Our Purpose

‘Mobilise New Zealanders to be world leaders in clean and clever energy use’

Energy Efficiency and Conservation Authority
Te Tari Tiaki Pūngao

EECA’s submission to the New Zealand Productivity Commission’s Low-emissions economy draft report

8 June 2018

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To the New Zealand Productivity Commission,

The Energy Efficiency and Conservation Authority (EECA) congratulates the New Zealand Productivity Commission on producing its *Low-emissions economy* draft report. The report's level of analysis and detail highlights the challenges and opportunities of transitioning New Zealand to a low emissions economy.

The draft report has identified a number of areas relevant to EECA's statutory role and purpose. We are providing this submission to give our clear opinion on various matters contained in the draft report and, where our views differ, offer additional thoughts and insights based on our extensive experience in the demand-side of the energy and transport systems.

In summary, our key views include:

- concurring with the Commission's recommendations in support of innovation
- supporting the phase out of light fossil-fuelled vehicles and the introduction of vehicle fuel efficiency/emissions standards in alignment with Australia
- supporting the uptake of electric vehicles (EVs), continuing to invest and build the national charging network, and noting the need to investigate cost-reflective pricing for charging
- continuing a strong focus on energy efficiency to reduce electricity demand (both overall and peak) and as part of this aligning lighting standards with Australia
- EECA already having a clear mandate to deliver carbon emission reduction programmes
- continuing to work with the largest energy users/emitters as they offer the greatest potential for emissions reductions at the least cost
- agreeing on the recommendation on improving the energy efficiency of buildings using the Building Code.

All of the positions and recommendations expressed by EECA in this submission are in principle, and would be subject to the normal policy development process.

We are available to meet the Commission to discuss our submission and look forward to seeing the final findings and recommendations later in the year.

Yours sincerely,

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About EECA

The Energy Efficiency and Conservation Authority (EECA) is the Crown entity established under the Energy Efficiency and Conservation Act 2000 to encourage, promote, and support the uptake of energy efficiency, energy conservation, and the use of renewable sources of energy in New Zealand. This mandate provides us with the authorising environment to work with a wide range of stakeholders and customers, as we transition to a low carbon and sustainable economy.

Innovation

Note: The numbered references for each paragraph heading in this submission refers to the Productivity Commission's report recommendations (R), findings (F) or questions (Q).

The paragraph headings provide a summary of EECA's views for each relevant recommendation, finding or question.

R5.4: EECA concurs with the Commission's recommendations in support of innovation

1. EECA agrees there should be policies to incentivise the development and uptake of clean, effective technologies. We also agree increasing the 'absorptive capacity' of firms is important for raising investment in technologies that improve energy productivity and reduce emissions.

2. EECA's experience is that many firms are not operating at energy efficiency or emissions best practice.

3. As part of supporting businesses in these areas, EECA delivers the ongoing Technology Demonstration programme which co-funds up to 40 per cent of project costs for under-utilised commercial technologies that demonstrate the potential to reduce energy use and associated emissions.[1]

4. In support of the Commission's recommendation that the Government scan the international environment for new low-emissions technologies that may be relevant to our circumstances, EECA plans to publish regular international technology scans to fill this knowledge gap.

5. This scan will proactively identify new low emission energy technologies and assess their potential applicability in New Zealand. This intention is set out in EECA's recently published Statement of Performance Expectations 2018-19.[2]

New - EECA recommends drawing on international best practice to support innovation

6. Some countries utilise a list of efficient and renewable energy technologies that are often linked to financial schemes. For example, in the Netherlands a Technology Eligibility List is updated on an annual basis and linked to their Energy Investment Allowance (EIA) – a tax

[1] For more information on EECA's Technology Demonstration programme : https://www.eecabusiness.govt.nz/funding-and-support/technology-demonstration-projects/

[2] EECA's Statement of Performance Expectations 2018-19, https://www.eeca.govt.nz/assets/Resources-EECA/EECA-Statement-of-Performance-Expectations-2018-19.pdf

relief programme which provides a financial incentive for companies to invest in new technologies.[3]

7. Some firms, such as those in the food processing sector, could also benefit from benchmarking their performance with similar firms in New Zealand, and even internationally. Examples of benchmarking initiatives include Japan's Energy Efficiency Benchmarking Programme[4] and the Netherlands' Long-term Agreements.[5]

Transport

8. The transport sector provides the greatest near term opportunity to improve New Zealand's energy productivity and energy-related emissions profile. There are significant emission reductions to be achieved using sustainable and efficient technologies, particularly electric vehicles (EVs).

9. However, on the world stage New Zealand remains a small market for manufacturers and does not attract a wide-range of new models. We also have a preference towards purchasing lower cost second-hand vehicles. Policies to support both the supply of new fit-for-purpose vehicle models for transport and to modify the buying behaviour of New Zealanders are therefore required.

Q11.1: EECA supports the phase out of light fossil-fuelled vehicles

10. EECA agrees New Zealand should phase-out the importation of light fossil-fuelled vehicles by a sensible specified date, noting the size and age of the current light fleet. A stated end-date by the Government would provide certainty and a strong signal to both the industry (supply) and the public (demand).

11. At this stage in the development of low emission transport technologies, the importation ban should only apply to light vehicles, with exemptions for specific needs where a non-fossil

[3] Industrial Efficiency Policy Database, Netherlands NL-7: Energy Investment Allowance: http://iepd.iipnetwork.org/policy/energy-investment-allowance-eia#implementation_toolbox

[4] Industrial Efficiency Policy Database, Japan JP-3: Mandatory energy efficiency benchmarking in industry: http://iepd.iipnetwork.org/policy/mandatory-energy-efficiency-benchmarking-industry

[5] Industrial Efficiency Policy Database, Netherlands NL-2:Long-Term Agreements on Energy Efficiency: http://iepd.iipnetwork.org/policy/long-term-agreements-energy-efficiency

alternative is not available and for vintage or historical vehicles. The date could align with dates set by other right-hand drive countries to ensure availability of zero-emission vehicles on the second-hand market.

12. For city buses, phase-out could potentially occur sooner. Already, Auckland Council has committed to only procure zero-emission buses by 2025 through the C40 Fossil-Fuel-Free Streets Declaration.[6]

Q11.2: EECA supports feebates for heavy vehicles so long as good data is available

13. The Commission asks if a feebate scheme for the heavy vehicle market is appropriate, and if there are other policies to improve emissions from heavy transport.

14. While, in principle, EECA supports feebates in the heavy vehicle market, we suggest first looking at the heavy vehicle data we collect.

15. For a feebate scheme to cover vehicles within the heavy vehicle fleet, there needs to be reliable and comparable emissions data. As heavy vehicles (e.g. trucks) can vary significantly in terms of their performance, capability to carry loads, and componentry to suit individual business operations (as compared to light vehicles where a degree of standardisation can be observed), reliably comparing these for a feebates scheme will be difficult.

New - EECA recommends an extension to the Road User Charges exemption for low emissions heavy vehicles

16. In New Zealand, the uptake of efficient heavy vehicles would be further accelerated by an extension to the exemption on Road User Charges (RUC).

17. Currently, the RUC exemption is in place until electric heavy vehicles reach 2 per cent of the heavy vehicle fleet. This incentive can be worth around $20,000 per year per vehicle for a typical intra-regional freight vehicle. This policy could be extended to provide further ongoing support for the transition of the heavy fleet.[7]

[6] Auckland Council, 'Major Commits to a greener Auckland' (27 October 2017): http://ourauckland.aucklandcouncil.govt.nz/articles/news/2017/10/mayor-commits-to-a-greener-auckland/

[7] As an aside, the economics of RUC and the tax treatment of vehicles (light and heavy) should be conducted by the Ministry of Transport.

R11.1: EECA supports the introduction of vehicle fuel efficiency/emissions standards in alignment with Australia

18. EECA supports the introduction of vehicle fuel efficiency/emissions standards. New Zealand, Russia and Australia remain the only OECD countries currently without a vehicle fuel efficiency/emissions standard. Introducing these standards would provide a bottom line performance standard and avoid the potential dumping of emissions-intensive vehicles in New Zealand.

19. Australia is currently considering low emission transport policy options. We recommend coordinating with Australia to signal to the Original Equipment Manufacturer (OEM) market the greater demand for low-emission vehicles in the trans-Tasman.

F11.4 and F11.6: EECA supports the uptake of EVs and highlights a supply-side barrier

20. EECA agrees that the widespread uptake of EVs and improvement in the efficiency of fossil-fuel vehicles are the greatest abatement opportunities New Zealand has to reduce road transport emissions.

21. EVs enable motorists to reduce their transport emissions without having to significantly alter their transport use. Ninety-five percent of daily travel by household cars in New Zealand is for distances of less than 120 kilometres, which is well within the range of many EVs in the market today.[8]

22. EECA-supported research concluded that driving an EV in New Zealand led to an emissions reduction of 80 per cent compared to a petrol vehicle, and a 60 per cent reduction over the total life of the vehicle.[9]

23. In addition to the barriers noted by the Commission (including price), EECA considers one of the most significant barriers to EV uptake is the lack of model supply and choice in New Zealand.

[8] Analysis provided by Ministry of Transport, based on the Ministry's Household Travel Survey results (2015-2017).

[9] Energy Efficiency and Conservation Authority (EECA), '*Life Cycle Assessment of Electric Vehicles',* https://www.eeca.govt.nz/news-and-events/media-releases/research-confirms-environmental-benefits-of-electric-vehicles/ (10 November 2015).

24. New Zealand accounts for a very small proportion of global sales of new light vehicles. EV models available in other countries are not offered here, and some models are offered at a significant price premium over the same model in other countries (even before any subsidies).

25. A vehicle emissions standard would help address this supply-side barrier by encouraging manufacturers to offer more models of low-emission vehicles, with marketing and pricing to ensure they meet the standard.

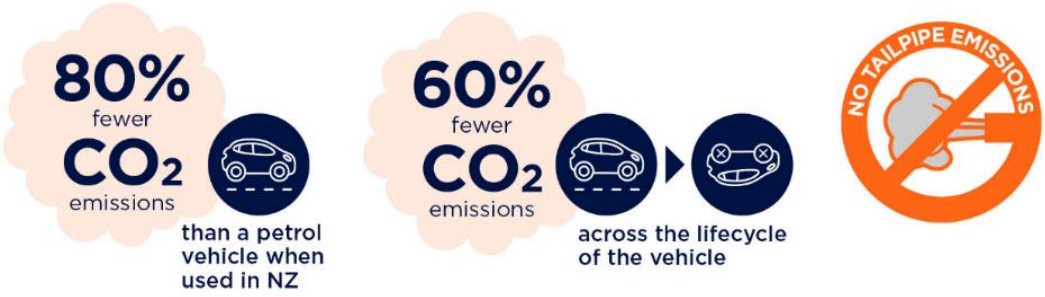
26. A well-designed standard is potentially a more powerful tool than a feebate scheme (a demand-side incentive), as the standard will help address the supply-side barrier. The two policies could complement each other to provide greater momentum in EV uptake.

F11.6: EECA's public information campaign for EVs addresses the lack of awareness

27. EECA agrees the "lack of public awareness and understanding of EVs" is a barrier and is addressing this through delivery of its five-year public information campaign. This aims to overcome information barriers to uptake, including awareness and understanding. The campaign includes communications through a range of channels, including the Government's EV website: https://www.electricvehicles.govt.nz/.

28. As part of this campaign, EECA has been tracking barriers and marketing trends to EV uptake in New Zealand since October 2016, including New Zealanders' familiarity, favourability and confidence in EVs.

Examples of some of the key messages developed by EECA:



Cost and charging:

29. EECA recommends removing reference to the cost-reflective pricing from **F11.6** and capturing the issue of cost-reflective pricing (and associated network management issues) as a separate matter. The lack of cost-reflective pricing may only marginally increase the cost of charging an EV, which is a minor consideration for potential purchasers. A risk of not having cost reflective pricing is that poor charging decisions may be made which may increase peak demand.

F11.6, F11.11 and R11.3: The Government already provides financial support for charging infrastructure across the country

30. EECA agrees that "limited travel range, and associated range anxiety" is a barrier for some people in the uptake of EVs.

31. The Government's primary tool for developing New Zealand's charging network is the Low Emission Vehicles Contestable Fund which EECA administers.[10]

32. To date, EECA has invested $3.22 million in 17 charging projects that will add hundreds of fast and slow public charging stations across the country's network.

33. In April 2017, the New Zealand Transport Agency (NZTA) set a target for a nationwide network of EV charging infrastructure of 'coverage of fast/rapid direct current (DC) charging stations every 75 kilometers across our state highways'.[11]

34. Nationwide DC coverage is estimated to be at 88 per cent by July 2018, once all funded projects from EECA's contestable fund are completed.

[10] EECA, Low Emission Vehicles Contestable Fund: https://www.eeca.govt.nz/funding-and-support/low-emission-vehicles-contestable-fund/

[11] New Zealand Transport Agency (NZTA), Enabling a nationwide network of public charging infrastructure: https://www.nzta.govt.nz/planning-and-investment/planning/transport-planning/planning-for-electric-vehicles/national-guidance-for-public-electric-vehicle-charging-infrastructure/enabling-a-nationwide-network-of-public-charging-infrastructure/

F11.12: The Government has a watching brief on the potential for hydrogen fuel-cell vehicles and associated infrastructure

35. The Commission states the biggest challenge for achieving the uptake of hydrogen in New Zealand is the significant investment needed in new infrastructure.

36. EECA, the Ministry of Business, Innovation and Employment (MBIE), and other private sector partners have jointly commissioned a detailed study on the likely economics of hydrogen, and the implications for New Zealand specifically. The study will include a focus on hydrogen use in public transport and the freight sector. This work is expected to be completed in September 2018.

R11.4: EECA agrees government agencies should procure low emission vehicles where practicable

37. The Commission states the Government should encourage government agencies wherever possible to procure low emission vehicles. The Government currently has a commitment to transition its vehicle fleet, where practicable, to become emissions-free by 2025/26.[12]

38. Combined, government organisations have a total of around 25,700 light vehicles in their fleets and purchase around 4,000 vehicles annually.

39. However, there are significant barriers to EV uptake by government organisations – primarily, the high capital cost of new EVs and infrastructure installations, and secondly the range of models currently available through the New Zealand Government Procurement's (NZGP) All-of-Government vehicles catalogue.

40. EECA would encourage the Commission to consider supply-side measures to enhance the variety of new EVs coming into New Zealand. This may include seeking closer alignment with Australia's developing transport policy, thereby creating a more attractive and viable Australasian market, and actively promoting opportunities in this market with vehicle manufacturers.

[12] Coalition Agreement New Zealand Labour Party and New Zealand First (2017), http://img.scoop.co.nz/media/pdfs/1710/362429780LabourandNewZealandFirstCoalitionAgreement.pdf

Electricity

R12.1 and F12.3: EECA believes it is possible to further decarbonise the electricity system, without undue impact on pricing and without subsidies

41. F12.3 suggests that wholesale prices may increase as a result of pursuing low emissions electricity.

42. EECA modelling suggests that generation *costs* may increase (as a result of carrying excess generation capacity), but in the absence of other mechanisms these costs may not be recoverable through the market, leading to a lower level of investment than is desirable. This is also borne out in recently published work from Concept Consulting.[13]

43. Modelling of high-levels of renewables suggests that spot prices will be low on average, with periods of very high prices at times of low hydro supply.[14] Some form of return-smoothing mechanism would assist the generators to make long-term decisions, recognising that no mechanism for this exists under the current open market.

44. EECA agrees that subsidising particular technologies should be avoided, due to the risk of locking in high costs.

45. EECA notes that emissions prices alone may not be sufficient to drive investment in new renewables, since new generation plant is a high capital cost investment which, in many cases, is competing against existing depreciated generation assets.

46. Further, the current emissions pricing design provides only a short-term signal, whereas renewable generation investments are a long-term decision. One solution to this would be to facilitate long-term contracting arrangements for both emissions and electricity, so that potential investors could have greater certainty and lower risks.

47. We also agree that retention of some form of thermal generation (with a preference for lower emission fossil fuels) is likely to be the most efficient and cost-effective way of meeting dry year demand for all users.[15]

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[13] Concept Consulting, '*Summary insights on energy-related carbon-abatement opportunities',* prepared for the Parliamentary Commissioner for the Environment (September 2017), http://www.concept.co.nz/uploads/2/5/5/4/25542442/summary_report_-_energy_related_carbon_abatement_.pdf

[14] EECA analysis, unpublished.

[15] Derived from EECA analysis and the Concept Consulting report cited above at n 13.

48. In the Commission's draft report (section 12.4, page 326), it is assumed that gas-fired co-generation will continue over the long-term based on the scenarios analysed.

49. The University of Waikato has investigated the economics of co-generation and found that in most cases, the production of electricity via co-generation is not as carbon efficient as producing heat and purchasing grid electricity.[16] As such, in a low carbon future, co-generation may reduce.

New - EECA strongly recommends continuing focus on energy efficiency to reduce demand

50. Section 12.5 (page 336) of the report discusses '**Demand-side options'**, but overlooks the potential for energy efficiency measures to provide permanent reductions in existing demand (both overall and at peak).

51. Efficiency gains (such as resulting from EECA's Equipment Energy Efficiency (E3) Programme)[17] can free more room for new sources of demand without additional generation or network capacity.

52. A report commissioned by EECA with Concept Consulting estimates that greater uptake of energy efficiency measures that reduce the peak impact of household demand could readily reduce the overall cost of supplying electricity to New Zealand by $30 million per year.[18]

53. EECA notes the Winter Energy Payment could in future years be used to stimulate investment in energy efficient, low emission technologies that will reduce energy costs and improve health and quality of life outcomes for low income households over the long-term.

New - EECA recommends aligning lighting standards with Australia

54. As background, EECA and Australia's state and federal governments jointly administer the E3 Programme, which sets minimum energy performance standards (MEPS) and labelling on energy-using equipment, which are proven tools for reducing energy use and improving energy productivity across all sectors.

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[16] Atkins M.J., Walmsley T.G., Philipp M., Walmsley M.R.W., Neale J.R., 2017, Carbon emissions efficiency and economics of combined heat and power in New Zealand, Chemical Engineering Transactions, 61, 733-738 DOI:10.3303/CET1761120: http://www.aidic.it/cet/17/61/120.pdf

[17] EECA, Equipment Energy Efficiency (E3) Programme: https://www.eeca.govt.nz/standards-ratings-and-labels/equipment-energy-efficiency-programme/

[18] EECA, '*Big benefits from reducing peak energy use',* https://www.eeca.govt.nz/news-and-events/media-releases/big-benefits-from-reducing-peak-energy-use/ (29 March 2018).

55. Since 2002 and to date, the E3 Programme in New Zealand has reduced emissions by 1.4MtCO_2e with national benefits of $842 million and energy reductions of 34.7PJ.[19]

56. While New Zealand's residential houses only contribute 6.5 per cent of New Zealand's energy-related emissions, there are some gains in this sector which EECA recommends capturing through changes already widely adopted overseas. The best example of this opportunity is in residential lighting.

57. Generally speaking, New Zealand and Australia align standards to ensure consistency in our markets for trade benefits. However, since 2009, New Zealand's lighting standards have not synchronised with Australia's, who have phased out the importation of inefficient incandescent lightbulbs, is in the process of phasing out halogen lamps, and are applying MEPS to LED technologies.

58. EECA estimates aligning residential lighting policy in New Zealand with Australia could reduce emissions by 1.4MtCO_2e through to 2030 at a negative net cost to New Zealand.[20] A standard LED lightbulb uses up to 85 per cent less electricity than traditional incandescent light bulbs and can last more than 15 times longer.

Heat and industrial processes

Q13.4: EECA recommends policies complementary to the ETS to support reductions to the embodied energy and carbon in buildings and infrastructure

59. The Commission asks if a higher effective carbon price would be sufficient to encourage the greater use of lower carbon technologies.

60. In EECA's experience in working with New Zealand's largest energy-users, a higher effective emissions price on its own will have limited impact on the embodied energy and carbon in buildings and infrastructure. The use of procurement standards and targets would complement the emissions price.

[19] Based on EECA analysis from sales data collected from industry that sell energy-using products that are regulated under the Energy Efficiency (Energy Using Products) Regulations 2002.

[20] Based on EECA analysis.

61. Substitution of steel and concrete for engineered timber (laminated structural lumber or LVL) in mid-rise commercial buildings and road bridges is an opportunity to reduce emissions, and could increase economic activity by producing higher value-added wood products.[21]

62. An example of more active policy in this area is Rotorua District Council's adoption of a 'Wood First Policy' to encourage government agencies to use natural, timber-based construction.[22]

F13.1: EECA understands there are abatement opportunities for high-temperature heat users

63. In F13.1, the Commission states that high-temperature heat users have no viable short-term abatement opportunities.

64. We do not believe F13.1 to be universally true. A number of electro-technologies (induction, infra-red and microwave heating, mechanical vapour recompression) can meet existing high-temperature heat requirements.

65. However, because of high electricity prices, these opportunities are more likely to be cost-effective in non-energy intensive companies, where fuel cost is a small proportion of overall cost, than for large heat users.

66. The largest opportunities for cost-effective electrification of process heat are in low-temperature applications, such as space heating and water heating.

67. EECA has commissioned research to provide guidance on specific applications where electric heating may be economically viable. EECA is designing a heat pump pilot project to support broader application of high temperature heat pumps for industrial heating processes and building heating.

68. The electric heating research and early results of the pilots can be provided to the Commission to inform the final report.

[21] Dr Martin Atkins, 2017. Industrial Process Heat – Options for Efficiency Improvements and Emissions Reduction, Presentation to EMANZ Conference 2017: http://www.emanz.org.nz/system/files/Dr%20Martin%20Atkins_Industrial%20Process%20Heat.pdf

[22] Rotorua Lakes Council, 'Council adopts Wood First Policy for Rotorua', 7 April 2015, http://www.rotorualakescouncil.nz/our-council/news/Pages/default.aspx?newsItem=6113.

F13.2: Operational efficiencies can reduce process heat emissions, but require better metering and benchmarking

69. EECA agrees there are limited operational opportunities to reduce process heat-related emissions on a percentage basis (typically 3-5% per heat plant).

70. However, because large heat users have such high-levels of energy use, even these percentage reductions can have significant impact. For example, a five per cent efficiency improvement in low and medium temperature boiler systems nationwide could generate an estimated 230,000t CO2e per year.[23]

71. In addition, these opportunities could be realised in the short term at negative cost, and have significant cumulative impact until heat plants reach their end of life. Lack of heat metering and a thorough understanding of the value of heat plant opportunities are barriers to realising operational efficiencies.

72. EECA is initiating a pilot heat plant optimisation project to obtain credible information on a range of opportunities applicable to a wide-range of fossil fuel heat plant.

F13.4: In the right applications, woody biomass is effective at providing low-carbon heat

73. The issues raised about the emissions impact of biomass in the Commission's report (page 352) are noted, but in the right circumstances (local supply, low moisture content, modern combustion equipment) it can provide a low-carbon heat source for low (<100^{o}C) and medium (100 – 300^{o}C) temperature applications.

F13.5: Emissions pricing alone is not sufficient to drive emissions reductions

74. EECA agrees that emission prices are necessary, but not sufficient to drive emission reductions. There is widespread evidence that firms primarily base their investments on minimising upfront costs rather than lifecycle costs.

75. Future asset replacement decisions result in poor emissions outcomes because business decision-making is constrained by short-term return-on-investment (ROI) thresholds. There is an opportunity to modify corporate decision-making and underlying financial analysis to encourage investments that minimise whole-of-life cost rather than first cost.

76. EECA has commissioned PricewaterhouseCoopers (PwC) to outline how large industrial energy users invest in energy efficiency and emission reduction projects, and what their

[23] EECA's Energy End Use Database (2015 data); Boilers supplying low and medium temperature emitted an estimated 4.2MtCO2e in 2015.

business decision-making processes are. This report is due in late June 2018 and can be made available to inform the Commission's final report.

77. The research will also assist in assessing different policy options according to how effective they will be in influencing the investment practices of industrial energy users.

78. Most state and utility-led programmes in the United States have financial incentives funded through a systems benefit charge (or levy) to help bring low-emissions projects over their corporate ROI threshold criteria.[24] The Netherlands, Ireland, and the UK have targeted tax deduction and depreciation schemes.[25] [26]

79. A large, but unquantified amount of medium temperature heat (100 - 300^{o}C) is driven by the use of steam for transporting heat rather than for end-use requirements. Re-engineering the heat supply and distribution system can enable the substitution of medium temperature heat with low temperature heat and make low carbon options (such as high temperature heat pumps) viable.

R13.1: EECA already has a clear mandate to deliver carbon emission reduction programmes

80. Under the Energy Efficiency and Conservation Act 2000 (the Act), EECA's statutory function is: "to encourage, promote, and support energy efficiency, energy conservation, and the use of renewable sources of energy".

81. While the Act does not explicitly mention the reduction of carbon emissions as part of EECA's functions, the nature of our activities and programmes produce this as a co-benefit.

82. EECA's work programme is also guided by the *New Zealand Energy Efficiency and Conservation Strategy 2017-2022* (NZEECS), which provides a clear carbon focus.[27]

83. There could be economies of scope in widening our mandate to cover operational activities around indirect carbon emissions (e.g. corporate air travel) and other greenhouse gas emissions, such as refrigerants or industrial process emissions.

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[24] US DOE/EPA (2014), Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector: https://www4.eere.energy.gov/seeaction/publication/industrial-energy-efficiency-designing-effective-state-programs-industrial-sector

[25] International Energy Agency Workshop background document (IEA), '*The Future of Energy Efficiency Finance*' https://www.iea.org/media/workshops/2012/energyefficiencyfinance/Background.pdf (2012)

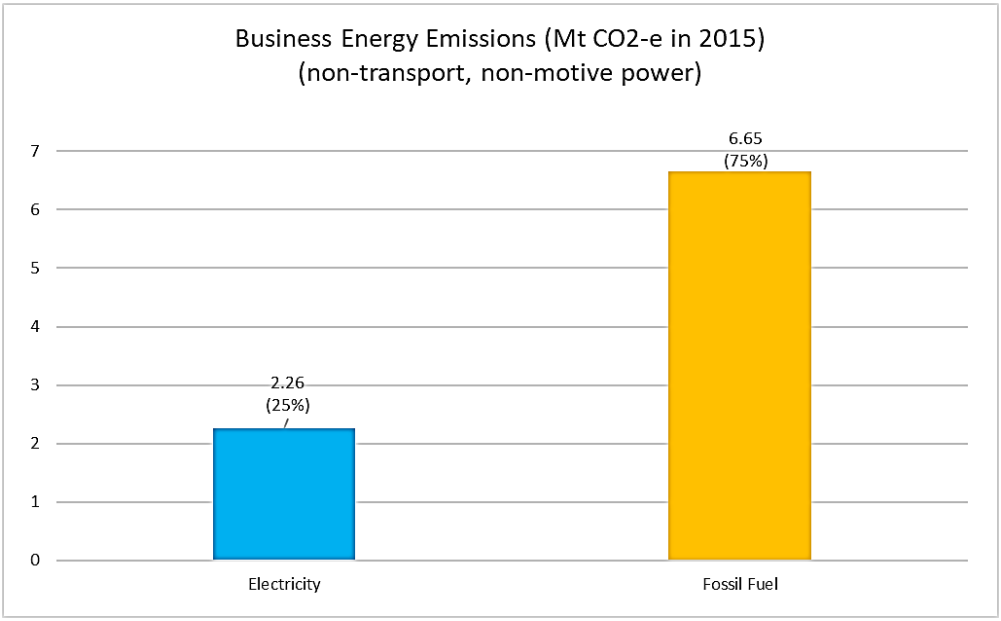
[27] New Zealand Energy Efficiency and Conservation Strategy 2017 – 2022 (NZEECS), Unlocking our energy productivity and renewable potential: www.mbie.govt.nz/info-services/sectors-industries/energy/energy-strategies

84. There appears to be no mandate for any agency to focus on minimising the use of materials with high embodied energy and carbon used in infrastructure and buildings construction.

85. In its recommendation, the Commission might wish to clarify whether changing EECA's mandate to address emissions is confined to reducing energy-related carbon emissions, or whether it is recommending EECA should be given the role to address non-energy related emissions as well (e.g. agricultural emissions).

R13.2: EECA must continue to focus on the largest energy users/emitters, as they offer the greatest potential for emissions reductions at the least cost

86. Energy use by businesses (excluding transport) accounts for approximately 51 per cent of New Zealand's total energy use, and more than 43 per cent of our energy-related carbon emissions.[28] Most of these emissions come from several large energy-using businesses. We estimate that 75 per cent of business emissions are from fossil fuel use for process heat, compared with only 25 per cent from electricity.[29]



87. While small firms face barriers to improving energy efficiency, the barriers facing large firms remain significant. Large emitters currently offer greater abatement opportunities at lower

[28] The Ministry for Business, Innovation & Employment (MBIE), Energy in New Zealand 2017: http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/documents-images/energy-in-nz-2017.pdf; Ministry for the Environment, New Zealand's Greenhouse Gas Inventory 1990 – 2016, (April 2018), http://www.mfe.govt.nz/node/24120/

[29] EECA's Energy End Use Database (2015 data).

transaction cost (e.g. the cost to EECA for engaging with these businesses). Our experience is also that ongoing senior management engagement is required to embed long-term energy management improvements in companies.

88. EECA maximises its reach to smaller businesses through energy service providers working with individual firms, by promoting widely-applicable sector-based information and guidance, and through product regulations.[30] EECA plans to initiate further sector-based activity, but too much direct engagement with SMEs would involve high transaction costs for comparably less measurable emission reductions.

89. Where recovery for services is feasible, EECA believes this work would be best done by the private sector.

90. EECA does not co-fund capital investments, except for technology demonstrations where there are diffusion benefits from early adopters.

New - EECA recommends the use of high-temperature heat pumps in low-temperature process heat applications

91. In regards to '**Fuel Switching'** and '**Electricity**' on pages 349-350 of the report, the Commission should consider the emissions reduction potential of high temperature heat pumps to largely displace fossil fuels for low temperature process heat (<100◦C).

92. This technology is improving and is now capable of meeting heat demands for all building services in new buildings and is suitable for replacement heat plant in many existing buildings and low temperature industrial processes. EECA can share more information about this technology with the Commission.

New - EECA proposes a phase-out of coal from buildings and plant

93. Regarding the use of coal, EECA supports the Commission's view that it "does not see a compelling future for coal-based process heating, given its emissions intensity."

94. Given the improving performance of heat pumps, there is a case for considering a ban on the use of coal for low temperature heating in new facilities and existing plant as it reaches its end of life.

[30] EECA Business provides a range of tools, information resources and case studies to support both small and large businesses: https://www.eecabusiness.govt.nz/resources-and-tools/.

95. Development of such a policy would require detailed analysis to fully quantify the costs and benefits, and to confirm the availability of fit-for-purpose technologies and the security of supply of alternative fuels.

New - EECA recommends investigating boiler energy or emissions standards

96. In regards to '**Boiler standards'** on page 354 of the report, EECA is investigating the case for standards (MEPS) particularly for smaller heat plant, including gas and liquid fuel burners and controls. Boilers and heat distribution systems have a longer life than burners and replacing burners with more efficient ones offers an opportunity to reduce emissions before major upgrades of heat plants.

97. The United States and European Union (EU) regulate boilers by setting a minimum efficiency percentage for different sized classes of boilers.[31] The EU currently regulates both solid fuel boilers and boilers fueled by liquid and gaseous fuels through eco-design requirements (MEPS) and labelling.

The built environment

F15.1: EECA recommends policies to complement the ETS in reducing emissions from the built environment

98. The Commission states that increasing the price of emissions via the ETS is the most effective way to incentivise the transition towards the construction of buildings with lower embodied emissions.

99. In theory an increased emissions price would provide an incentive to make new and existing buildings more energy efficient. However, in EECA's experience under its Commercial Building Design Advice programme, the owners/developers of commercial buildings are not making the most efficient long-term energy usage decisions because of a variety of barriers.

100. Barriers include a lack of observable information about energy efficiency, a focus on minimising capital costs, rather than lifetime costs during construction and refurbishment, and inefficiencies getting locked-in at the design stage. Split incentives between landlords

[31] EU Ecodesign Directive, Solid fuel boilers: 2015/1189, 813/2013 (eco-design requirements for space heaters and combination heaters) and 811/2013 (energy labelling for space heaters): http://ec.europa.eu/growth/industry/sustainability/ecodesign_en.

US DOE, Energy Conservation Program: Energy Conservation Standards for Commercial Packaged Boilers, https://energy.gov/sites/prod/files/2016/12/f34/CPB_ECS_Final_Rule.pdf, page 11 (Note: this rule is not yet published in the Federal Register as of Thursday 9 November 2017).

and tenants are a barrier to carbon efficiency, as landlords often pay the cost of intervention, but tenants see the main benefit.

101. Co-benefits, such as improved occupant health and comfort or improved workforce productivity, may in some cases be the main motivations for decision-makers to choose low-carbon building strategies. EECA can provide further information to support this finding.

R15.1, R15.2 and R15.3: EECA agrees with the Commission's recommendations for improving the energy efficiency of buildings using the Building Code

102. Building Code energy performance requirements for large buildings (H1) have not been updated since they were introduced in 2000 (except for lighting). In EECA's view, the scope of H1 is limited (e.g. Heating, ventilation, and air conditioning (HVAC), a significant energy end use, is excluded) and the stringency for some criteria is low (e.g. minimal thermal envelope requirements and lighting).

103. EECA estimates the economic potential in existing commercial buildings is equivalent to 1.0 MtCO2e per year, out of an estimated 2MtCO2e from the commercial building sector (including some public sector buildings).[32]

104. These savings would be delivered by improved lighting (LED lighting technology with automatic controls), shifting to high efficiency electric heat pumps for space and water heating, continuous commissioning of HVAC systems (see para 109), improved building control systems, and appliance choices. EECA is examining opportunities to further reduce energy demand in commercial buildings.

New - EECA is investigating the value case for mandating office ratings in New Zealand

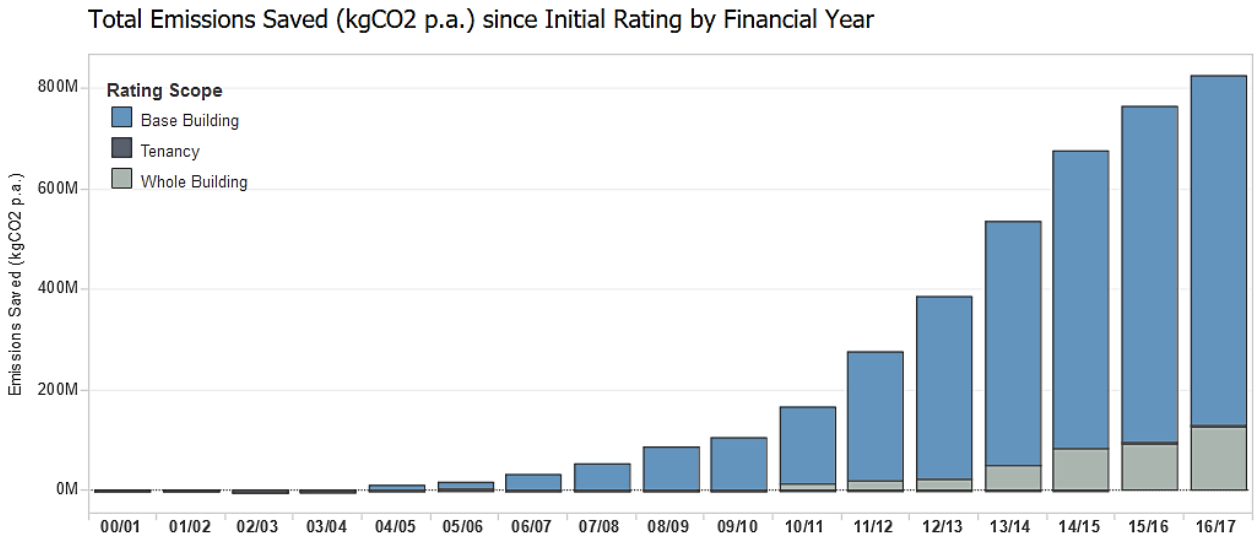
105. NABERSNZ is a voluntary rating scheme that measures the operational carbon performance of existing office buildings on a 6-star scale.

106. In Australia, NABERS has been mandatory for all offices since 2010. State governments began implementing NABERS requirements for their own offices as early as 2004.

107. The table below shows the emissions saved resulting from NABERS.[33]

[32] EECA analysis using the EECA Energy End-Use Data Base and Energy Efficiency Potentials Tool.
Note that public sector buildings includes tertiary and health institutions, and not just public office spaces.

[33] NABERS Annual Report 2016/17: https://nabers.gov.au/AnnualReport/2016-2017/nabers-energy-for-offices.html
Note Australia has a more carbon intensive electricity system than New Zealand.



108. As NABERSNZ is voluntary in New Zealand, uptake is low. Given the success of NABERS at abating emissions in Australia, EECA is investigating the value case to do the same here.

New - EECA recommends a focus on commissioning existing buildings

109. Building commissioning (and re-commissioning) is the process of tuning the internal systems (most commonly HVAC systems) in a building for optimal energy performance.

110. Over time energy using systems deviate from optimal performance as, for example, temperatures are adjusted in response to ad hoc requests from tenants, building controls (e.g. louvres) begin to fail, and building management systems are not upgraded. For new buildings, commissioning should occur as part of the building handover process and, for an existing building, commissioning should be part of any maintenance regime.

111. The 2004 University of Berkeley study *The Cost-Effectiveness of Commercial Buildings Commissioning* is often cited as a seminal study on the benefit of commissioning.[34] It looked at numerous commissioning projects across the US and found a median payback period of 0.7 years for existing buildings (and 15 per cent energy cost savings), and 4.8 years for new buildings. The report notes these findings as conservative.

[34] E.Mills, H. Friedman, T.Powell, D. Claridge, T. Haasl and M. Piette (2004), ' The Cost-Effectiveness of Commercial Buildings Commissioning – A Meta-Analysis of Existing Buildings and New Construction in the United States', http://www.google.co.nz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwjh3P-Fq8DbAhUKHJQKHQv6CfAQFgg2MAI&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.233.5527%26rep%3Drep1%26type%3Dpdf&usg=AOvVaw1Jrjgb1rU8InP1tydY66Wh