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**Downer**

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# Freight Rail

## Solutions to drive a sustainable future

**Downer**

Relationships creating success





Image courtesy of the State Library of Queensland



## Downer has a proud history and an exciting future in the rail freight market

### Our proud history in freight

Downer has a long history of designing and manufacturing locomotives across Australia for every major operator and in every state including our 150-year-old Maryborough, Queensland facility. The first steam trains entered service from 1897, before we went on to build more than 500 steam locomotives between 1896 and 1958. We have subsequently continued to build locomotives at Maryborough through to the most recent diesel-electric GT42 class, (4000 and 4100 class locomotives). In total, we have manufactured almost 1,000 locomotives including diesel electric, diesel hydraulic, electric and steam locomotives from Maryborough alone.

### Our exciting future

Downer is excited to be re-entering the rail freight market with a robust service offering in line with customer needs.

Downer is a trusted partner for the rail freight market who from 2023 will be offering customers the full spectrum of design, manufacture and maintenance, as well as decarbonization and digital and data solutions.

As we look to a net zero future, Downer is proud to bring a sustainability focus to provide engineering support, decarbonisation solutions and advanced rail technologies including our TrainDNA platform.

Downer's rail freight market offering can be tailored to specific customer requirements such as:

- Engineering fleet support with specialised freight engineering capability
- Advanced Asset Management services as Downer is accredited to ISO55001
- Quality wheel and bearing services
- Rollingstock maintenance
- Rollingstock design and manufacture
- Rollingstock overhaul and repair
- Decarbonisation solutions
- Advanced rail technologies, including data acquisition and asset protection equipment.

## Australia's leading rollingstock provider

At Downer, we are the largest provider of through-life support asset management services for passenger rollingstock in Australia.

We build and maintain passenger trains across all major cities in Australia. We've been building and maintaining trains for over 100 years with some of our key passenger rollingstock projects including:

- Manufacture and maintain 119 Waratah trains in NSW – Australia's largest passenger fleet on Australia's largest passenger network
- Construction of the Newcastle Light Rail Project, and through Keolis Downer the operations of the fleet

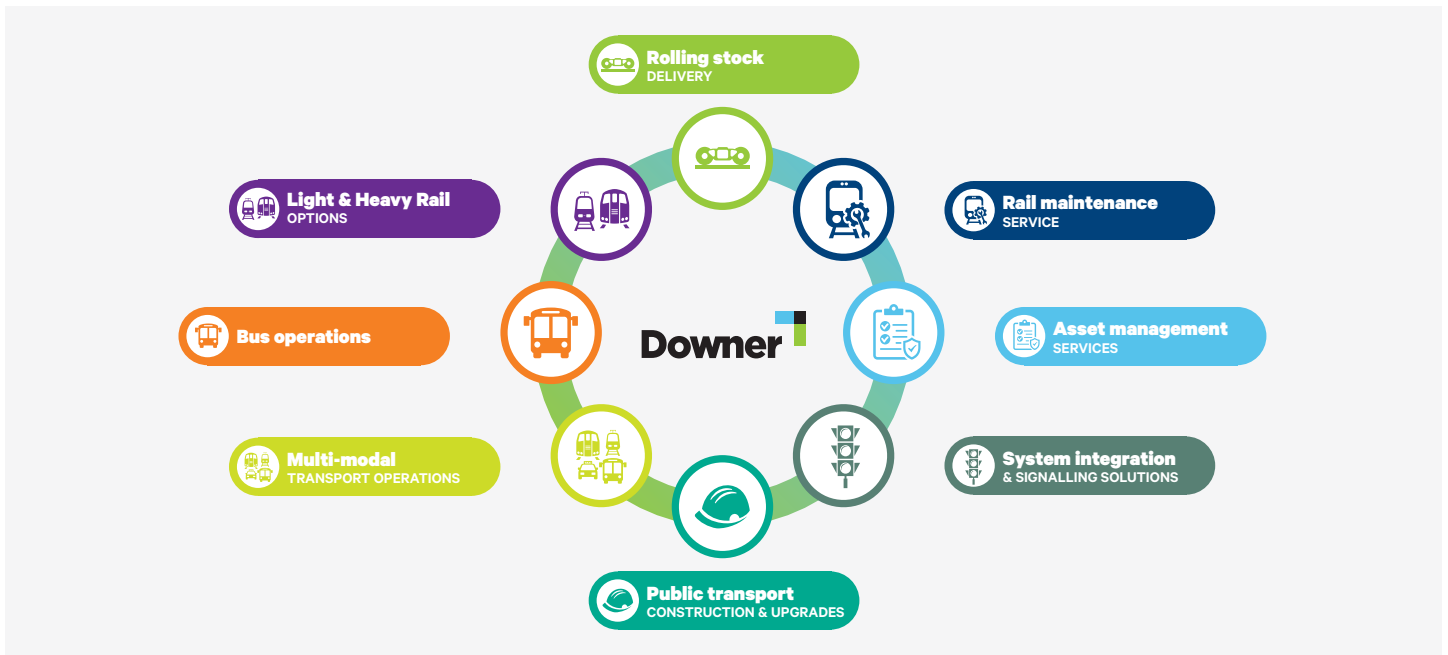
- Manufacture and maintain 70 High Capacity Metro Trains in Victoria – a step change in public transport offering 20 per cent more capacity than the current fleet and designed with a customer-centred stakeholder engagement piece. Refurbish 85% of the Yarra Trams fleet, making it the world's largest tram refurbishment project
- Manufacture over 1,000 rail cars and nearly 1,000 locomotives from our Maryborough, Queensland site.

## Our rollingstock footprint

- Downer provides trusted support to critical passenger train assets across Australia and is the largest national rollingstock maintainer
- Unique breadth of capabilities across Downer – no other organisation has all these capabilities in-house:
  - Rollingstock design, manufacturing and TLS capability
  - Infrastructure delivery and maintenance capability
  - Operational and maintenance capability.



## Our rollingstock capabilities



## Downer – the leading provider of urban services in Australia and New Zealand

We employ 33,000 people and partner with all levels of Government—federal, state and local—as well as Government like entities to help them service and manage their critical infrastructure and provide their services to the general public across Australia and New Zealand.

Some of our service offerings include power generation, power transmission, water, gas, the NBN, roads and transport.

Our service delivery excellence drives long-standing and trusted relationships. We are uniquely placed to support the Australian and New Zealand economies in energy transition and decarbonisation.

## Keolis Downer – Australia’s largest private provider of multi-modal transport solutions

Keolis Downer operate and integrate all types of mobility services for more than 350 million passenger journeys each year.

We are the largest light rail operator in Australia, operating and maintaining Yarra Trams in Melbourne and G:link on the Gold Coast.

We are the largest private multi-modal transport operator in the Southern Hemisphere with significant bus operations in Western Australia, South Australia and Queensland, and are the operator of the new integrated public transport system in Newcastle.

We also develop new forms of shared and customised mobility to answer local needs, such as demand responsive transport services and autonomous vehicles.





## Downer and sustainable transport solutions

### Providing value to our customers

At Downer, sustainability means sustainable and profitable growth, providing value to our customers, delivering our services in a safe and environmentally responsible manner, helping our people to be better and advancing the communities in which we operate.

As Australia's leading provider of through-life passenger rolling stock asset management services, we are investing in technologies and practices to drive efficiencies and help our customers create a more sustainable transportation network.

We know that almost all western jurisdictions have committed to being some form of net zero by 2050, which incentivizes us to invest in technology and provision of new services focused on driving efficiency and long-term value. It is not just something we want to focus on, **sustainability is critical to our success.**



# Downer's tri-brid technology: diesel, electric and battery providing a more sustainable rail network

Downer is proud to have designed and manufactured solutions for the rail freight sector for over 100 years, including both locomotives and freight wagons. Over that time, rail solutions have evolved and transformed from steam-powered locomotives to diesel engines and electrification.

Now, with the commitment to reduce emissions by 2030 and net zero emissions by 2050, we know that rail transport will again transform to combat climate change.

The need to reduce emissions and lower transport costs is driving change throughout the transport industry, and as Australia's leading provider of rolling stock asset management services, Downer is proud to be a part of the solution.

## Tri-brid technology: the power to drive change

Hybrid technology combining traditional fuels and electric battery power is already mainstream in the automotive industry. Downer has signed a strategic partnership agreement with ABB, who are a world leader in traction technology and electrical energy management. Together we have developed tri-brid technology—with a new locomotive concept that combines three modes of energy that provides operational flexibility to get the freight task done now and into the zero-carbon emissions future.

The tri-brid can seamlessly switch between using onboard energy storage, to overhead catenary line energy (25 kVa or 1500 VDC) or to a small diesel backup generator (or a combination of all three sources) which provides significant cost savings and carbon reduction across the rail network.

This gives it the power to climb, maintain speed on flat sections, the ability to recover energy through regenerative braking down hills, and the capability to recharge en route.

## Tri-brid locomotive features

The tri-brid's three energy sources are specifically configured to successfully operate freight services, without the need for extensive new electrification or infrastructure. This allows retirement of diesel only locomotives and replacement of ageing electric locomotives.

The tri-brid locomotive uses the overhead electric network when available and the on-board battery storage in other areas. A backup diesel engine is only used in limited areas to increase operational range and to reduce infrastructure costs.

Tri-brid locomotive co-configuration:

- Narrow gauge bogies and bodies
- Six axles with six AC traction motors
- 25 kV overhead pantograph equipment
- 1400 kWh of energy storage
- 1200 kW diesel generator, 1000 kW at wheel (Cummins QSK38 Tier 3 engine)
- Overall Mass of 120 tonnes (132 tonne version is also available)
- Operate as independent unit or multiple units
- Length 22,000 mm over couplers faces
- Continues tractive effort rating of 460 kN and starting tractive effort of 600kN
- Power at the rail of 2300 kW in all modes of operation including overhead connection and with energy storage / diesel mode
- Full locomotive electric regenerative braking capability of up to 2300 kW. Most operational segments will require minimum train friction braking
- Fully appointed vibration isolated Driver's Cab with AAR crashworthiness.

## Tri-brid cost benefits

Traditional diesel locomotives have a whole of life capital and running cost of \$36 million per locomotive.

A tri-brid locomotive whole of life cost is \$22 million.

With a typical fleet of 100 locomotives and at \$14 million whole of life savings per locomotive, the tri-brid solution has the ability to save \$1.4 billion dollars over the 30-year life of the fleet with reduced maintenance costs *and* deliver greatly reduced emissions.

The tri-brid solution allows for further investment into electrification over time, which will result in a total elimination of diesel engines, helping achieve zero carbon emissions.

While the initial cost of a tri-brid locomotive is \$3 million more per unit than a diesel locomotive, this is more than compensated with the reduced maintenance and significantly reduced diesel consumption costs up to 100% on some routes.





# TrainDNA

Downer's TrainDNA delivers a full-service approach for improved passenger experience through next generation asset management.

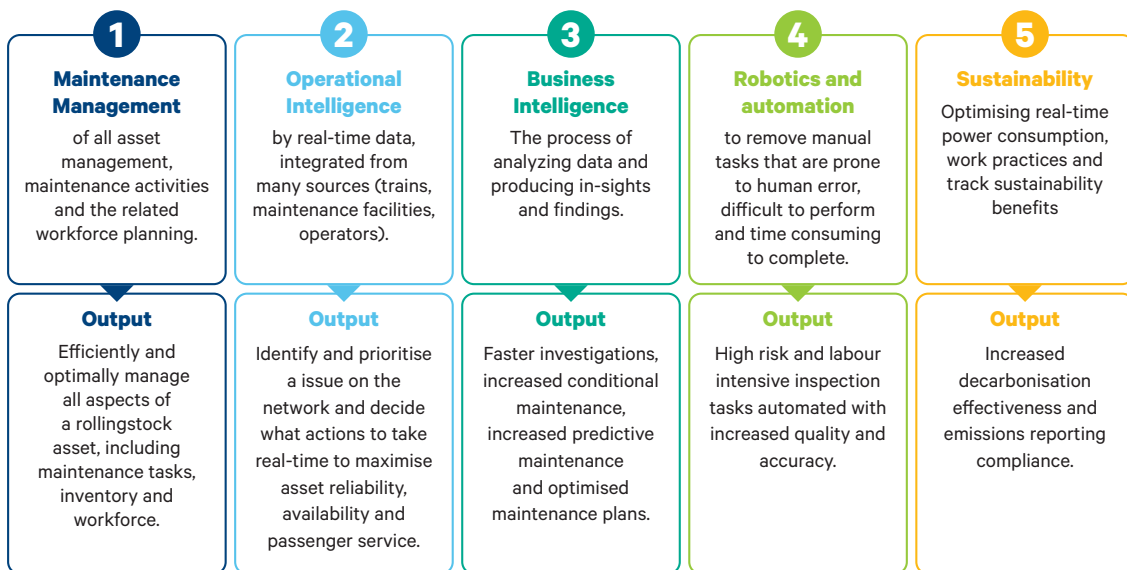
Over a development period of more than 10 years, Downer has taken a base industry standard asset management tool (typically used for static assets) and, in conjunction with deep industry experience, developed an industry application that:

- Is uniquely tailored to suit mobile assets and the particular requirements of the rail and transit systems sectors
- Is comprised of multiple unique modules tailored to the unique industry needs of operators, maintainers and asset owners

- Provides a custom integration layer to connect all of the modules, set-borne data feeds, customer data feeds (e.g. timetables and advertising), and external data feeds
- Provides a wide range of operational, life cycle cost and safety benefits.

## Our Modular Approach

The need to change and improve maintenance work practices is increasing at pace. TrainDNA's modular product approach allows Downer to focus on differing customer needs, with the ability to expand in the future to provide a complete digital solution underpinning all maintenance activities.



## Downer x IBM Consulting: a ten-year partnership in sustainable asset management

Downer and IBM Consulting have signed a ten year partnership to keep passengers moving safely, reliably and comfortably with a sustainable asset management system.

Working together, our validated and operational TrainDNA platform is continually being updated to provide a sustainable high quality service to passengers.

Powered by IBM Maximo, TrainDNA pulls train data in real time which helps to identify and resolve issues before they occur. This real-time data also supports predictive maintenance efforts for 200 trains across Australia.

Our partnership works at collecting and transforming data into something that's valuable to use for our customers and even more importantly, their passengers. A key part of this value is how we can assist our customer with their sustainability initiatives.

It's acknowledged that train networks are some of the largest users of electricity. Through TrainDNA, Downer and IBM Consulting are able to better understand which parts of the rail systems require the most energy throughout the day, helping to better support transport operators to optimise use and achieve more sustainable outcomes.

TrainDNA provided:

- reduced equipment malfunctions, netting a 51 per cent increase in train reliability
- asset data contained in more than 130 messages received every hour from every train in real time
- a 20 per cent improvement in efficiency by doubling the number of trains maintained in the facility.





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