



Improving fuel efficiency keeps rail sustainable.

Smooth operator

KiwiRail tells *Rail Express* how its adoption of driver advisory systems from TTG Transportation Technology is not just about saving fuel.

When representatives from TTG Transportation Technology first contacted KiwiRail with their new system, the New Zealand rail operator couldn't believe what they were hearing.

The Sydney-based manufacturer was introducing their driver advisory system (DAS), Energymiser to KiwiRail and was suggesting that the state-owned enterprise could save 10 per cent of their fuel bill. According to Soren Low, technology and customer innovation leader at KiwiRail, it would take a change of management for the offer to be taken up.

"We struggled at first to get any interest in installing Energymiser, but a couple of years later there was renewed interest and the group general manager at the time said 'Let's give it a crack and do a trial and see what happens, if nothing comes out of it that's great, at least we can say we tried.'"

KiwiRail chose to test the system on a freight line that took wood pulp from the mill at Karioi in the middle of the North Island to the Port of Wellington.

"We did a trial over three or four months and what became really clear is that the numbers that came out of this trial were too good to be true," said Low.

The initial figures promised by TTG were being delivered and led to the DAS modules being rolled out across the entire network.

"We used the trial to write a business case to justify the investment to roll out Energymiser across the business," said Low.

A few years later, the onboard systems were in the cabs of KiwiRail's fleet of 180 locomotives and 350 train drivers were trained how to use the system. Now, across KiwiRail's 4,500km network the DAS technology delivered by TTG indicate to drivers when to increase speed, when to brake, and when to coast to enable the most efficient runs possible.

The DAS system enables KiwiRail to make the most of a 150-year-old narrow gauge network with many tight corners and steep inclines. Whether hauling bulk freight, logs for export, and dairy during the milking season, Energymiser is enabling KiwiRail to cut fuel costs and significantly reduce emissions.

CHANGE THE WAY YOU DRIVE

While the figures from the trial convinced KiwiRail's management of the benefits of the DAS technology, there was another group who needed to come on board.

"When we first started talking about DAS to the driver union representatives, there wasn't much support for it," said Low. "There was a straight-out view that no technology can tell a driver how to drive a train better than they can. In time, the Rail & Maritime Transport Union representatives came on board, and really helped us sell it to our people. Being able to pull together a small team of committed drivers who believed in what we were doing really helped us test, tweak and deliver the system."

Until the incorporation of Energymiser, KiwiRail drivers had been trained to travel at the maximum track speed. Now, the DAS onboard screen was telling drivers that they could travel below the track speed and coast on downhill sections and they would arrive at their destination at the scheduled time.

To communicate this change in practice, KiwiRail enlisted the help of a senior driver, Robin Simmons. Having someone with Simmons's respect within the organisation helped to win over resistant drivers.

"Simmons really quickly bought into this," said Low. "He really quickly said, 'You know what, this is actually a really good thing.' To this day, he is our DAS champion. He has been

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Soren Low, KiwiRail technology and customer innovation leader

pretty much working full time on DAS. The training program that we built was very heavily influenced by Simmons and in the early days he did most of the training himself. The fact that he's a locomotive engineer and train driver was really good in terms of his credibility.”

Another important factor said Low is to ensure that the information that is displayed in cab is not in conflict with conditions on the track. For example, during summer some parts of the KiwiRail network have speed restrictions due to heat. This function was not inbuilt into the Energymiser system initially, so KiwiRail and TTTG updated the software.

“The DAS was saying you should be doing 70 km/h whereas the driver knew they should be doing 40 because they were in a heat restriction area and we try and avoid having those mixed messages in the cab,” said Low.

KiwiRail found drivers were in three camps; those that embraced the technology, those who used the DAS because they had to, and those who would prefer not to use the technology. Convincing the second and third camps and encouraging the first to become advocates for the system would take a different approach.

“In our training, we spend a day in the classroom with our drivers and most of it is really hearts and minds stuff. It's about the bigger sustainability picture, it's about why this is important, it's about how organisations like KiwiRail need to cut costs, how we need to invest our money wisely and then a little bit of the training is actually the technical bit of how you use the tool,” said Low.

Acknowledging and incorporating these factors has led to the success of the system.

“The reality is if you can't get the drivers on board then you are dead in the water.”

ENCOURAGING CLEAN AND EFFICIENT OPERATIONS

Seven years on from the first contract signed between TTTG and KiwiRail the system has enabled a 10 per cent reduction in fuel costs. However, even more important than the savings are the benefits that the system has brought to KiwiRail.

KiwiRail has three carbon reduction targets and by the end of June 2020 is aiming to reduce energy consumption by 73.5 GWh. This target was raised from 20 GWh, which was

reached only eight months after the agreement between KiwiRail and the Energy Efficiency and Conservation Authority (EECA) in 2016. Fuel savings in locomotives are a major part of this effort and already 17 million litres of fuel have been saved since 2015.

By 2030, KiwiRail must reduce its carbon emissions by 30 per cent below 2005 levels, in line with the Paris Agreement. Finally, as a state-owned enterprise, KiwiRail must achieve net zero carbon emissions, in line with New Zealand's overall climate goals. Since the 2012 financial year, the company has reduced its carbon intensity of rail freight by 15 per cent.

To meet future goals, DAS has a role not only to ensure the efficient movement of freight but to provide a better service for KiwiRail's customers, enabling more goods to be moved on rail rather than road. The KiwiRail network is predominantly single track, so making sure trains run to schedule is essential. This is where the connected DAS technology can contribute.

“The connected DAS, where you integrate the onboard systems back to the back end of train control can create a potential opportunity to tie those things together to take it to the next level,” said Low.

This can enable better scheduling to move freight quicker, without using more fuel.

“Our job is to provide excellent customer service outcomes,” said Low. “The first step is to analyse schedules to ask, ‘How do we take our existing journey time and look to cut up the journey into more fuel-efficient increments, what kind of fuel saving can we derive from that?’”

Getting to that point, however, requires buy-in from across the organisation, and this is where DAS's fundamental benefits are important, concludes Low.

“This is not for us right now, it's for our grandchildren's grandchildren. It's a long-term project, that's why it's so vitally important.”

Managing director of TTTG Dale Coleman said TTTG are extremely proud of its relationship with KiwiRail that embodies what success looks like. TTTG and KiwiRail have combined world leading research into technology that can be successfully implemented into an existing operating environment by a committed Kiwi Rail management and operations team.

Coleman also acknowledged the research excellence of the University of South Australia, which has been instrumental in the delivery of Australian knowhow in building a fully connected and integrated DAS deployed on more than 8,000 devices operating over 60,000 kilometres of track in more than 10 countries worldwide. The system delivers sustainability not only to KiwiRail but also other leading world class railroads including SNCF, Arriva, First Group, Abellio, and Aurizon. 🚂



KiwiRail tested the system with driver Robin Simmons, who became an advocate for the technology.