Emissions Trading Scheme FAQ[1]

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Contents

[1] Disclosure: The author owns a small number of NZUs purchased through the SALT Fund.

ETS in a nutshell

The Emissions Trading Scheme (ETS) uses prices to lower emissions.

The ETS raises the price of goods and services according to their emissions content. Almost everything you buy includes an ETS charge.

The ETS is a 'cap and trade' system based on government-issued emissions permits. For each tonne of emissions, businesses must obtain an emissions permit, then surrender it to the government.

The government issues permits using auctions and free allocations to some businesses. The government also issues permits for activities which take emissions out of the atmosphere, for example by planting trees.

The government can lower emissions by issuing fewer permits.

Businesses trade to obtain the permits they need. The market price of permits is the cost of emitting one tonne of greenhouse gases. This is the carbon price.

The ETS sets one carbon price across the economy (except agriculture). As a result, the ETS reduces emissions for least cost.

The current ETS price is $38 per tonne of CO2. At that price, the ETS has only a modest effect on the cost of petrol, but nearly doubles the cost of coal.

At least 27 countries have an ETS. Emissions prices reach as high as NZ$200 per tonne.

Research suggests the ETS is 5 to 50 times more effective than policy per dollar.

The ETS does not depend on consumer perfection or perfect markets. It reduces emissions even when consumers make mistakes.

The ETS raises revenues for the government from the sale of emissions permits. The government can use these revenues to protect low-income households or offset other taxes.

New Zealand's ETS launched in 2008. It is now one of the best-designed schemes in the world.

1 A defence of the ETS

The case for the Emissions Trading Scheme does not depend on perfect consumers or assume infallible markets.

The case for the ETS is that it works even though consumers make mistakes.

There are no perfect consumers. Yet supermarkets exist, houses get built, taxis take you to the airport, and the ETS reduces emissions.

1.1 Priors

Two questions broadly define climate change policy in New Zealand:

- What should be our emissions targets?
- How should we meet our targets?

The first question is settled. New Zealand has committed to targets under the Paris climate agreement by 2030 and to reduce net emissions[2] to zero by 2050. The New Zealand Initiative supports these targets.

The targets having been set, the question is how to get there.

We believe

- emissions targets should be met for the lowest possible cost, and
- households and businesses should decide how and where to cut emissions, not officials.

The Emissions Trading Scheme meets both of these requirements.

2 The Emissions Trading Scheme

2.1 A quick overview

The ETS is a cap and trade system based on trade of emissions permits. Each permit gives its holder the right to emit one tonne of greenhouse gases. The government issues permits.

Businesses who participate in the ETS have 'surrender obligations.' Each year, they must obtain enough permits to cover their emissions, one permit per tonne of emissions. The businesses then surrender their permits back to the government.

The government can reduce emissions by issuing fewer permits. This is the 'cap' in cap and trade.

Businesses trade permits for a price based on supply and demand. The market price of permits is the carbon price – the cost of emitting a tonne of greenhouse gases.

The carbon price enters the cost of nearly all goods and services in the economy. Product prices rise in proportion to their emissions content. Prices for the high-emissions products rise the most.

[2] Net emissions is gross emissions of greenhouse gases (for example, emissions from your car or from livestock) minus removals (for example, greenhouse gases removed from the atmosphere by trees).

Emissions fall when businesses and households respond to these price changes by altering their behaviour. The higher cost of emissions-intensive products encourages a switch to greener alternatives.

Since there are only limited permits to go round, permit prices will be bid up to whatever level is necessary to bring emissions within the cap.

The most important property of the ETS is that it cuts emissions from the least-cost sources first. This is the valuable by-product of putting one price on carbon across most of the economy. A single price encourages behaviour changes in the places where people find it easiest to reduce their emissions.

The carbon price is the cost of reducing or removing the last tonne of greenhouse gases from somewhere in the economy.

The current price of emissions permits is $38/tonne. At this price, the ETS raises the cost of petrol by about 4% but nearly doubles the wholesale cost of coal. This reflect the relative emissions intensity per dollar of petrol and coal.

This description has left out some important details which we cover in section 2.4.

2.2 A simple example

Here is an illustrative example of how cap and trade lowers emissions.

> The economy has two companies, Paper Ltd and Glass Ltd. Each produces 5,000 tonnes of emissions for an economy-wide total of 10,000 tonnes.
>
> An ETS is introduced and caps emissions at 9,000 tonnes. The government issues 9,000 emission permits. Each company is given 4,500 permits. At year's end, each company must surrender back to the government permits equal to their own emissions.
>
> The emissions cap could be achieved if each company reduces its emissions by 500 tonnes.
>
> But it turns out Paper can reduce its emissions at much lower cost than Glass. So the companies make a deal.
>
> Glass will leave its emissions unchanged at 5,000 tonnes. Paper will reduce its emissions to 4,000 tonnes.
>
> That leaves Paper with 500 spare permits, and Glass 500 permits short. Glass writes a cheque at an agreed price to buy the permits from Paper. Glass has *offset* its emissions.
>
> The result is that Paper surrenders 4,000 permits to the government, Glass surrenders 5,000 permits and emissions total 9,000 tonnes. The emissions target is achieved. And emissions were cut from the most affordable source.
>
> Now re-run the scenario. There is still an ETS with a 9,000 tonne cap, but this time the government intervenes. Emissions from glass manufacturing must come down,

the government declares. Generous subsidies will pay Glass to upgrade its equipment. Emissions from Glass fall to 4,500 tonnes.

What does Paper do in response? Does Paper still reduce its emissions down to 4,000 tonnes? No. There is nobody to buy 500 spare permits from Paper, since Glass already has the 4,500 permits it needs. So Paper only cuts its emissions to 4,500 tonnes.

Emissions total 9,000 tonnes – the same as without intervention. All the subsidy did was shift where emissions fall from low-cost Paper to high-cost Glass. National income falls by the extra cost of reducing emissions via Glass.

Some takeaways from this simplified example:

- Policies which force emissions to be reduced from particular places, rather than allowing discovery of the least-cost reductions using offsets, make it more expensive to achieve a given cut in emissions.
- When Glass writes a cheque, it does not shirk its responsibilities. It funds emissions reductions by Paper.
- Glass may not know it is the high cost source of emissions reductions. This important fact is only revealed when Paper is willing to sell its permits for less than the cost to Glass of reducing its own emissions.
- Suppose the government subsidies had gone to Paper instead of Glass. In that case, we get to the same outcome as permit trading without subsidies: Paper and Glass still make their deal, Paper cuts its emissions to 4,000 tonnes, and sells 500 permits to Glass who emits 5,000 tonnes.

2.2.1 What if one company is stupid?

Perhaps the most frequent objection to the ETS is that it depends on perfect decisions by consumers. It does not.

What if Paper or Glass (or both) had refused to trade permits, against their interests? Or one side (or both) was greedy, resulting in no trade?

Emissions still fall to 9,000 tonnes.

If Paper or Glass irrationally refuse to trade, then the scenario defaults to the no-trade outcome: each company reduces its emissions by 500 tonnes, and overall emissions fall to 9,000 tonnes. Without trade, emission are reduced at a higher cost.

The lesson:

Irrationality does not break the ETS. Irrationality raises the cost of meeting the emissions cap, but emissions still come down.

The essential condition for an ETS to work is that the government enforces the cap. Penalties for failing to surrender permits must be high enough to make compliance more affordable than the alternative.

2.2.2 What happens when customers make the decisions and businesses only trade permits on their behalf?

In the Paper and Glass example, the two businesses cut their own emissions. In practice, businesses often surrender emissions permits on behalf of their downstream customers. Fuel importers obtain and surrender emissions permits even though it is their downstream customers who do the combustion.

Thus, end customers usually decide how and where emissions fall. These customers do not haggle over permits and permit prices, like Glass and Paper. In fact, these customers do not ever see permits and may have no idea what an ETS is.

These customers make their consumption decisions based on prices which have been adjusted by the ETS. The price of nearly every good and service in the economy includes a charge for the cost of emissions permits. This charge is proportional to the emissions content of each good or service.

Consumers who choose to pay a petrol price which includes the cost of permits to cover emissions effectively outbid somebody else for the use of those permits. This is the necessary result of there being only limited permits to go round. These consumers are like Glass: for them, it is cheaper to pay the cost of permits than to reduce their emissions.

Other consumers will not pay the higher price of petrol including the permits cost. These consumers are like Paper: for them, it is cheaper to reduce their emissions than to pay for permits. These consumers might be able to easily substitute to public transport, or perhaps work from home one day per week.

The fact that consumers respond to price changes brought about by a mechanism they cannot see, the ETS, rather than haggle over the price of permits, makes consumers price takers but does not change the end result: emissions come down, and from the least-cost sources first.

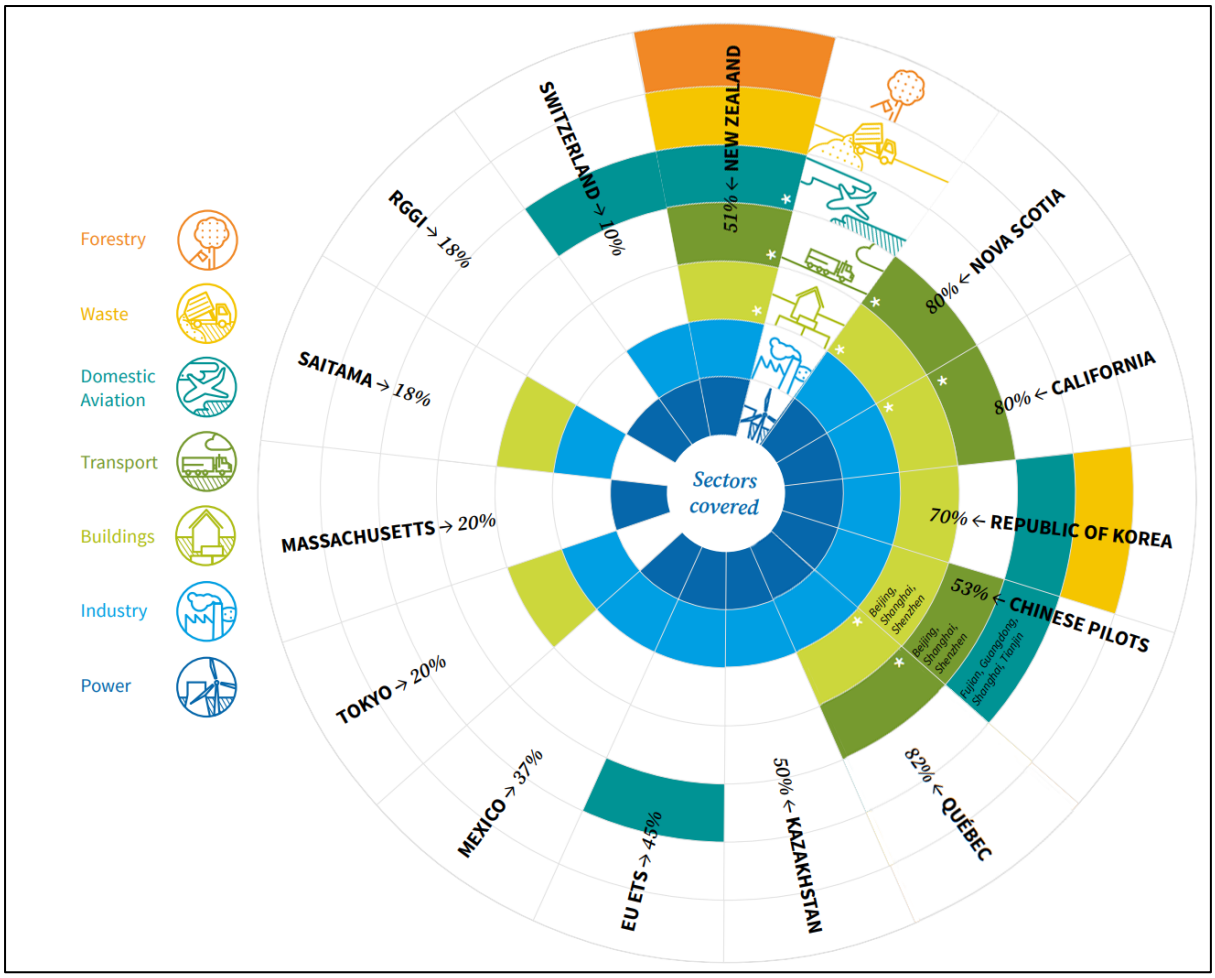
2.3 Key facts about the New Zealand ETS

- The Helen Clark government established the ETS in 2008.
- At the time, the ETS was the first in the world capable of covering all greenhouse gases and all sectors.
- Today, the ETS covers all NZ emissions except from agriculture and is more comprehensive than schemes in other countries (Figure 1).
- NZ emits 79 million tonnes of greenhouse gases each year, mostly from agriculture (48%) and energy (41%).[3]
- NZ removes 23 million tonnes of greenhouse gases from the atmosphere each year, mostly through forestry.
- The government issues around 27 million emissions permits each year, with fewer permits to be issued each year in line with emissions targets.
- The current price of an emissions permit is NZ$38 per tonne.

[3] Based on CO2-e.

- Permit prices have quadrupled since 2016 (Figure 2)
- Permits are called NZ Units, or NZUs. Each NZU is the right to emit one tonne of CO2 or a CO2-equivalent amount of another greenhouse gas (e.g. methane, nitrous oxide).

Figure 1: ETS coverage NZ vs other countries



Source: ICAP Carbon Action (link)

Figure 2: NZU price 2014-2021

Source: Carbon Forest Services link

2.4 Further details about the ETS

2.4.1 How the ETS cuts emissions at least cost

The ETS solves the problem of how and where in the economy emissions come down. But how does trading emissions permits lead to lower emissions?

To see this, we must step through the process which determines the price of emissions.

Let us simply things by ignoring the fact that permits can be stored indefinitely, and that there is a stockpile of permits. We will consider stockpiling later. For now, we consider a single year of emissions trading in isolation. Every permit issued by the government at the start of the year will be surrendered back to the government at year's end.

This year, the government will issue fewer emissions permits than it did last year. As usual, permits are issued via some combination of free allocations and auctions.

Once permits are issued, the task for companies who have surrender obligations is to obtain enough permits to cover their (and their customers') emissions.

Trading of permits begins, establishing a carbon price. The price is higher than last year, which is unsurprising since the government has issued fewer permits this year.

The higher cost of permits enters the price of goods and services throughout most of the economy. Households and businesses, confronted with the higher cost of emissions-intensive products, must choose whether to change their behaviour or bear the higher cost of high-emissions products.

Higher permit prices leads more households and businesses to change their behaviour. For example:

- a school replaces its coal boiler a year early in response to the rising cost of coal;
- a family that was on the fence about buying an EV rather than a petrol vehicle takes the plunge now that EVs are relatively affordable;
- an office worker catches the train to work an extra day every fortnight;
- a business switches to LED lighting.

Changes in behaviour might be imperceptible, even to the people who make the changes, and nobody may connect price changes to the ETS. They do not need to because the ETS works when consumers respond to the prices in front of them. As carbon prices rise, more behaviours change and emissions come down in more and more places.

The price at which total emissions just equals the number of permits issued by the government is the *market clearing price*. This price equals the cost of removing the last tonne of emissions somewhere in the economy.

The essential thing to notice about this process is that it is based on feedback. Permit prices rise until emissions fall to fit within the cap. As a result, consumer mistakes do not break this process. Even if consumers fail to respond to the carbon price when models suggests they should, permit prices will simply keep rising. Eventually, behaviours must change and emissions fall.

Consumers could be totally irrational and the ETS would still cut emissions – even if that took astronomical prices. In practice, it does not take sky-high carbon prices to convince consumers to change.

Consumer rationality is a red herring when it comes to whether the ETS is fit for purpose as a tool to cut emissions.

ETS works like airline overbooking

The ETS is like the auctions airlines use to solve overbooking.

Airlines overbook their flights to fill their planes, knowing that some passengers will be late for their flight. Overbooking raises the average revenue per seat, but sometimes causes flights to have more passengers than seats.

When this happens, airlines use auctions to work out who to leave behind. Here is how it works. An airline representative at the gate asks passengers waiting to board if anyone is willing to take the next flight instead, and sweetens the deal with compensation. Offers might start at, say, $100. Passengers volunteer to stay behind by raising their hand. The airline raises its offers until it has found enough volunteers.

Of course, probably make mistakes all the time in these auctions. For example, a passenger who is willing to catch the next flight might not raise his hand even when it is in his interest. Perhaps he has not seen an auction before and does not understand the process.

But the system still works. The airline continues to up its offers until, eventually, the airline gets it volunteers. Mistakes mean the airline might pay more for its volunteers. But the planes still depart.

It is the same with the ETS.

2.4.2 Stockpiled permits

So far, we have ignored the fact that permits never expire and many businesses have a stockpile of banked permits. Some businesses have large stockpiles. Do stockpiles mean a business can simply ignore the ETS?

No. Even with stockpiled permits, a business faces the same incentive to reduce emissions.

Why? Because businesses value their banked permits based on what a buyer is willing to pay for these permits today, not by what they paid for the permits. A business might have paid only $2 for each permit in its stockpile. But it will value these permits at the market price today, about $38. Even businesses with large stockpiles will recognise the cost of surrendering permits to the government as the revenue it forgoes by not selling those permits to a buyer instead. Thus even large stockpiles of permits should not prevent businesses from reducing their emissions when that is cheaper than surrendering permits.

But what if businesses fail to recognise the value of their stockpiled permits, and use their stockpile to keep emitting against their own interests? Emissions still come down, because the ETS cap is the cap. Permit prices will adjust upwards to whatever level is necessary to bring emissions down to the cap. Somebody, somewhere, must respond even if businesses ignore the incentives in front of them.

In short, a stockpile of permits does not break the ETS.

2.4.3 Further details about the ETS

- The New Zealand ETS covers all of the economy except agriculture.
    - The ETS covers 96% of GDP, but only half of New Zealand's emissions.
    - The ETS excludes livestock (cows, sheep) emissions, but farmers still pay ETS charges for drying milk and petrol and diesel in farm vehicles.
    - Apart from agriculture, the ETS covers almost everything: electricity, petrol, building materials, domestic flights but not international.
- The ETS has a price floor and price ceiling, introduced recently. For 2021, the floor is set at $20 per tonne and the ceiling is $50 per tonne. Each rises at 2% per annum. The price floor and ceiling are there to provide certainty.
- As of 2018, the ETS had 176 mandatory points of obligation for the economy.[4]
- As of 31 December 2020, a total of 2,444 businesses were participating in the ETS. Most businesses (1,984) are post-1989 forests.[5]
- It costs $6.4 million per year to run the ETS.[6]

[4] Leining, C. (2018), "A guide to the New Zealand Emissions Trading Scheme," Motu. Link
[5] Link.
[6] Administrative costs only. Based on appropriation of $6.392 million for "implementation and operation" of the ETS and the maintenance of the units registry. See Vote Environment, Budget 2020. Link.

- Emissions permits are called New Zealand Units, or NZUs.
- NZUs can be stored, never die. As of June 2020, there was a stockpile of around 121 million emissions permits.[7] The stockpile is a hangover from when the government accepted international credits. Businesses surrendered international credits and banked NZUs, anticipating the government would close the window on international units. The window closed in 2015 and has not re-opened. The government has set aside future units to retire some of the stockpile between 2021 and 2025.[8]
- Anybody can buy NZUs, for speculation or any other purpose.
- The government uses free allocations of permits to keep businesses in the country or to compensate for system changes.
    - In 2019, 77 businesses received free allocations of 8.3 million permits. The largest free allocations were to New Zealand Steel Development Limited, New Zealand Aluminium Smelters Limited, Methanex New Zealand Ltd, Fletcher Concrete and Infrastructure Limited, and Oji Fibre Solutions (NZ) Limited. You can see who receives free allocations here.
- Apart from issuing fewer permits, the government can reduce emissions by purchasing emissions units on the open market and retiring (or shredding) those permits. In fact, anybody can purchase and shred permits.
- The government issues new emissions permits for activities which absorb emissions, and also penalises activities which return stored carbon to the atmosphere (like harvesting trees):[9]
    - Planting a hectare of exotic trees (e.g. pinus radiata) will give you 34 permits per hectare per year for the first 28 years after planting.[10] The landowner may sell the permits on the open market.
    - Felling trees without replanting is penalised by the ETS with a one-off obligation of 946 permits per hectare. This penalty is avoided if harvested trees are immediately replanted. However, after their first rotation, forests attract no further emissions permits, because it is conservatively assumed all of the emissions from trees is returned to the atmosphere.[11]

2.5 Four surprising effects of a binding ETS

When the government issues fewer emissions permits than emissions, the ETS is said to be 'binding'. A binding ETS caps emissions. Under a binding ETS, overall emissions are determined *solely* by the number of issued permits (for the parts of the economy covered by the ETS).

This has four important consequences:

[7] Link.
[8] See Ministry for the Environment link.
[9] https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/2019-detailed-guide.pdf p.100 The ETS recognises other offsets, such as changes in land use.
[10] See Ministry for the Environment (2019), "Measuring emissions: A guide for organisations," p. 99. Link
[11] Reforms to the ETS may recognise when the carbon in harvested forests is not returned to the atmosphere (for example the timber that is embedded in buildings).

1. **Driving your car does not raise overall emissions.** Nor do domestic flights, running your gas heater or running a coal boiler. Why? Because there is only a finite number of permits to go around. When you drive, fly, or heat your home, you pay a price which includes the cost of emissions permits. This reveals your willingness to pay for the access to scarce emissions rights.

   Since permits are capped, you can be sure of two things: that the emissions from your car or heater or flight will be fully offset by lower emissions somewhere else in the economy, and b) emissions will be reduced from a source at a lower-cost than if you had reduced emissions yourself. That you are not the lower-cost source is revealed by your willingness to outbid other potential users of those permits.

2. **Other policies have no effect on overall emissions.**[12] Electric vehicle (EV) subsidies might lower transport emissions, but under a binding ETS must have exactly zero effect on total emissions. That is because EV subsidies do not change the number of emissions permits. Lower emissions from EVs simply frees up permits for somebody else to use. That means higher emissions (or less emissions reductions) elsewhere in the economy. This is called the 'waterbed effect'.

   Under a binding ETS, policies only change where emissions come down, and the cost of reducing emissions.

3. **Free allocations have no effect on total emissions.** Governments here and overseas give away permits to certain businesses, called free allocations. Governments use free allocations to prevent businesses shifting overseas. This gives valuable protection from the job losses that carbon prices might cause, thus protecting support for the ETS. But free allocations have no effect on overall emissions, provided the allocated permits come from the fixed pool of permits within the emissions cap. In fact, the government could give away 100% of permits and still achieve its emissions target. Free allocations change where emissions reductions occur, reduce revenues from the sale of permits, and may indirectly raise the ETS price. But free allocations have no effect on overall emissions, which is determined solely by the cap.
4. **The ETS allows anyone to reduce New Zealand's emissions.** Anybody can buy NZUs and shred them. Each shredded permit reduces New Zealand's emissions by one tonne by taking permits out of circulation.

2.6 Doing the ETS and not other policies is a "purist" view

It is politically hard for governments to only do the ETS. Perhaps that is why politicians and officials deride calls to only to the ETS as "purist."

Set aside the politics. If the ETS has capped emissions, then other policies cannot lower emissions any further. This is just the arithmetic of cap and trade.

[12] Again, for the parts of the economy covered by the ETS. Regulations affecting parts of the economy not covered by the ETS could affect overall emissions.

For example, an EV subsidy might get people out of their petrol vehicles and reduce transport emissions. But that just frees up emissions permits and raises emissions elsewhere in the economy.

Under a binding ETS, other policies only change where emissions come down but cannot reduce overall emissions.

It is important that this by-product of cap and trade is recognised because, if correct, the ETS entirely neutralises other emissions policies. The government could transform the economy for zero emissions benefits.

Politics might require non-ETS policies. However, it is useful to know when other policies cannot reduce emissions.

An ETS-only approach is also justified as a complete solution to the source of the emissions problem. Excess emissions are the result of no property rights in clean air. The ETS, and other forms of emissions pricing, establish those rights.

2.7 But cars will raise emissions once fake foreign emissions permits destroy the integrity of the ETS

This problem is solved by deciding not to accept fake foreign permits.

It is true that counterfeit offshore emissions permits can stop the ETS from reducing emissions. But offshore permits risks is manageable. The problem can be:

- Avoided, by refusing all offshore permits. This is New Zealand's current position.

or

- Solved, by
    - Only allowing genuine offshore permits with appropriate checks and balances; and/or
    - Pre-committing to make good on credits which turn out to be counterfeit by purchasing an equal number of genuine permits elsewhere or lowering domestic emissions budgets.

The risk of counterfeit permits can be allocated among participants:

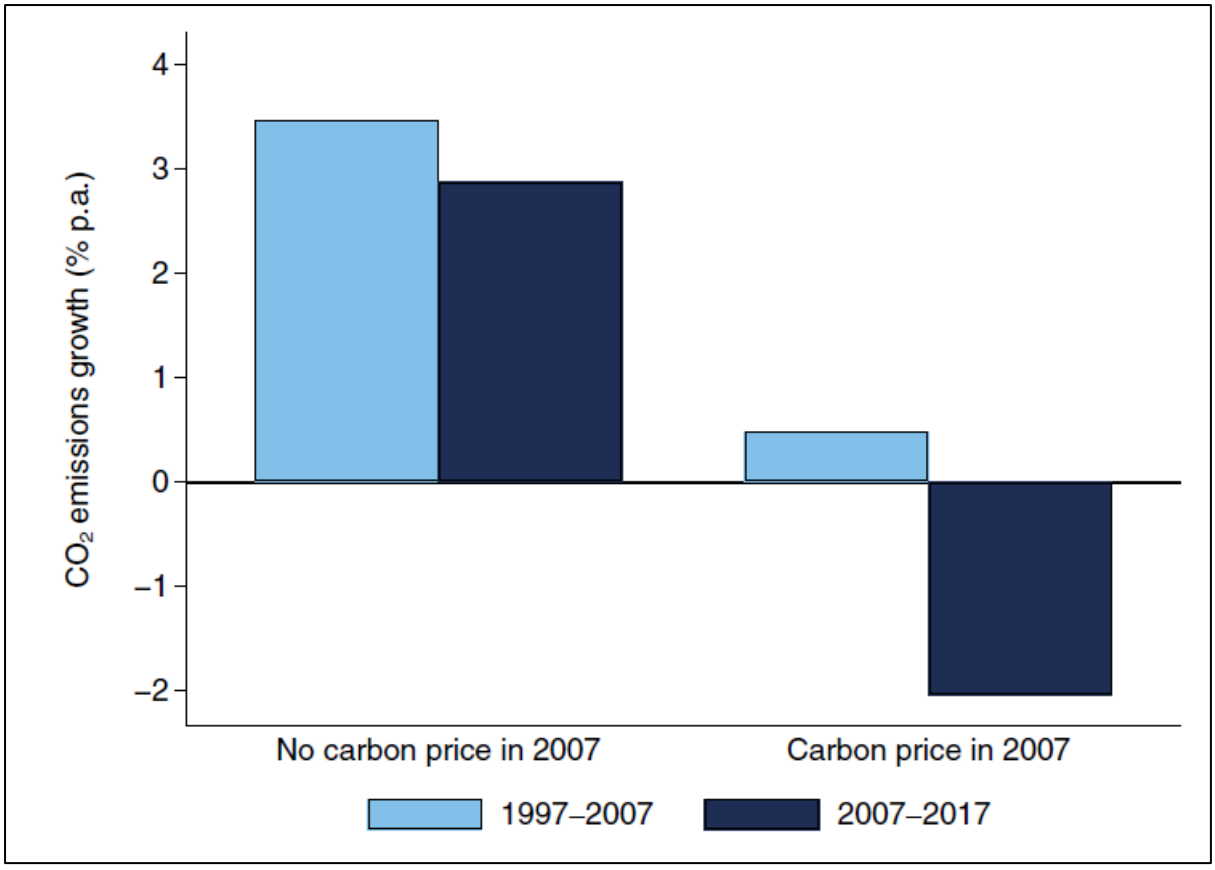
- The country supplying the permits (for example, by demanding a government guarantee and independent auditing).
- The country purchasing the permits (for example, pre-commitment to make good on counterfeit permits), or
- The individual businesses who surrendered the permits (for example, by requiring genuine permits to be surrendered).

3 Evidence for the effectiveness of the ETS

Cap and trade works. At least 27 countries have schemes similar to New Zealand's ETS. Studies in these countries show ETSs can have large effects on emissions, even at a low carbon price. Here is what they have found:

- **Gugler et al (2020)** consider the effect of Britain's ETS on its electricity sector emissions. The results are striking. After Britain added a price floor to its ETS in 2013 – a guaranteed minimum carbon tax – owners of coal generators responded *en masse* by converting their plant to natural gas. Emissions from Britain's electricity sector fell by 55% in five years. More than half of this fall was due to the ETS.
- **Best et al (2020)** use data from 142 countries, with carbon priced in 43 of those countries, to estimate the effect of carbon pricing. In countries with carbon pricing, annual growth rates of CO2 emissions were 2% lower. The study estimates each additional euro (NZ$1.68) cost per tonne of emissions reduces annual growth in emissions by 0.3%, an astounding finding.

Figure 3: Effect of carbon prices on emissions



Source: Best et al (2020)

- **Perry (2019)** compares the performance of the EU ETS against other policies to lower emissions. He estimates that greater use of EU ETS, and less reliance on policies such as emissions standards, national (non-ETS) emissions targets, and energy efficiency rules, roughly halves GDP losses in 2030 due to emissions reductions.
- **Brunix et al (2020)** estimate the effects of recent changes to strengthen the EU ETS. They estimate the changes may quadruple the EU carbon price. As a result, emissions are expected to fall by 41% between 2017-2061, a reduction of 11 gigatonnes.

- **Cullen and Mansur (2017)** estimate a US$70 carbon price will reduce electricity sector emissions by 10%.
- **Bayer and Aklin (2020)** estimate the EU ETS saved 1.2 billion tonnes of CO2 between 2008 and 2016, about 3% of EU emissions. During this period, carbon prices averaged €10. The EU ETS price is currently €33.
- **Murray and Maniloff (2015)** consider the Regional Greenhouse Gas Initiative (RGGI), a cap and trade system for electricity markets in the northeast United States. Between its launch in 2009 and 2015, the authors estimate RGGI lowered emissions by 24%, after accounting for other factors (e.g. fracking). For most of this period, the RGGI carbon price sat below US$5. Emissions in RGGI areas fell by far more than elsewhere in the US.
- **Chan and Morrow (2019)** show the RGGI also reduces sulphur dioxide and damages from other types of pollution. However, the study shows these benefits have been partly undone by leakage of generation to nearby states.

We are not aware of any comparable studies of the NZ ETS. Such a study is surely overdue, particularly since the draft recommendations from Climate Change Commission are based in part on doubts about the effectiveness of the ETS.

4 Objections to the ETS

In this section, we list common concerns with the ETS and offer responses.

4.1 The ETS assumes perfect consumers and perfect markets

It is argued the ETS depends on rational actors and perfect markets to reduce emissions or that the ETS is undone by consumer biases.

It is not. The ETS does not depend on perfect rationality or perfect markets to lower emissions.

The ETS works by raising the cost of goods and services in proportion to their emissions. Emissions come down when consumers and businesses respond to price changes by switching to greener and therefore cheaper alternatives.

If consumers do not change their behaviour, permit prices will be bid up until, eventually, behaviours change and emissions fall. This is the unavoidable result of a limited number of permits penalties for non-compliance (i.e. failure to surrender enough permits).

Consumers could be totally irrational, absolutely unwilling to substitute to low-emissions alternatives at any price, and the ETS will still lower emissions. Consumers have finite budgets, so rising prices must ultimately force even intransigent consumers to reduce their consumption (the income effect).

In practice, it has not taken astronomical prices to convince consumers to change behaviours and bring down emissions. Research finds consumers respond even to moderate ETS prices (see section 3). This finding should not be a surprise. It is not controversial to suggest consumers are price sensitive.

New Zealand's ETS also has a price ceiling, which limits how high permit prices can rise. When the ceiling is reached, the government must back each permit it sells at the ceiling price with an emissions unit purchased overseas. This clever mechanism, recently introduced to the ETS, means the price ceiling does not lead to higher emissions.

Perhaps doubts about consumers' response to the ETS is because it is not believed the ETS can ever bite hard enough. But the ETS does bite. At $38 per tonne, the ETS raises the cost of coal-fired electricity generation by more than 60%. The ETS has a far less dramatic effect on petrol prices, but that is because petrol is much less emissions-intensive per dollar compared with coal.

In other words, the ETS hits hard where emissions are the most intensive.

4.2 The ETS cannot deliver our emissions targets and remain politically feasible

The ETS works by raising the cost of emissions by enough to bring emissions within a cap. But prices cannot rise indefinitely. At some point, further price rises will not find a majority in Parliament.

An important question, then, is whether the political constraint will become binding before New Zealand reaches meets its emissions targets.

There is reason to think the ETS can remain politically feasible and get New Zealand all the way to its emissions targets:

- Overseas research suggests an ETS can have a substantial effect on emissions even at low (and therefore politically viable) prices
- Other countries have demonstrated high carbon prices are achievable. For example, Norway prices carbon at US$140 per tonne, more than five times higher than the ETS in New Zealand. Recently, Norway announced it will raise the carbon price to US$237 per tonne by 2030. The Labour opposition leader in Norway said the government had not been aggressive enough.[13]
- The Climate Change Commission estimates New Zealand will reach net zero emissions in 2050 at an ETS price of $50/tonne. With the possible exception of agriculture, this price is politically feasible.
    - The ETS, the Climate Change Response Act, and our international obligations all give equal recognition to carbon sinks (e.g. trees, carbon capture and storage). Provided offsets continue to be given equal recognition, the most significant changes may be unnecessary to reach our emissions targets.
- The political feasibility of the ETS can be protected with things like a predictable and credible carbon price path, safety valves like a price ceiling, giving businesses ways to manage their exposure to carbon prices, and by recognising offsets as genuine, and by not arbitrarily dismissing the most effective carbon removals (as the Climate Change Commission does in its draft recommendations).

[13] https://www.reuters.com/article/us-climate-change-norway/norways-plans-to-raise-carbon-tax-draw-oil-industry-ire-idUSKBN29D1BD

- Long available timeframes (more than 25 years) provides warning, which means price increases are less likely to be disruptive.

Perhaps the best sign of the political feasibility of the ETS is the lack of opposition to recent rises in the carbon price. Since 2016, ETS price has quadrupled from less than $10/tonne to $38/tonne today. This lack of pushback likely reflects the credibility of the ETS i.e. acceptance that carbon pricing is permanent, and an expectation that the ETS price would rise at some point, leading businesses to prepare.

Of course, the possibility that the ETS will lose Parliament's support sometime in the next 30 years cannot be ruled out. Given the merits of the ETS against the alternative of policy (bans, subsidies, regulation), we would suggest taking steps to maximise the political feasibility of the ETS to make the most use of it.

4.3 The ETS cannot work if consumers do not know about it

Consumers do not need to know why prices rise, or even that the ETS exists. The ETS works through the price system, raising the price of goods and services in proportion to their emissions. It makes high-emissions products less competitive relative to greener low-emissions alternatives, working on the uncontroversial principle that people use less of something when it is more expensive.

As a simple parallel, consider that the world's supply of platinum is limited. Many electronic products contain it – products we all buy and use. Consumers do not need to know anything about the price of platinum, or about markets for platinum, to ensure that companies make the most efficient use possible of a costly and limited resource.

4.4 The ETS is not effective enough to get people out of their petrol and diesel cars

The ETS adds about 9 cents to the price of a litre of petrol, a fairly minor effect. But the ETS has far stronger effects on more carbon-intensive activities, such as coal, natural gas and (in the opposite direction) forestry.

The weak effect of the ETS on petrol prices simply reflects the fact that transport is currently a high cost way to lower emissions. The ETS has found lower hanging fruit elsewhere in the economy. But transport's time will come when the ETS exhausts more competitive ways to cut emissions and as electric vehicles become more affordable.

Whether emissions come down in transport has no bearing on our targets or climate change. What matters is that overall emissions fall. New Zealand has not committed to lower transport emissions, only to lower emissions.

That people still drive petrol and diesel vehicles is not evidence of the ineffectiveness of the ETS. Instead, this simply reflects that the ETS reduces emissions from the most effective sources first.

4.5 Consumers failure to buy electric vehicles, even though it is in their own interests, shows they are irrational

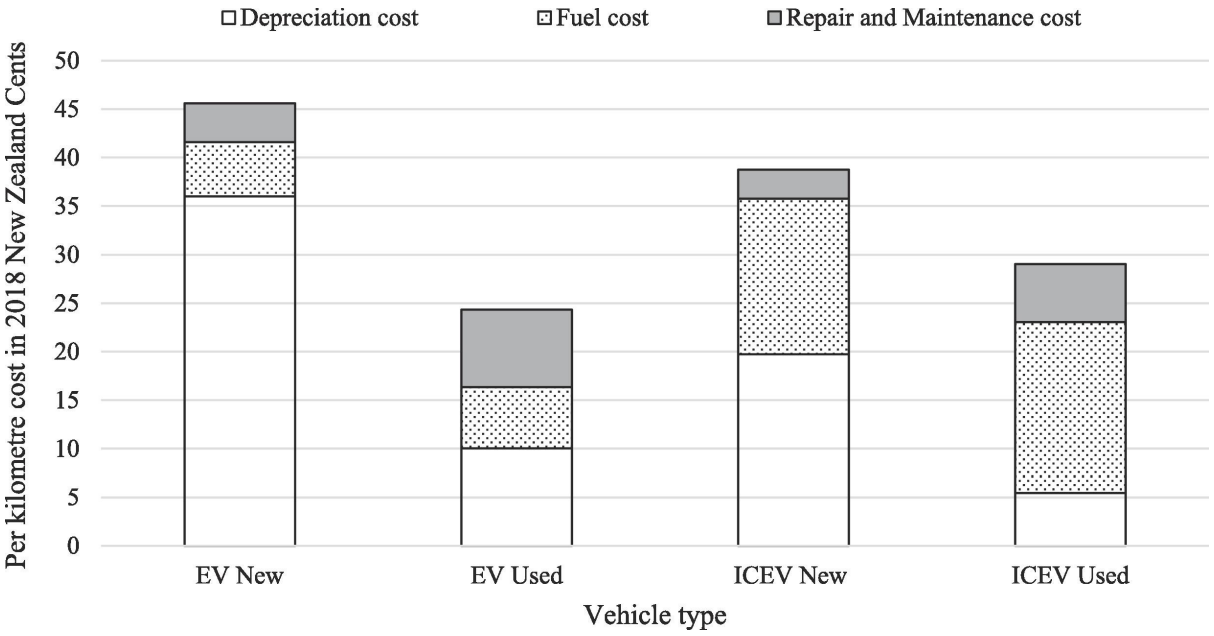
It is sometimes argued that decisions by consumers to avoid EVs is the product of irrationality.

As we have said, consumer irrationality is a red herring. Consumers could be totally intransigent and the ETS would still reduce emissions. What matters for reducing emissions is the government's willingness to set and enforce a binding emissions cap, not consumer perfection.

Regardless of its relevance, claims of consumer irrationality are not well supported by the data, at least with respect to EVs. EVs are expensive relative to conventional vehicles (Figure 4) and there are issues of range and recharging. These factors plausibly explain consumers' quite rational reluctance to buy EVs.

Claims of consumer irrationality seem to be based on officials' economic models which show EVs are the better option. But what is more likely: that almost every vehicle owner in the country is irrational, or there is a mistake in officials' models?

Figure 4: Per-kilometre cost of vehicle ownership in New Zealand



Source: Hasan, Frame et al 2021

4.6 Businesses operate independently. The ETS gives businesses no way to know if they are the next best place to reduce emissions.

The ETS is the way different sectors work out where emissions can be offset most cheaply.

This coordination between households and businesses who have never met is the product of one carbon price across the economy. Each household and business does not need to know the relative cost of cutting their own emissions. They simply respond to the ETS-adjusted prices of goods and services.

Provided the ETS sets a single price for carbon, raises the carbon price however high is necessary to reduce emissions down to the cap, then the ETS will systematically find and exploit the least-cost sources of lower emissions across most of the economy. This feat of co-ordination, measurably beyond anything officials have managed to achieve on climate change, is the result of the law of one price.

4.7 Using offsets just means businesses and households can buy their way out of their responsibilities

Far from being a functionless way to evade responsibilities, purchasing offsets is integral to the discovery of how and where emissions can be reduced at least cost. Our example of Glass and Paper tried to demonstrate this.

The market price for an emissions permit is the cost of cutting the last tonne of emissions anywhere in the economy (that is covered by the ETS).

A household or business that is willing to pay the market price for offsets, rather than reduce their emissions, is revealed to be a relatively high cost source of lower emissions.

This valuable information is revealed by the use of offsets, and might otherwise be unavailable.

4.8 The ETS does not care about intergenerational equity and distribution

The annual pathway to zero carbon for the cap to emissions under the ETS can be chosen with an eye on intergenerational effects. The job of achieving zero carbon at least cost is important in its own right. The lower that cost, the greater the national income that is available to redistribute using tax, welfare and other regulatory policies.

The ETS is not the only factor affecting the distribution of income and wealth. Governments have to consider the totality of distributional effects, when addressing distributional issues.

Forgoing the first-best emissions tool we have may take away nearly all emissions benefits. Compared to the ETS, non-ETS policies spend 5-50 times more to remove each tonne of emissions. Other things being equal, paying vastly more to reduce or remove each tonne of emissions takes more money out of the pockets of households, including low-income households.

It is not clear if policy has any general advantage over the ETS even in relative terms. For example, low-income households spend a higher share of their incomes on energy and transport, two sectors which are the primary targets of draft recommendations by the Climate Change Commission.

A better way to manage equity and distribution is to pair the first-best emissions tool, the ETS, with compensating adjustments to the tax and welfare systems. These systems specialise in redistribution, can take into account the effects of other policies, meaning more effective and certain protection for low-income households.

4.9 Arguing for the ETS only is a purist view

If an ETS-only approach seems unwise, the alternative, to combine the ETS with other policies, is absurd. With binding ETS, other policies have zero extra effect on overall emissions.

You can't cap emissions twice. Doing both ETS and other policies is like commuting into work twice, first by car and again by bus after returning home. One of those commutes is a pure waste. The better strategy is to choose one, and keep the other in reserve.

It is the same with the ETS and non-ETS policies. Pick one, and support it with checks and balances to give the earliest possible warning of problems.

4.10 ETS cannot be credible if politics decides its settings

While settings within the ETS are politically determined, and that does affect credibility, there is political consensus on the ETS system. Even if emitters cannot be certain of the carbon price in 20 years, they can have some confidence that there will be a price on carbon and that the price will not be lower than today.

Policy, the alternative to the ETS, is far more vulnerable to this criticism. While emitters can be confident there will be emissions policies in the future, it is doubtful they can say much more than that. Lack of credibility means that to reduce emissions, policy must burn more political capital or compensate investors up front for changing investment.

The ETS can influence investment decisions at a far lower cost because it promises carbon will continue to be priced in the long term. That is, the ETS is credible.

4.11 The ETS will inflate electricity prices (due to the highest cost plant will set the market price), and disincentivise electrification, New Zealand's biggest de-carbonisation opportunity

New Zealand's electricity system is built on a principle that prices reflect costs. Our system is possibly unique in this respect. Without subsidies, prices are a clean signal of the tradeoffs between generation types, locations and so on, which supports discovery of how to meet electricity demand for the lowest cost.

Similarly, the ETS prices emissions, and raises the cost of goods and services in proportion to their emissions. Any increase in the electricity price is on the merits. Allowing the ETS to operate on a level playing field is necessary to understanding the complicated tradeoffs that go with reducing emissions.

The effects of the ETS on electricity go beyond rising prices. Pricing carbon will drive investment in renewable generation, and lean against gas and especially coal generation. Using prices to discourage coal and gas, rather than hard bans, has the tremendous advantage of leaving room for thermal generation to protect security of supply. Some emissions are worth having, as the current mid-winter blackouts in Texas show.

Good principles for dealing with the massive complexity and tradeoffs of reducing emissions across an economy is a) where possible, preserve a level playing field by being tech- and sector-neutral, and b) use prices.