders' wellbeing in a low emissions world. Such an energy system would also provide opportunities to grow New Zealand's economy by driving innovation in clean energy and providing opportunities to grow New Zealand's exports.
4. In achieving this vision, my strategy focusses on three main outcomes:
 - a. An inclusive and consumer focused energy system;
 - b. A system that encourages increased investment in low emissions technologies; and
 - c. An innovative and modern energy system that creates new opportunities for business and consumers.

Background

5. The Government has a goal to transform New Zealand's economy into a more productive, more sustainable and a more inclusive economy. This includes our goal to transition the economy to a clean, green and carbon neutral New Zealand. The

current and future work in the Energy and Resources portfolio is critical for achieving these ambitious goals.

6. New Zealanders rely on access to affordable and secure energy to live their day to day lives. Energy underpins our economy as a key input into every good and service. However, having access to affordable and secure energy is no longer enough. Our reliance on fossil fuels is compromising our climate and the wellbeing of future generations.
7. To realise a more sustainable energy future, without compromising affordability or security of supply, New Zealand will need to ensure our policy settings are right, and can embrace rapidly evolving energy technologies that can assist in the transition.
8. Transitioning how we supply and use our energy will be complex, involving fundamental and interrelated changes in technologies, fuels and infrastructure. We therefore need a coherent package of policies to achieve a shift in energy systems, and to ensure that the transition can occur at the pace necessary to meet our economic, climate and social objectives.

The Government is setting up the architecture for the transition to a productive, sustainable, and inclusive economy

9. The Government has a goal to transform New Zealand to become more productive, sustainable, and inclusive. It is committed to taking decisive action on climate change to build a more sustainable economy that is not only better for the environment, but creates jobs and helps to improve the lives and wellbeing of all New Zealanders.
10. The Government has already achieved a great deal to pave the way towards this low emissions future and has also initiated a large amount of preparatory work for the economy broadly, for example:
 - 10.1. The Climate Change Response (Zero Carbon) Amendment Bill has been designed to provide certainty on climate policy by providing a clear signal on New Zealand's long-term emissions reduction goals, a durable framework to adapt to the impacts of climate change, and stable and enduring institutional arrangements for climate change action.
 - 10.2. A review is underway to amend the New Zealand Emissions Trading Scheme (NZ ETS) to ensure that the NZ ETS is a strong, credible and fit-for-purpose tool. The NZ ETS remains the Government's key tool to drive changes in energy use and meet emission reduction targets.
 - 10.3. The \$100 million Green Investment Fund (GIF) was established to accelerate domestic low emission investments.
 - 10.4. The Productivity Commission prepared a report for the Government on how New Zealand can reduce its greenhouse gas emissions through a transition towards a lower emissions future, while at the same time continuing to grow incomes and wellbeing. The Government's response to the Productivity Commission is the first step toward outlining a strategic approach to the

transition to a low emissions economy, and will be followed by development of a long term low emissions development strategy under the Paris Agreement.

10.5. The interim Climate Change Commission (ICCC) has been considering how New Zealand can transition to 100 per cent renewable electricity, as well as the potential to decarbonise industry and transport. I have reported separately on my proposed response to the ICCC's report "Accelerating Electrification".

10.6. New Zealand's broader economic strategy to transition to a more productive, sustainable and inclusive economy is being developed, including developing an Economic Development Strategy and refocusing our approach to industry policy. The proposed industry policy approach, as yet to be agreed by Cabinet to renewable energy will be to drive development, production and use of renewable energy resources, focused around two pillars - completion and implementation of the Green Hydrogen Strategy; and, switching energy sources for process heat away from fossil fuels, particularly coal, to biomass or electricity in food and beverage manufacturing.

11. We have also taken bold and tangible steps in solidifying our international leadership position on Climate Change by ending new offshore oil and gas exploration permits, and subsequently establishing the Just Transitions work programme to ensure that the transition to a low emissions economy is fair, equitable and inclusive for regions, sectors and communities.

The energy sector is central to our transition to a low emissions economy

12. Though we rarely think about it, energy is a fundamental part of our lives and underpins our standards of living. In and around our homes energy powers our fridges and freezers and washers, runs our cars, and gives us light. In the broader economy we transform energy into valuable goods and services and are able to deliver those to markets in faraway places, providing for our economic prosperity.

13. But our use of fossil fuel energy is also compromising the climate and the wellbeing of future generations. In 2017, energy sector greenhouse gas emissions, which include emissions from transport, industrial heat, and fossil fuel electricity generation, made up about 41 per cent of New Zealand's gross emissions.

14. This means that in order to achieve our goal of net zero emissions by 2050, we need a coherent set of policies to address emissions from the energy sector, in a way that supports our wider social and economic objectives.

Decarbonising New Zealand's economy depends on achieving a highly renewable energy system, which is both secure and affordable

15. Achieving a low emissions energy sector is a formidable challenge, but I believe that New Zealand is well positioned to tackle it by transitioning our energy system to renewable energy, and capitalising on the economic opportunities that present themselves along the way.

16. According to Bloomberg New Energy Finance, global investment in clean energy capacity increased 61 percent since 2008, from \$205 Billion to \$330 billion per year. These numbers are even more impressive when you consider that the costs of delivered energy from clean energy have plummeted over the same period. For example, the cost per kilowatt hour for lithium ion batteries fell 85 per cent and the costs of solar PV fell by 94 percent. Bloomberg predicts that there are tipping points on the horizon where the operating costs of existing fossil fuel electricity generation will exceed the sum costs of both building and operating new renewable generation.
17. The world is clearly moving towards a renewable future, and there is opportunity for New Zealand to lead the way, building off our existing renewable strengths in electricity generation. New Zealand's energy advantage lies in its abundant renewable energy resources. We can be proud of our world class electricity system which is currently around 82% renewable.
18. I believe that with the right actions now, we can put our electricity system on a pathway towards 100 per cent renewable electricity by 2035, in a way that provides for secure and resilient energy and low consumer prices. I acknowledge that the (interim Climate Change Commission) ICCC found that achieving the goal of 100% renewable electricity, especially the last few per cent, could be costly, and recommended we prioritise demand side emissions – industrial heat and transport.
19. I agree with the ICCC that keeping electricity prices down during the transition is going to be critical to achieving a highly renewable energy system. Our largest energy using sectors, industrial heat and transport are responsible for 8% and 20% of New Zealand's total emissions. As the costs of renewable electricity technologies decline, low cost renewable electricity could provide New Zealand with the opportunity to electrify industrial heat and transport sectors which are currently reliant on fossil fuels.
20. Transpower's Te Mauri Hiko – Energy Futures report concluded that as our economy electrifies, electricity demand is likely to more than double by 2050. Electricity demand as a percentage of total delivered energy demand is estimated to increase from 25 percent in 2016 to 61 per cent by 2050.
21. There is still much we can do to facilitate a percentage increase of renewables in our electricity system without increasing the cost of electricity. The ICCC suggests that we will be able to achieve 93 per cent renewable electricity without any intervention. However at about 5% of New Zealand's total greenhouse gas emissions, that is, 4

million tonnes of carbon dioxide equivalent of energy sector emissions, electricity sector emissions remain a challenge we will eventually need to tackle in order to reach net zero emissions. That's why my renewables strategy also emphasises the need to facilitate investment in new technologies, such as hydrogen, that will bring down the future cost of achieving high levels of renewable electricity.

A renewable energy strategy requires action across multiple domains

22. My renewable energy strategy begins with a vision for affordable, secure, and sustainable energy system that provides for New Zealanders' wellbeing in a low emissions world. Such an energy system would also provide opportunities to grow New Zealand's economy by driving innovation in clean energy and providing opportunities to grow New Zealand's exports.

23. In achieving this vision, my strategy focusses on three main outcomes:

a) An inclusive and consumer focused energy system

- Consumers are at the centre of the energy system and there is evidence that they struggle to engage with it and influence decisions that affect them. Consumers will need a strong voice through the transition so that solutions are not industry-centric, but consumer-centric.
- New technologies such as solar PV and batteries are providing new opportunities for consumers to achieve greater energy independence, for example, the global trend seeing the rise of prosumers, who both consume and produce, generating and storing electricity. However, we need to ensure that greater energy independence for some people does not exacerbate energy hardship for others who are unable to participate due to financial circumstances, resulting in bearing a disproportional share of grid costs due to their lack of independence from the national electricity grid.
- As we decarbonise our electricity system, we need to ensure that all consumers pay fair and reasonable prices, and that they all share the benefits of an efficient and competitive energy system.
- As we move away from traditional fossil fuel sectors, it will be important to ensure that a transition is just and inclusive and that people impacted have full opportunities to participate in the transition

b) A system that encourages increased investment in low emission technologies

- For some renewable technologies, such as hydrogen or off-shore wind, the regulatory system may be incomplete, or poorly understood. In order to ensure that we make the most of new technologies we need to establish high quality and transparent regulatory settings that enable confident business investment.
- While the energy transition is a long term process, there is a role for government to encourage, support and plan with industry, both on supply side (incentivise new renewable generation) and demand side (electrification of transport and industry), to ensure New Zealand can capitalise on the opportunity renewables present.
- There is also a need to set the right investment signals to avoid the lock-in of high emissions energy technologies. While the review of the ETS will ensure a credible price signal exists to incentivise investment, as the replacement of long-lived assets occurs infrequently, it will be important to ensure that there are no barriers for businesses and Government to invest in low emissions alternatives to fossil fuels, otherwise high emissions become 'locked in' for long periods of time.

c) An innovative and modern energy system that creates new opportunities for business and consumers

- Innovation is crucial if we are to decarbonise our energy system. It will not be enough to hope that new technologies developed offshore will be suitable for New Zealand's needs. New Zealand needs to foster and promote an energy sector with an innovative mind-set. We require a forward thinking sector, geared towards seeking out and applying new technologies.
- New technologies are also beginning to challenge some of our traditional regulatory systems. For example, as transitional electricity networks seek to participate in new business models that benefit their consumers, the lines between contestable and monopoly services have become greyed. We need to ensure our regulatory settings incentivise innovation and uptake of new technologies for the benefit of consumers.
- Business investment in R&D in New Zealand is low and the energy sector is no exception. This will need to change if New Zealand is move towards a more knowledge intensive, high skill, high wage economy. Government has an important role to play in creating an environment which encourages innovation to thrive.

24. Over the next six months I will be seeking Cabinet decisions on a range of work programme areas that support these three outcomes, beginning with the Government's Response to the Electricity Price Review:

Ensuring the electricity market is delivering fair and affordable prices, and will continue to do so throughout the transition

25. The Electricity Price Review (the Review) is investigating whether the electricity market, as it exists at present and into the future, is and will be delivering a fair and

equitable price to end-consumers, taking into account the need to maintain energy security and environmental sustainability.

26. The Review is not only focused on prices; it is also looking at the role of emerging technology in the electricity sector. We need to make sure that we have got the regulatory settings right as new technologies provide opportunities and challenges to the structure of our electricity system.
27. The Review has now reported to me and many of its recommendations address the need for electricity prices to be fair and affordable, not just efficient or competitive. The report also contains suggestions to help ensure the electricity sector functions well during the transition away from carbon-based fuels – a consideration that will become increasingly important as electricity meets more of New Zealand’s energy needs.
28. I will present options to Cabinet shortly on how to improve the affordability and fairness of electricity prices and what regulatory changes are required to enable the electricity system to capitalise on the opportunity emerging energy technologies create.
29. These options, along with those we agree to accelerate the deployment of renewable electricity generation and encourage the uptake of renewable energy in industry energy use will form the basis of a renewable and affordable energy Bill.

Accelerating the deployment of renewable electricity generation

30. I have work underway to look at options to accelerate the deployment of renewable electricity generation to achieve the goal of 100 percent renewable electricity by 2035. This work has included identifying the barriers and developing policy options to reduce these barriers and accelerate the deployment of renewable electricity generation. The barriers identified are:
 - 30.1. consenting barriers for renewable sites and their transmission connections
 - 30.2. transmission access barriers, particularly in areas where multiple renewable investors require connection
 - 30.3. lack of incentives to accelerate renewable electricity generation investment, and
 - 30.4. lack of affordable technologies for dry year and winter cover.
31. A pressing issue is addressing the consenting barriers to renewable generation and their transmission connections, and transmission access barriers.

- 32.** Additional work will be the dry year security supply considerations of moving towards 100 per cent renewable electricity. The Electricity Price Review may provide insights into how electricity markets can better manage dry year risks by examining the potential for more robust forward contract markets. In addition, it will be crucial that New Zealand's market is able to quickly adopt evolving energy technologies that increase the resilience of the grid.

Encouraging energy efficiency and the uptake of renewable fuels in industry

- 33.** Changing how industry uses energy will be a crucial component in New Zealand's transition to a productive, low emissions economy. I will produce a package of policies and programmes to reduce greenhouse gas emissions associated with industrial energy use and process heat. This package is investigating a range of actions including:
- 33.1. improving the energy productivity of industrial sites,
 - 33.2. encouraging fuel switching to renewable energy sources (e.g. electrification or biofuels) and the adoption of low emission technologies and processes, and
 - 33.3. facilitating state sector leadership in reducing process heat emissions
- 34.** There are strong interdependencies between accelerating renewable electricity generation and encouraging changes in industrial energy use. The electrification of industrial sites could be a major driver of future electricity demand.
- 35.** Bioenergy has been identified as important in sectors that are hard to electrify, such as shipping, aviation and high-temperature heat requirements in the industrial sectors. My work on Process Heat in New Zealand (PHiNZ) will assess options for bioenergy to transition New Zealand industrial sectors to lower emissions. For biofuels, the Government is already funding research organisations, such as, Scion to undertake research to understand if a clear case for further government intervention is needed in this area.
- 36.** Later this year, I will seek Cabinet approval to release papers with policy options to accelerate the deployment of renewable electricity generation, improve security of supply in a highly renewable system, and to encourage the uptake of renewable energy in industry energy use.

Driving energy sector research and innovation

- 37.** Research and innovation play a crucial role in the transition to a low emissions economy.
- 38.** New Zealand currently has pockets of world-class capability in niche areas of advanced energy research. This type of research has the potential to radically transform energy landscapes – leading to step changes in efficiency, enabling greater use of renewable energy in transportation and creating business opportunities that will attract investment, create jobs and enable New Zealand to export solutions to global challenges.

39. The 2019 Budget includes \$20 million in new science funding for the creation of an Advanced Energy Technology Platform. This new platform, implemented through the Strategic Science Investment Fund, will build on our existing research strengths in areas such as organic photovoltaics, super conductors, nanotechnologies and inductive power. The Advanced Energy Technology Platform will focus on earlier stage research, creating opportunities for commercial spinoffs and for the private sector to fund more applied, commercially-orientate research.
40. We have strengthened incentives for such research through the Taxation (Research and Development Tax Credits) Act 2019 which passed into law in early May 2019. The R&D Tax Incentive offers a credit rate of 15% to businesses that invest in eligible R&D, and is an important lever to support our aim of raising New Zealand's R&D expenditure to 2% of GDP by 2027.
41. International R&D investments and partnerships will be critical to build our R&D capabilities and New Zealand's competitive advantage as a location of choice for the development of new transformative energy related technologies.
42. Late last year I instructed MBIE officials to develop under the Innovative Partnerships programme an energy focussed platform-play to attract globally leading firms and innovators to partner with businesses and research institutions, conduct R&D, innovate, invest, and build a sustained presence in New Zealand. The Innovative Partnerships team has been engaging across New Zealand and with international stakeholders to define New Zealand's value proposition as a location for investment and identify key partnership opportunities. New funding provided to for the Innovative Partnerships programme as part of Budget 2019 will accelerate this work.
43. The Provincial Growth Fund (PGF) provided \$50,000 to support the development of an H2 Taranaki Roadmap. The focus of this roadmap is on the application of hydrogen technologies in Taranaki and my understanding is that several of the projects proposed in the roadmap will be put forward as individual applications to the PGF to encourage the adoption of hydrogen technologies in the region and beyond.
44. The Government has announced the National New Energy Development Centre. This clean energy centre in Taranaki will look at the full range of emerging clean energy options such as offshore wind, solar batteries, hydrogen and new forms of energy storage. It will help create new business and jobs in Taranaki while helping New Zealand move towards clean, affordable, renewable energy and away from fossil fuels. The Wellbeing Budget is investing \$27 million to set up the centre in Taranaki, alongside the \$20 million over four years to establish a new science research fund for cutting edge energy technology.

Ensuring a Just transition

45. Since May 2018, I have been responsible for the Government's just transition approach to the transition to a low emissions economy. A just transition is about the partnership between government, Māori, business, the workforce and communities to understand the potential pathways for transition, to support new opportunities that arise from the transition, and to better understand the impacts of transition on communities, sectors and regions in New Zealand.

- 46.** To support this work, the Just Transition Unit (JTU) was established within MBIE. The JTU has delivered two key pieces of work since its establishment;
- 46.1. Partnering with the Taranaki region to create a transition plan (the Taranaki 2050 Roadmap) which captures the Taranaki region's vision for a low emissions future and ideas for the key transition pathways to reach their vision. The draft Roadmap was launched on May 9 at the National Just Transition Summit which was held in New Plymouth.
- 46.2. The purpose of the National Just Transition Summit was to kick-start a national conversation about what a transition to a low emissions economy could look like for New Zealand. More than 500 people from unions, businesses, iwi, community groups and academics attended over the two days.

Future fuels – green hydrogen

- 47.** Green hydrogen could play a role in New Zealand's energy future by supporting resilience in a renewable electricity system. It also has transport applications. For instance, it could be used by some of the heavy vehicle fleet to help transition away from reliance on fossil fuels.
- 48.** Last year, I signed a Memorandum of Cooperation with Japan's Economy, Trade and Industry Minister on the development of hydrogen technology. Green hydrogen provides a potential economic and export opportunity for the country. Thanks to our abundant renewable energy, New Zealand can produce some of the cleanest green hydrogen in the world, and may receive a premium for it in international markets.
- 49.** I will produce a green paper on New Zealand's Hydrogen Future, including the possible role for hydrogen in the economy and for export. This paper will describe the strengths and weaknesses of hydrogen for New Zealand and lay out a broader vision for how hydrogen could contribute to New Zealand's net zero emissions goal. My aim is to present this paper to Cabinet for release for consultation in mid-2019. Ensuring the resource sector supports our energy markets and our economic and climate objectives.

Development of a Resource Strategy for petroleum and minerals in New Zealand

- 50.** I have initiated the development of a Petroleum and Minerals Resource Strategy. This Strategy will underpin the Review of the Crown Minerals Act 1991 and will articulate the Government's priorities and long term vision for the petroleum and minerals sector and its contribution to New Zealand. This work will look at how New

Zealand can sustainably derive value from its petroleum and minerals resources, in the context of the transition.

51. The Strategy will be a 10 year Strategy and will support the transition to a carbon neutral New Zealand by 2050 and a productive, sustainable and inclusive economy.

Gas Act changes

52. I have also initiated a programme of work to assess whether the Gas Act 1992 (the Gas Act) is fit-for-purpose in regulating the uptake of future fuels such as hydrogen and biogas. The Gas Act would regulate the transmission and distribution of hydrogen in New Zealand, much like natural gas today.
53. This work will build understanding of any regulatory gaps or barriers and enable New Zealand to make the most of the opportunities presented by hydrogen. Currently this work is separate to the targeted changes I intend to make to the Act in the short-term to improve information disclosure rules in the context of the recent Pohokura gas outages, and to ensure that the penalties regime in the Act is fit-for-purpose. However, if there are changes needed to the Act imminently, then there is an option for these to be included in the changes being made.

Next Steps

54. I will return to Cabinet in the coming months to release a discussion document on, options to accelerate the deployment of renewable electricity generation and the uptake of renewable fuels, and to get your agreement to develop an energy policy package.
55. Confidential advice to Government
56. Confidential advice to Government
57. There is an opportunity now to begin the transition to low-emissions, climate-resilient New Zealand and to take necessary action to maximise the benefits and minimise the costs of this transition. At the same time, it is important to ensure that this is a just and inclusive transition that supports and empowers industries, workers and their communities to adjust, and also supports the wellbeing of all New Zealanders.

Consultation

58. I will consult on the individual elements of my renewable energy strategy with relevant parties as the work progresses.

Financial Implications

59. Confidential advice to Government

Legislative Implications

60. Confidential advice to Government

Regulatory Impact Analysis

61. A Regulatory Impact Analysis is not required at this stage.

Human Rights

62. There are no human rights implications arising from this paper.

Gender Implications

63. There are no gender implications arising from this paper.

Disability Perspective

64. This paper is consistent with the Convention of the Rights of Persons with Disabilities, the New Zealand Disability Strategy and the Disability Action Plan 2014-2018.

Publicity

65. No specific publicity is proposed at this stage.

Recommendations

The Minister for Energy and Resources recommends that the Committee:

1. **Note** that the work underway in the Energy and Resources portfolio is critical to achieving the Government's vision of a productive, sustainable and inclusive economy
2. **Note** the Government has ambitious goals to achieve 100 per cent renewable electricity by 2035 and a carbon neutral economy by 2050.
3. **Note** the key components of my vision for a Renewable Energy Strategy include work-streams on ensuring the electricity market is delivering fair and affordable

prices, accelerating deployment of renewable electricity generation, and encouraging changes in industrial energy use.

4. Confidential advice to Government

Authorised for lodgement

Hon Dr. Megan Woods

Minister for Energy and Resources

PROACTIVELY RELEASED