

Decarbonising freight

Transport accounts for one-fifth of greenhouse gas emissions in NSW, and this is rising. Fifty per cent of emissions from transport are from cars, and a further 30 per cent are from the rapidly growing freight sector. Achieving NSW's goal of net zero emissions by 2050 will not only require electric cars, but the adoption of zero emissions fuels across the freight sector.

The high upfront costs of electrification will be a short-term challenge for the freight sector, but costs will fall as core technologies improve and markets grow. In the longer term, dramatically lower fuel costs of electric vans and trucks will increase productivity.



Powered by regional NSW

Freight transport is a large consumer of fossil fuel energy. Of the 143,000 heavy trucks registered in NSW, only 100 are electric or hybrid vehicles. Replacing the energy source used by freight vehicles is a huge challenge, but also an economic opportunity for NSW.

A decarbonising freight industry is likely to be a foundational customer for emerging clean energy industries. Electrifying freight will drive investment in wind and solar farms, pumped hydro storage, grid-scale batteries, transmission and distribution, and hydrogen production. It will accelerate demand for advanced skills and bring new opportunities for local engineering, manufacturing and refining.

Importantly, a clean energy economy will drive regional investment: hydrogen production at Port Kembla and the Hunter Valley; energy generation in the renewable energy zones of New England, the Riverina and Central West; and advanced clean industries in logistics hubs such as the Parkes Special Activation Precinct. Freight, always a critical industry for primary production, will be powered by the regions.

Cleaner, quieter and safer freight

Urban freight

In Australia light commercial vehicles account for 85 per cent of road freight vehicles and 73 per cent of kilometres travelled, mostly in urban areas. Medium-size heavy trucks account for 13 per cent of total road freight vehicles and 15 per cent of the total kilometres travelled.

NSW's urbanised population means much of the light freight and distribution task occurs in urban centres. Battery electric commercial vehicles and medium-duty trucks are well suited to urban environments where they can reduce noise and air pollution, and improve the liveability of neighbourhoods. Quieter and safer vehicles can allow deliveries late at night, and access restrictions to be reviewed.

Battery technologies already provide sufficient range for many light and medium-size freight vehicles in urban areas, and their overnight charging demands are more readily accommodated without power supply upgrades.

Australian trials are underway with beverage distribution and supermarket delivery services, waste collection and light trucks. Other urban vehicles well suited to electrification include shorter range heavy-duty vehicles that can return to single charging depots, such as garbage trucks and concrete mixers.

The last mile

Electric cargo bikes and similar small vehicles can offer fast delivery, particularly in highly urbanised or congested environments.

Light parcel delivery is growing, driven by the online shopping boom. E-bikes and other micro freight vehicles have the potential to efficiently accommodate last mile delivery increases. Transport and the City of Sydney have trialled a parcel consolidation space in the Sydney CBD to assess potential productivity and congestion benefits.

Numerous studies have recognised the potential of electric cargo bikes. The NSW Productivity Commissioner has recommended a review of e-bike regulations and safety standards to maximise the potential of e-bikes. This would include a review of the appropriateness of the current 250 W power limit.

Heavy freight

Large trucks account for two per cent of road freight vehicles and 11 per cent of total kilometres travelled. Their intense duty cycles and high average speeds are not yet economic for battery operation on long-haul routes, although large electric trucks with a range of 400 kilometres are now in production by established manufacturers such as Daimler, Volvo and Scania. Hydrogen trucks, which combine batteries and hydrogen fuel cells, promise longer range and faster fuelling, and are expected to follow.

Other technologies that could decarbonise long-haul road freight include catenary trucks, battery swapping systems and synthetic fuels. While all have been demonstrated, their cost and additional complexity may limit their uptake.



How can the NSW Government accelerate the adoption of zero emissions freight transport?

Rail: making clean cleaner

Rail is already the cleanest option for containerised and bulk freight, with emissions up to 16 times lower than road haulage. Investment to improve access, capacity, reliability and timing of operations can help shift freight to rail. New passing loops are being delivered on the NSW regional rail network, and the NSW Government is protecting corridors for rail freight in Western Sydney and the Lower Hunter.

In the shorter term, retiring some of the oldest locomotives in existing fleets would improve fuel economy and reduce air pollution emissions. Subsequently, rail freight emissions will need to be eliminated to achieve NSW's net zero emissions goal.

Overhead electrification of railways is an established technology that could suit interstate main lines as Australia's freight task grows, and as more freight is shifted to rail to meet climate targets. Electric freight trains are faster and more powerful than their diesel counterparts, and easier to timetable alongside passenger trains. Electrification of main lines, if pursued, would require collaboration with the Australian Government's Australian Rail Track Corporation.

Overhead electrification is prohibitively expensive for secondary lines. Alternative rail decarbonisation technologies may involve hydrogen, batteries, or potentially hybrid technologies using a combination of intermittent overhead electrification, batteries and fuel cells. In the case of hydrogen traction, much longer range between refuelling is theoretically possible, but as yet there are no examples of hydrogen traction for mainline rail freight.

Electric freight trains bring flexibility. Because they can operate safely in longer tunnels without the need to ventilate diesel exhaust, new freight lines can be delivered that pass below sensitive areas such as national parks or urban communities. This may prove especially useful in resolving freight limitations in Greater Sydney. Electrification may also unlock the potential for the efficient sharing of new rail lines with electric passenger trains.



**What is the right mix of technologies for decarbonising rail freight?
Is there a role for the NSW Government?**

Opportunities

‘NSW’s Net Zero Plan Stage 1: 2020–2030’ is the foundation for emissions reduction in the State, aiming to achieve a 50 per cent reduction on 2005 emissions by 2030 and net zero emissions by 2050. Many of the actions in the plan, and in the ‘NSW Electric Vehicle Strategy’, support decarbonising the freight sector.

Setting targets

Clear decarbonisation and air quality targets, such as net zero by 2050, can provide certainty of policy directions for industry. However interim targets may provide clearer investment signals. An example is the United Kingdom’s ‘Transitioning to zero emission cars and vans: 2035 delivery plan’, which will ban the sale of internal combustion engine cars and vans by 2030. The UK has also announced a ban on sales of internal combustion engine light and heavy trucks by 2035 and 2040 respectively.

Alternatively, progressive regulatory controls that target vehicle emissions or air quality could be pursued, including access measures such as low emissions zones in urban centres.



What types of targets would provide investment confidence for industry?

Hydrogen

Hydrogen production, storage and fuelling is highly specialised, with investors facing high risk in the absence of guaranteed offtake by customers. Both the NSW and Australian governments have committed funding to reduce the costs of hydrogen.

The NSW Hydrogen Strategy will support the uptake of hydrogen across multiple sectors, including heavy transport. The Strategy will support 100 refuelling stations, and establish a target of 20% hydrogen vehicles by 2030 in the NSW Government fleet.

Model and fleet availability

Australia is a relatively small right-hand-drive market, hindering access to many electric vehicle models available internationally. The ‘NSW Electric Vehicle Strategy’ will facilitate bulk buying to induce greater availability of models, particularly for fleets. There is potential to extend this approach to heavier vehicles.

Linfox GreenFox

Between 2007 and 2016, Linfox reduced carbon emissions by more than 50 per cent.

The company taught drivers fuel efficient driving techniques, modelled emissions from transport routes and logistics operations, upgraded building systems and cold storage, installed solar power, adopted low rolling resistance tyres, modernised the fleet and trialled biofuels and liquefied natural gas.

Linfox is now trialling 6 electric trucks serving major customers, including the Volvo FL, which has a gross vehicle mass of 16 tonnes, and a range of approximately 250 kilometres.

Innovation and Skills

From the development of core solar technologies in NSW to the export of high-power fast chargers from Brisbane, Australian innovators have had an outsized impact on the clean energy sector. Decarbonising freight will create new markets for innovation and business development.

New technologies and new industries will require a highly skilled workforce competent in electric-drive train systems, battery technologies, charging systems, hydrogen electrolysis and storage. NSW has an extensive vocational training program, and opportunities exist to focus skills development in regions such as the Hunter Valley or Central West. The rail freight sector will also benefit from measures to address specific skills shortages.

Charging infrastructure

With the potential exception of long-haul freight, the NSW road vehicle fleet will be overwhelmingly battery electric, and will require sustained expansion of private and public charging infrastructure. The *NSW Electric Vehicle Strategy* allocates \$171 million towards charging infrastructure, with a focus on regional locations.

The energy required for charging freight vehicles is substantial, with potential battery sizes exceeding 500 kilowatt hours, and fast charging rates as high as one megawatt for long-haul trucks. The scale of the energy required is an opportunity for renewable energy producers, many of whom are on important freight corridors, including the New England Highway and the Hume Highway, which have large wind resources, or the Newell Highway, which has world-class solar resources.

Many operators of light commercial vehicles or trucks are constrained by the electrical infrastructure available in their leased depots or premises. Power supply upgrades necessary to support even small fleets can be expensive, especially if fast charging is required, and owners do not always share incentives with tenants. Measures such as the Building Upgrade Finance NSW program could potentially assist in upgrading power supplies to business premises.



How can industrial and commercial premises be prepared for electric freight?

Managing the grid

As electricity generation shifts towards variable renewable energy, new measures will be needed to balance supply and demand. The demand response market is a highly cost-effective way to manage grid variation. It would allow commercial vehicle owners to profit from reducing their charging at times of high grid demand, or to increase their load when production is high. In the longer term, the huge energy storage in hundreds of thousands of freight vehicle batteries may allow vehicle owners to become active participants in energy markets, able to both buy and sell energy using vehicle-to-grid technology.

Modernising existing technologies

Even with rapid investment in clean technologies, diesel will remain the workhorse of the freight industry in the short to medium term. Fleet modernisation programs have the potential to accelerate the withdrawal or modernisation of older locomotives, heavy-haul trucks and plant. In addition to regulation or subsidy, there are opportunities to consider incentives such as improving access to freight paths for rail operators, or allowing cleaner vehicles priority access to the freight signal priority trial as part of the 'Future Transport Technology Roadmap 2021-2024'.



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What happens to my feedback?

Thank you for sharing your views with Transport for NSW. We will consider your input and will share the draft Future Transport Strategy when it is published via the email address you provided.