In the future, transport will get us to where we need to be, when we need to get there, and it will do so with a fraction of the emissions we see today.

We see a future where transport has ceased to be one of the major players of the carbon century. Transport will no longer be on the list of major contributors to carbon emissions. We will power our vehicles with different sources of energy, use different vehicles, and travel shorter distances.

What moves us

For centuries we relied on legs and horses to get around and to move goods. But horses were not without their problems. Julius Caesar restricted horse-drawn carts in Rome to the night-time in an effort to reduce traffic jams, noise, accidents, and ‘natural emissions’.

By the late 1800s, this dependence was causing huge problems with waste. The manure stank, spread disease, and attracted clouds of flies. Cities around the world were ‘drowning in horse manure’. One such situation has become known as the Great Horse Manure Crisis of 1894. London’s Times newspaper claimed that in 50 years every street in London would be buried under nine feet of manure!

So, when motorised transport was introduced, it was seen as the environmental saviour of the city.

Transformation by car, (mostly) for the better

Not only were cars seen as positive for the environment, cars transformed the way we live in a positive way, connecting people with each other and with economic opportunity. Cars increased personal mobility, and became a powerful symbol of freedom and status.

Cars were one of the things that made suburbia and New Zealand’s quarter-acre dream possible, and people embraced and enjoyed the benefits.
Economies of scale and affordability improved the quality of life for people with access to cars throughout the world – from tenements to clean, bright, modern houses and from corner-shops to supermarkets.

In major cities worldwide, the new age of transport contributed to the clearance of city slums and the creation of new satellite towns through the middle of the 20th century.

However, this explosion in mobility and sprawling development had a downside.

**The birth of environmentalism, and a focus on efficiency and climate change**

In 1970, the world woke up to the environmental impact of human activity. The first Earth Day brought Americans out for peaceful demonstrations for environmental reform and was one of the starting points for modern environmental activism. A journey began to allow the freedom of the car whilst minimising CO2 emissions from transport.

Since the first Earth Day, a growing consensus and understanding of the causes and impacts of climate change has provided continued impetus to develop a path to low emissions transport options.

**What drives you? Pure power**

In the future we will see a shift in the power source for our road vehicles. The entire passenger vehicle fleet will be made up of low emission vehicles. The average kilometres per litre will improve tenfold, with an average car travelling 100km for every litre of petrol or diesel used.

New Zealand is unique in that a large amount of our electricity – around 80 percent – is generated from renewable sources. As a result, the increased use of electric and hybrid electric vehicles will help to reduce greenhouse gas emissions.

In the future, almost all of our electricity will be generated from renewable sources. This, combined with improvements in battery technology (capacity and ability to handle faster charging), will change the face of New Zealand’s passenger vehicle fleet. Hybrid and electric technology will be widespread as we retain the freedom to travel longer distances in our cars. Use of connected autonomous vehicles that won’t crash will allow lighter construction, further extending the distance travelled.

In urban areas, many people will just plug into a garage outlet to power up their vehicle. Along highways connecting urban areas, high-speed charging stations will be more common than traditional petrol pumps throughout New Zealand. This will allow the more environmentally passionate of us to keep our emissions to zero even when on long journeys.
Who drives you?
Ownership, driverless cars and public transport

New ownership and business models for passenger transport based around autonomous (or driverless) vehicles will challenge the way we think about mobility.

We will laugh at the idea of owning a car – why own one when the cost will be less to step into an autonomous car? A tap on our mobile device will bring a vehicle directly to us. Corporations and car manufacturers will own fleets of autonomous vehicles. They will turn their attention to marketing their vehicles to people based on the brand they want to be associated with hiring rather than owning. They will shift their business models to build their brands as transport service providers.

These changes will provide fleet operators with the opportunity to sell transport as a service rather than a series of products. We will buy mobility in the same way that we currently pay for our mobile phones. We will be able to choose a pre-pay option or a package of services. The service packages will provide options from Zero to Hero. Zero packages will provide access to electric bikes, shared autonomous cars and public transport. For an extra fee, we will be able to upgrade to the use of a private autonomous car. For those who want to show their status there will be Hero packages with access to luxury autonomous cars.

This change in ownership models, along with an increase in ride-sharing, will reduce the number of vehicles needed to supply our needs by two-thirds. In turn, it will significantly reduce the carbon required to produce the vehicles that we previously bought and then allowed to slowly rust away in our garages or parking spaces. Having fewer vehicles will also help to address the challenge of recycling the hundreds of thousands of batteries that provide the primary source of power for autonomous vehicle fleets.

Quiet electric autonomous trucks will change the face of local delivery, making the use of roads at night possible. Consequently, we will see another positive benefit as night deliveries take the pressure off roads and reduce congestion. Similarly, autonomous vehicles will become a popular way to travel between cities on quiet roads overnight, while some or all of their passengers sleep. Why stay in a motel when you will be able to sleep in a campervan on the way to a New Zealand holiday destination?

While we expect air travel to continue to increase in volume, we will see ongoing improvements in the fuel efficiency of planes, reducing their carbon impact. (See the Future of Air Travel).

Where size matters – moving heavy freight

Electric buses and trucks will provide urban-based services. Under-the-road charging technology at locations throughout our cities will charge up fleets of waste disposal trucks and pizza delivery vans as necessary.
Trucks carrying freight between cities will use a rich blend of biofuels or will have gas turbine powered engines, halving the carbon emissions from each truck. Autonomous and connected technologies will allow trucks to drive closer together, delivering fuel efficiencies. Where suited to the network, platooning of heavy trucks will become commonplace. Vehicles will be sized for the task at hand. Tracking technology and a self-managing transport system will match deliveries with system availability and there will no longer be empty loads. This will lead to a drastic reduction in the number of freight trips.

Real-time tracking coupled with predictive vehicle movement will support effective integration across all modes. Self-loading trains will enhance integration, allowing rapid interchange of trailers between rail and roads. Technology advances will also speed up time from deck to dock, allowing more frequent unloading. Increasing ship frequency will allow maritime movements to become part of a well-planned just-in-time logistics chain. As a result, we will see a resurgence in the use of sea freight. We will optimise its use to minimise our carbon impact.

The efficiency of ships will continue to improve. We will see ships double in size, and a ship carrying 7000 containers or more will become commonplace. While the efficiency gains of larger ships will decrease their carbon impact, new ship designs will bring further benefits. We will see a reduction in the carbon impact of ships as they increasingly use natural energy to supplement traditional power sources. Ships will capture energy en route using solar and wind technologies.

**Changes in land use and transport are intertwined**

From the dawn of society, people have grouped together. And for thousands of years, people have seen the benefits of larger cities for trade and cooperation. Many different forms have been chosen for cities. Some have chosen to build outwards and others upwards to accommodate this growth. Both forms have supported economic success, but the 20th century surge in city size has relied on the combustion engine to bring in food and goods and to take away much of our waste.

While the carbon impact of each truck movement will be lower, in the future we will also carefully manage demand for freight movement to minimise overall carbon emissions. We will see a greater emphasis on products that will last or that can be recycled. Waste will be fed back into the local system, minimising the volume of goods needing to be moved between cities. Engineers will become re-engineers, waste disposal units will become composting systems, and socks with holes will be given to the darners and not the dustbins.
Closer, more active living

The spread and density of our cities strongly influences how far we travel each day, as well as our ability to choose low carbon transport options. We will see the development of higher-density ‘urban villages’, providing people with the option to live closer to their daily destinations. We will invest in high-quality three- to four-storey apartments to make the best use of space and light, with community areas for barbecues and secure places to lock your bike.

In turn, walking, cycling, and the use of other zero-carbon, low-speed mobility devices will become the most convenient and enjoyable way to travel for short trips. There will be a significant health spin-off as active means of transport coupled with improving air quality see the incidence of coronary disease in New Zealand plummet.

This story is one vision for the future

Human activity is having an impact on climate. We cannot walk away from this, leaving a legacy of extreme weather to our descendants. But the choices are hard as many changes, which would be sensible from an environmental perspective, have social and economic impacts. Finding solutions that will find the right balance is key for our children’s future, and this vision portrays one way we might solve this dilemma.

We want you to challenge these perceptions and ideas. This vision is not presented as the views of industry or government policy. Rather, it is the Ministry of Transport’s intention for this vision to stimulate wider debate and generate ideas on the possible future of New Zealand’s transport system. Challenge our ideas and let us know your vision for the future of low-carbon transport.

Find out more about transport futures at www.transport.govt.nz/futures