Energy Efficiency in New Zealand's Light Transport Fleet: Is it Time for a CO_2/Fuel Efficiency Standard?

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Empirical evidence shows that other OECD countries are pulling ahead of New Zealand, reaching higher levels of energy efficiency and lower levels of CO_2 emissions from their light transport fleets (private passenger cars). A key reason for this lag is the lack of specific energy efficiency regulations or standards in New Zealand. The main submission made is that the time is ripe for a substantial overview of New Zealand's light transport fleet as it produces the greatest amount of CO_2 emissions in the transport sector. New Zealand's greenhouse gas emissions profile is different from that of many other developed countries because it is primarily an agricultural producing economy with high methane gas emissions. It already has high levels of renewable energy in its electricity sector, which leaves transport as one of the best remaining areas from which to extract energy efficiency to reduce New Zealand's CO_2 emissions. This article identifies the clear and widening gap in energy efficiency in New Zealand's transport sector. It then examines the international and national environment to determine whether the legal framework is in place to introduce energy efficiency regulations/standards in line with other OECD countries. The conclusion is that the existing legal structure is sufficient for regulations/standards to be made. With New Zealand's Energy Efficiency and Conservation Strategy (New Zealand's primary policy document on energy efficiency and conservation matters) to be reviewed in mid-2016 and remaining

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in place until 2021, there is now an opportunity to set new policy and targets to achieve greater energy efficiency and CO_2 reductions from New Zealand's light transport fleet.

1. INTRODUCTION

But we can never do nothing. That which we have done for thousands of years is also action. It also produces evils. Once we are aware that the status quo is action, we can then compare its discoverable advantages and disadvantages with the predicted advantages and disadvantages of the proposed reform, discounting as best we can for our lack of experience. On the basis of such a comparison, we can make a rational decision, which will not involve the unworkable assumption that only perfect systems are tolerable.

— Garrett Hardin[1]

The methodology used for this article includes both doctrinal (black letter law) and non-doctrinal considerations of policy and society to approach the difficult problem of how to reduce greenhouse gas (GHG) emissions. In particular, the focus is on how to increase energy efficiency in the New Zealand transport sector to reduce CO_2 emissions. Underlying the problem is an undisputed tension between the need for prosperity and economic growth, and a strong desire to protect the environment for current and future generations.

The article is divided into the following three sections. Part 2 deals with the concept of "energy efficiency" in international documents. Part 3 discusses New Zealand's policy, legislation and regulation of energy efficiency for light transport. Part 4 looks at the latest CO_2/fuel efficiency standards in place in the United States, Japan and the European Union, and then examines common energy efficiency fiscal policies.

Over 50 per cent of world oil production is used for transport and three quarters of that is used on the roads.[2] The International Energy Agency (IEA)[3]

1 Garrett Hardin "The Tragedy of the Commons" (1968) 162 (3859) Science 1243 at 1247–1248.

2 International Energy Agency *Technology Roadmap: Fuel economy of Road Vehicles* (IEA, Paris, 2012) at 1 [IEA *Technology Roadmap*].

3 The IEA was established in 1974 to encourage energy security amongst member states and to provide research and analysis on ways to ensure reliable, affordable and clean energy.

projects that without strong new policies and laws focused on energy efficiency, the world's transport fuel use will double between 2010 and 2050.[4]

A critical task for New Zealand in 2016 will be refreshing the Energy Efficiency and Conservation Strategy,[5] a job which is undertaken by the Energy Efficiency and Conservation Authority (EECA)[6] and the Minister of Energy and Resources. The current Minister is also Minister of Transport and Associate Minister for Climate Change Issues.[7] This places him in a unique position to understand three vital intersecting areas affecting energy efficiency:

1. The requirement that New Zealand reduce its CO_2 emissions.
2. New Zealand's energy profile.
3. The specific nature of the light passenger fleet and the challenges it poses in creating a more energy-efficient transport sector.

2. THE INTERNATIONAL SITUATION

> *The world is not on track to meet the target agreed by governments to limit the long term rise in the average global temperature to 2 degrees Celsius … our climate is already changing and we should expect extreme weather events (such as storms, floods and heat waves) to become more frequent and intense, as well as increasing global temperatures and rising sea levels. … Energy is at the heart of this challenge: the energy sector accounts for around two-thirds of greenhouse-gas emissions, as more than 80% of global energy consumption is based on fossil fuels.*
>
> — International Energy Agency *Redrawing the Energy-Climate Map*[8]

The climate is a highly complex system that has developed a delicate ecological balance over millennia which is now capable of sustaining life. Since the early 1900s, with the birth of the Industrial Revolution powered by the burning of fossil fuels, human activity has placed large quantities of GHGs into the

4 IEA *Technology Roadmap*, above n 2, at 1.

5 Energy Efficiency and Conservation Authority *Briefing to the Incoming Minister of Energy and Resources* (EECA, October 2014) at 4.

6 The EECA is a statutory body set up under s 20 of the Energy Efficiency and Conservation Act 2000.

7 Hon Simon Bridges, Minister of Energy and Resources, Minister of Transport and Associate Minister for Climate Change Issues <www.beehive.govt.nz>.

8 International Energy Agency *Redrawing the Energy-Climate Map: World Energy Outlook Special Report* (IEA, Paris, 10 June 2013) at 9.

atmosphere upsetting this balance. CO_2 is the main gas released from the burning of fossil fuels. The net impact of human activity is to trap too much heat in the climate system, with the potential to cause climate change beyond our control. The dilemma we face is that our vastly improved standards of living depend on the combustion of traditional fossil fuels (coal, oil and gas) to create the energy needed to drive economic growth, and the movement of approximately 1.5 billion vehicles around the planet.[9]

The latest Intergovernmental Panel on Climate Change (IPPC) report[10] warns that the total cumulative amount of human-produced CO_2 emissions released into the atmosphere will need to be limited to about 1,000 gigatonnes to prevent the climate changing beyond human control. About half this budget has already been spent. The remaining amount must be used equitably, sparingly and as efficiently as possible while the world switches to a new zero-carbon renewable energy reality. This makes the next few decades vital in terms of energy efficiency policy, law and practice.

Limiting temperature rise will require substantial reductions of GHGs. At the recent scientific conference "Our Common Future Under Climate Change" (CFCC 15)[11] held in the run-up to the Paris Conference (COP 21),[12] the outcome statement recognised the key role energy efficiency must play and saw transport as one of the easier and more cost-effective sectors from which to extract CO_2 reductions.

BP's *Statistical Review of World Energy*[13] notes that CO_2 output has flattened during 2014, showing the slowest rate of growth since the late 1990s and decoupling (for the first time other than during the Global Financial Crisis) from world economic growth.[14] Group Chief Executive Bob Dudley reserves

9 Drew Kodjak *Policies to Reduce Fuel Consumption, Air Pollution and Carbon Emissions from Vehicles in G20 Nations* (International Council on Clean Transportation, G20 briefing paper, May 2015) at 4.

10 Intergovernmental Panel on Climate Change "Summary for Policymakers" in TF Stocker and others (eds) *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the 5th Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, 2013) at 14.

11 Our Common Future Under Climate Change Scientific Committee *Our Common Future Under Climate Change: Outcome Statement* (CFCC 15, Université Pierre et Marie Curie, Paris, 10 July 2015).

12 The United Nations Climate Change Conference of Parties (COP) is a product of the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is to stabilise GHG concentrations in the atmosphere. The role of the COP is to review the Convention's implementation. The first COP took place in 1995 and other significant meetings since then have included COP 3 when the Kyoto Protocol was adopted, COP 11 where the Montreal Action Plan was produced, and COP 17 when the Green Climate Fund was created.

13 BP *Statistical Review of World Energy 2015* (BP, June 2015) <www.bp.com>.

14 At 1.

judgement on whether this is due to successful CO_2 reduction policies or the slowing and rebalancing of China's market (the largest in the world) from a developing energy-intensive economy to a mature goods and services one.[15] The IEA takes the view that the trend is the result of the use of greater low-carbon energy sources and the rapidly expanding renewables market. It believes there are clear signs that global growth and energy-related emissions are starting to decouple:[16]

> The energy intensity of the global economy dropped by 2.3% in 2014, more than double the average rate of fall over the last decade, a result stemming from improved energy efficiency and structural changes in some economies …

With the recent introduction of US shale oil into the energy market and with world oil prices low, several countries including India, Indonesia, Malaysia and Thailand have removed internal fossil fuel subsidies. Provided they can sustain this position when the price goes up again, this policy measure will curb incentives for wasteful oil consumption caused by artificially low fossil fuel prices.[17]

Climate change is a global problem that will affect all people in all regions. If we are to be successful in limiting harmful impacts, all countries, even small ones like New Zealand, must contribute to reducing their GHG emissions.

2.1 Energy Efficiency

The development of energy efficiency laws and domestic sustainable energy policy has been positively influenced by principles of international environmental law. But international and regional

15 At 3. Japan recorded the largest decline in oil consumption of the OECD in 2015, falling to its lowest level since 1971. Developing countries outside the OECD accounted for all the net growth in oil consumption. Global oil production was more than double global consumption in 2014.

16 International Energy Agency *Energy and Climate Change: World Energy Outlook Special Report* (IEA, Paris, 2015) at 11 [IEA *Energy and Climate Change*].

17 New Zealand Climate Change Minister Tim Groser led a coalition of governments calling for the phase-out of subsidies on fossil fuels. See New Zealand Government "Climate Change Minister calls for phase-out of fossil fuel subsidies" (press release, 18 April 2015) <www.beehive.govt.nz>. See also International Institute for Sustainable Development "Fossil-Fuel Subsidy Reform Communiqué" (press release, 17 April 2015) <www.iisd.org/publications>.

> *treaties fail to establish uniform energy efficiency obligations and are drafted in non-binding hortatory language.*
>
> Stuart Bruce[18]

International environmental law is made up of numerous treaties, declarations and soft law principles. These principles, while not legally binding, have guided the development of many national energy efficiency policies and laws. In particular, the principle of sustainable development has underpinned the development of energy efficiency. There is no common internationally accepted definition of energy efficiency.[19] However, its general meaning is that energy efficiency is the end result of using less energy to produce the same service or amount of output.[20]

At a national level, energy efficiency can be measured as the total primary energy supply (TPES) per unit of gross domestic product. The terms "energy efficiency" and "energy conservation" are not the same thing. Energy efficiency refers to a reduced level of energy intensity in energy use whereas energy conservation refers to a saving or overall reduction of energy use without reducing energy intensity levels.[21]

Overseas, CO_2/fuel efficiency standards, which require higher levels of energy efficiency in vehicles, have proven to be one of the most effective tools in improving transport energy efficiency and reducing CO_2 emissions.[22] Worldwide, the number of cars on the road has increased from 5 million after the Second World War to 1.5 billion today, and is expected to reach 2 billion in 2020.[23]

The amount of fuel consumed by a vehicle over a set distance is affected by the efficiency of that vehicle converting the chemical energy in the fuel through the combustion process, to the axles to drive the wheels. In conventional internal combustion engines only 15 to 20 per cent of the energy used ultimately reaches the wheels. The rest is lost in the process. Internationally it is well recognised

18 Stuart Bruce "Climate Change Mitigation through Energy Efficiency Laws: From International Obligations to Domestic Regulation" (2013) 31 Energy & Nat Resources L at 313.

19 In New Zealand the Energy Efficiency and Conservation Act 2000 contains a definition of "energy efficiency" in s 3 for the purposes of the Act.

20 Beng W Ang "Monitoring Changes in Economy-Wide Efficiency: From Energy GDP Ratio to Composite Efficiency Index" (2006) 34 Energy Policy 574 at 575.

21 Marcel Eusterfeldhaus "The Law of End-Use Energy Efficiency" (LLM dissertation, University of Waikato, 2010) at 3.

22 AE Atabani and others "A Review on Global Fuel Economy Standards, Labels and Technologies in the Transportation Sector" (2011) 15 Renewable & Sustainable Energy Reviews 4586.

23 Kodjak, above n 9, at 4.

that there are still large opportunities to improve fuel efficiency.[24] In 2007 the UK government released the King Review,[25] which focused on potentials for reducing CO_2 emissions from road transport. It concluded that at low cost and using only existing technology, emissions could be reduced by a further 50 per cent by 2030, simply by adopting a selection of the most cost-effective fuel efficiency technologies.[26] The report recognised that without energy efficiency regulation, the market tended to use efficiency gains to produce bigger engines and larger, heavier cars. Consumers also are not necessarily economically rational when purchasing vehicles; nor are they driven primarily to buy the most fuel-efficient cars. Many other factors like cost, engine size, safety and status go into the purchasing decision.[27]

Having briefly considered the concept of energy efficiency, the next question must be: Can this concept be found within the law and if so, where?

2.1.1 Sustainable development

The principle of sustainable development was famously developed and defined in the Brundtland Report[28] and is the key idea that underpins energy efficiency. Sustainable development is defined in the report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The term "sustainable development" is now widely understood to mean that there must be a careful balancing decision made between economic development and environmental impact. The International Court of Justice, in the case of *Gabcikovo-Nagymaros Project (Hungary v Slovakia)*, considered for the first time the importance and significance of the concept of sustainable development. The Court noted that:[29]

> Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind — for present and future generations — of pursuit of such interventions at an unconsidered and

24 Julia King *The King Review of Low Carbon Cars* (United Kingdom Government, October 2007) <www.unep.org>.

25 The King Review was led by Julia King, Vice-Chancellor of Aston University, former Director of Advanced Engineering at Rolls-Royce.

26 King, above n 24, at 1.

27 Hunt Allcott and Michael Greenstone *Is There an Energy Efficiency Gap?* (National Bureau of Economic Research Working Paper No 17766) at 17–18.

28 World Commission on Environment and Development "Our Common Future" A/42/427, 4 August 1987 <www.un-documents.net>.

29 *Gabcikovo-Nagymaros Project (Hungry v Slovakia)* [1997] ICJ Rep 7 at 78.

> unabated pace, new norms and standards have been developed … Such new norms have to be taken into consideration … This need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.

Christopher Weeramantry in his separate opinion went even further, commenting that while the Court considered sustainable development to be "a concept" that allowed it to balance environmental and development considerations, he considered sustainable development to be a principle of law with normative value. He discussed a long tradition of cultures which recognised that human development and sustainable use of natural resources are an intertwined prerequisite for human survival.[30]

In energy use matters, sustainable development involves weighing up current energy use against the harm to present and future generations that follows from that use. Energy efficiency is a direct outgrowth of the inherent tension that exists between the economy and the environment within the principle of sustainable development itself. Energy efficiency is a practical attempt to still meet energy needs of the present while reducing negative impact on the environment now and in the future.

2.1.2 Plan of Implementation of the World Summit on Sustainable Development

Energy efficiency is specifically referred to several times in the Johannesburg Plan of Implementation as a means of achieving sustainable development. Paragraph 20 calls on governments to:[31]

> (b) Integrate energy considerations, including energy efficiency, affordability and accessibility, into socio-economic programmes, especially into policies of major energy-consuming sectors, and into the planning, operation and maintenance of long-lived energy consuming infrastructures, such as the public sector, transport, industry, agriculture, urban land use, tourism and construction sectors;

The Plan is a soft law document but demonstrates recognition of energy efficiency as a tool for achieving sustainable development.

30 Separate opinion of Vice President Weeramantry ILM 162 (1998) at 18.

31 Johannesburg Declaration on Sustainable Development, Plan of Implementation of the World Summit on Sustainable Development A/CON.199/20, 4 September 2002 <www.johannesburgsummit.org> ch 1, para 20(b) at 9.

2.1.3 Sustainable development goals

At the Rio+20 Earth Summit[32] it was agreed to make a start on preparing a set of sustainable development goals (SDGs) which would replace the millennium development goals (MDGs). These would be a set of measurable targets aimed at promoting sustainable development globally. Whereas eradicating poverty was the clear overall objective of the MDGs, climate change and environmental protection play a bigger role in the new SDGs. The 17 goals and 169 targets were formally adopted by the 193-member United Nations General Assembly on 25 September 2015 and set the agenda for sustainable development for the next 15 years. Secretary-General Ban Ki-moon described the agenda as one for the planet and a promise by world leaders to tackle climate change. General Assembly President Mogens Lykketoft called for the protection of the planet by changing unsustainable patterns of consumption and production. Energy efficiency is specifically included in Goal 7: "7.3 By 2030, double the global rate of improvement in energy efficiency".[33]

Although the exact legal status of sustainable development is still being debated, it is increasingly understood as a general principle of international law and provides the political and legal framework within which the SDGs will be carried out. Energy plays a crucial role in sustainable development and the SDGs very clearly recognise that energy efficiency is a key to the success or failure of many of the SDG targets.

2.1.4 International treaties

Concern about the effects of climate change led to the creation of the United Nations Framework Convention on Climate Change (UNFCCC).[34] The UNFCCC is a document of general statements containing no specific emissions commitments from the signatories. No reference is made to energy efficiency or to any other specific climate change mitigation policy. However, the UNFCCC does set up the requirement for Annex I countries (including New Zealand) to monitor and keep records of emissions. Without this vital foundation, it would not be possible to measure emissions reduction progress. The UNFCCC

32 Rio+20 was the third international conference on sustainable development. United Nations Conference on Sustainable Development A/Res/66/288, 11 September 2012 <www.uncsd2012.org>.

33 United Nations Department of Economic and Social Affairs "Transforming Our World: The 2030 Agenda for Sustainable Development" (Sustainable Development Knowledge Platform, 11 August 2015) <www.sustainabledevelopment.org>; see also <www.un.org>.

34 United Nations Framework Convention on Climate Change (opened for signature 9 May 1992, entered into force 21 March 1994) <http://unfccc.int>.

embodies many basic principles of environmental law and provides a structure for the creation of further domestic policy and law to reduce emissions.[35]

The Energy Charter Treaty is an international agreement covering all aspects of energy activities including a declaration that each party will strive to minimise, in an economically efficient manner, harmful environmental impacts arising from energy use. New Zealand is not a party to this treaty, but even for those countries that are signatories, it employs non-binding language.[36]

The Kyoto Protocol,[37] a legally binding agreement to the UNFCCC, establishes for the first time specific GHG reduction targets for signatories and also specifically lists energy efficiency as one measure to meet those targets.[38] The Kyoto obligations for the first commitment period have now expired with New Zealand choosing not to sign for a second commitment period after 2012. Instead the New Zealand government has set a new target under the broader, non-binding UNFCCC.[39]

The UNFCCC and Kyoto Protocol encompass sustainable development principles and consensus-based environmental principles and policies including energy efficiency. However, their objectives are not achievable without being converted into domestic policy and legislation.

Having considered energy efficiency in the context of international environmental law, it should be recognised that this alone cannot drive national policy and law change. There are also a number of important intergovernmental and non-governmental organisations whose focus is international energy security, energy conservation and energy efficiency. They also have a strong influence on the creation of national domestic energy policy and law.[40]

35 Preamble, art 3(3) and (4) and art 4(1)(b), (c), (f), (i) and 2(a).

36 Energy Charter Treaty 2080 UNTS 95 (opened for signature 7 December 1994, entered into force 16 April 1998); Energy Charter Protocol 2080 UNTS 95 (opened for signature 7 December 1994, entered into force 16 April 1998).

37 Kyoto Protocol to the United Nations Framework Convention on Climate Change 2303 UNTS 148 (opened for signature 16 March 1998, entered into force 16 February 2005) <www.unfccc.int>.

38 New Zealand's Kyoto commitment was limiting net emissions to 1990 levels during the period 2008 to 2012. Energy efficiency is referred to in art 2(1)(a) and (i).

39 "Kyoto 'out-dated, insufficient': Groser" Fairfax Digital Media (New Zealand, 3 December 2012) <www.stuff.co.nz>.

40 For example, the International Energy Agency (IEA), the Global Fuel Economy Initiative (GFEI), the United Nations Environment Programme (UNEP), the International Council on Clean Transportation (ICCT) and the International Transport Forum (ITF).

2.1.5 Group of 20 Energy Efficiency Action Plan

In 2014 Australia invited New Zealand to attend the Group of 20 (G20) meeting in Brisbane during Australia's year as Chair.[41] The G20 produced a plan to strengthen energy efficiency collaboration. The first priority of the plan is: "Improving vehicle energy efficiency and emission performance." Section 2.3 states:[42]

> This work, which will be coordinated by the United States, will evaluate and promote opportunities for faster development and introduction of more stringent domestic vehicle fuel efficiency requirements and air pollution emissions standards for new vehicles, as well as related national fuel quality standards and green freight programs. The expertise of specialist international organisations, such as the International Council on Clean Transportation (ICCT), the Global Fuel Economy Initiative (GFEI), and the International Transport Forum (ITF), will be an important input to this work. While such standards are applied domestically, in accordance with differing national circumstances and priorities, international work can accelerate technical development standards and testing regimes and facilitate voluntary harmonisation. Harmonisation of national standards helps reduce development costs for new vehicles and lessens the regulatory burden. This will include collaboration and exchange of experiences and best practices on relevant national standards.

2.1.6 New Zealand's Intended Nationally Determined Contribution (INDC)

The 21st conference of the UNFCCC meets in Paris in December 2015 with the intention to adopt a new global agreement to limit GHGs. Success will hinge largely on whether the new national pledges can be integrated into a workable international framework. New Zealand's commitment is to reduce GHG emissions to 30 per cent below 2005 levels by 2030.[43]

41 The Group of Twenty (G20) is an international forum of 20 major economies founded in 1999 with the aim of promoting high-level policy discussion about international issues. Collectively, G20 economies account for 85 per cent of gross world product, 80 per cent of world trade and two-thirds of the world's population <www.g20.org>.

42 G20 Energy Efficiency Action Plan, Voluntary Collaboration on Energy Efficiency (G20, Brisbane, Australia, 16 November 2014).

43 New Zealand Government *Submission to the Ad Hoc Working Group on the Durban Platform for Enhanced Action, New Zealand's Intended Nationally Determined Contribution* (7 July 2015).

The INDCs submitted by UNFCCC signatories are not sufficient to keep the world below a two-degree threshold. If relied upon as the only course of action taken, the world will use up the remaining carbon budget by 2040, a date well within the lifetime of many existing energy assets. The IEA report *Energy and Climate Change*[44] recommends a new short-term strategy to raise climate ambition called the "Bridge Scenario". It lists five key energy sector measures that can be taken immediately to act as a bridge to further action. The first is: "Increasing energy efficiency in the industry, buildings and transport sectors."[45] Within the Bridge Scenario, the largest contribution to GHG abatement comes directly from energy efficiency, which is responsible for an astonishing 49 per cent of the savings by 2030.

The IEA recommends that transport sector CO_2/fuel efficiency standards be implemented in every country for all new light-duty vehicles so that average fuel consumption is reduced to around 4 litres per 100 km by 2030.

> In the Bridge scenario, energy efficiency is the largest contributor to additional GHG emissions savings … of around 2.3 Gt CO_2-eq relative to the INDC Scenario in 2030, or 49% of the total. Early adoption of energy efficiency policies is important, because savings increase over time as they take effect and the proportion of more efficient technologies in the stock rises, in particular in road vehicles … where the average lifetime is typically in the range of 10 to 15 years.[46]

The combination of recent international developments (the INDC, the G20 Action Plan, the SDGs and the upcoming COP 21 meeting) is driving a renewed interest in energy efficiency.

44 IEA *Energy and Climate Change*, above n 16.
45 At 67.
46 At 78.

3. THE NEW ZEALAND SITUATION

3.1 The National Emissions Profile

Agriculture is the largest contributor to New Zealand's GHG emissions profile producing 48 per cent of the total amount.[47] However, agricultural GHG emissions' intensity has been reducing by about one per cent per year due to increased efficiency in the sector with a goal to reduce emissions further by developing new technological options. This work is part of a global partnership in livestock emissions being carried out by the Rumen Microbiology team at AgResearch[48] and the United States Department of Energy's Joint Genome Institute in California. A breakthrough has come after finding compounds that inhibit methane gas being produced in the digestive system of animals.[49]

Energy is New Zealand's second-largest emission sector, comprising 39 per cent of total emissions with road transport dominating that figure. Between 1990 and 2013, energy sector emissions increased by 32 per cent. A large proportion of this increase came from road transport. Transport emissions are greater than electricity, manufacturing and fugitive emissions combined.[50] Over three quarters of liquid fuel emissions come from the transport sector. New Zealand has one of the largest increases in energy emissions (a 50 per cent increase since 1990) among Kyoto's Annex I countries with emissions per capita being the fifth highest.[51]

47 Ministry for the Environment *Snapshot April 2015 Info 735: New Zealand's Greenhouse Gas Inventory 1990–2013* (Wellington, April 2015) <www.mfe.govt.nz>.

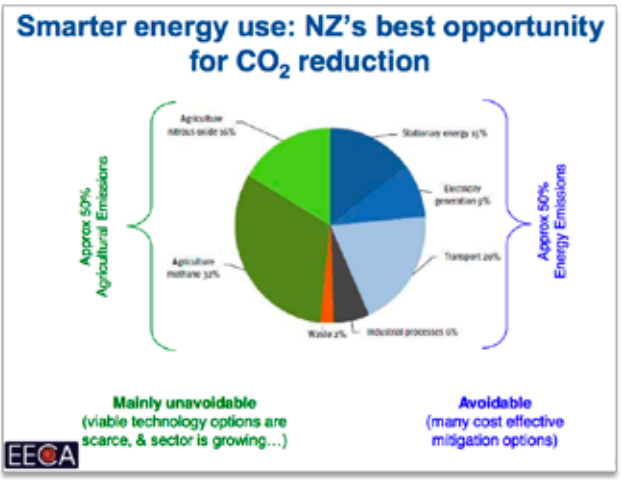
48 New Zealand Agricultural and Greenhouse Gas Research Centre "Science and Policy converge to discuss reducing agriculture's environmental footprint" (7 May 2015) <www.nzagrc.org.nz>.

49 Adrien Taylor "Scientists make breakthrough in fight against methane gas" (3 News, online ed, 28 April 2015) <www.3news.co.nz>. Thousands of compounds have been screened and tested searching for methane inhibitors. To date, five have been selected for animal trials and show promising reductions of between 30 to 90 per cent of methane gas emissions from sheep and cattle. Potential development includes introducing the compounds directly into stock feed, grasses or developing a vaccine. AgResearch is looking to engage a commercial partner with the hope of seeing a commercial product within five years.

50 "Fugitive emissions" are the waste from production, transmission and storage of fuels and non-productive combustion. See also Ministry of Business, Innovation and Employment *Energy Greenhouse Gas Emissions* (Wellington, 2013) <www.mbie.govt.nz> at 2; Ministry for the Environment *New Zealand's Greenhouse Gas Inventory*, above n 47.

51 See above n 47 at 4. See also Ministry of Business, Innovation and Employment *Energy in New Zealand: Comprehensive information on and analysis of New Zealand's energy supply, demand and prices, modelling and sector trends* (Wellington, 2013).

Figure 1: Smarter energy use: New Zealand's best opportunity for CO_2 reduction



Source: Energy Efficiency and Conservation Authority.

The bulk of energy used by the transport sector (99.8 per cent) is from imported oil. New Zealand produces its own oil but is a net importer because its crude is of very high quality and is exported while cheaper foreign oil is imported and refined at Marsden Point. Being dependent on oil imports has a number of negative impacts for a small economy. Unpredictable spikes or high international oil prices can drain foreign exchange from reserves and create destabilising effects on the economy.[52]

3.2 New Zealand's Transport Fleet

New Zealand is a little different from many other developed countries in that, with the possible exception of Auckland, the population is low and widely dispersed across two long, narrow and mountainous islands. Its location is isolated and distant from trading partners, which is significant for an export-dependent economy relying on agricultural output. Of food production, 85 per cent is exported.[53] New Zealand's geography and population has resulted in an

52 Timothy JH Crownshaw "A System Dynamics Approach to Understanding the Role of Imported Petroleum in New Zealand" (MEnergy thesis, University of Auckland, 2012) at 1, 4, 10–14 and 41–45. When oil prices spike or are high, national demand remains high because of enormous capital investment in conventional oil-based transport modes with little short-term ability to switch to alternatives.

53 Ministry for the Environment *New Zealand's Sixth National Communication under the United Nations Framework Convention on Climate Change and the Kyoto Protocol* (Wellington, 2013) at 12 and 35 [MfE 2013].

energy-intensive road transport system that has a heavy dependence on fossil fuel. Most people use private cars to get to work and road transport carries most of the domestic freight. There are around 3.2 million cars on the road with the majority of vehicles (over 90 per cent) being light passenger vehicles powered by petrol.[54] The use of private passenger cars is largely inevitable for the foreseeable future in most parts of the country. Light-duty vehicles include all cars, vans, four-wheel-drives and sports utility vehicles under 3.5 tonnes. New Zealand has the second-highest private car ownership rate in the OECD (sitting just behind the United States)[55] with a per capita ownership of 697.4 vehicles per 1,000 people. CO_2 emissions are dominated by the light vehicle fleet, with passenger travel making up 77 per cent, light commercial 15 per cent, and truck, bus and motorcycle the other eight per cent.[56]

A 2011 Ministry of Transport report shows that New Zealand has one of the oldest transport fleets in the world with an average age of 12.7 years in 2010, and the potential problem (based on Ministry of Transport modelling) that 15 per cent of the light fleet will be older than 20 years by 2020. This reflects a large increase of used cars, imported during the period 2000 to 2005 before any regulatory controls.[57] As a result, there is a peak of vehicles in the fleet in the age band 1995–1997 which were already 8–10 years old on arrival into New Zealand. In 2010 over 20 per cent of light vehicles on the road were manufactured in these three years. As this peak gets older, the average fleet age will also increase. The report states: "It is reasonable to assume that an older fleet will be less safe and have higher harmful emissions than a younger fleet."[58]

In the Motor Industry Association's (MIA) 2015 climate change consultation document,[59] data is provided (as of 2014) that shows the average age of a used import at time of first registration in New Zealand is 8.18 years.[60]

54 Ministry of Transport *Sector Report: Aging of the light vehicle fleet — May 2011* (May 2011) at 1 [MoT *Sector Report*].

55 MfE 2013, above n 53.

56 Ministry of Transport *Annual Fleet Statistics 2014* at 6 [MoT *Annual Fleet Statistics*].

57 Other than controls in place in the country of origin for a vehicle at time of first registration.

58 MoT *Sector Report*, above n 54, at 1 and 8. See also Motor Industry Association "Average age of used cars entering the NZ fleet" (June 2015); "Passenger car fleet breakdown" (June 2015); and "Additions to the fleet" (June 2015).

59 Motor Industry Association *Motor Industry Association Climate Change Contribution Consultation* (2 June 2015) <www.mfe.govt.nz> [MIA *Climate Change Contribution Consultation*]. This document was sent to the Ministry for the Environment in the consultation process leading up to setting New Zealand's INDC.

60 See Motor Industry Association "Average age of used cars entering the NZ fleet" (June 2015). New Zealand's Vehicle Exhaust Emissions 2007 Rule (and changes made in 2012 tightening requirements) has had an impact on the age of used cars now imported into New Zealand, requiring that they meet overseas exhaust pollutant standards, which are two model cycles behind new vehicles. However, while this prevents very old cars now being

Just under half of the New Zealand fleet (44.7 per cent) was 15.4 years or older in 2013.[61] According to the MIA as of June 2015, the largest segment of the fleet is now 18 years of age (192,071 vehicles). In Australia, 30.4 per cent of vehicles are five years and under compared to New Zealand's 12.1 per cent in the same category. The MIA notes that government regulation can have "a direct impact on the age profile of used imports"[62] which is the largest group of cars coming into New Zealand with most being "one to two model cycles behind current technology".[63]

3.3 National Policy and Legislation for Transport Efficiency

This section looks at New Zealand policy and legislation, relevant to improving levels of efficiency in the transport sector. Clearly, any energy efficiency regulation or standards adopted cannot be more onerous than overseas standards where vehicles are actually manufactured. New Zealand is a small market that is not big enough to influence design decisions. Also, too stringent a policy will be counterproductive for the economy with increased vehicle costs and reduced consumer choice.

However, the current position is that there are no specific energy efficiency regulations for light transport CO_2/fuel efficiency in New Zealand at all. This means that even adopting regulations or standards that are lower than current overseas standards would create energy efficiency improvements. There is an argument that New Zealand need do nothing at all but wait and reap the benefits of the higher overseas standards as we buy new vehicles. The problem with this approach is that the bulk of cars being purchased in New Zealand are not new but used vehicles already several years old. Japanese taste in vehicles has changed dramatically and is now quite different from New Zealand with top sellers there being small 1,300 cc hatches and hybrids whereas the Japanese cars being imported into New Zealand tend to be larger, heavier 2,000 cc cars. Reasons for this relate to profit margins for the importer, New Zealand driving conditions and preferences, and the difficulty facing importers buying the more fuel-efficient Japanese models (particularly hybrids) which hold their value longer in Japan and are more expensive. Much of the benefit of increased energy efficiency in the used imports is traded off against heavier engines and

imported, these rules regulate exhaust pollution not CO_2 and New Zealand already has a large existing stock of very old cars.

61 See Motor Industry Association "Passenger car fleet breakdown" (June 2015).

62 MIA *Climate Change Contribution Consultation*, above n 59, at 6. This happened with the following transport rules which excluded older vehicles that did not meet the new requirements: Frontal Impact Amendment 2011, r 32006/5; Vehicle Exhaust Emissions 2007, r 33001/2; Light-vehicle Brakes Amendment 2014, r 32014/4.

63 MIA *Climate Change Contribution Consultation*, above n 59, at 6.

increased power. This makes relying on overseas standards alone to increase New Zealand's light-fleet energy efficiency unrealistic.

3.3.1 New Zealand Energy Strategy 2011–2021 (NZES)

The NZES sets the new strategic direction for energy and the role it will play in the economy.[64] The Strategy focuses on four priorities, one of which is "achieving efficient use of energy"[65] and, within that priority, achieving an "energy efficient transport system".[66] "Continued promotion of energy efficiency will also contribute to reducing greenhouse gas emissions, where it leads to fossil fuel savings."[67] The Strategy undertakes to invest in roads of national significance, rail, reliable and cost-effective public transport, and improvements in infrastructure for walking and cycling.[68]

3.3.2 New Zealand Energy Efficiency and Conservation Strategy 2011–2016 (NZEECS)

The NZEECS is a statutory document prepared in accordance with the Energy Efficiency and Conservation Act 2000. It has the purpose of giving effect to the government's policy on the promotion of energy efficiency, energy conservation and the use of renewable sources of energy.[69] The NZEECS remains in place for five years with a requirement before that time to decide whether a new strategy is needed. Otherwise the NZEECS remains in place for a further five years. To date it has been replaced three times and must be reviewed again in 2016. The Chair of the EECA, Tom Campbell, has already signalled to the Minister of Energy that reviewing the NZEECS will be an important task in 2016:[70]

> A critical task for next year is refreshing the New Zealand Energy Efficiency and Conservation Strategy — which is statutorily required, and frames all our activities. The Energy Efficiency Conservation Act 2000 requires the Minister to consider the need to replace or renew the Strategy every five years. The current Strategy will need to be replaced or renewed by August 2016.

64 *New Zealand Energy Strategy 2011–2021* (MED, Wellington, August 2011) <www.mbie.govt.nz>.
65 At 1.
66 At 5.
67 At 9.
68 At 10.
69 Energy Efficiency and Conservation Act 2000, ss 7(b), 8, 9 and 10.
70 Energy Efficiency and Conservation Authority *Briefing Paper prepared by the Energy Efficiency and Conservation Authority to the incoming Minister of Energy and Resources* (October 2014) at 4 [EECA *Briefing Paper*].

The government's energy efficiency target under the current NZEECS is "to continue to achieve a rate of energy intensity improvement of 1.3 percent per annum".[71] The NZEECS states that the greatest areas where energy efficiencies can be made are transport, business and residential. The objective for the transport sector is: "A more efficient transport system with a greater diversity of fuels and alternative technologies." The "target" is that "[t]he efficiency of light vehicles entering the fleet has further improved from 2010 levels".[72] The NZEECS states:[73]

> It is … a long-term strategic priority for New Zealand to ensure that energy efficiency opportunities in the transport sector are fully realised. The relatively poor historic fuel economy of the New Zealand vehicle fleet is an important energy challenge facing the economy. While fuel efficiency is improving, projected rates of improvement in the efficiency of the light vehicle fleet may not be sufficient to keep pace with improvements in the other OECD countries. This could place New Zealand at a competitive disadvantage.

To achieve efficiency gains, a mix of information/public education, incentives, codes and standards will be required. Responsibility for achieving these objectives and targets is split between the Ministry of Transport, the EECA, the Ministry of Business, Innovation and Employment and the Civil Aviation Authority.

In a review of New Zealand's energy policy in 2010, the IEA examined the draft of the current NZEECS and noted that:[74]

> … the draft proposals lack a firm commitment to actions that will contribute to achieving the energy savings goals. The government needs to assign priorities for working towards goals it can realistically achieve in order to demonstrate early effectiveness and lead to confidence building. The Strategy is missing a firm set of actions to achieve its stated goals. While the Strategy takes a high-level view, action plans complement strategies by detailing what specific actions are needed by whom and when. Detailed action plans targeted specifically on the transport, commercial, buildings and industry sectors may be needed in the form of sectorial strategies.

71 *New Zealand Energy Efficiency and Conservation Strategy 2011–2016* (MED, Wellington, August 2011) <www.mbie.govt.nz> at 17.

72 At 18.

73 At 19.

74 International Energy Agency *Energy Policies of IEA Countries: New Zealand — 2010 Review* (IEA, Paris, July 2011) [IEA *New Zealand*].

Barry Barton and Marcel Eusterfeldhaus comment that:[75]

> There is no point proclaiming a target without choosing the policy measures that will be necessary to reach it. The 2011 Strategy seems to have responded to this criticism by removing any energy efficiency targets but the most unadventurous. Those for transport, business and the public sector are merely for improvements (unquantified) in present levels of energy efficiency … The 2011 Strategy fails to provide sectoral action plans, and … offers no connection between the economy-wide target and policy activity in different sectors.

The EECA has attempted to make up for this looseness in the Strategy by setting out in its annual report specific energy efficiency programmes undertaken with targets and results achieved to date. The annual report states that the EECA programmes are "influenced" by the NZEECS, which suggests a lack of specific guidance from the higher policy level.[76] With the review of the NZEECS next year, there is a clear opportunity to achieve a better structure and roadmap at policy level for energy efficiency gain.

3.3.3 New Zealand Transport Strategy 2008

The New Zealand Transport Strategy 2008 (NZTS) is an ambitious policy document setting out specific transport targets:[77]

> Halve per capita greenhouse gas emissions from domestic transport by 2040.
> …
> Reduce the rated carbon dioxide (CO_2) emissions per kilometre of combined average new and used vehicles entering the light vehicle fleet to 170 grams CO_2 per kilometre by 2015, with a corresponding reduction in average fuel used per kilometre.[78]

However, the NZTS, a non-statutory document prepared by the former Labour government, has been largely superseded by National's *Connecting New Zealand* policy document. While National supported the general terms of Labour's NZTS, it considered that:[79]

75 Marcel Eusterfeldhaus and Barry Barton "Energy Efficiency: A Comparative Analysis of the New Zealand Framework" (2011) 29 J Energy & Nat Resources L 431 at 447.

76 Energy Efficiency and Conservation Authority *Annual Report 2013/14* <www.eeca.govt.nz> [EECA *Annual Report*].

77 *New Zealand Transport Strategy 2008* <www.transport.govt.nz>.

78 At 5.

79 IEA *New Zealand*, above n 74, at 47.

> moving too quickly on modal shift will have a negative impact on environmental and economic efficiency. The government expects carbon mitigation primarily to occur via new fuels (e.g. biofuels and electric cars) encouraged via an emissions trading scheme …

3.3.4 Connecting New Zealand 2010

The current government's policy statement *Connecting New Zealand*, covering the period 2010–2021, was released in August 2011 and acknowledges the importance of energy efficiency but sets no specific targets as the NZTS did. It includes a continued reduction of CO_2 from land transport as one of the government actions for road transport through to 2021.[80] *Connecting New Zealand* summarises transport's overall policy direction as:[81]

- economic growth;
- value for money; and
- road safety.

The document sets the overall policy context for transport but indicates that the NZEECS is still the primary high-level policy document for transport energy efficiency.[82]

3.3.5 Legislation supporting transport energy efficiency

(i) Resource Management Act 1991 (RMA)

The RMA is New Zealand's primary environmental land-use planning Act. It is relevant to all projects for energy supply, which require consents and/or permits with respect to their impact on the environment. Energy efficiency is specifically referred to in s 7(ba). The section has been considered by the courts in an energy supply context. In *Genesis Power Ltd v Franklin District Council* energy efficiency was briefly discussed in relation to a wind farm proposal.[83] It was noted that there was an element of energy efficiency in supply because there were no electricity transmission losses on the scale traditionally involved in the national high-voltage network.

While the RMA is less relevant to the demand side of energy efficiency relating to transport, Eusterfeldhaus and Barton note that:[84]

80 *Connecting New Zealand: A summary of the government's policy direction for transport* (New Zealand Government, Ministry of Transport, 2010) at 4.

81 At 5.

82 Ministry of Transport "Key strategies and plans" <www.transport.govt.nz>.

83 *Genesis Power Ltd v Franklin District Council* [2005] NZRMA 541 (EnvC).

84 Eusterfeldhaus and Barton, above n 75, at 431.

> There are opportunities for further research about the role of the Act in improving settlement patterns and urban form, which affect transport requirements and in turn energy efficiency. The NEECS must be taken into account by district councils, city councils and regional councils as they prepare policy statements and plans, and could be used more vigorously.[85]

(ii) The Climate Change Response Act 2002 (CCR Act)

The CCR Act is New Zealand's primary legislation responding to climate change. It sets up the New Zealand Emissions Trading Scheme (ETS) but does not specifically refer to energy efficiency. The ETS does cover liquid fossil fuels, which could incentivise transport energy efficiency, but in practice does not. The emissions trading units are uncapped and the unit price is too low (to incentivise energy efficiency of fuel use). The Scheme has been weakened by too many free allocations of units and an ongoing two-for-one scheme.[86] The ETS is also unable to operate as intended because of a large oversupply of units on the international market.[87]

(iii) The Energy Efficiency and Conservation Act 2000

The Energy Efficiency and Conservation Act is New Zealand's primary piece of legislation to promote energy efficiency. Section 5 sets out the purpose of the Act, which is "to promote, in New Zealand, energy efficiency, energy conservation, and the use of renewable sources of energy". Energy efficiency is defined in s 2 as "a change to energy use that results in an increase in net benefits per unit of energy". Sustainability principles are set out in s 6 and impose on those who exercise functions and powers under the Act the responsibility to implement sustainability principles, which bear similarities to ss 5, 7 and 8 of the RMA. David Grinlinton notes that here (unlike the RMA definition of sustainable management in s 5(2)) all elements of s 6 are cumulative and of equal importance.[88]

85 At 452. Note also that s 19(b)(ii) of the Public Transport Management Act 2008 requires any current national land transport strategy and the National Energy Efficiency and Conservation Strategy to be taken into account when preparing or adopting regional public transport plans.

86 New Zealand Government "Legislative Changes to the New Zealand Emissions Trading scheme" (6 April 2013) Climate Change Information New Zealand <www.climatechange.govt.nz>.

87 Geoff Bertram and Simon Terry *The Carbon Challenge: New Zealand's Emissions Trading Scheme* (Bridget Williams Books, Wellington, 2010).

88 David Grinlinton "Sustainability in New Zealand Law and Policy" in Peter Salmon and David Grinlinton (eds) *Environmental Law in New Zealand* (Thompson Reuters, Wellington, 2015) 105 at 131. He notes that the requirement to "take into account" the elements of s 6 is one of the weaker forms of statutory direction.

Section 7 sets out the responsibilities of the Minister including:

- developing government policy on the promotion of energy efficiency in New Zealand;
- developing a National Energy Efficiency and Conservation Strategy;
- promoting public awareness of the importance of energy efficiency in New Zealand;
- promoting practices and technologies that further energy efficiency;
- arranging for research on energy efficiency matters and publishing this information as the Minister sees fit;
- monitoring and reviewing the state of energy efficiency in New Zealand; and
- publishing relevant information, research and other material.

Section 9 sets out the Minister's ongoing obligation to ensure that there is a Strategy in force at all times. Section 10 sets out the purpose and contents of the Strategy, which is to give effect to government policy on the promotion in New Zealand of energy efficiency. The Strategy must state the government's policies on energy efficiency and:

1. the objectives to be pursued to achieve these policies;
2. targets to achieve these policies that are measurable, reasonable, practicable, and considered appropriate by the Minister; and
3. means by which those policies, objectives, and targets are to be achieved.

Under s 13 the Minister may direct the EECA to prepare the draft Strategy for his approval. Historically, it was the now defunct Ministry of Economic Development not the EECA that prepared the draft Strategy that was the forerunner to the current NZEECS.[89] Eusterfeldhaus and Barton note that the EECA has no monopoly on providing advice to the Minister regarding energy efficiency matters.

Section 20 establishes the EECA as a Crown entity. It was originally established in 1992 (before the Energy Efficiency and Conservation Act came into force) as an agency attached to the Ministry of Commerce but with no statutory basis or mandate. Section 21 sets out the functions of the EECA to:

- encourage, promote, and support energy efficiency through advising the Minister;
- assist in the preparation of the Strategy;
- promote public awareness of energy efficiency practices and technologies;

89 Eusterfeldhaus and Barton, above n 75, at 441.

- arrange for the conduct of research, assessments, demonstrations, and studies that further energy efficiency;
- publish relevant information, research, and other material; and
- monitor the state of energy efficiency.

Eusterfeldhaus and Barton again note that there is "no function of monitoring the implementation and effectiveness of a Strategy. This is a gap that needs to be filled." They also point out that there is no obligation in the legislation on the government to fund the EECA to implement the Strategy.[90]

Section 36 provides for the making of a specific list of regulations including:

- prescribing minimum energy performance standards including for vehicles;
- prescribing labelling requirements, including for vehicles, of energy efficiency or proficiency in conserving energy;
- provision of information for determining compliance with standards;
- prescribing the form and manner of testing or verifying energy performance;
- providing information for statistical purposes; and
- prescribing offences and levels of fines for non-compliance with standards or regulations.

In 2007 vehicle fuel economy labelling regulations were introduced requiring all vehicles, both new and used, to display fuel economy information at date of purchase.[91] The aim of the labelling programme is to enable consumers to make more informed decisions about fuel economy/efficiency.

(iv) The Land Transport Management Act 2003

Section 19B requires that the NZEECS be taken into account in preparing the national land transport programme. Section 14 requires the same for regional transport plans. Section 67 requires that when preparing a government policy statement on land transport the Minister must take into account the NZEECS in force.[92]

(v) The Land Transport Act 1998 (LTA)

Section 152 provides the Minister with the power to make ordinary rules for the licensing of any form of transport (including technical requirements and

90 At 449.

91 Energy Efficiency (Vehicle Fuel Economy Labelling) Regulations 2007 (SR 2007/398). Any person in breach of the regulation (r 11) is liable, on conviction, to a fine not exceeding $5,000.

92 Land Transport Management Act 2003; see ss 5, 14, 19B, 20 and 67. "Government policy statement" here means the statutorily required land transport statement made under s 66 of the Act.

standards) and to ensure environmental sustainability.[93] Section 155 provides the ability to make rules concerning vehicles that may set standards concerning:

- construction, mass, dimensions, emissions, environmental requirements, identification, repair, maintenance, modification, inspection, and fuel systems for vehicles;
- systems and components or equipment to be fitted to or incorporated in the construction of vehicles;
- recall of vehicles that do not meet standards;
- periodical or other examination of vehicles;
- when vehicles are to be registered or deregistered;
- procedures to verify compliance with standards; and
- providing for the recording or making available of information about vehicles.

Sections 169 and 169A provide that the objectives and functions of the Minister under the Act include ensuring that New Zealand's obligations under any international conventions, agreements or understandings relating to land transport are implemented.[94]

In 2007 a Land Transport Rule for vehicle exhaust emissions came into force, which was tightened and improved in 2012.[95] Internationally, the health impacts caused by vehicle pollutant emissions has led to new emissions controls that are capable of reducing particulate matter and nitrogen oxide (NO_x) emissions by over 90 per cent from unregulated levels. World-class pollutant emission standards dramatically reduce local air pollution and associated health impacts.[96] The New Zealand rule does not deal with fuel economy, energy efficiency or CO_2 mitigation but with the reduction of local air pollution.[97] The technology that reduces pollution is downstream of the engine so does not

93 Land Transport Act 1998, s 152(a) and (f). See also *Imported Motor Vehicle Association v Minister of Transport* [2011] NZHC 485.

94 There are no specific obligations under either the UNFCCC or Kyoto concerning land transport. The choice of policy options to reduce GHGs is left to each country.

95 Land Transport Rule: Vehicle Exhaust Emissions 2007, r 33001/2 [Transport Rule]; see also *Report on the Vehicle Exhaust Emissions Amendment Rule 2012 to the Cabinet Economic Growth and Infrastructure Committee* (Office of the Associate Minister of Transport).

96 Joshua D Miller and Cristiano Facanha *The State of Clean Transport Policy: A 2014 Synthesis of Vehicle and Fuel Policy Developments* (ICCT, 2014) at 7.

97 GW Fisher and others *Health effects due to motor vehicle air pollution in New Zealand* (Report to the Ministry of Transport, 2002). Many densely populated cities worldwide have serious air-quality issues. Vehicle pollutants present a range of health impacts including cardiovascular and respiratory disease, lung cancer and infant mortality.

alter the amount of fuel that is burned or CO_2 released.[98] While it is tempting to assume that stronger exhaust emissions standards will reduce New Zealand's fuel consumption and automatically increase road transport energy efficiency, this is not borne out by the historical transport data.[99] CO_2 emissions are lowered by improved energy efficiency and lighter vehicles, not implemented emissions pollution controls.[100] The vehicle emissions rule is based on overseas standards with a delay of several years for imported used cars. It currently lags best world practice, in terms of stringency, compliance and enforcement.[101] The Ministry of Transport is now in the process of reviewing the rule to consider tightening the standards again. This would have the direct result of reducing air pollution and the indirect but useful result of further reducing the age of imported vehicles arriving into the country.[102]

The overall fuel efficiency of the light vehicle fleet will slowly improve as new cars meeting overseas CO_2/energy efficiency standards enter the fleet with the benefit of more energy-efficient technology, but it is not possible for New Zealand to rely solely on this improvement because the largest group of cars coming into the country are used cars already several years old.[103]

3.3.6 Transport efficiency programmes in place

The EECA and the Ministry of Transport have made, and are continuing to make, good progress on a number of important energy efficiency programmes in the transport area. These include:

98 Ian McGlinchy *State of Transport Presentation* (Ministry of Transport, October 2014) <www.transportblog.co.nz>; see also John Polkinghorne "The New Zealand vehicle fleet: fact and fiction" (20 December 2014) TransportBlog <transportblog.co.nz>.

99 There is little evidence that age of vehicle fleet and fuel economy are linked; McGlinchy, above n 98. Since 1987 when reliable fleet data started to be collected, there has been a close relationship between fuel use and size of the fleet. This means that if we had a younger fleet as a result of getting rid of the oldest vehicles, the resultant fleet would probably be heavier, have larger engines and travel further than the current fleet. The view of Ian McGlinchy (Senior Transport Policy Analyst) is that actively intervening to create a younger fleet to reduce CO_2 emissions would probably not work. However, if the fleet size shrank as older vehicles are scrapped, then fuel use may fall.

100 MoT *Annual Fleet Statistics*, above n 56, at 10.

101 There is no specific testing in New Zealand for air pollutants unless a vehicle is seen to be visibly emitting smoke. Transport Rule, above n 95, s 4, Visible smoke check.

102 The 2012 amended rule and the original 2007 rule faced fierce resistance from the Imported Motor Vehicle Industry Association (IMVIA), which unsuccessfully sort judicial review in 2011. The Minister noted that the IMVIA has predicted its own demise on several occasions but had so far proved to be resilient and adaptable. See above n 93.

103 International Energy Agency *Improving the Fuel Economy of Road vehicles: Policy Pathway* (IEA, Paris, 2012) [IEA *Fuel Economy*].

- An electric vehicle exemption for road user charges until 2020.[104]
- A heavy vehicle fuel-efficiency programme through driver behaviour change and better management systems.[105]
- A fuel economy labelling scheme to provide the public with information on fuel economy/efficiency when purchasing both new and used vehicles.[106]
- Improvements in cycling/walking tracks and improvements in public transport to reduce private vehicle use, particularly in the main centres.[107]
- A fuel-efficiency tyres education programme.[108]
- An objective to integrate road and rail to improve freight network productivity.

In 2008/09 the incoming National government did consider a CO_2/fuel efficiency standard for New Zealand based on work done by the prior Labour government. There was recognition that CO_2 emissions were steadily rising in the transport sector reflecting growth in the size of the fleet. Projections were that CO_2 emissions would increase between 10 to 35 per cent by 2030 compared to 2007 levels. In a report by the office of the Minister of Transport to the Cabinet's Economic Growth and Infrastructure Committee it was stated that:[109]

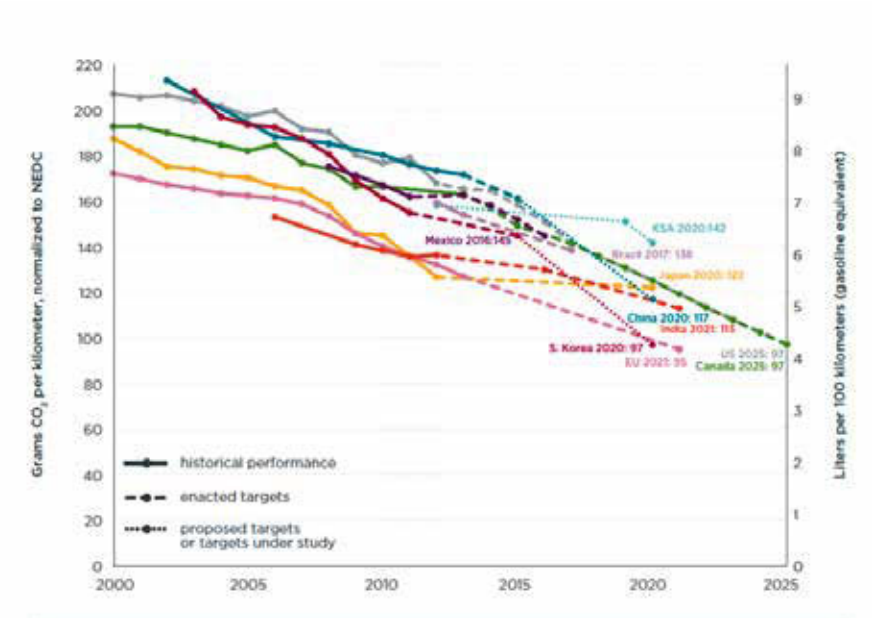
> With the exception of Australia, which has a voluntary agreement, virtually all developed countries have schemes in place to regulate and improve the average fuel economy of vehicles entering their fleets.

At the time, it was thought that because New Zealand had agreed to include transport fuels in its ETS, this would create a sufficient economic incentive to use fuel more efficiently and to purchase more fuel-efficient vehicles. However, neither of these consequences has occurred due to a number of unforeseen outcomes that have diluted the impact of the ETS. There was also a concern (coming out of the Global Financial Recession) about depressing the vehicle retail sector. The result was that the then Minister decided not to proceed with a CO_2/fuel efficiency standard. To date, CO_2 emissions from the transport fleet remain unregulated.

104 Road User Charges (Exemption Period for Light Electric RUC Vehicles) Order 2012.
105 EECA *Annual Report*, above n 76, at 56.
106 Land Transport Fuel Consumption Rule 2008, r 33020.
107 New Zealand Transport Agency *Statement of performance expectations 2015/16* (NZTA, June 2015) at 5.
108 Energy Efficiency and Conservation Authority *Statement of Intent 2014–2018* (EECA, 2014) at 14.
109 Ministry of Transport *Report from the Office of the Minister of Transport to the Cabinet Economic Growth and Infrastructure Committee 2009* (MoT, 2009) at 1.

New Zealand's current average CO_2 emission rate for its transport fleet is 183 g CO_2/km. This is higher than average projected rates for the United States, Japan, the European Union, Canada, South Korea, China, India, Brazil and Mexico. The graph below shows the mandatory energy efficiency standards set in these countries through to 2025.[110]

Figure 2: Global comparison of light-duty vehicle energy efficiency/CO_2 emission standards through to 2025



Source: International Council on Clean Transportation 2015.

Without a CO_2/fuel efficiency standard, New Zealand runs the risk of becoming a dumping ground for the least efficient vehicles on the world market as those vehicles are denied entry into more controlled markets.[111] More than 70 per cent of new light vehicles sold worldwide are now subject to mandatory CO_2/energy efficiency standards. Manufacturers of new cars sold in the European Union pay a penalty if the average of their fleet exceeds 130 g CO_2/km. They therefore tend to sell their higher-emission vehicles in countries with no mandatory standards.[112]

110 International Council on Clean Transportation *Global Comparison of Passenger Car and Light-commercial Vehicle Fuel Economy/GHG Emissions Standards: Update* (ICCT, February 2014) at 4.

111 Anna Mortimore "Could Australia become a dumping ground for high-emission vehicles?" (10 April 2015) The Conversation <www.theconversation.com>.

112 At 3 (see "new passenger graph"). Australia has a voluntary, not mandatory, standard.

4. OVERSEAS CO_2/FUEL EFFICIENCY STANDARDS AND OPTIONS FOR NEW ZEALAND

4.1 Overseas Examples

The economic argument is often made that a market functions best when there is as little interference in the form of regulation or taxes as possible.[113] With respect to promotion of energy efficiency, this has not been the case. The IEA makes the point that:[114]

> Public policy intervention to enable increased deployment of fuel efficient vehicles is justified because the total societal benefits outweigh the costs of improvement.

CO_2/fuel efficiency standards have a strong record of success in reducing fuel consumption and GHG emissions. Standards for light-duty vehicles have proven to be a highly cost-effective means of cutting CO_2.[115] Small countries like New Zealand with no vehicle manufacturing industry tend to be technology takers in the transport sector and have little influence on technologies being developed by car manufacturers. A key advantage of CO_2/fuel efficiency standards is that they provide certainty for manufacturers, allowing them to make the best research and development production decisions. A small country does not drive this process — however, well-designed fuel economy standards may still be worthwhile to ensure that imported vehicles at least meet a minimum level of energy efficiency performance.[116]

Different countries have designed and adopted distinctive CO_2/fuel efficiency standards for cultural, political and historic reasons.[117] The United States, Japan and the European Union all approach regulation of energy efficiency in the light-fleet sector differently with standards diverging in form and structure. Feng An and others note:[118]

113 New Zealand Government "Government Statement on Regulation: Better Regulation, Less Regulation" (Treasury Department, 17 August 2009).

114 IEA *Fuel Economy*, above n 103, at 14.

115 Miller and Facanha, above n 96, at 23–24.

116 IEA *Fuel Economy*, above n 103, at 25.

117 Feng An, Robert Earley and Lucia Green-Weiskel "Global Overview on Fuel Efficiency and Motor Vehicle Standards: Policy Options and Perspectives for International Cooperation" (United Nations Background Paper No 3 CSD19/2011/BP3, 2011).

118 At 2. If countries were able to reach agreement on one set of harmonised international standards it would benefit all and also prevent the transfer of energy-inefficient vehicles to the less wealthy developing countries. The US footprint model is perceived as the most flexible and equitable for car manufacturers although also the most complicated to administer.

> Vehicles and the automotive industry are changing at an extremely fast pace from all perspectives, including technology innovation and deployment, the development and implementation of governmental standards and regulations, industry structural shifts and consumer choice. Many technological innovations require new thinking regarding how to measure and rate vehicle energy efficiencies and GHG emissions.

4.1.1 The United States Corporate Average Fuel Economy (CAFE) standards

The United States was the first country to introduce fuel efficiency standards for passenger vehicles after the 1970s oil crisis. Their purpose was related primarily to energy security following the enactment of the Energy Policy and Conservation Act 1975. CAFE standards have been in place since 1975 but for much of that time they were rarely upgraded and ineffective. From 1990 to 2010 they were not revised at all.

The landmark case of *Massachusetts v Environmental Protection Agency* in 2007 considered the correct interpretation of s 202(a)(1) of the Clean Air Act[119] and the decision reached forced the specific regulation by the Environmental Protection Agency (EPA) of CO_2 and GHG as "air pollutants".[120] Later the same year, the Energy Independence and Security Act[121] was passed requiring that CAFE standards be set at the "maximum feasible level", with the consideration of four factors:[122]

1. Technical feasibility.
2. Economic practicability.
3. Effect of other standards on fuel economy.
4. The need for the nation to conserve energy.

In May 2009 United States President Barack Obama announced a national policy to reduce GHGs and improve fuel economy for all cars and trucks sold in the United States. Following the announcement, the EPA and the Department of Transportation issued a joint notice stating that the two agencies would in future work together to establish new CAFE standards.[123]

119 Clean Air Act (CAA) 42 USC § 7521(a)(1).

120 *Massachusetts v Environmental Protection Agency* 549 US 497 (2007). Also, in *Coalition for Responsible Regulation Inc. et al v Environmental Protection Agency* F 2d 09-1322 Ct App (DC Circ 2012) the Court upheld the EPA's greenhouse gas regulations.

121 Energy Independence and Security Act 2007 Pub L No 110–140.

122 See also *Centre for Auto Safety v NHTSA* 793 F 2d 1322 (Ct App DC Circ 1986) 147.

123 Notice of Upcoming Joint Rulemaking to Establish Vehicle GHG Emissions and CAFE Standards FR Vol 74 No 98 Friday May 22 2009 Notices <www.epa.gov>.

The EPA then issued an "Endangerment Finding" for GHGs, concluding that GHGs "contribute to the total greenhouse gas air pollution, and thus to the climate change problem, which is reasonably anticipated to endanger public health and welfare".[124] Next, the EPA introduced its tailpipe rule for "Light-Duty Vehicle Greenhouse Emission Standards and Corporate Average Fuel Economy Standards"[125] as part of the joint rulemaking initiative with the National Highway Traffic Safety Administration (NHTSA) setting GHG emission standards for cars and trucks. The standards apply to light-duty cars and trucks in model years 2012–2016 (first phase) and 2017–2025 (second phase).[126]

Having embarked on a new ambitious phase of reducing GHGs the EPA followed up the new standards with GHG requirements for large state and industry emitters. Those groups ideologically opposed the regulation of any GHG emissions and challenged the EPA rules. In the case of *Coalition for Responsible Regulation, Inc. v Environmental Protection Agency*[127] the petitioners challenged the rules setting standards for cars and trucks and requiring permits for large emitters (such as coal-fired plants). The claim made was that the rules were based on a faulty interpretation of the Clean Air Act and were capricious and heavy-handed. In a sharply worded opinion the United States Court of Appeals for the District of Columbia Circuit rejected the challenge, noting that the EPA interpretation of the Clean Air Act was "unambiguously correct".[128]

The road to tougher energy efficiency standards in the United States has been a difficult and litigious one (with California acting as the ground-breaker state on GHG reduction policies). Notwithstanding, the United States has carved a path towards major policy changes in energy efficiency. The 2025 emission standards for light-duty vehicles is expected to achieve the lowest

124 Endangerment Finding 74 Fed Reg 66,496 (Dec 15, 2009) at 66,499.

125 Light-Duty Vehicle Greenhouse Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed Reg 25,324 (May 7, 2010).

126 *Light-Duty Vehicle Greenhouse Gas Standards and Corporate Average Fuel Economy Standards: Federal Register* FR Doc No 2010-8159 40 CFR parts 85, 86, and 600: 49 CFR parts 531, 536 (2012–2016 standards); (2017–2025) FR Vol 77 No 199 Book 2 at 62623–63200; 40 CFR parts 85, 86 and 600; 49 CFR parts 523, 531 and 533. See recall of certain VW diesel vehicles (5,548 in New Zealand) with emissions software irregularities (12 October 2015) <www.volkswagen.co.nz>.

127 *Coalition for Responsible Regulation, Inc. v Environmental Protection Agency* US CA No 09-1322 decided 26 June 2012.

128 At 16.

new passenger car fleet CO_2 emission average in the world. This is an extremely ambitious target given the United States population tends to drive larger cars greater distances than the populations in many other countries.[129]

The new CAFE standards are based on the sales-weighted corporate average fuel economy for vehicles and the vehicle footprint. It is an attribute-based rather than a uniform system. The standards tie fuel efficiency to attributes like weight and engine distribution with variable targets for different vehicle footprints (the wheelbase multiplied by the track-width of the vehicle). The standards are expressed as a mathematical function, depending on vehicle footprint, and set in a curve so the burden of compliance is spread across all vehicles and all manufacturers. The larger the vehicle, the larger the footprint and the lower the fuel-efficiency target. The system is a complex one but the rationale for the complexity is that it is a fairer system to all manufacturers and encourages innovation while imposing as few technical restrictions as possible on designing and building vehicles to meet the new standards.[130]

The standards are projected to result in an average fleet-wide level of 163 grams per mile of CO_2, or in metric terms, 93 g CO_2/km in 2025.[131] The EPA projects the programme will:[132]

- Cut 6 billion metric tonnes of GHG over the lifetime of vehicles sold in model years 2012–2025.
- Save US$1.7 trillion in fuel costs.
- Reduce dependence on oil by 2 million barrels per day in 2025.

With Canada and now Mexico starting to harmonise their energy efficiency targets with the United States standards, these countries should also start to see significant CO_2 reductions across their vehicle fleets.[133]

129 "Global Comparison: Light Duty Fuel Economy and GHG" TransportPolicy.net <www.transportpolicy.net>.

130 A criticism of Japan's Top Runner programme is that it focuses on achieving incremental energy efficiency without rewarding more ambitious innovations.

131 Normalised to the New European Driving Cycle (NEDC) test cycle. See also Roman Nicolas "The Different Driving Cycles" (1 May 2013) Car Engineer <www.car-engineer.com>.

132 Environmental Protection Agency "Regulations & Standards: Light-Duty" <www.epa.gov>.

133 See Motor Industry Association "Average age of used cars entering the NZ fleet" (June 2015) and "Passenger car fleet breakdown" (June 2015).

4.1.2 Japan's Top Runner programme

Japan (like the United States) has had energy efficiency standards in place for many years.[134] When Japan adopted the Kyoto Protocol in 1997 it was required to achieve a six per cent reduction in its GHGs below 1990 levels by 2008 to 2012. The Top Runner programme was created as one means of reaching this goal.

The programme started in 1998 with nine different product groups including vehicles. Japan's approach is based on a category-based weighted system rather than the United States attribute-based footprint system. The basic structure is that the most efficient or "top product" in the marketplace sets the standard with a lag time during which all other products in the product class must meet that energy efficiency standard. As the technology to reach the standard clearly already exists and Japan's manufacturing sector is a technologically advanced one, this does not pose a barrier to reaching the new higher standard. An illustration of the success of the Top Runner programme can be seen in the following example. In 1998 Japan set a standard of 15.1 km per litre to be achieved by the rest of the vehicles in that model class by 2010. This was achieved by the market in 2005, five years ahead of the standard's target year.[135]

The institutional and cultural setting in Japan is very different to that of the United States and has a strong bearing on the success of the Top Runner programme. Government agencies in Japan, especially the Ministry of Economy, Trade and Industry (METI), have a very powerful position and influence on industry. Collaboration between METI, the government and the industry associations to create and set the standards at regular intervals is a large factor in the success of Top Runner.

While there were fuel-efficiency improvements in Japanese vehicles prior to the programme in the 1970s and 1980s, efficiency gains had stagnated and worsened in the early 1990s due to low petrol prices and increases in vehicle size.[136] The Top Runner programme has resulted in energy efficiency improvements across the products in the programme ranging from 16 per cent to 80 per cent,[137] with an estimated improvement in energy efficiency in petrol passenger cars between 1995 and 2010 of 22.8 per cent.[138]

134 K Osamu "The Role of Standards: The Japanese Top Runner Program for End-Use Efficiency. Historical Case Studies of Energy Technology Innovation" in A Grubler, F Aguayo, KS Gallagher and others (eds) *The Global Energy Assessment* (Cambridge University Press, Cambridge, 2012) ch 24 at 2.

135 Prafula Pearce "Using Tax and Regulatory Measures to Reform Choice and Usage of Motor Vehicles for Personal Transportation in Australia for the Sustainability of Oil" (PhD thesis, Curtin University, 2012) at 91–94.

136 Osamu, above n 134, at 7.

137 At 5.

138 At 6.

4.1.3 The European Union CO_2/fuel efficiency standard

During the 1990s the European Union adopted a strategy for increasing energy efficiency and reducing CO_2 emissions from its transport fleet by reaching a voluntary agreement with the major car manufacturers. This was supplemented with a strong consumer information programme and the promotion of fuel-efficient cars through the use of regulatory fiscal tax measures. One commentator has characterised the European Union's approach to energy efficiency as a dual *push/pull* strategy where a voluntary standard is first used to pull the market in the right direction, and then mandatory standards are enacted to push even further CO_2 reductions and energy efficiency gains.[139]

The voluntary approach worked well between 1995 and 2005, but improvements slowed after that time. In 2009 Regulation 443/2009 was adopted establishing a new mandatory fleet average target of 130 g CO_2/km to be reached by 2015. In 2013 more work was done setting a standard of 95 g CO_2/km, to be phased in for 95 per cent of vehicles by 2020, and 100 per cent of vehicles by 2021. Targets have also been set for light commercial vehicles (which have a separate standard in the European Union).[140] The European Union has also set stricter standards again for the light fleet (of 68–78 g CO_2/km) for 2025.[141]

4.1.4 Overseas fiscal measures

Governments are increasingly turning to fiscal policies to influence the public to purchase more energy-efficient vehicles. Finding the best design and mix of policies is challenging. Barriers exist in the form of both manufacturer and consumer behaviour. Policies depend on each country's circumstances including transport infrastructure, vehicle mix, quality of fuel (sulphur content and available biofuels) and the socio-behavioural profile of the local population (consumers' decision-making processes when buying cars). New Zealand has high-quality statistical information on its transport fleet collected by the Ministry of Transport,[142] and an excellent labelling scheme which enables the public to see the fuel efficiency of all new and used vehicles when making

139 Véronique Bruggeman "Energy Efficiency as a Criterion for Regulation in the European Community" (2004) 13 EUR Energy & Envtl L Rev 140.

140 COM (2009) 593. In 2012 these were updated. COM (2012) 393, with the end of the phase-in period delayed one year to 2017 and the long-term target changed. In 2013 the long-term target for light commercial vehicles was set at 147 g CO_2/km.

141 2025 EU target for passenger cars: COM (2012) 394.

142 IEA *Fuel Economy*, above n 103, at 21; See also IEA *New Zealand*, above n 74, at 47.

a purchase.[143] These are important structures to have in place prior to the introduction of any CO_2/fuel efficiency standard.

4.1.5 Fuel taxes

Fuel taxes are capable of impacting on consumer vehicle choice and driving behaviour. Fuel-efficient vehicle numbers are higher in countries with high fuel prices and vehicles tend to drive fewer kilometres. The problem with this policy is that fuel prices are already high in New Zealand. There are equity considerations to take into account when a high fuel price may unfairly affect the most financially vulnerable. Furthermore, if fuel prices are too high, transport-related business is negatively affected causing extra flow-on costs to the economy. On the other hand, if fuel prices are too low, they encourage greater fuel use and higher CO_2 emissions. The balance to be made is a delicate one.

4.1.6 Vehicle taxes

Nearly all countries require vehicle taxes of some sort to be paid at the time of purchase and/or annually. Historically, vehicle taxes are often based on factors such as engine capacity, vehicle size, and in New Zealand, accident rates for different classes of vehicles. Vehicle taxes can, and have in some countries been altered to, align with CO_2/fuel efficiency emissions, which make energy-efficient vehicles more attractive to the consumer. The combination of a strong CO_2/fuel efficiency labelling scheme with sliding-scale CO_2 vehicle taxes gives consumers both the necessary information and a cost incentive to buy the most fuel-efficient vehicles.[144]

> We recommend that all countries link fiscal policy directly to CO_2 emissions and provide the strongest price signal politically feasible for carbon reduction from passenger cars.

An advantage of such schemes is that they are easy to put in place at little or no extra cost to the government. Infrastructure for collecting taxes is generally already in place and the schemes can be designed to produce a similar revenue stream to any existing vehicle tax system. In a recent review by the International Council on Clean Transport of fiscal policies associated with

143 Land Transport Rule: Fuel Consumption Information 2008, r 33020.

144 Hui He and Anup Bandivadekar *A Review and Comparative Analysis of Fiscal Policies Associated with New Passenger Vehicle CO_2 Emissions* (ICCT, 2011) at 10. Of all the countries reviewed, Germany's policy design represents the closest to an ideal CO_2 incentive tax structure with a continuous linear CO_2 tax applied on car emissions >120 g/km.

vehicle CO_2 emissions, the following recommendations were made. Policies should:[145]

- be directly linked to vehicle CO_2 emissions rather than particular attributes of the vehicle and be applied at point of purchase, annually or both;
- apply to the entire fleet including conventional and advanced technology vehicles;
- set fees that vary continuously across the full spectrum of CO_2 emissions (as opposed to fees that apply to a limited CO_2 range or are based on "step" or "bin-based" structures).

Policies that apply both at time of purchase and throughout a vehicle's lifetime (annually) influence a consumer's vehicle replacement decision and yield greater CO_2 reductions than a single time-of-purchase policy. In New Zealand this kind of policy/regulation/rule would capture all the energy-inefficient vehicles already on the roads in the fleet.[146]

In wealthy countries, consumers are sometimes further incentivised with a subsidy for purchasing the most efficient vehicles, or a rebate or "feebate" system where a rebate on taxes is given on purchase of an energy-efficient vehicle, and a fee is charged on purchase of an inefficient vehicle.[147]

In France a CO_2-based *bonus/malus* scheme was introduced in 2008 on all new cars that awarded a rebate to consumers who purchased low CO_2-emitting vehicles and penalised buyers of high CO_2-emission cars. Public uptake was so strong that the scheme ran significantly over budget.[148] An important design consideration for any subsidy or rebate system is an ability to adjust the scheme once uptake reaches a certain threshold.

Vehicle taxes in the European Union are directly linked to CO_2 emissions, whereas Japan's taxes are based on fuel efficiency compared to target values for

145 At 9. Step or bin tax structures have bands of CO_2 emissions levels with a set fee for each step or bin. This dilutes the effectiveness of the tax.

146 The proposition is sometimes made that strict scrapping regimes for older vehicles would dramatically reduce CO_2 emissions. However, a factor to take into account is the huge amount of energy that has already gone into the design and build of vehicles and the disposal of them in terms of CO_2 emissions. If standards are too strict/rapid, the shorter lives of vehicles combined with disposal costs can contribute more CO_2 into the atmosphere than a more graduated approach.

147 For example, the US Energy Tax Act 1978 (Pub L 95-618 stat 3174) imposes a gas-guzzler tax on manufacturers who sell cars that fail to meet minimum fuel economy levels. See EPA regulations regarding gas-guzzler compliance 40 CFR § 600.513-08 and 40 CFR § 600.513-91. See also David L Greene and others "Feebates, Rebates and Gas Guzzler Taxes: A Study of Incentives for Increased Fuel Economy" (2005) 33 Energy Policy 757–775.

148 France introduced its *bonus/malus* scheme in 2007, which was so popular the cost became prohibitive causing the French government to scale back the rebates.

each vehicle class.[149] The United States has a tax disincentive called the "gas guzzler tax" which is based on the principle of polluter pays and applies to a small group of worst or least efficient vehicles that is paid by the manufacturer not the consumer. A similar suggestion has been made recently in Australia for a luxury energy tax.[150]

Ultimately, the International Council on Clean Transportation see one-off taxes on certain vehicle classes as useful but less effective than a graduated CO_2 tax across a whole light passenger fleet based on energy efficiency levels of individual vehicles.

4.1.7 The rebound effect

A commonly raised concern with energy efficiency standards and fiscal tools is the rebound effect.[151] Where consumers make considerable savings on fuel cost due to greater efficiency, there can be a resulting tendency to drive more often and further, and to purchase larger vehicles with bigger engines because running costs are lower. These rebound effects can offset CO_2 reductions expected from stringent policy measures. To prevent rebound effects, governments run public education programmes and implement vehicle use policies. Altering cultural and consumer perceptions around energy efficiency plays an important role. In many large cities, there are changing views about the place of cars in heavily built-up urban environments where they pose safety and health risks. Traffic moves slower in London today than in a horse-drawn carriage.[152] Congestion taxes are already levied in London and a low emission zone is planned for 2020, which will mean non-conforming vehicles pay an additional daily CO_2 charge when entering the zone.[153]

149 He and Bandivadekar, above n 144, at 33. See also Japan's Law Concerning the Rational Use of Energy (Energy Conservation Law) 49, 22 June 1979 (Regulations for 2010, 2015 and 2020 standards). See also *Final Report of Joint Meeting between the Automobile Evaluation Standards Subcommittee, Energy Efficiency Standards Subcommittee of the Advisory Committee for Natural Resources and Energy and the Automobile Fuel Efficiency Standards Subcommittee, Automobile section, Land Transport Division of the Council for Transport Policy* (December 2011) <www.transportpolicy.net>.

150 Pearce, above n 135.

151 Jeremy West and others *Vehicle Miles (Not) Traveled: Why Fuel Economy Requirements Don't Increase Household Driving* (United States National Bureau of Economic Research Working Paper No 21194, May 2015).

152 Adele Peters "7 Cities That Are Starting To Go Car-Free" Fast Company Co.Exist <www.fastcoexist.com>.

153 Transport for London "Ultra Low Emission Zone" <https://tfl.gov.uk>.

5. CONCLUSION

> *Among sectors, transport represents the greatest challenge but also the greatest opportunity to improve energy efficiency. Road transport has the highest dependence on oil compared to any other sector, and therefore, any improvements in energy efficiency can deliver great benefits in terms of increased energy security, economic performance, mobility of citizens and reduced carbon emissions.*
>
> — International Energy Agency 2012[154]

Having examined international and national policy/legislation concerning energy efficiency, it is clear that the foundation is already in place to implement regulations, rules or standards to improve energy efficiency in the light transport fleet in New Zealand. Barry Barton states that New Zealand and Australia are far out of step internationally and that change must be accelerated significantly. He makes the point that introducing regulations is "probably the single most effective step New Zealand could take to reduce its emissions". Taking these steps "would bring New Zealand into the international mainstream".[155]

This article has placed its focus on gains to be had from CO_2/fuel efficiency standards and energy efficiency fiscal tools. However, to achieve the greatest levels of energy efficiency and CO_2 reduction, New Zealand will need to employ a whole suite of other strategies including:[156]

- Greater incentives for alternative technology vehicles (hybrid and electric).
- Efficiency standards for heavy-duty vehicles.[157]
- Optimising intelligent network efficiency in transport infrastructure and freight movement.[158]
- Consumer behavioural change.[159]

154 IEA *Fuel Economy*, above n 103, at 4.

155 Barry Barton "What do we do in New Zealand about the emissions and fuel efficiency of our vehicle fleet?" (26 May 2015) University of Otago, Energy Cultures <www.energycultures.org>.

156 Michael RW Walmsley and others "Carbon Emissions Pinch Analysis for emission reductions in the New Zealand transport sector through to 2050" (2015) Energy 1. See also Rebecca Ford, Adam Doering and Janet Stephenson *Transport Transition in New Zealand: A Scoping Study Report Prepared for the Energy Efficiency and Conservation Authority* (Centre for Sustainability, University of Otago, May 2014).

157 This was one of the main focuses of the 2014 G20 meeting. Countries with mandatory light-fleet CO_2 standards are turning attention to their heavy fleet.

158 For example, ramp-metering signals improved capacity on the Northern Motorway in Auckland by more than 15 per cent. See McGlinchy, above n 98.

159 In the longer term, vehicle automation has potential to save fuel and reduce variability of human driving. McGlinchy, above 98.

5.1 Recommendation

It is the writer's recommendation that to maximise energy efficiency in the transport light fleet, the following course of action represents the best approach for New Zealand at this time:

1. Consultation is undertaken with the International Council on Clean Transportation, the Global Fuel Economy Initiative and the International Transport Forum which have extensive experience in assisting countries to design the best regulatory tools for the local environment to achieve high levels of energy efficiency in transport fleets based on the unique transport profile of each country.
2. New Zealand's vehicle tax system be reviewed and redesigned (to be cost neutral) aligning the tax structure with CO_2/fuel efficiency emissions based on a sliding scale across the whole light vehicle fleet. Once again the international organisations referred to above have considerable knowledge in fiscal CO_2 policy which prevents the process of New Zealand reinventing the wheel.[160]
3. In tandem with the review of the NZEECS, the government consider whether a specific New Zealand CO_2/fuel efficiency standard would be beneficial. Our transport profile as a non-manufacturer and importer of more used vehicles than new will be relevant. It is the writer's view that a well-designed vehicle tax across the whole light fleet, incentivising the purchase of energy-efficient vehicles, may well achieve greater energy efficiency gain. However, specific modelling of the options will be necessary to determine this outcome with certainty.

The Minister of Energy and the EECA will now be reviewing the NZEECS. This is the time to take action to improve energy efficiency in the light transport fleet, and in the process, enhance New Zealand's clean and green image.[161]

160 New Zealand's Motor Industry Association has recommended a full review of road and vehicle taxes; MIA *Climate Change Contribution Consultation*, above n 59. See also He and Bandivadekar, above n 144.

161 See Figure 3: Integrated Energy Efficiency Model. This model has been adapted from David Grinlinton's Environmental Management Model in "Integrating Sustainability into Environmental Law and Policy in New Zealand" in K Bosselmann, D Grinlinton and P Taylor (eds) *Environmental Law for a Sustainable Society* (2nd ed, NZCEL Monograph Series, Auckland, 2013) 21 at 33.

Figure 3: Integrated Energy Efficiency Model

International Commitments
– FCCC
– Kyoto
– Energy Charter Treaty (ECT) and Protocol on Energy Efficiency (not relevant to NZ)
– NZ's INDCs
– Soft law documents
– Sustainable Development Goals

Key Policy
NZ Energy Strategy 2011–2021
NZ Energy Efficiency Strategy 2011–2016

Legislation
– Climate Change Response Act 2002
– Energy Efficiency and Conservation Act 2000
– The Resource Management Act 1991 and the Resource Amendment Act 2004
– Electricity (Renewable Preference) Amendment Act 2008
– Gas Amendment Act 2004

Demand Side Energy
– Regulations and standards for EE
– MEPs (minimum performance standards eliminate the least efficient products from the marketplace)
– Fuel efficiency vehicle standards
  • Labelling (enabling purchasers to make informed decisions)
  • Voluntary programmes
  • Education/information programmes
  • Fiscal tools

Sustainable Development
– Intergenerational equity
– Precautionary principle
– Polluter pays principle

Energy Efficiency
– Still largely untapped
– Useful strategy (short to medium term) for keeping world below a two-degree threshold

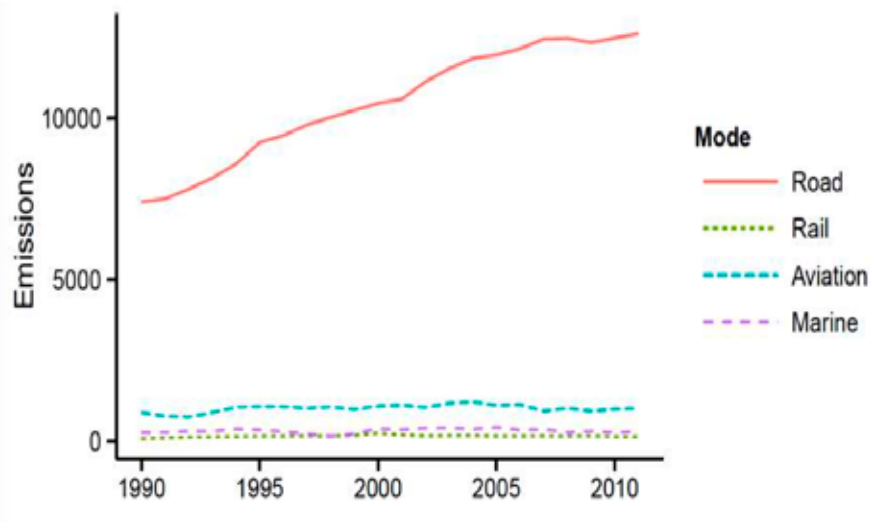
NGOs with important roles to play
– International Energy Agency
– International Council on Clean Transportation
– Global Fuel Economy Initiative
– International Transport Forum

Emissions Trading Scheme
NZ's primary policy to reduce emissions — transport fuel covered but Scheme weakened by:
– free allocations
– uncapped ETUs
– exclusion of some GHG-intensive industries
– "two for one" programme.
Carbon tax
– Not implemented in NZ

Supply Side Energy
• Fossil fuels (petroleum, coal, gas)
• Renewable Energies (hydro, geothermal, wind, solar, electric, marine)
• Biofuels

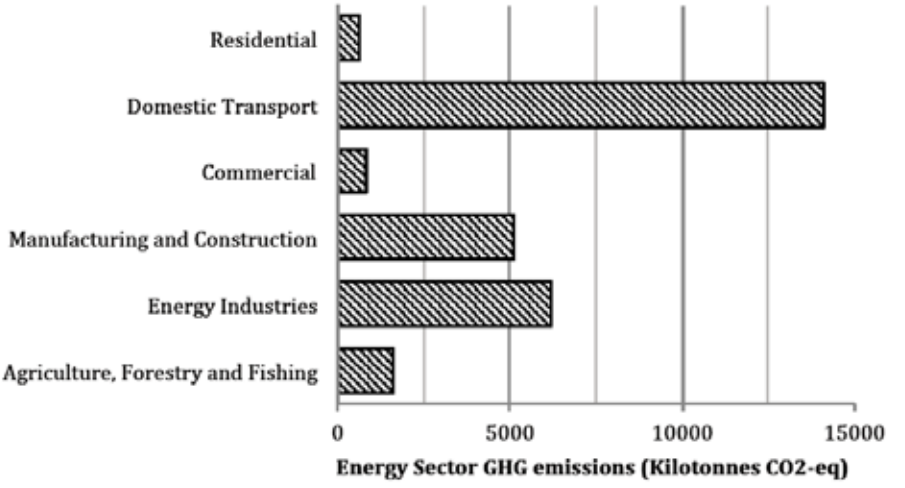
Source: adapted from David Grinlinton's Integrated Environmental Management Model (see fn 161).

Figure 4: New Zealand transport-related emissions



Source: Ministry of Business, Innovation and Employment.

Figure 5: Energy sector greenhouse house gas emissions



Source: Energy Efficiency and Conservation Authority.