The Value of Rail to Aotearoa

Moving New Zealand
Chairman’s introduction

Imagine... the value of rail

Many people will have heard of writer Oscar Wilde’s description of a cynic as someone who ‘knows the price of everything and the value of nothing’.

What people might not know is that Wilde was a habitual train traveller who said he never tired of taking a train journey, because it was a relaxing way to travel that gave him time to imagine.

It would seem Wilde knew the value of rail, and could make the distinction between that value and its cost.

It tells the value of rail story at a point in time, which encompasses the 32 million commuter services rail enables each year and KiwiRail’s national freight service. It outlines the benefits rail has in areas such as:

- Net congestion
- Emissions
- Safety
- Road maintenance

It also looks at what it means for some businesses to have rail and the importance of rail in their long-term plans. This is based on both quantitative and qualitative analysis and consultation with stakeholders by specialist analysts. It is not the whole story but the start of a conversation.

We look forward to refreshing the data with our transport stakeholders and continuing to have the discussion for the benefit of all New Zealanders.

Trevor Janes
Chairman, KiwiRail

1. Chairman’s Introduction
2. Model approach
3. Rail benefits New Zealand
4. Reducing cars on the road
5. Getting Auckland moving
6. Lifting the freight burden from roads
7. Delivering emissions reductions
8. Net congestion
9. Emissions
10. Safety
11. Road maintenance
12. Connectivity to the regional and national economy
13. The front door of the New Zealand economy
14. Delivering products to one billion people
15. More trains means fewer roadworks
16. Keeping us connected and resilient
17. Delivering products to one billion people
18. The $15 million tourist train
19. Reducing cars on the road
20. Getting Auckland moving
21. Lifting the freight burden from roads
22. Keeping us connected and resilient
23. Delivering emissions reductions
24. Delivering products to one billion people
25. More trains means fewer roadworks
26. The $15 million tourist train
To measure the value of rail EY asked what would be the effect on the roading network if rail was removed. EY analysed the effects and tested our assumptions as follows:

**Quantitative analysis**
- Congestion benefits (Avoided road congestion costs)
- Maintenance benefits (Benefits of not having to spend so much on road repairs)
- Safety benefits (Reduced costs of safety incidents like death and injuries)
- Emission benefits (Reduced discharge into the air)

**Qualitative analysis**
- Connectivity benefits
- Land use and value uplift benefits
- Resilience benefits

**Engagement with major stakeholders**
- Workshops
  - KiwiRail
  - NZTA
  - Ministry of Transport
  - Treasury
  - Greater Wellington Regional Council
  - Auckland Transport
- Discussions
  - KiwiRail
  - Modelling
    - Auckland Council
    - Greater Wellington Regional Council

While we know the costs, there is an economic value of rail in New Zealand which is not captured in prices. This value accrues to the community and in this publication some of these social, environmental and economic values of rail transport are identified and quantified. The analysis indicates that passenger and rail freight both contribute significantly to the New Zealand economy.

The total value of rail is estimated to be $1.47 billion - $1.54 billion from just four areas:
- Reduced congestion
- Reduced emissions
- Improved safety outcomes
- Reduced road maintenance

This value excludes further qualitative benefits from rail, such as connectivity, land use and resilience benefits which would significantly increase the value of rail. On this analysis the value of passenger rail alone is highly likely to far exceed the annual direct government investment in the existing rail network.

The general approach taken in assessing this value has been to model the effects on the road network if there was no rail network – i.e. what would be the potential economic cost to New Zealand from not having a rail network. The approach that has been taken is indicative because, for example, it doesn’t consider any second-order or behavioural effects that might result if there were more vehicles on the road.

The value could be further refined with the use of more detailed inputs and methodologies, which would remove some of its overly conservative assumptions. But the value of rail calculated provides a broad indication of size and magnitude that will be useful for further discussions and debate.
Passenger and rail freight both contribute significantly to the New Zealand economy.

The total economic value of rail is:

- $1.3B reduced congestion
- $8.5M reduced emissions
- $60M improved safety outcomes
- $63M reduced road maintenance

Total value is derived from:

This value far exceeds the government’s annual investment in rail

$1.47B–$1.54B EVERY YEAR

This value far exceeds the government’s annual investment in rail
Taking stock of benefits

Rail makes a significant contribution to the New Zealand economy.

Each year more than 32 million rail passenger journeys transport people around New Zealand, while around 18 million tonnes of freight are moved on rail. Rail also contributes a wider range of benefits to the economy, and these can be measured when we consider what might occur if we didn’t have rail. When we do this, we see that rail generates fewer costs in terms of accidents, congestion and emissions than road. These costs are not factored into transport prices.

The benefits include:

- **Congestion**: Rail reduces congestion on our roads by 76 million light vehicle hours a year, which is the equivalent of 100,000 daily car trips a year. It also eliminates 11 million heavy vehicle hours per year from our roads.

- **Emissions**: Rail helps the environment by reducing carbon dioxide emissions by 488,000 tonnes per year.

- **Safety**: Making our roads safer with 271 fewer injuries and fatalities per year. This is based on using the Ministry of Transport’s social cost of road crashes and injuries as a calculation base.

Using the values that the ACC calculates for costs of road crash incidents would return a significantly higher value in excess of $100 million.

- **Road maintenance**: It is estimated that without the rail network the extra net cost of maintaining roads would be $63.37 to $65.95 million.

- **Connectivity to the regional and national economy**: Rail provides resilience to the New Zealand transport network and connects people to communities, activities and workplaces.

- **Savings to taxpayers**: In annual road maintenance costs, rail saves taxpayers $63 million.

**THE VALUE OF RAIL**

- **Reducing congestion by 76 million light vehicle hours per annum (saving $1.1B)**
- **Eliminating 11 million heavy vehicle hours per year (saving $200M)**
- **Helping the environment by reducing CO₂ emissions by 488,000 tonnes per year (saving $8.5M)**
- **Making our roads safer with 271 fewer injuries & fatalities per year (saving $60M)**
- **Providing resilience**
- **Increasing land value**
- **Connecting people with communities, activities and workplaces**
- **Saving taxpayers $63M in annual road maintenance costs**
Imagine the impact on the number of cars on the road if the rail network did not exist.

Reducing cars on the road

The predicted increase in traffic congestion that would be caused by people having to travel by passenger vehicles instead of rail is huge.

It is estimated that without the Auckland and Wellington rail networks within the metropolitan areas where passenger services exist, there would be a further 76 million light vehicle hours on the road every year. That is the equivalent of a further 100,000 car trips on New Zealand roads every day of the year. To put it another way, the fact that we have existing metro passenger services in Wellington and Auckland means we have removed from the roads the equivalent of every car journey that takes place in the city of Palmerston North (with its population of 84,000 people) each and every day.

There is a significant financial benefit of this relative lack of congestion on our roads. It is estimated that not having those 100,000 daily car trips saves us at least $1.14 billion a year in avoidance of time delays (and yes, this calculation takes into account the time delays that occur when passenger trains are late).

The net benefit in Wellington is estimated to be at least $291.83 million, while in Auckland it is estimated to be at least $848.01 million. These costs are considered to be conservative, because they do not include the reduced reliability of journey times or the incremental cost of congestion if the 100,000 extra vehicle trips were put on the Auckland and Wellington roads each day. Imagine the possible impact of that.
Getting Auckland moving

In August 2017, one of the 1.5 million people living in Auckland hopped on a train. When they hopped off, they became the 20 millionth trip recorded on the Auckland train network in a single year. That 20 million-in-one-year figure wasn’t expected to be reached until 2020, confirming the phenomenal growth that has been taking place in Auckland train patronage. The Auckland commuter train network has been surpassing all forecasts, with patronage rising on average by nearly 20% every year in recent years. It has increased from three million trips in 2002.

Auckland Transport Chief Transport Services Officer, Mark Lambert, says the rising patronage has had a range of benefits for Auckland. The obvious one is the positive impact on road congestion, as there are fewer cars on the road as more people choose to travel by train. It is estimated there would be an extra 55.5 million to 57 million hourly car trips on Auckland roads if Auckland didn’t have commuter trains. This has also had a significant impact on Auckland’s carbon emissions, as the Auckland passenger rail fleet is electric. Aucklanders have embraced rail, says Mr Lambert. They’ve benefited from more frequent and reliable services and better links with the bus network and this greater choice has helped get cars off the road.

Mr Lambert says reaching the 20 million trips speaks to every Aucklander’s desire for a world-class rail system, both for residents and visitors to the city. The aim is to keep building on these benefits.

“We will continue working to ensure the rail network keeps getting better because of the benefits it brings to the city.”

Key players in Auckland rail are Auckland Transport, which is responsible for planning and funding and contracting Auckland’s public transport, TransDev, which operates the Auckland passenger rail network on behalf of Auckland Transport, and KiwiRail, which owns and operates the track network.

Forecasts are for Auckland’s rail patronage to increase to an expected 30 million annual trips by 2025 and 60 million by 2045. This will require infrastructure investment to manage the higher level of passenger demand, which sits alongside projected freight growth in the city.

Some of that investment is already being seen with development of the City Rail Link (CRL). The CRL is a 3.45km twin-tunnel underground rail link some 42 metres below the city centre transforming the downtown Britomart Transport Centre into a two-way through-station that better connects the Auckland rail network. It includes a redeveloped Mount Eden Station, where the CRL connects with the Western Line and two new underground stations – one mid-town at Wellesley and Victoria Streets – provisionally named Aotea, and one uptown at Mercury Lane, off Karangahape Road – provisionally named Karangahape.

Also on the horizon is the “third main”, which is an additional track on the currently double-tracked rail line, to run between Westfield, just north of Otahuhu, and Wiri near Manukau. This section of railway is one of the busiest in the country: it is used by the Eastern and Southern passenger lines, along with a significant portion of KiwiRail’s freight movements in Auckland. Due to existing congestion, passenger trains are delayed and slowed, while the amount of freight that KiwiRail can move is also limited.

A third track would take thousands of trucks off the roads, not just in Auckland but also on regional roads. It would speed up passenger train services, increase safety, and improve efficiency.
That’s the equivalent of taking 30,000 trucks off the road for an hour, every day (saving $200m). Rail has a big part to play in New Zealand’s transport system. A successful rail system benefits everyone, including all the users of the roads. Road and rail work best when they work together. The predicted increase in traffic congestion that would be caused by freight having to travel by heavy goods vehicles instead of rail is under-appreciated.

It is estimated that without the rail network there would be a further 11 million heavy vehicle hours on the road every year. That is the equivalent of a further 30,000 trucks on the road for one further hour, every day of the year.

There is a significant financial benefit of this relative lack of congestion on our roads. It is estimated that not having those 30,000 trucks on our roads for an hour each day saves us at least $200.27 million a year in avoidance of time delays.

This saving has been calculated by considering the effects of freight on the roads within the metropolitan areas of Auckland and Wellington, separate to the congestion effects on intercity roads. For example, trucks move frequently between Ports of Auckland and Westfield (South Auckland) where they use an incredibly busy stretch of motorway that can reach volumes of over 100,000 (southbound only) vehicles a day. Adding any heavy vehicles to this stretch of road would have a substantial impact on travel times – and therefore cost.

The gross cost caused by time delays if rail freight traffic moved to innercity roads is estimated to be at least $80.16 million. These costs are considered to be conservative, because they assume the extra congestion would be spread evenly throughout the day, rather than occurring in peaks (peak loading).

Imagine the possible impact if peak loading was taken into account.

**Lifting the freight burden from roads**

**Congestion – Trucks**

Imagine the impact on the number of trucks on the road if the rail network did not exist.
Imagine the impact on carbon emissions if the rail network did not exist.

The predicted increase in emissions that would be caused by freight and passengers travelling by road vehicles is significant. It is estimated that without the rail network there would be a further 488,000 tonnes of CO\textsubscript{2} emissions by vehicles every year (that’s even after subtracting the emissions savings from no longer having to operate freight trains). That’s the equivalent of saving the emissions of 87,000 cars every year.

To put it another way, having a rail network saves New Zealand the equivalent of the CO\textsubscript{2} emissions produced from flying a jumbo jet around the world all year – that’s nonstop every day, every minute, every second.

It is estimated that transport accounts for 17% of all New Zealand’s emissions, but rail accounts for just 1% of that total. On average, every tonne of freight moved by rail delivers a 66% reduction in carbon emissions compared with heavy road freight. KiwiRail has a fuel-conservation programme that aims to reduce consumption and improve efficiency across its fleet through a combination of improved asset planning and deployment, new operational procedures, staff training and technology. KiwiRail’s award-winning Driver Advisory System (DAS) achieved 6% fuel savings in its first full year of operation – a saving of 3.2 million litres of diesel which avoided 8,800 tonnes of greenhouse gas emissions.

There is a significant financial benefit of this relative lack of emissions on our roads from having a rail network. It is estimated that avoiding those extra emissions saves at least $8.45 million a year. A modest proportion of this is from the transfer of passenger services from road to rail, with the bulk of the saving coming from using freight wherever possible. Auckland and Wellington have electric-powered trains and therefore, if passengers had to move from rail to road, there would be a meaningful impact on the amount of emissions produced. But the bulk of the emissions benefits are generated from the transfer of moving freight from road to rail, even when subtracting the savings from eliminating train emissions. This assessment of the impact on emissions from not having a rail network does not take account of the extra emissions that would likely be caused from cars and trucks spending more time in traffic due to extra congestion on the roads.

Imagine the possible impact on emissions savings if that extra output was taken into account.
SAFETY INCIDENTS

A YEAR COMPARED WITH ROADS

That’s 271 fewer deaths, serious injuries and minor injuries a year. That’s the equivalent of... Actually, who needs an equivalent? That’s 271 people who won’t die or be injured.

Increased travel by road would have a significant safety impact. For example, if all travel was by road rather than rail, there would be an estimated 271 road safety incidents in New Zealand each year. That means an extra 271 people who would either die, have serious injuries or have minor injuries each year. That’s 271 families who wouldn’t have to suffer their loved ones being hurt, or even killed.

Health and safety is paramount to KiwiRail, which operates the rail network. The safety of its own staff, the passengers it carries, and safety of the public as they cross the railway tracks is a priority. While it is vigilant, the existing safety costs across KiwiRail’s network (including both passenger and freight services) is estimated to be $95.97 million a year. This represents 114 safety incidents a year.

The number of incidents for freight is less than that for passenger rail, but the freight related safety cost is much higher because the proportion of incidents that are deaths or serious injuries are far greater for trucks than light vehicles.

Any death or injury on rail or road is a statistic we don’t want to see... so let’s imagine reducing as many incidents as we can.
Imagine if New Zealand wasn’t connected with the rest of the world. As an island nation, sea transport is pivotal to the success of New Zealand’s commodity-based economy – and rail plays a critical part in enabling this freight.

New Zealand sea ports handle more than 49 million tonnes of exports a year – or 99% by weight of all exports. These exports are worth about $36 billion to the economy each year. Similarly, the majority of imports come into New Zealand by sea.

The lion’s share of this trade is through the Port of Tauranga, which is the leading New Zealand port for container throughput and the country’s largest port in terms of volume. This year, Port of Tauranga set a new record after processing one million shipping containers in one year. It was the first port in New Zealand to reach the milestone and is the only port able to accommodate the largest container vessels visiting New Zealand.

Commodities have helped the Port of Tauranga to grow rapidly since the 1960s, with forestry, kiwifruit and dairy accounting for almost 80% of exports. Much of this cargo is destined for customers in Japan, China, South Korea, South East Asia, Australia and the Pacific Islands. Imports have also been important and are an expanding sector of the Port’s business.

These include petroleum, fertiliser, coal, dry and liquid bulk, palm kernel and a range of other products. A major factor in this growth was the establishment of New Zealand’s first integrated inland port operation, MetroPort Auckland in 1999. MetroPort is located in the heart of Auckland’s industrial hub and is linked to Port of Tauranga by rail.

MetroPort was a strategic initiative on the part of Port of Tauranga to offer a competitive door-to-door import service and to provide importers and exporters with a choice of ports in the Auckland region. It is now a vital component in the port’s ability to handle increasingly larger volumes of cargo. In the past two years, the number of trains between MetroPort and Tauranga has increased from 54 to 86 per week.

In addition, more than half of log exports are delivered to the port via rail, along with pulp, paper and other bulk cargoes.

Port of Tauranga chief executive, Mark Cairns, says rail has a symbiotic relationship with the port and by working together with rail and shippers, the port has created commercial collaborations that enhance value in the shipping chain. He says:

“If rail didn’t exist, then the value that flows from these relationships would simply not exist either.”

The rail and port interface is effectively the front door to the New Zealand economy, with the linkage driving international competitiveness.

“Rail is, and will continue to be, our first preference for moving cargo within the North Island as it has the lowest community and environmental impact,” Mr Cairns says.

In addition to the commercial value, the rail service provides public value by reducing road congestion, especially close to the busy port. It also reduces safety costs, avoids road maintenance, provides emissions benefits and provides the most efficient option for moving bulk freight to and from port facilities.
More trains means fewer roadworks

Imagine the impact on maintenance for the road network if the rail network did not exist.

Trucks damage roads. This is expected to happen and so the government charges a Road User Charge (RUC) to recover the costs of the damage that vehicles cause to our roads. The predicted increase in road maintenance costs if freight travelled by road instead of rail is significant. It is estimated that without the rail network (in the context of freight, not passenger), the extra net costs of maintaining roads would be $63 million. That figure is calculated by using RUC data to estimate the amount of additional road maintenance incurred by shifting all existing rail freight to road, and then subtracting the existing rail maintenance costs. The New Zealand Transport Agency deems that road maintenance is only required for heavy vehicles and that light vehicles will cause negligible damage to the road, so this calculation doesn’t include any maintenance costs that might arise from switching rail passengers to cars or any impact there might be from extra buses. If rail didn’t exist, the road maintenance costs from the extra trucks that would be required to move freight would cost on average $60,000 per kilometre to operate, maintain and renew urban roads. This would be enough to maintain an urban road that would run the equivalent length from Bluff, at the bottom of the South Island, to Picton, with a little left over for some North Island asphalt. Imagine some of the potholes those savings could be spent on.

$63M IN ANNUAL ROAD MAINTENANCE COSTS

The average cost to operate, maintain and renew an urban road is $60,000 per kilometre a year. An urban road more than 1,000 kilometres long could be maintained for those savings.

That’s a road nearly the length of the South Island.
There are a range of other benefits that rail provides New Zealand that cannot easily be quantified.

**THESE BENEFITS:**

Help people in our communities to connect
Result in more productive use of land
Keep us moving in times of trouble

Imagine if people couldn’t connect with each other. In many countries the railways have been called the lifeline of the nation; for New Zealand communities this description also rings true.

Besides the benefits that have been quantified in this report, rail provides qualitative benefits including:

- **Connectivity benefits**
- **Resilience benefits**
- **Land use benefits.**

**Connectivity**

At the heart of our communities, rail provides a means of transport for local residents and visitors. It provides transport for people who do not have access to a car. Railways are of particular importance to young people as a means of travelling to training and tertiary courses, and for leisure. Trains are important in helping to foster a sense of independence and maturity. They also bring together friends and family. Many people who have a car choose to travel by rail as a fast, comfortable and relaxing alternative for commuting, business or leisure journeys. Rail also connects regional exporting businesses to global markets via ports, such as open country dairy exports. Rail connects more than just passengers.

**Resilience**

Rail is often available when the road network is not. In extreme events the road network can sometimes fail, causing a loss of economic, social and cultural value. Even in an event like a storm, earthquake or a man-made event like a traffic accident, rail provides resilience to the transport system. A good example of rail providing this support was after the Christchurch earthquake, where rail provided a fast supply of goods when roads leading into the city were damaged.

**Land use**

When train lines and train stations are built, the land around them often increases in value as people appreciate being close to improved public transport services. In some cases, this leads to more productive use of available land through construction of higher density or high-rise residences. Industrial and commercial properties also often increase in value because of their proximity to train lines. Sure, some property values in direct proximity to train lines can go down in value because of noise or vibration concerns - but overall, land use near rail services goes up more than it goes down.
Delivering products to one billion people

Imagine what 18 billion litres of milk looks like. The 10,500 farmers who own Fonterra produce 18 billion litres of milk each year, of which 95% is exported to international markets. How it gets there is critical – Fonterra’s products account for more than 25% of New Zealand’s merchandise exports and 7% of the country’s Gross Domestic Product (GDP).

Although Fonterra’s colourful milk tankers are a familiar part of New Zealand’s rural landscape, rail is primarily responsible for moving nearly 85% of this total export volume to New Zealand ports. Since KiwiRail’s formation in 2008, Fonterra has invested in rail capability to freight finished product from Crawford Street, Hamilton, Mosgiel, Whareeroa, Kauri, Pahiatua, Lichfield and Darfield.

For Fonterra, rail is a good commercial solution that also has other benefits. KiwiRail now transports 634.8 million Net Tonne Kilometres (NTK) on Fonterra’s behalf annually. In 2016, the partnership reduced the number of hours Fonterra’s heavy vehicles spent on the road by 172,188 hours and saved the dairy exporter 7.8 million litres of fuel and 21,306 tonnes in CO₂ emissions.

Mr Foord adds, “Fonterra’s long-term commitment to rail is verified in our much-valued partnership with KiwiRail. As our business grows and evolves with global demand, rail continues to be a reliable, efficient and valued means of delivering our products to more than one billion people around the world.”
Imagine when European settlers arrived on the West Coast of the South Island in the 1880s. It was a wild and remote area. But within a few short years the whole region was joined by railway lines. Trains were the main form of transport during the early development of the West Coast, initially being used mainly to move timber from the sawmills, and later, coal from the coal mines, to Port towns, such as Greytown and Hokitika. Some trains also moved supplies and people to booming gold towns, such as Ross.

The West Coast railways provided the resources for the mass settlement of the region and transported people and resources from the Coast either to the Port of Greymouth, or across the Southern Alps to markets and ports in the East.

Currently, largely as a legacy of that early development, the West Coast has around 420 kilometres of rail track in its network between Ngakawau in Buller and Hokitika in Westland. It is connected to the national network by the Midland Rail Line. KiwiRail currently operates coal trains and general freight trains in each direction daily over the Midland Line, while the Hokitika minor line carries Westland Milk to Greytown. The Midland Rail Line has been one of the busiest in the Kiwirail network, carrying around 2.5 million tonnes per year, or about 36 percent of the region’s freight (about 2.4 million tonnes from the Coast for export to Lyttelton and 0.1 million tonnes into the Coast.)

The West Coast economy is driven by dairying, mining and tourism. The region has a diverse mineral profile, with a long history of coal and gold mining and an expanding onshore oil and gas exploration programme. The West Coast is taking advantage of its abundant rainfall to expand its dairy industry, while its microclimates nurture an emerging niche horticultural industry. The region is also an internationally known eco-tourism destination, with extensive areas under conservation protection which support a range of accommodation and tourism operators.

It is the tourism economy that is especially benefitting from the rail network. The KiwiRail Great Journeys of New Zealand train, the TranzAlpine, travels the Midland Line with around 120,000 passengers a year on it.

Westland Mayor, Bruce Smith, says the line is a great benefit to the region. So much so that he’d like to see the service extended. The TranzAlpine began after it became clear how many passengers on the Christchurch-to-Greytown service enjoyed the scenery on their journey. The service has now become a New Zealand icon that has been named among the world’s top train journeys by publications including National Geographic and The Travel Luxury Expert.

West Coast Tourism estimates that the TranzAlpine brings in excess of $15 million per annum to the region.

That economic benefit is on top of the congestion and emissions benefits that come from the tourists taking the train, rather than driving.

Coupled with the benefits of removing freight trucks from the windy West Coast roads, imagine how scenic the journey is... Or you could just book yourself a TranzAlpine ticket.
The KiwiRail Great Journeys of New Zealand train, the TranzAlpine, travels the Midland Line with around 120,000 passengers a year travelling on it.