



IS NEW ZEALAND READY FOR A CROSS-COUNTRY TRIP WITH AN ELECTRIC VEHICLE?

STATUS QUO ASSESSMENT AFTER A THREE-WEEK
EXPERIENCE.

INTRODUCTION

IS NEW ZEALAND READY FOR A CROSS-COUNTRY TRIP WITH AN ELECTRIC VEHICLE?

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This is the question I want to answer in a three-week trip. After 3400km, here is the short answer for all impatient people: Yes, it is!

Beforehand, however, my partner and I wanted to set some conditions for how our trip should go:

- Not driving long distance in the car everyday – but spend 2-3 days at each place of accommodation with smaller excursion destinations
- No pre-planned route based on charging stations
- No dedicated preliminary research on charging apps in New Zealand
- Choice of an electric vehicle with a real range of at least 300km

We chose these conditions to experience a relaxed trip and to report transparently and as unbiased as possible about our experiences with electric mobility in New Zealand at the same time. My experiences through our route planning app (www.electricroutes.com) and projects in the area of UX are to be taken into account in my description, as I have already had many points of contact in Germany with our vehicle in New Zealand.

THE ROUTE

Our route takes us 3400km from the starting & ending point Auckland via some cities on the North Island to the southern tip of the North Island (Wellington). After a short ferry ride from Wellington to the South Island, we head directly to the Tasman region and the town of Mapua. We then drive over a pass road at Springs Junction towards Christchurch, the largest city on the South Island. It marks the southernmost part of the journey before heading back towards the North Island via Blenheim.

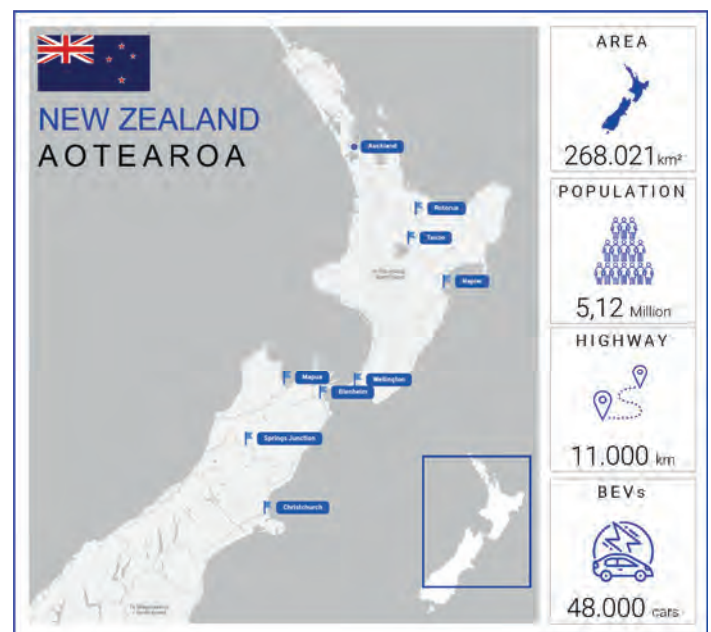
ROAD TRAFFIC, CONDITIONS AND CHARACTERISTICS

The traffic on our route takes us through the towns mentioned and over large parts of the highway infrastructure in New Zealand. These are single lane in each direction with some multi-lane sections so that slower vehicles such as trucks & campers can be overtaken.

The maximum speed is almost universally 100 km/h. This cruising speed may seem slow to some motorway fans but is easy on energy consumption in an electric vehicle.

Other obvious features, apart from the left-hand traffic, are probably the large number of pickup trucks on the roads in New Zealand. Models ranging from Ford F-150s to Dodge Ram and Toyota Hilux can be found everywhere in the country.

The reason for this is the tractive power needed to pull boats, at least that's what the New Zealanders we have spoken to told us. (On our way, we actually saw some boats behind pickups and could therefore confirm the impression from our perspective).



VEHICLE

When it comes to electric cars, we notice the relatively large number of Nissan Leafs. In personal conversations, Leaf drivers explained to us that importing from Japan is rather easy and inexpensive.

The cars are mostly used for short trips close to home, as the range of the older models is only 100 to 160 km. However, we have also met some of the Leaf drivers on their long-distance trips of over 500km.

THE VEHICLE FOR THE TRIP - THE POLESTAR 2



We chose the Polestar 2, which we rented through the car rental agency Sixt. The handover at Sixt is brief and (unfortunately) completely EV-unspecific. I didn't identify myself as an "EV expert", because I wanted to see if I could get an explanation of the car. Unfortunately, this is not the case. There is no information about charging either, except that she tells me again that they only have the "Emergency Cable" in the car.

When we return the car, we are not supposed to worry about the state of charge of the vehicle, because Sixt in New Zealand will charge it for the next customer free of charge.

We later learn why only the "Emergency Cable" is available in the car. In New Zealand, Polestar does not supply any Mode 3 cables (for AC charging at wallboxes / charging stations) in the Polestar 2 (as of January 2022). Since we want to complete our test without bias, we must live with this restriction. At least there is a Mode 2 cable under the boot cover, so we can charge safely at the New Zealand "regular" sockets. You can read about how this works on site in the following sections.

For complete newcomers to electric mobility, the entire lack of information at the rental station would probably be a bit confusing. For us, this is not a bad thing: we already know the car extensively from tests (<https://www.p3-group.com/polestar-2-auf-dem-pruefstand-der-ux-experten/>) in Germany and therefore do not face any usage challenges for our planned route. The integrated Google Android Automotive system takes us safely to our desired destinations and the great advantage of the unlimited internal data volume provides us with plenty of Spotify music during the drive.

However, the already known minor software weaknesses of the vehicle also become noticeable within the 3 weeks. Specifically:

- Once our internet connection in the vehicle failed completely
- Twice the driver's display failed completely

These errors can be remedied with a "hard reset" of the infotainment system. This is a quick fix, but only if you know about it. Inexperienced users might have problems with this, as support hotlines are often overwhelmed with this kind of question.

NEW ZEALAND'S CHARGING INFRASTRUCTURE

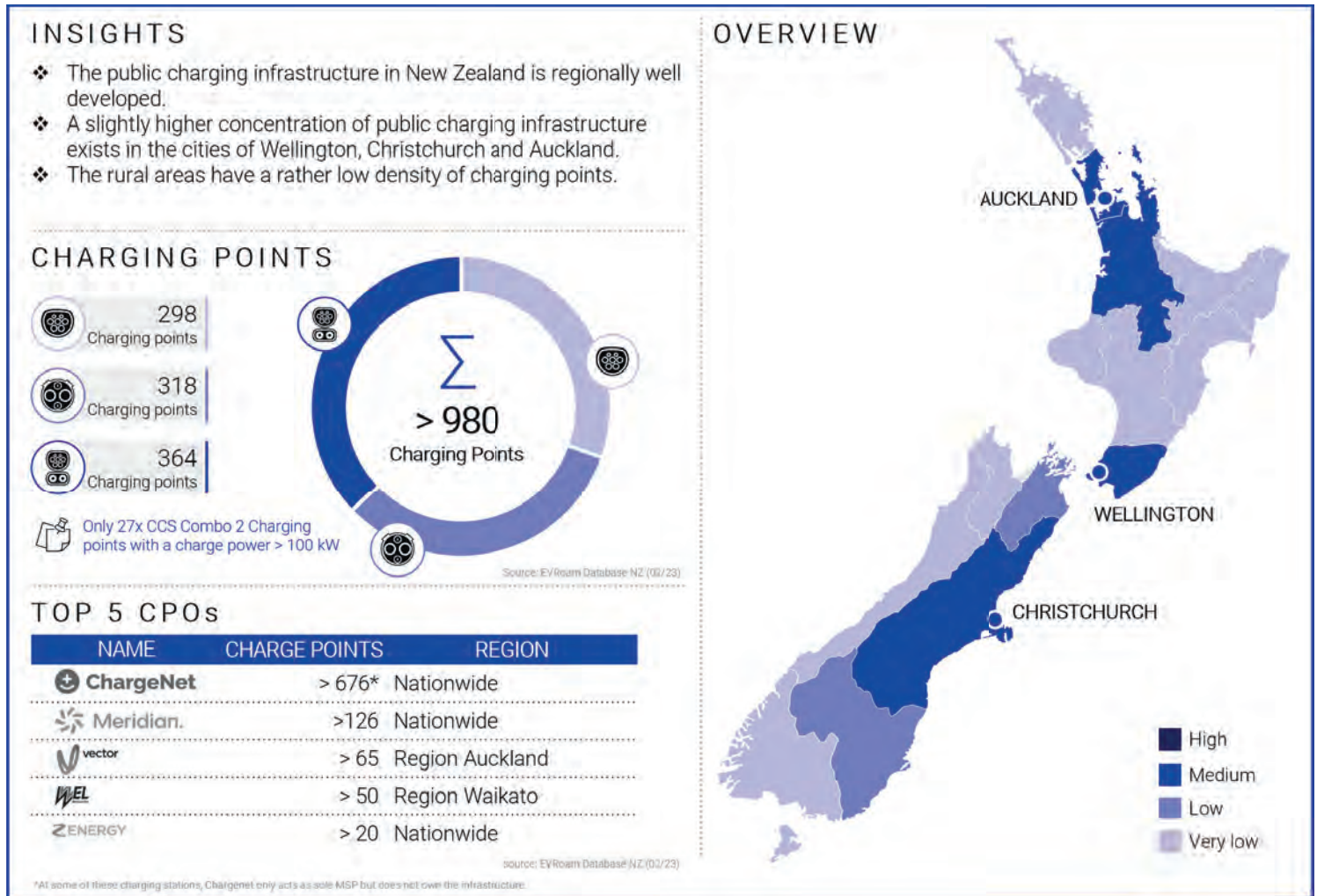
New Zealand's government started relatively late in 2017 with an overarching goal for nationwide charging infrastructure. In 2017, ChargeNet, currently the largest provider, had already been active in the market for 2 years. The stated goal is to cover the highway infrastructure every 75km or less with DC/HPC charging points.



INFRASTRUCTURE

This is a very generic goal, as no specific targets are given for the number and/or speed of these charging points. Find out now what the number and speed of charging points look like at the moment.

In order to get a better understanding of our charging experiences, there are some basic figures on the charging infrastructure in New Zealand for the statistics fans among you readers. A first point worth mentioning is that New Zealand's energy mix is over 80% renewable. 57% of the total demand is generated from hydropower, supplemented by geothermal and wind energy.



New Zealand currently has more than 364 public DC charging points with plug type CCS Combo 2 (source EV Roam Database NZ; see chart). Public AC charging points are present in slightly smaller numbers at around 300. The AC/CCS Combo ratio is therefore around 0.8:1, which shows a significantly lower spread of AC charging points compared to Germany (AC/CCS Combo 5.5:1).

Of the 364 public CCS Combo 2 charging points, only 27 are currently equipped with a capacity of over 100kW. This means that long-distance trips in New Zealand are currently increasingly encountering 50kW or 75kW capable DC charging points, which extends the possible charging time for new BEVs.

To put the DC charging points (CCS combo) into perspective in terms of area: Assuming these were evenly distributed over the approximately 268,000 km² in New Zealand, this would be about 0.14 charging points per 100km² (Germany would be about 3.2). This low coverage is also reflected in the coverage graph, which shows the real distribution of charging points. The charging infrastructure is noticeably concentrated around the metropolitan regions of Auckland, Christchurch and Wellington, which in turn are also home to around 40% of New Zealand's total population.

APPS USED

The even distribution of charging points per area is therefore not very meaningful in such a sparsely populated country. However, if we assume a similar usage pattern as in Germany, the value of fast charging points (CCS) in terms of registered BEVs could allow a comparison with the current EV situation in Germany. In Germany there are currently about 840,000 BEVs on the road, in New Zealand there are about 48,000. If we calculate the value [charging points (CCS)/ BEV] we get a score of 1.37 in Germany compared to New Zealand with 0.75. This difference of almost 55% can mean in reality: Significantly more vehicles have to share a CCS charging point in New Zealand.

For all Tesla fans & interested parties: Tesla also operates its own infrastructure (Supercharger & Destination Charger) in New Zealand. The 12 Supercharger locations are in the metropolitan regions and offer a total of 53 CCS combo charging points. The Superchargers on our route were visibly busy. However, Tesla does not (yet) release the infrastructure for other EVs, so they are not included in the graphs and further explanations.



APPS USED

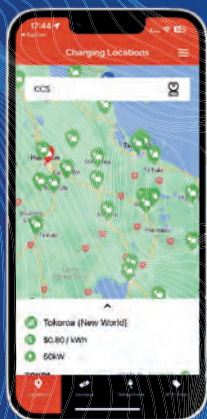
THE APPS - CHARGENET, Z ENERGY & BP

CHARGENET

The Google search in advance quickly provides a clear result: ChargeNet is the leading charging network operator (Charge Point Operator; CPO) and Mobility Service Provider (MSP) in New Zealand and is also the only provider available on the North & South Island with sufficient DC charging points for our route. Of the 364 CCS combo charging points mentioned, ChargeNet accounts for just under 300, which illustrates its market share.

ChargeNet offers a charging station finder on the website as well as in the app, which shows the charging stations including live status and price structure. Unfortunately, downloading the ChargeNet app currently requires a change of app store region on the smartphone, which is a known hurdle for many tourists. Once you have overcome this, you can register quickly and easily in the app. Then deposit your credit card and nothing more stands in the way of charging. For users who prefer an RFID chip, this can also be ordered for 12 NZD.

APPS USED



Basically, the app is very rudimentary and, in my opinion, needs some visual updates. However, we don't want to go much deeper into the app's usability shortcomings at this point, but rather go into the core features: How does charging with the app work? During a total of 21 charging sessions with the app, I had no noticeable problems and/or latencies. The time to successfully authorise charging was well under 2 seconds, which I would like to see some MSPs achieve in Germany. Since ChargeNet acts as both MSP and CPO, the app also offers the possibility to monitor the charging session including live SoC and therefore offers users a good level of trust.

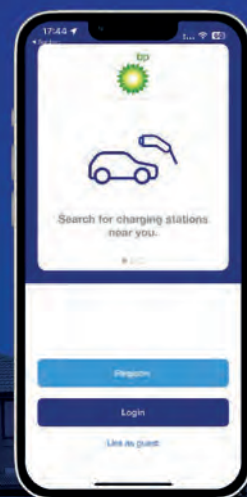
A desired functionality from the user's point of view would be the setting of the maximum SoC in the app, which ChargeNet could implement as CPO & MSP.

This way, you can safely follow the "charging etiquette" and only charge up to 80% if you want to be considerate of people waiting at the charging station. The 50 kW chargers often available in New Zealand from the Tritium brand offer this function via a button on the charging station.

From the user's point of view, however, the non-standardised pricing concept currently offered by ChargeNet is rather undesirable. While the HPC (High-Power-Charging) charging stations currently offer uniform prices of \$0.85 / kWh (the equivalent of 0.50 euros), other 50kW stations offer prices ranging from \$0.80 to \$0.25. In some cases, an additional per-minute charge is levied. Occasionally, a price per minute is also charged at some pillars, which deprives users who like to make an advance calculation of any options. In an interview with experts in New Zealand, however, it was confirmed to me that likely a uniform pricing of around \$0.80 for HPC & DC charging will prevail in the medium term.

Two other apps I downloaded from the New Zealand AppStore are "bp EV charging" from BP and "Z EV Charging" from Z Energy Limited.

bp EV charging is a very limited app that can be described as a QR code scanner. However, it does this well, so I had no problems at all during the two charging stops at BP. Why does the app only work as a QR scanner? BP currently only has charging stations in Christchurch and Auckland, where charging at the 75 kW Tritium chargers is free. Theoretically, they could do without authentication via app, but they would like to introduce users to the app and possibly introduce a payment system later.



At first glance, "Z EV Charging" from Z Energy makes a very tidy and appealing impression. However, I'm a bit sceptical about the payment mechanism: you top up your account with credit from your credit card, which then serves as charging credit. Z Energy currently has only 9 DC charging stations in operation in the whole of New Zealand and does not show in the app what kW output is possible at the stations. This uncertainty, as well as the type of "pre-payment", is then inevitably too cumbersome, which is why I have not used Z EV Charging at all.

CHARGING EXPERIENCE DURING THE ROUTE

One of the biggest differences between New Zealand and Europe is the lack of rest areas and car parks along the highway, where you usually find HPC / DC chargers in Europe. Since the mostly single-lane New Zealand highways could rather be seen as a federal road in German context, locating the charging points in the towns is one of the few plausible solutions. I could only recognise the location of charging points near sightseeing spots very sporadically, which I find a pity. From the user's point of view, the time spent at the POI (point of interest) could be very usefully combined with charging, regardless of whether AC/DC/HPC is used. Presumably, however, the development of the locations is simply uneconomical or not possible at present due to the mostly rural location. Another complicating factor is that the sightseeing spots are increasingly visited by tourists, for whom the EV rate is even lower than average.

As can be seen in the figures, in New Zealand you mainly come across DC chargers under 100 kW, which is why we had to plan somewhat longer charging stops on longer stretches with the Polestar. When using the ChargeNet app, you will notice that most of the charging stations are located on the premises of supermarkets or DIY chains such as New World, Pak'n'Save or The Warehouse. This makes for a good combination of shopping & charging experience, and a customer toilet is usually available as well. However, the transparency about all the amenities near the charging station is missing in the app, so we have to switch between Google Maps and ChargeNet app to plan the next stop in a bit more detail. More detailed in-app information would be desirable here.



The Polestar 2 also has live POI data of the ChargeNet stations integrated in Google Maps, but the update frequency is disappointing in contrast to the ChargeNet app. Charging processes that we have started are sometimes only updated in the Polestar more than 5 minutes later.

This makes checking the ChargeNet app unavoidable at busy charging stations, and Google Maps then functions more as mere navigation. This is where an integration of Apple CarPlay or Android Auto functionalities can achieve great added value from the user's point of view.

Many users are already accustomed to Apple CarPlay or Android Auto from their own vehicles, so that new apps can be found quickly by users.

The operating logics are also very standardised, which reduces distraction for the driver. Overall, Apple CarPlay / Android Auto-enabled apps are perceived positively by users.

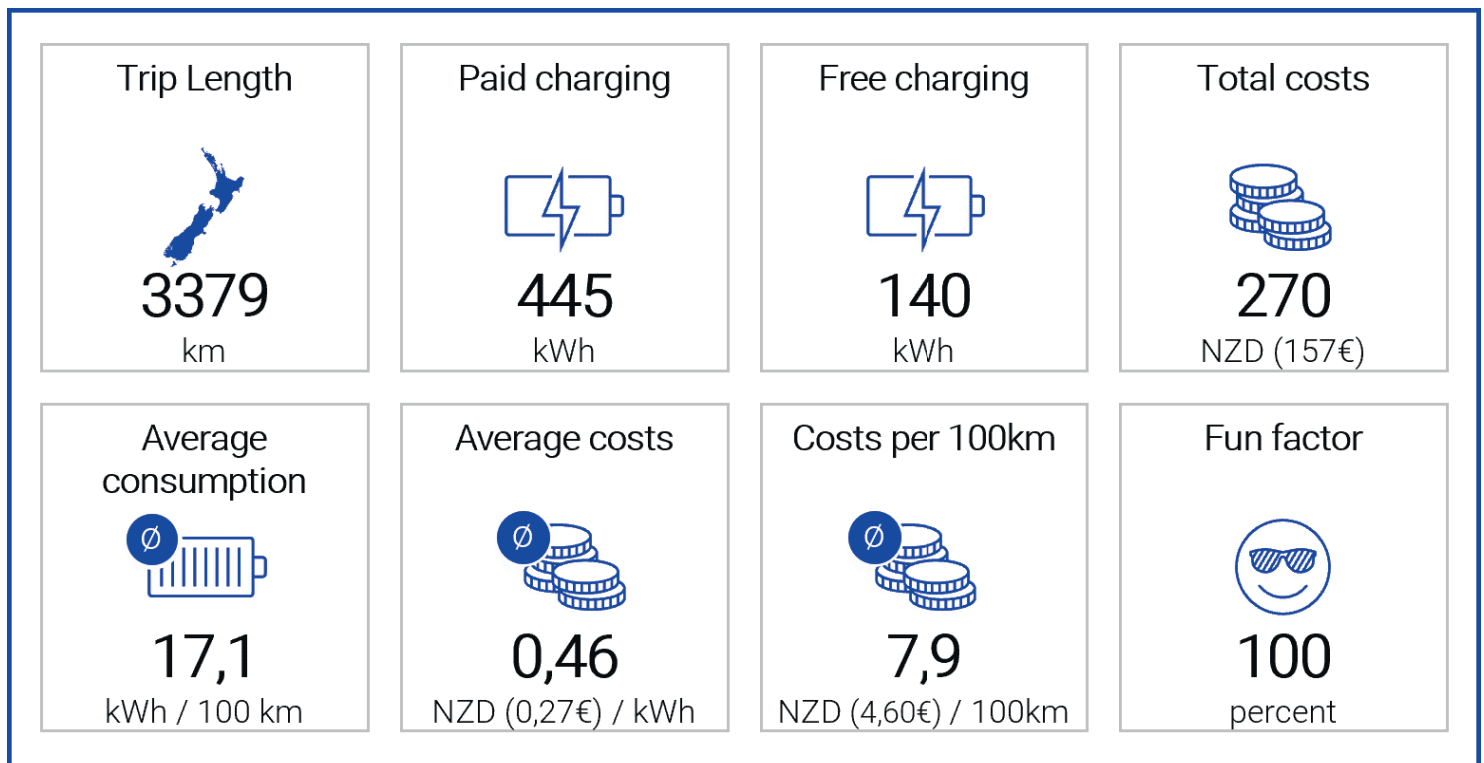
In the case of Android Automotive infotainment systems, as in the Polestar 2, publication in the vehicle's own Google Automotive Appstore would also be a customer-friendly option.

Our non-existent Mode 3 cable is not missing during the trip, but in view of the quota of AC charging points, this no longer surprises me. So, we only charge via DC on public infrastructure during the entire trip. In addition, the Mode 2 cable is very practical for charging at Airbnb accommodations, as all landlords allow us to charge. Although the charging power is limited (in NZ mostly 2 kW), the long charging time overnight usually rewards us with more than 30% SoC increase.

CHARGING EXPERIENCE ON THE ROUTE

CHARGING ETIQUETTE IN NEW ZEALAND

At our charging stops, we occasionally meet other EV drivers, all with typical New Zealand friendliness. The unofficial "charging etiquette" is to charge up to 80% to avoid long waiting times at the charging stations. During our trip, everyone adhered to this unofficial rule. We only have a short wait at 2 of 21 charging stops, both times by Nissan Leafs. The Chademo plug used by the Leafs blocks the CCS plug at the same time (for the 50 kW Tritium Chargers that are mostly used). We spend this short waiting time having nice conversations about electromobility in New Zealand - similar to Germany. In total, we wait about 25 minutes on the whole trip, which we consider a great value.



CONCLUSION



All in all, it was a very relaxed EV-trip that was not marred by any bad charging experiences. The basically positive conditions in New Zealand such as:

- consistently friendly encounters with other EV drivers,
- fascinating natural spectacles along the route,
- A sufficient charging station infrastructure with amenities
- and a relaxed cruising speed

lay a good foundation that you too can have a fantastic EV trip. Exploring "green New Zealand" with 80% green electricity is a point that I personally really like about the trip. However, the coming years will show whether the charging infrastructure in New Zealand can keep up with the increasing EV rate in the country. Travellers with a relaxed daily routine may not be bothered by the 50kW chargers here, but it is also important to adapt to the current capabilities of modern EVs and consistently establish HPC infrastructure at key locations. From the user's point of view, the experienced renting process of the electric cars is just as much expandable.

Cooperation between MSPs (ChargeNet) and car rental companies (Sixt) would be a good way to inspire confidence in users right from the start of the rental process and, for example, to include charging flats in the rental price.

On the MSP side, comprehensive roaming between the providers will be an important topic in New Zealand in the future, especially from the user's point of view. It is simply not user-friendly for the individual charging station operators, some of which operate on a very regional basis, to install their own app on the smartphone.

