

The emissions impact of a shift to universal road user charging in New Zealand

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26 May 2025

Abstract

A proposal by the New Zealand government to remove fuel excise duty and shift all light vehicles to road user charges (RUC) would reduce the effective carbon charge on petrol vehicles from \$448/tCO₂ to \$50/tCO₂. It would increase the running costs of hybrid petrol vehicles and decrease the running costs of high-emission petrol vehicles. This report examines the potential impact of this change on emissions, including a comparison to Iceland, the only other country to have introduced RUC for EVs and to be considering a universal RUC system.

1. The impact of a shift to road user charges

Since 1978, diesel vehicles in New Zealand have paid road user charges (RUC) via a formula that depends on vehicle size and weight. Revenues are allocated to the National Land Transport Fund. Petrol vehicles do not currently pay RUC, contributing instead via a fuel excise duty. Electric vehicles (EVs) were granted an exemption from RUC in 2009 which expired on 1 April 2024. From that date, EV owners were required to pay RUC at the same rate as light diesel vehicles.

The government has indicated that it intends to shift all light vehicles onto RUC, possibly by 2027 (RNZ, 2024). If fuel excise duty is completely removed and all light vehicles pay the same rate (as is currently the case for eligible vehicles), then the relative running costs of high- and low-emission vehicles would be altered. In this research note we explore the magnitude of this effect and its possible impact.

The current rate of fuel excise duty on petrol is 92 c/l including GST. As one litre of petrol emits 2.31 kg of CO₂ when burned, this is equivalent to a carbon charge of \$398 per tonne of CO₂. Petrol also incurs a carbon charge via the ETS, which for the purposes of this report we model at \$50/tCO₂. Thus, removing fuel excise duty would reduce the carbon charge from \$448/tCO₂ to \$50/tCO₂.

Table 1 lists the combined cost of RUC, petrol, and electricity per kilometre for a range of vehicles. The lowest-emitting hybrid vehicles would see a price increase of 39%, while the highest-emitting petrol vehicles would see price reduction of 6%. However, from the point of view of RUC regarded as a price to access the roading network, the anomaly in which the lowest-emitting hybrid pays 60% less than the highest-emitting petrol vehicle (and half as much as an EV) would be removed.

		RUC	Petrol	Electricity	Total	Change
BEV	Pre-RUC			3.4	3.4	
	Current RUC	7.6		3.4	11.0	+224%
PHEV 2l/100km	Pre-RUC		5.0	1.0	6.0	
	Current RUC	3.8	5.0	1.0	9.8	+63%
	Post-RUC	7.6	3.2	1.0	11.8	+20%
Hybrid 4l/100km	Pre-RUC		10.0		10.0	
	Post-RUC	7.6	6.3		13.9	+39%
Hybrid 6l/100km	Pre-RUC		15.0		15.0	
	Post-RUC	7.6	9.5		17.1	+14%
Petrol 8l/100km	Pre-RUC		20.0		20.0	
	Post-RUC	7.6	12.6		20.2	+1%
Petrol 10l/100km	Pre-RUC		25.0		25.0	
	Post-RUC	7.6	15.8		23.4	-6%

Table 1. Change in combined RUC, fuel, and electricity costs in cents/km for selected cars, based on a current petrol price of \$2.50/l and fuel duties of 92 c/l including GST. The PHEV is assumed to operate 40% of its distance on electricity. Here EVs consume 170 Wh/km and incur an electricity price of 20c/kWh (e.g. a night or otherwise discounted rate). An EV charged entirely by public rapid charges at 90c/kWh would incur total costs of 22.9 c/km, similar to the highest-emission petrol cars.

The emissions impact of the change is difficult to estimate. In fact, the impact of any such policy change in a rapidly changing environment is difficult to estimate. Ministry of Transport officials forecast that EV sales would fall by a third following the end of the feebate¹ and the introduction of RUC; in fact, they fell by two-thirds and did not recover by the end of the year, even though sale prices had reduced significantly, in some cases to far below the feebate-era price. Possibly the psychological effect of transport climate policies is important: both the introduction and then the removal of the feebate (the latter an election issue in 2023) brought significant public attention to the topic of EVs, transport emissions, and climate policy more generally. Anti-climate messaging from the government (removal of the feebate, introduction of RUC, weakening of fuel efficiency standards, and opening the door to the expansion of coal, oil, and gas extraction) may have influenced public views of the importance of personal climate action (see Coad et al. 2009, Kinzig et al. 2013, Osberghaus 2017).

On the other hand, hybrid sales received a large boost during the feebate era which did not dissipate following its removal (see Figure 2). When the RUC exemption for EVs was under consideration, the Ministry of Transport (2022) advised that ‘The Ministry of Transport cannot be confident the RUC exemption is an effective policy for incentivising LEV uptake because studies have not been undertaken on the topic’ but also that ‘Light EVs becoming more expensive to operate could slightly reduce uptake amongst very price-sensitive car buyers.’

Emissions could potentially be affected through changes to the rate of driving per vehicle, the removal of vehicles from the fleet, and the mix of vehicles entering the fleet. On the last point, a backstop exists through fuel efficiency standards, introduced in 2023 and now called the Clean Vehicle Standard. If the standards are met, then the fleet will become progressively lower-emission over time. However, there is some uncertainty over this. The standards were weakened in 2025 and are now to be reviewed every two years, next in June 2026. In addition, fines for missing the standard are relatively low at \$45/(gCO₂/km)/vehicle (cf. \$180 in the EU). In January-April 2025, the standard for passenger cars was exceeded by 25g per car (Ministry of Transport, 2025), although fines are unlikely to be payable as there are still credits available from 2023 when the feebate was in place. In other words, the robustness of the Clean Vehicle Standard has not been tested yet.

New Zealand’s five-yearly carbon budgets provide another potential backstop. The government must attempt to meet these emissions budgets and issue credible plans to do so. In theory, if emissions rise in a sector such as land transport so as to threaten a current or future budget, then climate policies (either in that sector or in others as well) should be strengthened. In practice all such questions are open to political direction. Letting emissions rise in a consumption sector such as private car travel may be popular with the driving public, but if it meant forcing industrial emissions down unfeasibly fast, the

¹ A system which charged buyers an initial registration fee of high-emitting light vehicles and paid a rebate on low-emitting vehicles, in operation from 1 July 2021 to 31 December 2023.

government would be in an awkward position. Governments' resolve to stick to existing carbon budgets, and to strengthen them in light of new information, would be tested.

The argument that land transport emissions are fully exposed to the Emissions Trading Scheme (ETS) and hence that their emissions are 'solved' does not stand up to closer inspection. First, the evidence on the emissions impact of carbon pricing is mixed and somewhat paradoxical, both in New Zealand and internationally. On one hand, the carbon prices that have been put in place so far have not been found to be highly effective at reducing emissions; where they have been effective, the mechanism has been attributed to allocating the carbon revenue to emissions reductions projects (Hall and McLachlan, 2022). On the other hand, carbon pricing remains a staple climate policy worldwide and many climate advocates seek higher carbon prices. In New Zealand, carbon pricing via the ETS is currently the main climate policy. Thus if the government believes that it is an effective policy, then they should also believe that a reduction from \$448/t to \$50/t would have a significant impact on emissions.

Second, the New Zealand ETS has two major weaknesses that limit its use as a sole climate policy: the ETS includes trees, and it does not cover all emissions (some CO₂ emitters receive free allocations, and some other gases (biogenic methane and nitrous oxide) are not in the ETS; in 2023 about 29 MtCO_{2e} out of a total of 79 MtCO_{2e} of gross emissions were fully exposed to the ETS). Under current policy settings, any rise in the carbon price, or any rise in fossil CO₂ emissions, could simply lead to more trees being planted. The inequivalence of fossil and biogenic CO₂ is widely recognised and there have been repeated calls for New Zealand's climate policy to shift to an increased focus on a reduction in gross emissions. Most recently, the Parliamentary Commissioner for the Environment (2025) called for forestry to be removed from the ETS.

The international evidence on the linkage between carbon taxation and transport emissions is mixed. A very wide range of demand elasticities has been reported. A recent study (Ptak et al. 2024) comparing changes to fuel taxation across different countries in Europe reviews the evidence and reports a demand elasticity of -0.9 in countries with high fuel taxes (New Zealand would fall in this class) and -0.1 in countries with low fuel taxes. An elasticity of -0.9 would mean that a 1% fall in the rate of fuel tax would lead to a 0.9% increase in vehicle emissions. Ptak et al. conclude (see also Hughey et al. 2006):

Taxes on fuels are specific taxes; therefore, the real burden falls with inflation and growing earnings, increasing fuel's economic affordability and demand for them. Thus, they should be adjusted over time to send a correct and strong signal. This is not easy from a political perspective, however. In the public discussion, the authorities should stress the growing economic affordability of fuels and the negative consequences of car transportation. The awareness that (high) fuel taxes can play a quite significant role in reducing demand for fuels and therefore reducing dependence on imported fuels and emissions as well other negative externalities, might reduce social resistance against higher fuel taxes.

In New Zealand, the retail price of petrol has broadly kept pace with inflation over recent decades. In that time, real incomes have risen and vehicles have become more fuel efficient, so petrol has become relatively more affordable. Nevertheless, petrol use per capita has been declining for some time, a decline that has accelerated since 2019 (see Figure 1). This decline cannot be attributed solely to the rise of diesel vehicles or to the increasing efficiency of non-diesel vehicles, which fleet has improved from 190 gCO₂/km in 2015 to 172 gCO₂/km in 2019 to 158 gCO₂/km in 2025. Most likely, a shift to working from home post-Covid, and less travel in general due to the current recession, are also partly responsible.

The New Zealand light vehicle fleet is still heavily dominated by non-hybrid petrol and diesel vehicles (see Table 2) and the effort to decarbonise the fleet and to reduce and eventually eliminate fossil fuel emissions from land transport is still in relative infancy.

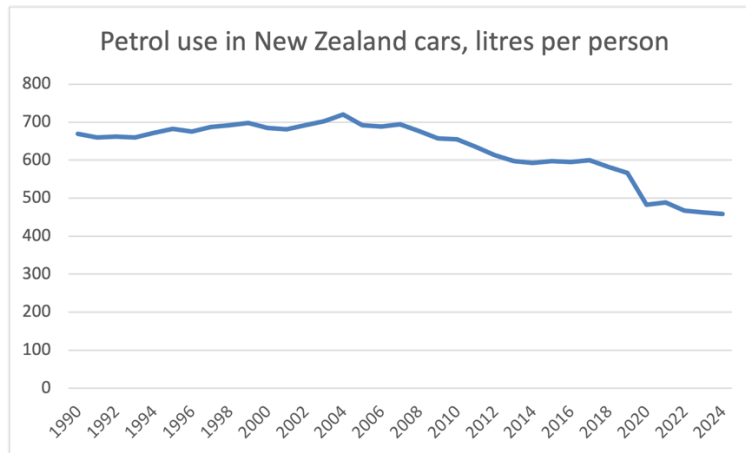


Figure 1. Petrol use in New Zealand cars, litres per person. Source: Ministry of Business, Innovation, and Employment.

		Fleet size		Initial registrations	
Passenger	Petrol	2874964	64.6%	84536	39.4%
	Hybrid Petrol	339207	7.6%	72663	33.9%
	Diesel	311290	7.0%	7971	3.7%
	Battery Electric	80432	1.8%	8401	3.9%
	PHEV Petrol	36481	0.8%	4795	2.2%
	Hybrid Diesel	1437	0.0%	1215	0.6%
	LPG/Other	637	0.0%	1	0.0%
	Fuel-cell (H2)	38	0.0%	18	0.0%
	PHEV Diesel	22	0.0%	0	0.0%
Light commercial	Diesel	645137	14.5%	26203	12.2%
	Petrol	155259	3.5%	3098	1.4%
	Hybrid Diesel	5062	0.1%	4720	2.2%
	Battery Electric	2090	0.0%	229	0.1%
	PHEV Petrol	811	0.0%	720	0.3%
	LPG/Other	288	0.0%	0	0.0%
	Hybrid Petrol	161	0.0%	77	0.0%
Total		4453316		214647	

Table 2. The composition of New Zealand's light vehicle fleet as at April 2025, and initial registrations May 2024-April 2025. Source: Ministry of Transport.

2. Diesel vehicles

Diesel vehicles have paid RUC since its introduction in 1978. They form a reference case to which petrol vehicles can be compared. The current newly registered diesel car emit an average of 224 gCO₂/km with combined RUC and fuel costs of 23.7c/l (cf. Table 1), slightly less than a petrol car of the same emissions.

Between 2017 and 2025, the emissions of newly registered diesel light commercial vehicles (14.7% of the light vehicle market) fell from 250 gCO₂/km to 234 gCO₂/km. However, the emissions of newly registered diesel cars (3.4% of the market) rose from 215 gCO₂/km to 224 gCO₂/km. In contrast, emissions of newly registered petrol cars fell from 193 gCO₂/km to 144 gCO₂/km in the same period, mostly due to the rise in popularity of (non-plug-in) hybrids (Ministry of Transport, 2025). The higher emissions and slower (or lack of) reduction in emissions of vehicles that incur RUC vs those that do not indicate a possible linkage.

3. Plug-in hybrid vehicles

Introduction of RUC for plug-in hybrid vehicles (PHEVs) in New Zealand was controversial as they would be paying both RUC and fuel excise duty. Some members of the public argued that their old PHEVs had no useful electric range at all, operating instead as non-plug-in hybrids. The initially proposed rate of 6.0 c/km was changed to 3.8 c/km during deliberation of the enabling legislation. Under a universal RUC scheme, this distinction would disappear and PHEVs would see increases in costs of 10-20%.

In the quest to decarbonize land transport, the role of PHEVs has been controversial. In New Zealand, PHEVs are currently registered at an average of 42 gCO₂/km. But in Europe it has been found that real-world emissions of PHEVs are considerably higher, averaging 135 gCO₂/km (Transport & Environment, 2022). (There is also a gap between nominal and real-world emissions of petrol cars, but it is much smaller – about 10%). The utility factor (proportion of EV driving) for different models of car and different owners (business vs. private) for New Zealand is not known. The emissions gap for cars (average gCO₂/km of sales minus the target) is currently 25 gCO₂. An increase of PHEV sales based on incorrect emissions values would undermine the reduction of transport emissions. At present, the effect (c. 1.5 gCO₂/km vs target) is not large.

The EU is currently phasing in higher emissions values for PHEVs, to be complete by 2027.

4. The example of Iceland

Iceland and New Zealand are the only countries that have applied RUC to electric vehicles, and are also the only countries that are planning to apply RUC to all vehicles. There are some similarities between the two countries. They both have among the highest rates of car ownership in the world (New Zealand 0.934/p, Iceland 0.779/p) and have similar transport

emissions (3.2 tCO₂/p in New Zealand, 2.8 tCO₂/p in Iceland in 2019). We review Iceland's situation.

RUC was introduced in Iceland on 1 January 2024 at a rate of 7.5 c/km (Matthíasson 2025)². This was intended to improve fairness, to be a step on the way to RUC for all vehicles, and to raise money. By 2023 18% of the light vehicle fleet in Iceland was electric, resulting in a considerable drop in revenue from fuel tax. Although the step was not controversial and achieved high compliance, the EV market share fell from a high of 87% in the last quarter of 2023 to 26% in the second quarter of 2024, recovering to 63% in the first quarter of 2025 (see Figure 2). The fall was more likely due to the end of the \$16,000 EV rebate at the end of 2023 than to the introduction of RUC.

RUC was to have been introduced for all vehicles on 1 January 2025, but a change in government has meant a likely delay to 1 January 2026. The RUC charge will be 8.4 c/km, and the carbon charge, currently 23 c/l (i.e. \$100/tCO₂) will be doubled. The fuel excise duty of \$1.40/l will be removed, leading to a fall in the price of petrol from \$4/l to about \$2.85/l. The combined fuel and RUC cost of running a 6l/100km hybrid car will increase slightly, from 24c/km to 25.5c/km, and of a 10l/100km petrol car will fall from 40c/km to 36.9c/km (of which 4.6c is the doubled carbon charge). As of January 2025, the public were evenly split for and against the change. In response to submissions that it would be unfair for motorcycles to pay the full RUC amount, they were given a 1/3 discount.

Although the proposed RUC system for Iceland is similar to that discussed earlier for New Zealand, the impact in Iceland is likely to be less than in New Zealand:

- Hybrid cars are less popular in Iceland than in New Zealand, with a market share of about 15% vs 40% in New Zealand.
- The EV transition is further advanced in Iceland (18% vs 3% fleet share)
- Iceland retains other strong climate policies on transport, including an initial registration fee of 0.31% on each g/km of emissions over 90 g/km, up to a maximum of 65% of the vehicle's value; an annual registration fee of \$3.48 for each g/km of emissions over 133 g/km; a policy of banning sales of ICE vehicles after 2030; and a national climate target of carbon neutrality by 2040.

² All prices are converted into New Zealand dollars at a rate of \$1 = ISK80.

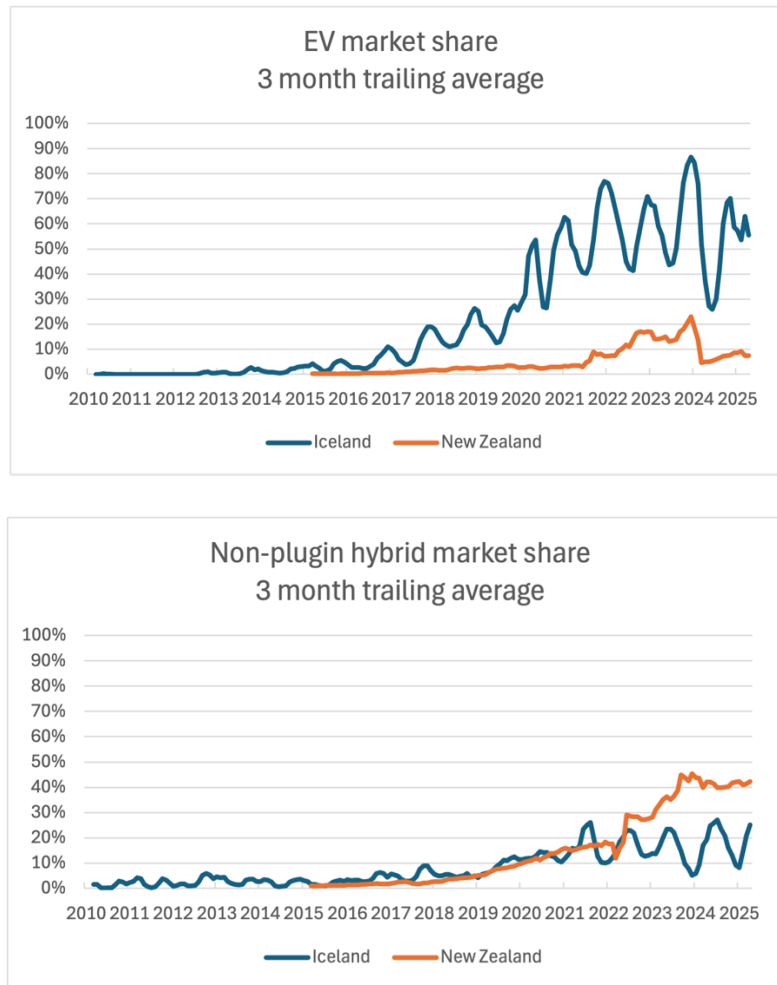


Figure 2. Market share of electric and hybrid passenger cars, Iceland and New Zealand. Source: Robbie Andrew, CICERO. <https://robbieandrew.github.io/carsales/>

5. Externalities

In 2022 the Ministry of Transport conducted a consultation on road user charges that included proposals to investigate the use of the RUC system to address other externalities of vehicle use besides road construction and road wear, such as congestion, climate change, health, safety, and noise impacts. Following the consultation, these considerations were deferred to the ‘Future of the Revenue’ system project (Ministry of Transport, 2022).

Using the current statistical value of life at \$12.5m, of serious injury at \$0.66m, and of minor injury at \$0.068m, the social cost of vehicle accidents in 2023 was \$6643m, or an average of 13.3 c/km. However, the social cost is not equal across vehicle types and is known to depend on the weight and safety rating of the vehicle (Highani, 2025; Tyndall, 2024).

The health impacts of vehicle pollution, primarily from Nox and PM emissions from petrol and diesel vehicles, were estimated at \$10.5b in the HAPINZ 3.0 study (Kuschel 2023), or 21.1 c/km. Again, these emissions depend on the vehicle type.

Estimates of the social cost of carbon vary widely. Two common values are the USEPA value of NZ\$317/tCO₂ (equivalent to 5.7 c/km for a typical petrol car) and NZ\$472/tCO₂ (Moore et al, 2024) (equivalent to 8.5 c/km). However, these values do not include the impact of climate change on GDP, which could be considerable – one estimate is 40% of GDP by 2100 under a high-emission scenario (Neal et al 2025). Another approach leads to an estimate of 1 death per 4000 tCO₂ (Bressler 2021, Richards et al 2023), which would correspond to \$3125/tCO₂.

Thus, very roughly, under the status quo drivers pay about 20c/km towards the operational cost of the roading network; central and local governments pay another 20c/km; and each kilometre of driving incurs another 40 cents of social costs through accidents, health, and climate impacts. Social costs are not typically charged directly to those that cause them, but contribute to other (e.g. regulatory) policies that attempt to address social impacts.

6. Conclusions

If the demand elasticity of fuel taxation is as high as that found by Ptak et al. (c. -0.9), then the emissions impact of a shift to universal RUC would be considerable. Owners of low-emission petrol vehicles would drive them less, high-emission petrol vehicles more. High-emission diesel vehicles (already in the RUC system) might become more popular. Resale values of small hybrids would fall. Sales of new hybrid vehicles could fall relative to those of non-hybrid vehicles, testing the Clean Vehicle Standard. The current slow decline in land transport emissions (currently just 3% lower in 2024 than in 2019, comprising a 15% fall in emissions from petrol and a 9% rise in emissions from diesel) could stall, placing carbon budgets at risk and creating a need for new, stronger climate policies elsewhere.

On the other hand, the long-term destination for land transport vehicles is for them all to be electrified, ideally as quickly as possible. Once this destination is reached, the question of emissions (although not that of other externalities) becomes moot.

Negative impacts could be counteracted by strengthening leadership on other components of the national transport climate plan, such as strengthening the Clean Vehicle Standard, incorporating a CO₂-based annual component to annual registration fees, and setting future targets that lead to an end of petrol and diesel light vehicle sales. On current settings, EV sales are well below the world average. On the specific issue of RUC, following Iceland's example of instituting a higher carbon charge on fuel would go some way towards moderating (but not removing) the impacts. Iceland's value of \$200/tCO₂ would still allow the price of petrol fall from \$2.50 to \$1.92 per litre. Emissions values for PHEVs should be re-evaluated along the lines of current EU policy.

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