



**Hato Hone
St John**

EV Emergency Ambulance Trial

Feasibility study | Year one insights
June 2024 – June 2025



Strategic *context*

Manaaki Ora

To care for others by uplifting their mana, respecting their dignity and honouring their place in the world

A holistic state of health and wellbeing – where mind, body and wairua | spirit are in balance

Together, *Manaaki Ora* calls us to care deeply, connect meaningfully, and make a lasting difference.



Achieving Financial and Operational Sustainability

To keep delivering for the people of Aotearoa New Zealand tomorrow, we must act wisely today. We're making deliberate, future focused choices to ensure long term sustainability – so we can reach more people and remain a trusted presence for generations to come. This means increasing our income, strengthening our systems and infrastructure, and protecting the environment we all share.



Partnering for greater impact

We're stronger when we work side by side to make life-changing differences.

By joining forces with others across the motu | country and around the world, we can amplify our impact and reach more people in new, better ways.

We're building lasting relationships – grounded in shared purpose, mutual respect, and a belief that collaboration leads to better health and wellbeing for all New Zealanders.



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Partnering for *greater impact*

With a fleet of more than 1,300 vehicles (of which around half are ambulances), the diesel used accounts for around 88 percent of Scope 1 emissions and 65 percent of total emissions. Addressing vehicle emissions is a priority for Hato Hone St John to minimise environmental impact.

In the current fiscal environment, investment in sustainable technologies becomes even more challenging. It is through the partnership and support of ASB as a major sponsor of Hato Hone St John we have been able to build and test the feasibility and viability of the first electric emergency ambulance in Australasia. We are now able to share the learnings from the first year of this trial with the broader ambulance and health sectors and support their sustainability journey too.

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Cameron Brill

Deputy Chief Executive, Corporate Operations, Hato Hone St John

ASB is proud to be a long-standing partner of Hato Hone St John and the sponsor of this important initiative. The decision to support the trial was an easy one as we were confident in the potential to reduce carbon emissions, while ensuring the highest standard of patient care. We're impressed by the work that's gone into evaluating the electric emergency ambulance capabilities, and the results of the trial will reassure the public as the EV fleet is expanded. Building a sustainable future for all New Zealanders is a core focus for ASB. We see potential for this project to have a rippling effect through other industries on the same path and are extremely excited to be able pave the way for future work in this space.

Carrie Gage

General Manager – Sustainability, ASB



Case for *change*

As a partner to the New Zealand health system, we deliver emergency ambulance services to over 90% of Aotearoa and provide a range of community health services. With around 350 sites and 1,300 vehicles in our fleet, we are conscious that providing these services generates emissions which contribute to climate change and its impacts, such as the increasing frequency and intensity of weather events we are experiencing, and risk this poses to our critical assets, infrastructure and access to communities we serve.

In early 2025, we achieved Toitū Carbon Reduce certification for a third consecutive year, demonstrating our commitment to measuring and managing our emissions in accordance with ISO and Toitū standards.

The diesel we use (predominantly to fuel our ambulances) contributes around 88% of our Scope 1 emissions, and 65% of our total emissions. To put that into perspective, our electricity, domestic travel and waste related emissions combined account for around 10% of our total emissions. Becoming less reliant on diesel and petrol vehicles would be a big win for more sustainable health care delivery.

With the support and investment of partner ASB, in June 2024 we commenced a trial of the first electric vehicle (EV) emergency ambulance in Australasia to better understand how an EV ambulance could perform within a metropolitan area of Aotearoa, New Zealand.



A community of *change*

The success of our EV emergency ambulance trial reflects the collective commitment of clinicians, managers, multidisciplinary project teams, sustainability champions, local communities, and industry partners. Together, we've taken meaningful steps toward understanding what it would take to journey towards a cleaner, quieter, and more sustainable future for emergency healthcare. This collaboration shows that when we align purpose with partnership, we can accelerate innovation that benefits both people and the planet.

I would like to acknowledge the exceptional collaboration to take an idea to reality in context of the demands of delivering emergency ambulance services to over 97% of Aotearoa, New Zealand and bringing our organisation and wider community on the journey with us.

Dr Colin Tan

*Head of Service Improvement & Sustainability –
Corporate Operations*
Hato Hone St John – Project Lead

Key partners

ASB
ONE STEP > AHEAD



Thanks to

- > Our key partners
- > The core project team
- > Driving instructors and champions
- > Supporters and provocateurs.



Year one *core insights*

In year one of the trial, the EV emergency ambulance has attended over **500 incidents**, travelled **13,671 kms** and provided a quieter, more comfortable experience **while avoiding over four tonnes of CO₂-e operating emissions**. It has proven reliable and efficient within the metropolitan area as an additional vehicle in the fleet offering fuel savings and reduced emissions without compromising performance and quality service delivery. The insights gained over the first year of the trial have helped to inform minimum requirements and thresholds for wider fleet transition.



Live insights during year one of the trial **informed continuous improvement of design** and fit-out.



Driver training was relevant to the environmental and operational context.



Maintenance in first year was no more than expected for a new model in fleet, and was **not increased by use of EV technology**.



15% quieter than a standard ICE ambulance.



It is possible to complete a **12-hour shift in a metropolitan context in New Zealand**. Returning to station for charging does limit its range of operation and we are exploring increased range options.



Attended **521 incidents** where patients were transported – **4 incidents per day** on average.



Travelled **13,671km** –
93km per day on
average.



Only two recorded incidents where the EV
had to be swapped out for an ICE ambulance
due to change management process.



Trust and confidence in EV technology has improved at HHStJ
and in public sentiment over the first year, in the context on an
emergency ambulance service and as part of a commitment to
delivering more sustainable health care.



Financial impact – the EV
ambulance **cost about the same**
to produce as our standard
ambulances, while costing
less to run (\$9 less per day on
average) and **is expected to**
require 50% less maintenance.



Environmental impact – compared
to a standard HHStJ diesel
ambulance, **the EV contributed**
four tonnes less CO₂-e operation
emissions during the trial.

Project *overview*

Concept, design and build

December, 2022

Launch

April 2024

Testing and driver training

May 2024

Trial starts

June 2024

Year one data and insights analysis

July–September 2025



Trial design and change *management*

Feasibility

The trial started with an analysis of the distance an average metropolitan emergency ambulance travels per shift (~180km). With technology in vehicle platforms now giving us the range, this gave us the confidence to start vehicle selection, trial and change management design.

Change management

Change management started with a communication plan. This ensured alignment of project milestones and leveraged key dates such as World Environment Day and World EV Day. The plan included communicating the “why” at national and local levels and FAQs both about the trial and the vehicle.

We focused on identifying champions at the district management level early on, before identifying local champions. Once established, this cohort enabled ownership of the project and ongoing support with vehicle manifest and clinical equipment layout, roster and shift management, communication, and vehicle management.

Through clear communication, visual aids, consistent safety messaging, and phased operational adjustments, we successfully integrated the EV ambulance into daily dispatch processes without disruption.

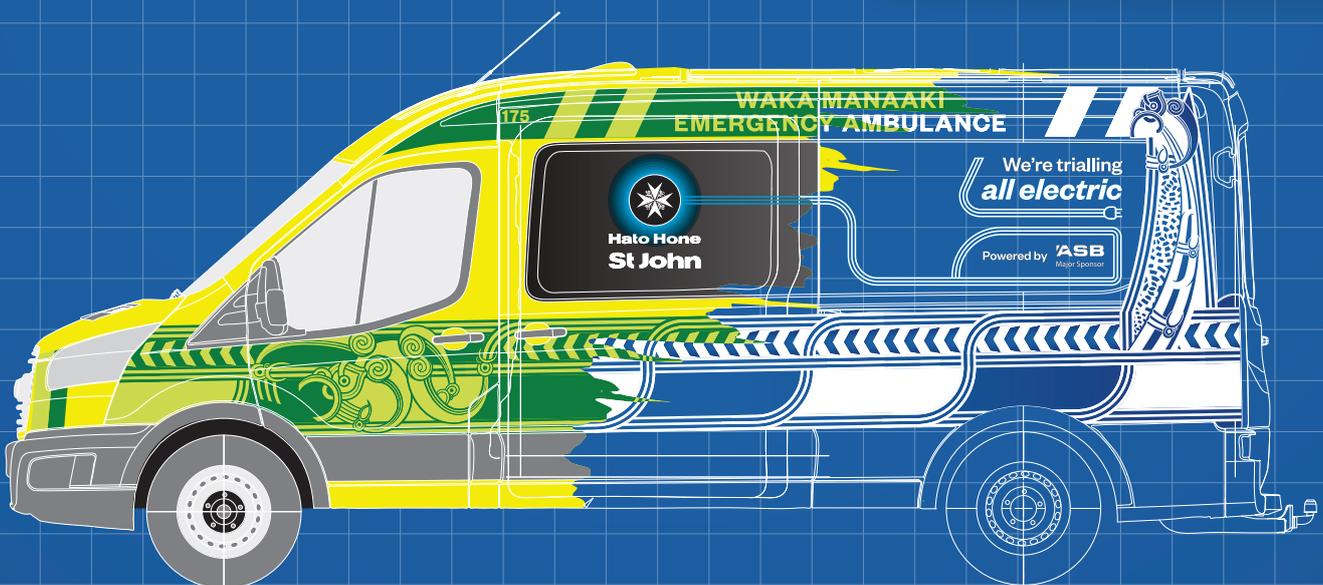
Training, familiarisation and feedback

The first phase of training took place at Mystery Creek Showground. This included a full vehicle shake-down, stability and off-road testing, and driving instructor and vehicle familiarisation sessions. Partners and stakeholders were introduced to the trial, and a structured training package was developed as an outcome. At Hampton Downs, staff who were scheduled to use the EV ambulance received detailed familiarisation training. These staff became champions for their watches and a good source of feedback. The training included discussions on response parameters and experience driving the vehicle on a track with a professional instructor. A bonus for attendees was one-on-one coaching with the instructor. For those who missed the track day, individual training sessions were arranged as needed. As the trial progressed, inducted crew members trained their partners, ensuring knowledge was shared across teams. Today, most Hamilton-based staff have had the opportunity to use the EV ambulance.

Staff were actively encouraged to give feedback through conversations with their managers, email, or by using QR codes placed in the vehicle and at key locations, allowing them to provide real-time input. Any major safety concerns raised were addressed immediately, reinforcing confidence in the process. Two information sessions were held for Communications staff in our Integrated Operations Centre to ensure dispatchers understood the vehicle’s capabilities and protocols. Operational procedures were clearly defined, including minimum charge thresholds, callsign identification, and charging routines. A backup standard ambulance was always available to maintain service continuity. These measures – real-time feedback, rapid response to safety issues, local champions, transparent communication, and continuous improvement – demonstrate that strong change management underpinned the success of this trial.

Vehicle specifications

- › Ford E-Transit 420L medium roof height.
- › Range: 220km real-world (prior to build).
- › GVM: 4.25 Tonne, Payload 1.6 Tonne.
- › Battery: 75kWh – 68kWh useable.
- › Onboard charger: 11.3kW. When plugged into an AC charger. This gets converted to DC to charge the battery. This does not apply to rapid charging.
- › House batteries: Two 12V heavy duty.
- › Roof mounted Solar Panel which charges house batteries which run warning devices, communication and medical device charging.
- › The patient compartment layout was collaboratively co-designed with representatives from the ambulance operations, corporate operations, Health Safety and Wellbeing and Action Manufacturing.



Design and fit out *requirements*

Insights from our valued partner Action Manufacturing

As the first electric ambulance for Hato Hone St John, and the first of its kind in Australasia, this project marked a real turning point – not just in the way of how emergency vehicles are powered, but in how we think about designing for the future. Being part of that shift was both a privilege and a responsibility and the project has been a journey of discovery. As a manufacturer, we have tested our limits and solved new problems in building a model for Hato Hone St John that paves the way forward for more sustainable delivery of emergency services.



Because this was a one-off build utilising a Ford E-Transit that was also a new model in fleet for HHStJ, there was no blueprint to follow. Every step required innovation. One of the greatest challenges was the underfloor – instead of the standard chassis we typically work with, the entire base of the vehicle was a lithium battery. That meant rethinking our entire approach to the build. We had to work closely with engineers to manage space, weight distribution, and access, all while ensuring we didn't compromise the critical features paramedics rely on. We introduced new systems to maximise power efficiency, trained our team on EV-specific safety protocols, and carefully designed around the limitations of the battery's footprint. This wasn't just a new ambulance, it was an entirely new way of building.

A key highlight was seeing the vehicle roll out of our workshop and onto the roads of Aotearoa, New Zealand, a milestone that represented thousands of hours of problem-solving, collaboration, and determination. Receiving feedback from frontline paramedics who were not only impressed by the build but genuinely excited about its performance was incredibly rewarding. We have been informed by the early data and insights, learning more about how the EV performs in real-world conditions and identifying where there's still room to evolve. The capacity to learn and improve backed by live insights is a real step forward for maximising performance and minimising environmental impact.

Looking ahead, technology continues to move at pace and the EV range is improving. Hybrid options are emerging and we are better positioned now to compare performance across platforms. We're already thinking about how a future build could take this further, drawing on everything we've learned to create something even more refined, efficient, and fit-for-purpose.

Key challenges to navigate

- ▶ Not just a new model ambulance – an entire new way of building with no blueprint to follow.
- ▶ Underfloor – instead of the standard chassis, the entire base of the vehicle was a lithium battery.

Charging

Whilst rapid chargers – defined as high-powered charging units typically delivering 50kWh or more – were considered during the planning phase, they were ultimately not pursued. This decision was driven by three key constraints: the age of our existing facilities, which lack the necessary electrical infrastructure to support rapid charging, the absence of dedicated funding to upgrade wiring or install high-capacity chargers, and the costs associated with upgrading public infrastructure such as transformers and distribution panels both at our ambulance station and at Waikato Hospital.

Instead, a 22kWh charger was selected as the most practical and cost-effective solution. This choice aligned with the existing electrical capacity at our Hamilton station and avoided the need for significant infrastructure investment. During the trial, the EV ambulance was charged using the 22kWh unit when not in use on shift. If the vehicle was on stand-down, it was shifted to a 7kWh charger to maintain battery levels.

To support onboard equipment, a solar panel was installed on the roof of the EV ambulance. This panel provides supplementary power to two house batteries, helping to maintain essential systems without drawing from the main drive battery.

When the vehicle is plugged into a charger, it prioritises charging the battery with the lowest state of charge first. Once all batteries reach an equal level, the system then distributes charge evenly across all batteries.

Operationally, the EV ambulance had a minimum charge threshold of 25%, equating to approximately 32km of remaining range. Once minimum threshold is reached, it is expected that the vehicle is stood down. A backup internal combustion engine (ICE) ambulance remained available to ensure continuity of service if charging constraints ever impacted availability.

Access to the public charging network was also available, if the vehicle needed additional charge to return to station.





Measures



Stakeholder engagement – how do various stakeholders, including the New Zealand public, feel about EV use within an emergency ambulance service?



Design and fit-out requirements – is it possible to reduce the weight of onboard equipment to maximise driving performance and range, and provide supplementary power to house batteries required for equipment?



Charging infrastructure requirements and networks – what are the site's electrical capacity constraints for charging infrastructure and charge time considerations?



EV technology performance – how does the battery perform under high-demand conditions (e.g. long shifts and high-speed travel), and what are the battery replacement or future upgrade options?



Operational capabilities – how do response times compare to those of standard ambulances in fleet, and how do terrain and climate variables impact range?



Financial impact – how does the whole-of-life cost of this EV ambulance compare to standard internal combustion engine (ICE) ambulances, and what's the break-even point?



Environmental impact – how do operating GHG emissions compare between this EV and other ICE ambulances in a Aotearoa, New Zealand context, and what about emissions associated with the material, part production and batteries?

Stakeholder *engagement*



Internal and stakeholder launch

World Earth Day 2024 public launch

April 2024

First patient transported to ED in EV Ambulance

June 2024

Received Toitū Certification – 3rd year

March 2025

Delivered early insights to stakeholders

September 2025

Year one data and insights finalised

October 2025

To maximise key stakeholder engagement in the trial, a 12-month integrated communications and marketing campaign was deployed focusing on the first EV emergency ambulance to go into service in Australasia. The communications plan identified opportunities to raise awareness of the trial and pose questions such as:

- › Will the EV ambulance go the distance?
- › What's the impact to the environment?
- › What do ambulance officers think?

A key component of the campaign was uplifting the expertise of key partners in the project and their contribution, including internal expertise within HHStJ in sustainability and operational effectiveness. Acknowledging key milestones through communications and engagement helped to build trust and confidence in the trial and in the use of EV in the context of emergency ambulance service delivery.

Early insights from the trial were shared with key health system stakeholders including the Council of Ambulance Authorities and Sustainable Healthcare Aotearoa. Stakeholder engagement is growing with interest from other Ambulance jurisdictions globally engaging in the year one insights.

Over the year, public response and sentiment about the use of EV in an emergency ambulance context shifted from a balanced response to one that was dominantly positive. This can also be attributed to a growing confidence of EV in Aotearoa, New Zealand in a personal and commercial context as EV infrastructure grows and incentives are put in place through policies to reduce emissions.

Campaign objectives

Engage – with New Zealanders about the EV ambulance trial and why it matters.

Inform – about the journey to deliver more sustainable healthcare in Aotearoa.

Share – insights about what it has taken to get the first EV Emergency Ambulance in Australasia into service.

Bernie Snook (pictured with wife Susan) was the first patient to be transported by our EV ambulance.

The couple had seen a story about the vehicle in the paper that day and were pleased to see it arrive on scene. "When we were told we were going in the EV – we were just delighted," Susan said. "We're all for EVs. We have a hybrid ourselves – I think it's the way to go really."

The Snooks were impressed with the layout and comfort of the treatment area inside the Ford E-Transit. There was a comfortable seat for Susan so she could stay close to Bernie during the journey to hospital.

They were also impressed at the equipment and how everything was within reach for our paramedics Josh Stannard and Colin Tan. "All the gear and monitoring equipment was just amazing and the EV is also so quiet – which is great for communication," Susan said. Bernie agreed, "It was great – excellent service. When I went into re-sus at the hospital, most of the work had been done," he said.

Bernie is now back at home recovering from the medical event and said while he loved the EV, he's in no great rush to go for another ride in it if he can avoid it!



Operational *capabilities*

Insights from our Integrated Operations Centre

- › With a unique call sign, dispatchers were able to easily identify the EV ambulance. This meant the team were aware of its operational capabilities and dispatched accordingly.
- › The EV functioned well within the 40km radius and we transitioned it from a day shift only vehicle (12 hours) to different shift patterns.
- › Visual aides of the vehicle's operational area were useful for helping inform dispatch decisions.
- › Early communication about the trial and use of FAQs built confidence in the role of dispatch in the trial.
- › The key messages were consistent in exercising caution and reinforcing safety as the number one priority.
- › The EV Ambulance was dispatched to 521 incidents during the 12 months with nil issues reported from the Integrated Operations Centre. This is indicative that with good processes, different vehicle types can be incorporated into daily operations.
- › As confidence has grown, we have seen the EV ambulance used in 24 hour capacity.



Insights from our Ambulance Operations team

Range confidence

- ▶ Performs well in metropolitan areas when it has short distances to cover to and from hospital, and when breaks are taken on time so it can recharge using the 22kW charger.
- ▶ Rapid recharge is a requirement when the vehicle has attended one or more incidents near or at maximum distance. Although it has the range to continue, when dispatched to multiple jobs with no time to recharge, range confidence is reduced.
- ▶ It is successful when there are enough resources to attend the jobs that a standard ICE vehicle would be able to respond to.
- ▶ As charging takes significant time, it can cause some performance anxiety.
- ▶ The battery range is reduced significantly when it is cold.
- ▶ The EVs range is limited when going further afield due to charging requirements, but this is usually manageable with communication with dispatch rarely requiring swapping out, even when in use on a continuous basis during a 12-hour shift.
- ▶ If more charging infrastructure was available, such as at hospital emergency departments, it would be more than reasonable to have an EV ambulance in metro areas. This is because hospitals are a natural stop point for our vehicles.
- ▶ While the initial range was adjusted, it still does not factor in the reassignment of jobs where they may all be within 40km of the station. Locations may not be in a 40km range of each other. One situation required the crew to swap out vehicles for the rest of the shift after they were left with 15% charge.
- ▶ The charging is fairly straight forward, however even the fast charger sometimes doesn't feel fast enough for the work load in Hamilton.
- ▶ The project team had high concerns around range anxiety. With good change management by the team, very clear boundaries around when to decline jobs or return to charge, and having an ICE ambulance on standby, staff felt supported to make the hard calls if necessary. Charging between each job also helped effective range for the day. Staff felt supported to make the hard calls if necessary. Charging in between each job also helped effective range for the day.

Delivery of clinical care

- › Some good features suitable for the small space such as the stair chair drawer, the position of the scoop beside the stretcher and the quick access pouches beside the treat seat.
- › Has the potential for being better operationally with some tweaks – such as the Zoll placed on the wall, creating bench space and adding an IV drawer.
- › As it is a smaller vehicle, it can feel quite cramped in the front, and when treating in the rear compartment it can be challenging with the lack of height and bench space.

Comfort

- › Patient comfort – noticeably quieter which can assist significantly with communication on the way to hospital. Smoother over potholes on the roads than other models.
- › Paramedic comfort – the seats are more comfortable, especially the seat warmers on cold winter days.
- › Patient whānau comfort – the airway seat is adjustable which is very handy with family members who wish to sit with the patient.
- › The Ford E-Transit 420L offers a middle ground between low-roof Mercedes Sprinter (in common usage in Australia) and high-roof Mercedes Sprinter (the current NZ model) – providing improved ergonomics and sustainability without the full cost or clearance of high roof platforms.

Overall design and performance

- › Interior heating and cooling options should be further considered, given the excellent options we have available in our Gen's.
- › Warning lights are excellent, "Lit up like a Christmas tree!"
- › The EV is surprisingly feasible as a metro ambulance, in consideration of the performance of the vehicle alone.
- › Excellent driving performance, great handling, low road noise, great visibility and comfort when responding under lights.
- › Hard to lose traction, very easy to control even when having to dodge hazards such as unpredictable drivers.
- › Communication with the rear crew through the bulk head/microphone can be challenging while driving. Low driver visibility into the rear.
- › Duress button is not within easy reach of crew in the back raising safety concerns.
- › Recommend a revision of the rear treatment will be required for future models with early input of FTE Paramedic into the design process.
- › As the EV market is limited in the van sector, finding a vehicle that met all our needs was challenging. This impacted on the ergonomic design of the vehicle.
- › Because of the payload weight restriction of an EV when compared to an ICE vehicle, different considerations were required with regards to layout, manifest and weight reduction.
- › We were affected by available choices of lighter weight stretchers due to the ambulance restraint standards (AS/NZS4535:1999).
- › The Ford E-Transit ambulance outperforms ICE Sprinter platforms in handling and drivability. Its electric drivetrain delivers instant torque for smooth, responsive acceleration in urban traffic. A low centre of gravity enhances stability during cornering and emergency manoeuvres. Overall, the E-Transit offers a quieter, more stable, and more agile operating environment, directly supporting both patient comfort and crew safety.

Financial *impact*

What we know so far:

- › Similar cost of production – slightly more than one of our existing ICE models, slightly less than another.
- › Cheaper to run – \$9 saved per day on average on running costs.
- › As we increase usage from a 12-hour shift to a 24-hour shift vehicle with a larger response area, cost savings per day will increase.
- › Our Internal Combustion Engine (ICE) Ambulances are serviced every 20,000 km or 12 months (whichever comes first) and the costs is typically between \$1,000 to \$3,000, depending on the level of maintenance required.
- › In the first year of the trial, mileage was around 13,671 km. Although we haven't yet reached the 20,000 km threshold, we have had one service via Ford at a total cost of ~\$200. For our ICE ambulances, this is typically between \$1,000 to \$3,000, depending on the level of maintenance required, every 20,000 km or 12 months (whichever comes first).
- › It is predicted that we will have ~50% less maintenance costs over time with the EV ambulance. This is still to be confirmed.



Environmental *impact*

From a greenhouse gas emissions perspective specifically, we found that*

Vehicle operation emissions

In Aotearoa, New Zealand electricity generation is currently around 85% renewable and increasing, making EV operation emissions far lower than ICE equivalents.

Over the trial period, our Ford E-Transit EV emergency ambulance travelled 13,671 km, producing approximately 610 kg CO₂-e vehicle operation emissions (emissions associated with the generation, transmission and distribution losses and use of the purchased electricity used to power the vehicle).

In comparison, our most common standard diesel ICE emergency ambulance model (the Mercedes Sprinter) would have produced approximately 5,000 kg CO₂-e operating emissions (emissions associated with the extraction, processing, transportation and distribution of the diesel used to power the vehicle).

Non-operation emissions

Life cycle assessments (LCAs) obtained from Ford in mid-2025 indicate that non-operation emissions (emissions associated with material and part production, batteries, transport and logistics, assembly, maintenance and end-of-life) are higher for a Ford E-Transit EV compared to a Ford Transit diesel ICE. Despite this, our initial calculations indicate that:

- › Once we have travelled around 35,000 kms in the EV ambulance, the EV's lower vehicle operation emissions are expected to outweigh its higher non-operation emissions, with the EV contributing less emissions overall from this break-even point onwards.
- › On average, our standard emergency ambulances travel around 40,000 km per year. We expect the EV ambulance to reach the ~35,000 km emissions break-even point within 1–2 years, depending on usage going forward.
- › Once we have travelled 240,000 kms over the EV ambulances' approximate lifespan**, we estimate the overall emissions (accounting for vehicle operation and non-operation emissions) to be close to a third that of our standard ICE ambulance.
- › HHStJ's standard ICE ambulances remain operational for approximately 400,000 km. Considering the EV's approximate lifespan of 240,000 kms**, if a second EV ambulance was required to complete this 400,000 km distance, the overall emissions (accounting for vehicle operation and non-operation emissions) of two EVs combined is still expected to be less than half that of the single ICE ambulance.

Our initial calculations are ongoing as we collect information. They are based on data available to us at the time of writing and include unknowns, assumptions and approximations. Our intention is to share the information we have currently as we continue to measure and update findings over time as part of an ongoing learning process.

**240,000 km lifetime distance travelled is based on the selected boundary conditions used for the LCAs provided by Ford. Our EV may be operational as an emergency ambulance for more or less than 240,000 kms depending on real-world battery degradation. If / when no longer suitable as an emergency ambulance, the EV will likely be repurposed and continue to be used within our wider fleet, for example as an Events Health Services vehicle.

Please refer to Appendix 1 for further information, methodology and data used.

thinkstep-anz have reviewed the calculations underpinning our comparative assessment of the estimated global warming potential (GWP) impacts of the EV ambulance and a standard diesel ICE ambulance.

thinkstep-anz confirm that the calculations support our findings:

*"The assessments show that the vehicle operating emissions for EV ambulance are much lower than the Diesel ICE ambulance over the trial period (travel distance of 13,671km). Despite the EV ambulance having higher emissions associated with vehicle materials, part production and batteries compared to Diesel ICE ambulance, the calculations for the full life cycle emissions indicate that: **EV's lower operation emissions will outweigh its higher material, part production and battery emissions once the travel distance is about 35,000 km and beyond...***

The comparative study does not claim compliance with the ISO LCA Standards (ISO 14040 and ISO 14044), and this review does not constitute a formal compliance assessment against them. Within the limitations of our review, the assessment and supporting statements appear to follow the aforementioned ISO LCA standards."

EV Ambulance

600kg

CO₂-e operation
emissions
over 13,671kms



ICE Ambulance

5,000kg

CO₂-e operation
emissions
over 13,671kms



Where to from *here*

Our trial confirms that a metropolitan EV ambulance is feasible. It means the concept is technically and operationally viable and demonstrates that EV ambulances can be integrated into urban fleets today, provided charging is managed at the depot level and routes remain within predictable ranges. Cost and complexity barriers are lower than initially assumed, because rapid chargers and major electrical rewiring are not prerequisites for starting the transition. Solar-assisted systems add resilience, reducing reliance on the main drive battery for warning devices, communication and medical equipment and improving sustainability.

However, the feasibility is conditional. Scaling beyond one vehicle will require national charging infrastructure expansion, depot upgrades including hospital bay charging infrastructure. The continued roll-out of such vehicles also depends on a supportive NZ political and business environment. The government's "Charging Our Future" strategy sets clear targets for public and depot chargers and introduces co-investment and concessionary loan models to accelerate infrastructure deployment. Additionally, collaboration between public and private sectors will be essential to build out depot-level charging and ensure demand matches fleet electrification goals. Future EV vans with extended range and lighter components could broaden deployment beyond metropolitan areas.

To drive further progress, we propose the following:

- › Conduct cold-weather testing with the current vehicle in the South Island and collect ongoing maintenance costs data.
- › Build and trial an EV Patient Transfer Service ambulance for metropolitan operations. Patient Transfer Services, which conduct scheduled non-emergency patient movements between healthcare facilities, rely on reliability, sufficient range, and onboard medical power – and are well suited for early EV adoption given their predictable routing and charging intervals.
- › Pilot the extended-range Ford E-Transit – featuring an 89 kWh battery with up to ~402 km WLTP range – currently available overseas but not yet in New Zealand. This will need a lighter weight design incorporating better heating and cooling systems well as cab-to-patient compartment communication.
- › Our Health Shuttles were early adopters of electric vans, supported by an EECA grant and trialled with Renault Kangoos. While the vehicles ultimately proved unsuitable due to limited range and cold-weather performance, the results of this EV ambulance trial encourage us to see this as an area worth reviewing.

As we continue to evolve our electric fleet with the introduction of EV SUVs to our medical alarm team, rapid response vehicles and charging infrastructure, we know this journey is not one we take alone. We're actively seeking partners who share our commitment to sustainable transport and operational excellence – so we can keep moving forward, together, for our communities.





**Hato Hone
St John**

Appendix *one*

Data and methodology used to compare estimated emissions of HHStJ's EV ambulance with a diesel ICE equivalent:

In July 2025, Ford provided life cycle assessments LCAs for both the 2024 Ford E-Transit (EV) and Ford Transit (Diesel ICE), as certified by TÜV NORD in accordance with DIN EN ISO 14040:2021 / DIN EN ISO 14044:2021 standards. The LCAs for both models included greenhouse gas emissions (kg CO₂-e') for each of the following:

- › Material and part production
- › Battery
- › Transport / Logistics
- › Assembly
- › Vehicle operation
- › Maintenance
- › End-of-life.

Vehicle operation emissions

The Ford E-Transit (EV) vehicle operation emissions numbers provided by Ford are based on vehicle operation within Europe, with associated electricity production and transmission and distribution (T&D) loss emissions factors for this location. We replaced these numbers with the operating emissions calculated from our 12-month trial in New Zealand (based on the actual total number of kWhs used to power the vehicle throughout the trial and respective emissions factors).

Similarly, we replaced the Ford Transit (Diesel ICE) vehicle operation emissions numbers provided by Ford with those reflecting the actual average fuel consumption of our most common standard diesel ICE emergency ambulance model (the Mercedes Sprinter), multiplied by the kms travelled throughout the trial, to give us the total number of litres that would be required to power this vehicle for the trial distance.

Non-operation emissions

The transport and logistics emissions numbers provided by Ford were based on transport from Turkey (where these vehicles are produced) to customers within Europe. We replaced these numbers with estimated emissions associated with transport from Europe to New Zealand for both our Ford E-Transit (EV) and Mercedes Sprinter (Diesel ICE), produced in Turkey and Germany respectively.

For the remaining non-operations emissions numbers (those associated with material and part production, battery, assembly, maintenance and end-of-life), we opted to use the numbers provided by Ford (which compare the Ford E-Transit (EV) against a Ford Transit (Diesel ICE), rather than against our most common diesel ICE model, the Mercedes Sprinter. While this does not reflect our situation exactly, it was the best available data to us at the time of writing. Rationale:

- › Mercedes have not shared emissions information with HHStJ.
- › The Ford Transit (Diesel ICE) and the Mercedes Sprinter (Diesel ICE) have comparable rates of fuel consumption.
- › Ford have advised that in general, vehicle LCAs are not currently comparable between auto manufacturers, even if they are compliant with the same standards and certified by a third party. As such, we have assumed that comparing the Ford E-Transit LCA numbers with the Ford Transit LCA numbers (supplied by the same manufacturer at the same time and certified by the same third party) for these non-operation emissions may be more accurate than comparing the Ford E-Transit LCA numbers with Mercedes Sprinter LCA numbers (if these were available), as these numbers would be supplied by different manufacturers at different times and potentially certified by different third parties.

Please refer to table 1 and 2 below for further detail and emissions calculations.

Table 1. Factors used for calculations

Ford E-Transit (EV)		
Description	Value	Unit
Kerb weight	2,944	kg
Average shipping distance from Europe to NZ	20,000	km
NZ MftE emissions factor for average container ship (internal sea freight) (2025 workbook)	0.016	kg CO ₂ -e' per tkm
Electricity generation (proxy based on 29.5% of purchased electricity)	0.026	kg CO ₂ -e' per kWh
NZ MftE emissions factor for NZ grid 2024 annual average purchased electricity (2025 workbook)	0.101	kg CO ₂ -e per kWh
NZ MftE emissions factor for NZ grid 2024 annual average T & D losses (2025 workbook)	0.008	kg CO ₂ -e per kWh
Vehicle electricity consumption: kWhs per 1 km	0.329	kWh

Ford Transit (Diesel ICE)		
Description	Value	Unit
Kerb weight	2,599	kg
Average shipping distance from Europe to NZ	20,000	km
NZ MftE emissions factor for average container ship (internal sea freight) (2025 workbook)	0.016	kg CO ₂ -e per tkm
Diesel generation (proxy based on UK DESNZ 2025 workbook)	0.61101	kg CO ₂ -e per litre
NZ MftE emissions factor for NZ diesel transport fuel (2025 workbook)	2.681	kg CO ₂ -e per litre
Average HHStJ ICE emergency ambulance diesel consumption: Litres per 1km	0.111	Litre



Table 2. EV vs. ICE comparison scenarios

12 month trial: 13,671 km

Ford E-Transit (EV)	
Travel distance (km)	13,671
Category	Emissions (kg CO ₂ -e)
Material and part production	15,188
Battery	9,210
Transport / Logistics	942
Assembly	483
Maintenance	877
End-of-life	67
Vehicle operation	609
Total	27,376
kg CO ₂ -e / km	2.0025

Ford Transit (Diesel ICE)	
Travel distance (km)	13,671
Category	Emissions (kg CO ₂ -e)
Material and part production	13,376
Battery	0
Transport / Logistics	832
Assembly	483
Maintenance	989
End-of-life	60
Vehicle operation	5,001
Total	20,740
kg CO ₂ -e / km	1.5171

Estimate emissions break-even point: ~35,000 km

Ford E-Transit (EV)	
Travel distance (km)	35,000
Category	Emissions (kg CO ₂ -e)
Material and part production	15,188
Battery	9,210
Transport / Logistics	942
Assembly	483
Maintenance	877
End-of-life	67
Vehicle operation	1,559
Total	28,326
kg CO ₂ -e / km	0.8093

Ford Transit (Diesel ICE)	
Travel distance (km)	35,000
Category	Emissions (kg CO ₂ -e)
Material and part production	13,376
Battery	0
Transport / Logistics	832
Assembly	483
Maintenance	989
End-of-life	60
Vehicle operation	12,802
Total	28,542
kg CO ₂ -e / km	0.8155

Estimate lifetime distance travelled: ~240,000 km (Ford life cycle analysis)

Ford E-Transit (EV)	
Travel distance (km)	240,000
Category	Emissions (kg CO ₂ -e)
Material and part production	15,188
Battery	9,210
Transport / Logistics	942
Assembly	483
Maintenance	877
End-of-life	67
Vehicle operation	10,687
Total	37,454
kg CO ₂ -e / km	0.1561

Ford Transit (Diesel ICE)	
Travel distance (km)	240,000
Category	Emissions (kg CO ₂ -e)
Material and part production	13,376
Battery	0
Transport / Logistics	832
Assembly	483
Maintenance	989
End-of-life	60
Vehicle operation	87,787
Total	103,527
kg CO ₂ -e / km	0.4314

HHStJ standard diesel ICE lifetime distance travelled: 400,000km

Assuming 2x EV ambulances required to complete 400,000km

Ford E-Transit (EV)	
Travel distance (km)	400,000
Category	Emissions (kg CO ₂ -e)
Material and part production	30,376
Battery	18,420
Transport / Logistics	1,884
Assembly	966
Maintenance	1,754
End-of-life	134
Vehicle operation	17,812
Total	71,346
kg CO ₂ -e / km	0.1784

Ford Transit (Diesel ICE)	
Travel distance (km)	400,000
Category	Emissions (kg CO ₂ -e)
Material and part production	13,376
Battery	0
Transport / Logistics	832
Assembly	483
Maintenance	989
End-of-life	60
Vehicle operation	146,312
Total	162,051
kg CO ₂ -e / km	0.4051

Model specifications of the Ford E-Transit (EV) and Ford Transit (Diesel ICE)

Ford E-Transit (EV)

Vehicle Line	Transit BEV (E-Transit)
Variant	E-Transit Van 1.7EF-350E-2T L4 (N1 (N2))
Ford Internal Vehicle Code	V363
Roof	High Roof Line
Variant	Trend, Extended Range
Drive	Rear Wheel Drive (RWD)
Engine	Electric Motor
Transmission / Drive	1 Speed Auto Trans / 2 Wheel Rear Drive
Wheels	6.5 × 16" Wheel Style L
Tires	P 235/65 R16C BSW
Max. Power (kW)	198
CO ₂ Emissions (WLTP) (g/km)	0
Electrical Energy Consumption (WLTP) (kWh/100km)	32
Kerb Weight (kg)	2,944
Installed Battery Capacity (kWh)	114.8
Battery Chemistry	NMC 8:1:1
Battery Weight (kg)	522
Location Vehicle Assembly	Kocaeli, Turkey
Location Battery Assembly	Kocaeli, Turkey
Location Battery Cell Production	Göd, Hungary

Ford Transit (Diesel ICE)

Vehicle Line	Transit
Variant	Transit Van (Kombi M1) 1.7-350L-2T, 2.0l Diesel
Ford Internal Vehicle Code	V363
Roof	Medium Roof Line
Variant	Trend
Seats	6 Rear Seats
Drive	Front Wheel Drive (FWD)
Engine	2.0l EcoBlue (165 PS)
Transmission / Drive	8-Speed Automatic Transmission
Wheels	6.5 × 16" Wheel Style L
Tires	P 235/65 R16C BSW
Max. Power (kW)	121
CO ₂ Emissions (WLTP) (g/km)	249.92
Diesel Fuel Consumption (l/100km)	9.4
Kerb Weight (kg)	2,599
Location Vehicle Assembly	Kocaeli, Turkey

Acknowledgements

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