# Hon Dr Megan Woods

**MP for Wigram**

Minister of Energy and Resources
Minister Responsible for the Earthquake Commission
Minister for Greater Christchurch Regeneration
Minister of Research, Science and Innovation


Hon Simon Upton
Parliamentary Commissioner for the Environment
PO Box 10 241
Wellington 6143

14 MAY 2018

Dear Simon

Thank you for your letter dated 28 March 2018 in relation to the environmental report *Our atmosphere and climate 2017*, published by the Ministry for the Environment and Statistics New Zealand.

You have requested specific information on actions that the Ministry of Business, Innovation and Employment (the Ministry) is undertaking in response to this report.

The following response relates to policies, work programmes and other initiatives that the Ministry has in place to reduce greenhouse gas emissions from the energy sector. This includes emissions from electricity, heat generation, and road transportation.

*Our atmosphere and climate 2017* contains information on emissions changes across the New Zealand economy from 1990 to 2015. The report showed that population growth has been a key driver of increasing emissions, with those from public electricity and heat generation having increased by 16 per cent, and from road transportation by 78 per cent.

1. ***What work has the Ministry done to identify what is driving the increases in energy sector emissions cited above and what might be done to reverse their upward trend?***

The Ministry collects data on historic fuel use, electricity generation by fuel type, and emissions from the energy sector, and publishes annual and quarterly energy statistics[1]. Annual and quarterly online reports are also published, which highlight changes and trends in energy use in New Zealand.

The Ministry carries out energy sector modelling and in 2016 published the Electricity Demand and Generation Scenarios (EDGS), five scenarios investigating future electricity and energy demand and supply in New Zealand[2]. As part of this work, the

[1] Ministry of Business, Innovation and Employment Energy statistics http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/statistics
[2] Electricity Demand and Generation Scenarios http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/modelling/electricity-demand-and-generation-scenarios/edgs-2016


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Ministry carries out "top down" consumer energy demand modelling[3]. This involves investigating which drivers best explain the consumer energy demand for specific consumer groups (e.g. residential, commercial and industry) and derives econometric relationships based on these historic drivers that can be used to forecast energy demand into the future.

For example, this work shows that commercial energy demand can best be explained by a relationship with commercial GDP. The modelling also captures the mix of fuels that are used to meet consumer energy demand in each consumer group and how these change over time, and captures how relative price changes of fuels relate to fuel switching. Together the drivers of consumer energy demand and the fuel switching trends give a high level understanding of what is driving energy emissions.

The Ministry works with the Ministry of Transport to understand road transport demand and used its Vehicle Fleet Emissions Model to forecast transport demand for the EDGS. This "bottom up" model produces road transport energy demand and emissions projections based on historic changes to New Zealand's vehicle fleet (based on fleet turn over, kilometres travelled, efficiency improvements, engine size and fuel switching) and economic and population growth and fuel prices.

The following answers to question 2 - 7 explain the work that has been done to identify what might be done to reverse the upward trends in energy emissions from electricity generation, heat and road transport.

2. ***What work has the Ministry done looking at what emission reductions from the energy sector are technically possible from existing technologies?***

3. ***What work has the Ministry done looking at what emissions reductions from the energy sector are technically possible from new or emerging technologies?***

The New Zealand Energy Efficiency and Conservation Strategy (NZEECS) 2017-2022[4] was published in 2017, and has the goal of New Zealand having an energy productive and low emissions economy. It sets the overarching policy direction for

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[3] *Energy Modelling Technical Guide* http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/technical-papers/pdf-library/energy-modelling-technical-guide-august-2016.pdf

[4] The NZEECS is made under the Energy Efficiency and Conservation Act 2000 and is available at: http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-strategies

government support and intervention and guides the work programme of the Energy Efficiency and Conservation Authority (EECA).

The NZEECS outlines Government policies, objectives and targets, as well as encouraging businesses, individuals, households, community institutions and public sector agencies to take actions that will help unlock our renewable energy, and energy efficiency and productivity potential.

The NZEECS identifies three priority areas: renewable and efficient use of process heat, efficient and low-emissions transport, and innovative and efficient use of electricity. This aligns with the areas identified as contributing to New Zealand's increased emissions since 1990. More specific information on work by the Ministry in transport and process heat is set out below.

*Transportation*

As noted in the NZEECS, electric vehicles (EVs) provide an opportunity to leverage from our renewable electricity system to reduce transport emissions. The Ministry has worked collaboratively with the Ministry of Transport and other relevant agencies on the development and implementation of an EVs Programme. This comprised of a number of different policies and initiatives to encourage the uptake of EVs.

The Ministry's role in implementation included progressing legislative change to enable EECA to use levy funding for a Low Emissions Vehicle Contestable Fund and an EVs information campaign. New Zealand Government Procurement (NZGP), which is part of the Ministry, added EV models to the all of government vehicles contract, and continues to work to support the uptake of EVs in government fleets.

The Ministry also recently amended the *Engine Fuel Specifications Regulations*[5] to raise the biodiesel blend limit from 5 per cent to 7 per cent, the principal benefits of which are a reduction in greenhouse gas emissions and a slightly more diverse and secure energy supply.

*Process Heat (heat generation)*

In collaboration with EECA, the Ministry is carrying out work to identify emission reduction potential and costs from integration of both emerging and existing technology, and efficiency measures for use in process heat production. This is a specific action under the NZEECS and further information is provided in the answers to questions 5 and 6.

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[5] The Engine Fuel Specifications Regulations set out minimum standards for the performance of fuel. The regulations also include provisions limiting fuel components that could be harmful to the environment or public health.

*Electricity*

In 2014, the Ministry commissioned a Smart Grid Forum to advance the development of smart electricity networks in New Zealand[6]. One of the focus areas for the Forum was to understand how smart grid developments can support emissions reductions.

A report on this topic was published by the Forum in June 2016[7] that identified the opportunity for greenhouse gas emissions savings, where and how it arises, and any changes required to enable or enhance that opportunity. The report outlined potential of new options for sourcing, using and transporting electricity to support emissions savings.

### 4. *What quantification have you done to determine how much these technologies would reduce emissions from the energy sector relative to Business as Usual?*

The EDGS modelling carried out by the Ministry explores uncertainty in the energy sector focusing on electricity demand and supply. These scenarios include different uptake rates and future cost scenarios for batteries, electric vehicles, and renewable electricity generation.

While these scenarios do not quantify emissions reductions per se, they do help understand the potential for emissions reduction from these existing and emerging technologies.

The modelling captures aspects of time of demand and supply for electricity, and explores how the temporal dimension of electric vehicle charging and battery load shifting can flatten the profile of electricity demand, and investigates the associated emissions reduction potential.

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[6] The Forum brought together relevant parties from business, scientific and academic circles, along with policy makers, regulators and consumers. It has successfully raised awareness and produced valuable material for moving forward the conversation on New Zealand's smarter energy future.

[7] *How Smart Grid Developments Can Support Emissions Reductions.* http://www.mbie.govt.nz/info-services/sectors-industries/energy/electricity-market/nz-smart-grid-forum/meetings-year-2/meeting-10/5-smart-grid-forum-emissions-discussion-final.pdf

5. ***What barriers to increased energy efficiency within process heat production and use have been identified and what plans or actions are either in place or under consideration to address those barriers?***

6. ***What barriers to increased use of renewable energy for process heat production and use have been identified and what plans or actions are either in place or under consideration to address those barriers?***

Our current state of knowledge of process heat[8], and the energy sector, generally, suggests that the barriers to increased energy efficiency and the use of renewable energy are:

- The true costs of using fossil fuels are not fully internalised and so they are generally more cost-competitive than many renewables as an energy source, which does little to discourage their use. This likely reduces the incentive to seek, or supply, information on renewable energy alternatives or energy efficiency practices.
- The lack of information means that many businesses often do not always prioritise measuring and managing their energy use, nor do they always fully assess the benefits of investment in energy efficiency measures
- The lack of information in the market can impede the development of markets, for example for wood energy, industrial heat pumps and other low emission technologies.
- The lack of information creates a perception of risk in entering the market for products and services related to renewable energy, energy efficiency, and technology for process heat that favours the status quo. This lack of information creates a flow-on barrier that there may not be sufficient or widespread capability and expertise to assess the feasibility and business case of heat pumps and other low emission technologies.
- Security of supply concerns further undermines the uptake of renewable energy, notably wood energy.
- The cost of infrastructure (such as new equipment and connection to the national grid) is a potential barrier to electrification.

The Ministry and EECA are developing a process heat plan under the NZEECS – called Process Heat in New Zealand (PHiNZ). This will involve public consultation to

[8] Our knowledge is based on EECA's market interventions (e.g. Wood Energy South), market research, domestic and international research, and previous stakeholder consultation (e.g. during the review of the New Zealand Emissions Trading Scheme). We have yet to test this knowledge with stakeholders.

test our understanding of the barriers and market failures, and to seek feedback on policy options to address them.

The key outcome of PHiNZ is a government action plan that will develop policies and programmes to improve efficiency of existing process heat plant, and encourage investment in efficient and renewable plant used by businesses and public sector agencies. The action plan aims to reduce emissions from using and supplying process heat and to contribute to improving New Zealand's energy productivity.

In the short term, the objectives of PHiNZ are to increase the energy efficiency of existing processes, and remove the non-cost barriers to the efficient or renewable use of process heat.

Improving and increasing the transparency of the evidence and potential mitigation options for process heat users could improve economic choices and help remove some non-cost barriers to the more efficient or renewable use of process heat. A key outcome of PHiNZ is building the evidence and further developing our understanding of process heat demand by sector, fuel, region, heat demand, and emissions abatement potential. Components of this evidence include:

- Updating the heat plant database, which contains data on boiler equipment in operation – by company, site, location, size and fuel
- Engineering modelling of heat using processes and marginal abatement cost curves
- A study which will outline how large industrial energy users invest in energy efficiency and emission reduction projects and what their business decision making processes are, this may help identify specific barriers.
- Publishing a state of play document (a short summary of what we know now about process heat).

The features of process heat use, and the sectors in which it is used, mean that policy options cannot be 'one-size-fits-all' and must consider the characteristics of process heat use by different sectors. Further, to develop an effective action plan we will need to evaluate and review our approach as technological or policy horizons change, and to ensure alignment with government priorities and objectives.

Progress and published papers to date are available at: www.mbie.govt.nz/info-services/sectors-industries/energy/energy-efficiency-environment/process-heat-in-new-zealand

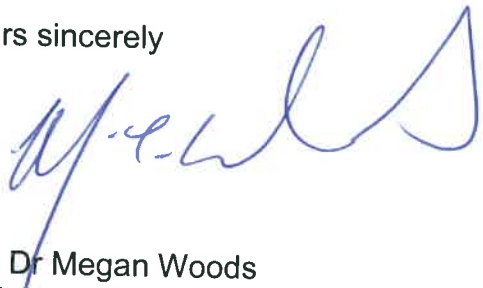
7. ***What work is underway or planned to investigate the relationships between economic growth and emissions reductions, and where the opportunities to decouple these processes may lie?***

The Ministry has looked at the historical relationships between output, productivity, economic diversification, and emissions at an industry sector level, using the System of Economic-Environmental Accounts recently published by Statistics New Zealand.

The Ministry is contributing to the cross-government agency work programme established to assess the impact of potential 2050 emission reduction targets. This programme of work includes:

- Whole-of-economy (Computerised General Equilibrium - CGE) modelling to assess the economic impacts on GDP and across sectors and regions of achieving different potential emission reduction targets.
- Sector-level modelling across the main emitting sectors, land uses and forestry of different transition pathways under uncertainty of achieving different potential emission reduction targets.
- Qualitative and empirical research on the potential innovation benefits and competitiveness challenges, and the potential for emissions leakage of stronger climate policy.
- Developing marginal abatement cost curves for different sectors, such as industrial process heat.

Yours sincerely



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**Minister of Energy and Resources**