

chargetrip

An introduction to EV Routing for CPOs and eMSPs



Introduction

E-mobility is a horseman of the green revolution. The market is jumping: rocket-fueled by a mix of government and industry incentives. By 2025, EVs will form 28% of all global vehicle sales, and 58% by 2040. But with any disruptive sector, several heavy barriers lie in the way of adoption.

Smart EV routing represents a powerful solution to many nagging issues for EV drivers: charge anxiety, range anxiety and complexity through market fragmentation. The task of improving the user experience for drivers falls on CPOs and eMSPs. This is where we help. At Chargetrip, we work with actors across the industry to create an electric future.

In this ebook we'll :

01

Step into the shoes of EV drivers, and try to grasp the complexity of their experience.

02

Explain what EV routing is, and how it helps create a user-friendly network.

03

Spell out the benefits of EV routing for CPOs and eMSPs.

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The ecosystem complexity

Driving and fueling a traditional (ICE) vehicle is straightforward. Driving and charging an EV is not. EV owners must consider many complex factors that affect the range of their car batteries*.

These include plug types and charging speed, charge cards and apps, and external variables.

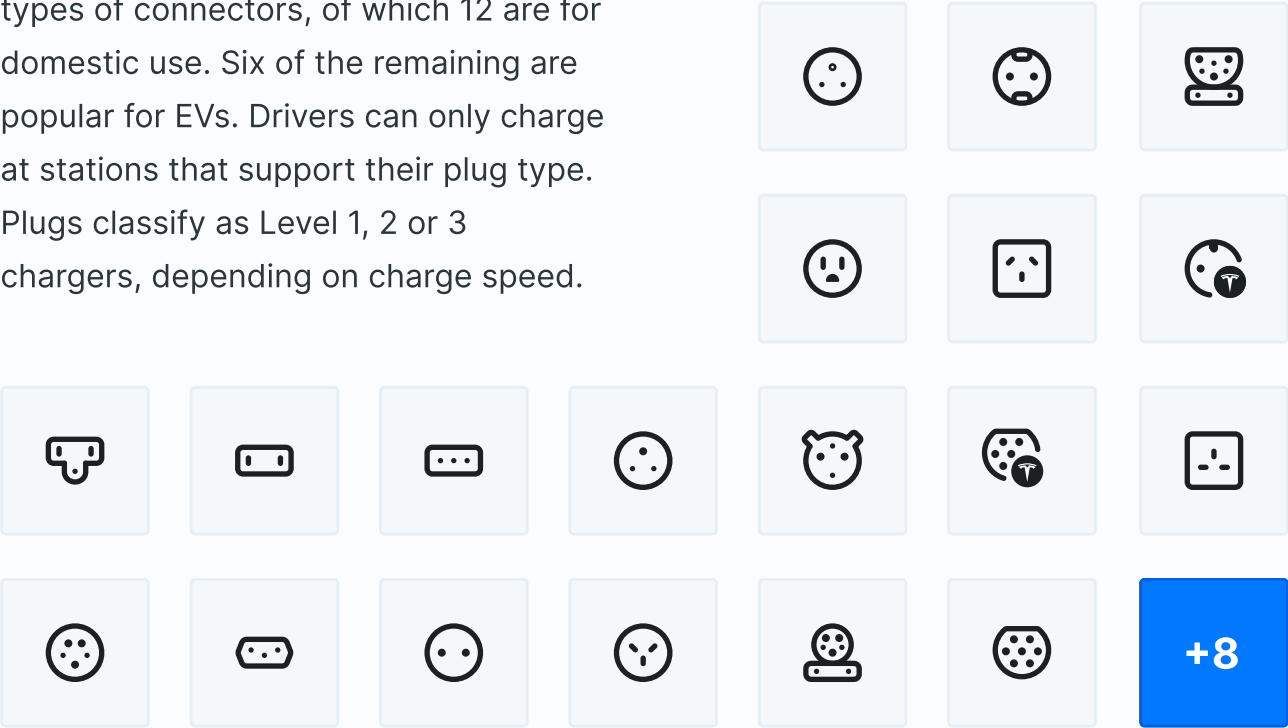


¹Sources: Elaad NL “Nationaal Laadonderzoek”, New Motion “EV Driver Survey Report 2020”, Geotab, “Prediction of Electric Vehicle Range: A Comprehensive Review of Current Issues and Challenges” by Varga, Sagoian and Mariasiu (2019).

Charging your vehicle at a charge station. © Audi.

Plug types and charging speed

OCPI documentation lists 27 different types of connectors, of which 12 are for domestic use. Six of the remaining are popular for EVs. Drivers can only charge at stations that support their plug type. Plugs classify as Level 1, 2 or 3 chargers, depending on charge speed.



A number of chargers illustrated



Charge cards and apps

On average, EV drivers own 2.6 charge cards. A New Motion survey says 35% of drivers in Europe own one charging card, 45% between two and four, and 45% more than five. The number of charge cards relates to how many applications the driver uses. In the Netherlands, drivers use around 1.6 apps on average.

External variables

Weather, terrain and elevation all influence battery range. Lithium-ion batteries, for example, perform best at 21.5 degrees celsius (70F). And range drops faster in extreme cold than extreme heat.

EV Skateboard by Canoo. Illustrating the battery platform being used. © Canoo



What

What

What

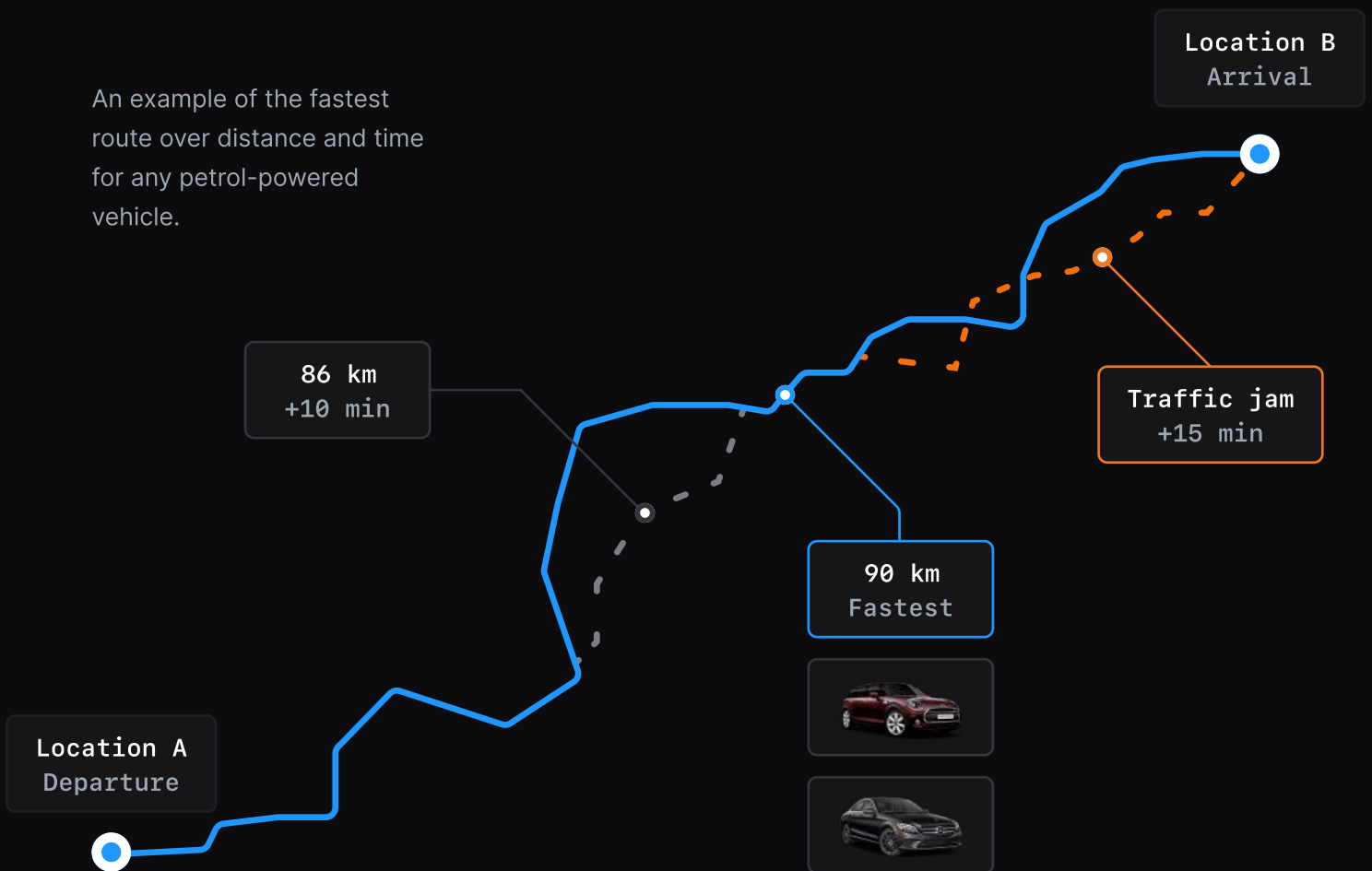
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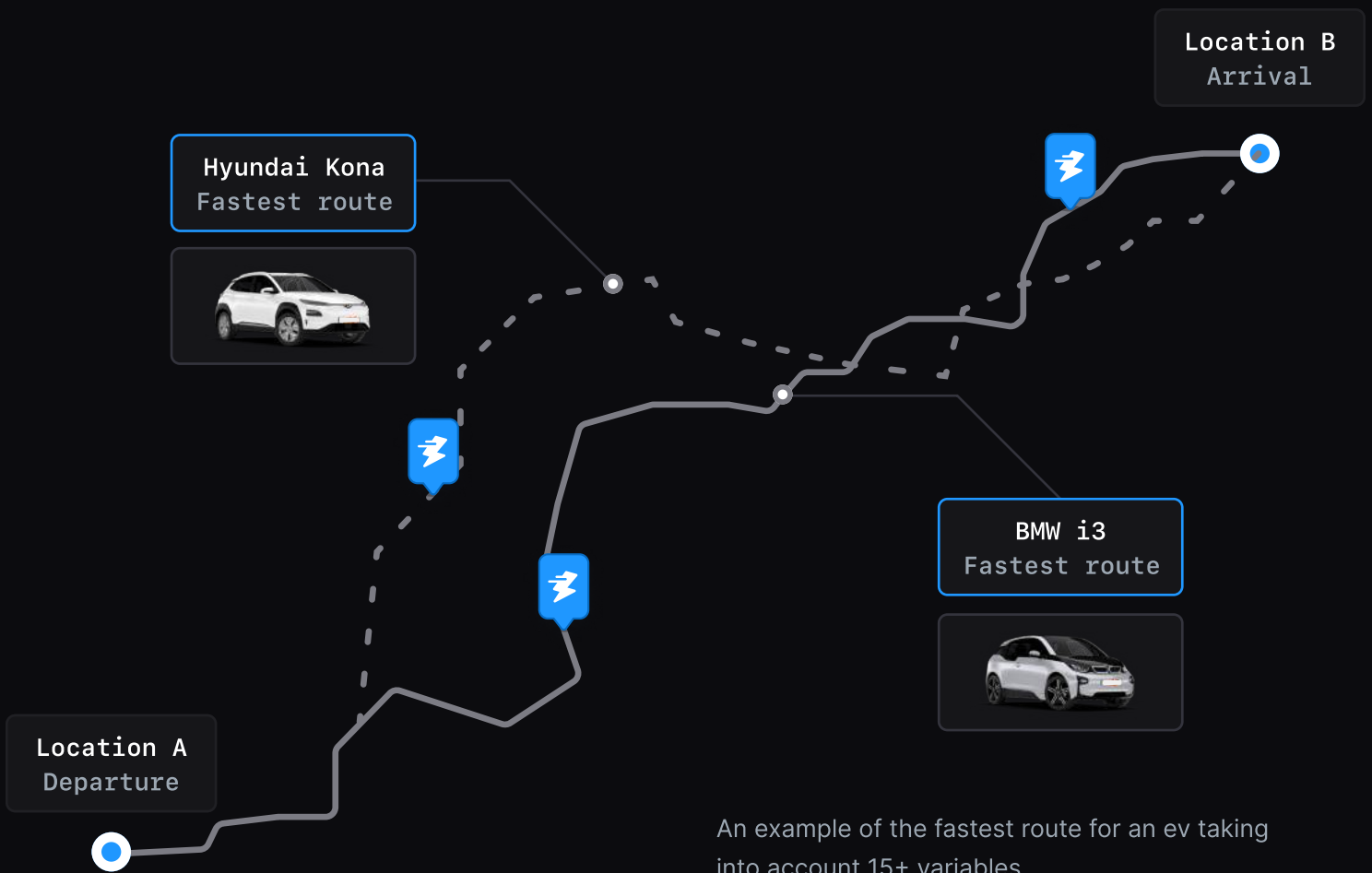
What is EV Routing?

Why traditional routing engines fail EV drivers

New mobility requires new routing. Imagine two friends take a drive in two different ICE vehicles. Before they leave, they use a navigation engine to calculate the best route — one that considers traffic and accidents. We would expect both drivers to receive an identical route, optimized for fastest driving time.

An example of the fastest route over distance and time for any petrol-powered vehicle.



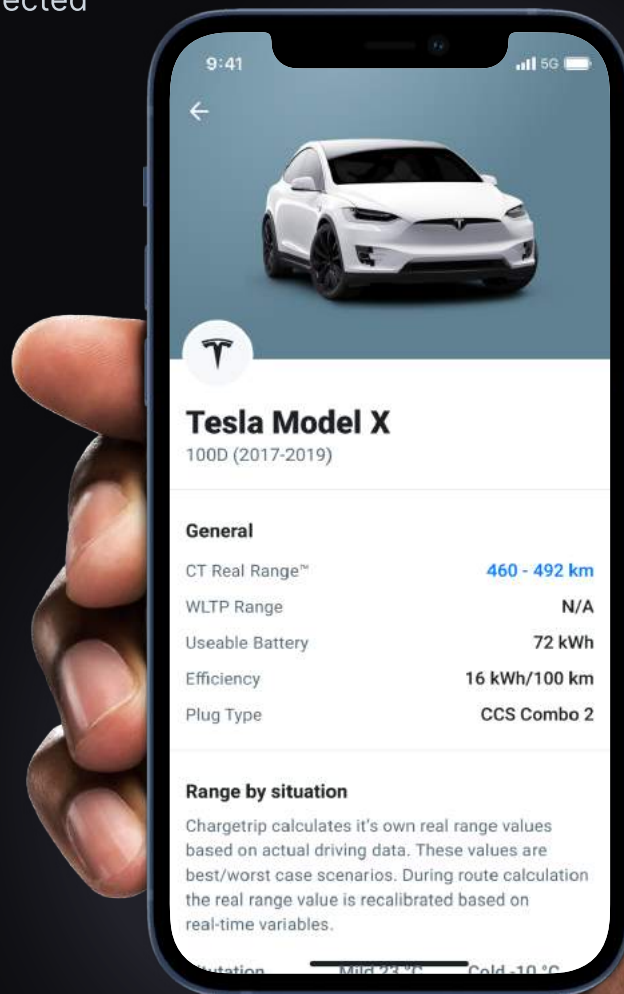


Now, reimagine that same scenario with two electric vehicles. A traditional routing engine will still recommend the same route for both vehicles, without paying heed to differences in battery size, energy consumption, plug type or payment support. It also ignores charge stops — a core part of the end-user experience, and one that significantly affects the journey plan. So unless it's a short journey, drivable on a single charge, this logic effectively makes the suggested route impossible.

How does a navigation app with EV routing work?

When the driver starts a journey, they will input their departure point and destination. Next, they select the car model and battery's current state of charge (SoC). The SoC can be set either manually, by the driver, or automatically if the app is connected to the vehicle.

Advanced EV routing engines absorb many data points to optimize the journey. They calculate a route based on many dynamic variables like weather, elevation, traffic, charge station availability, dynamic energy pricing — and show available charge stations only.



In-app
example of
Chargetrip's
car
variables

benefits

benefits

benefits

benefits

The benefits of EV routing



Improve the user experience for drivers

We've seen why EV drivers can't use traditional routing and navigation systems. But why should CPOs and eMSPs offer a routing service to their customers?

It's in the interest of all industry players to simplify the EV-owning experience.

Our solution offers drivers a one-stop application that covers all necessities; like payments, reservations, tariffs, and routing. EV routing forms a sharp differentiator in a competitive market where only few CPOs offer such functionality. It can strengthen marketing appeal, and increase customer loyalty.

Demo of the chargetrip routing engine presented on an in car infotainment system.



Increase accessibility and revenue

Most CPOs and eMSPs offer online mapping for nearby charge stations. But drivers must know how to get there and, critically, if they have enough range.

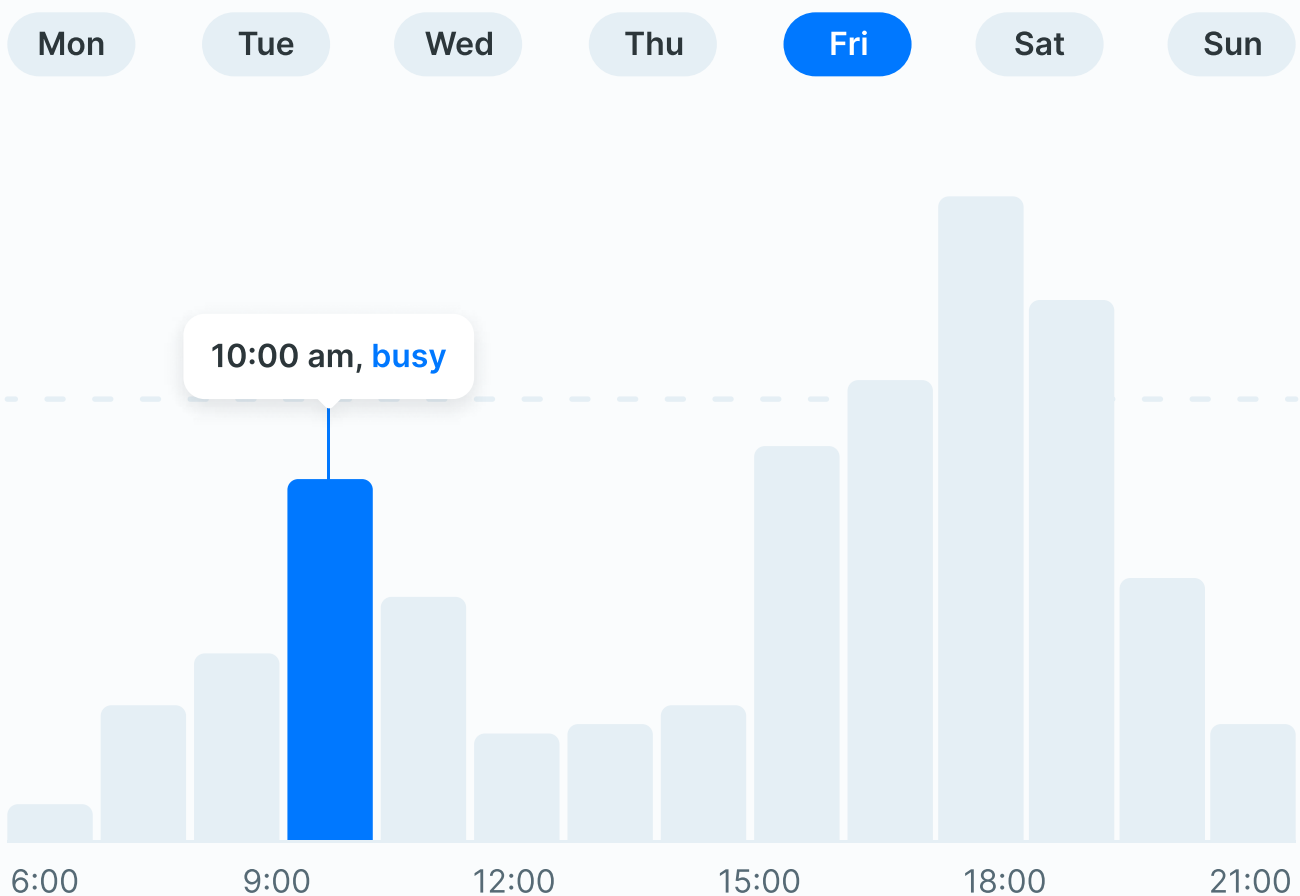
This is especially true of long, international trips or unknown roads. Alongside view and search functions, routing should ascend to a core feature of any CPO charge map.

Always be sure you have charging availability at hand when directing drivers to charging stations. © Audi



Optimize charge network utilization

Two key issues around EV charging are grid management and overload. In peak times, energy demand can stress the grid. Here too, EV routing can provide relief by spreading traffic over a charging network. By using machine learning to mine historic availability data, our algorithms learn when charge stations are busy, and reroute drivers to secondary locations.



Technology

Technology

Technology

Technology

Technology at Chargetrip



How is Chargetrip different from other EV route planners?

At Chargetrip, we've developed precise consumption models of all production EVs over the years, to predict an electric vehicle's real-time range under any condition.

After calculating the predicted consumption of the vehicle, we precompute a big graph of all possible route outcomes. In this graph, charge stations are represented as nodes, and roads as edges between nodes. We then weigh all the possible routes based on many internal and external impact variables. The resulting score determines the optimal route for the driver, with the most appropriate charge stations along the way. This forms the core of our routing engine.

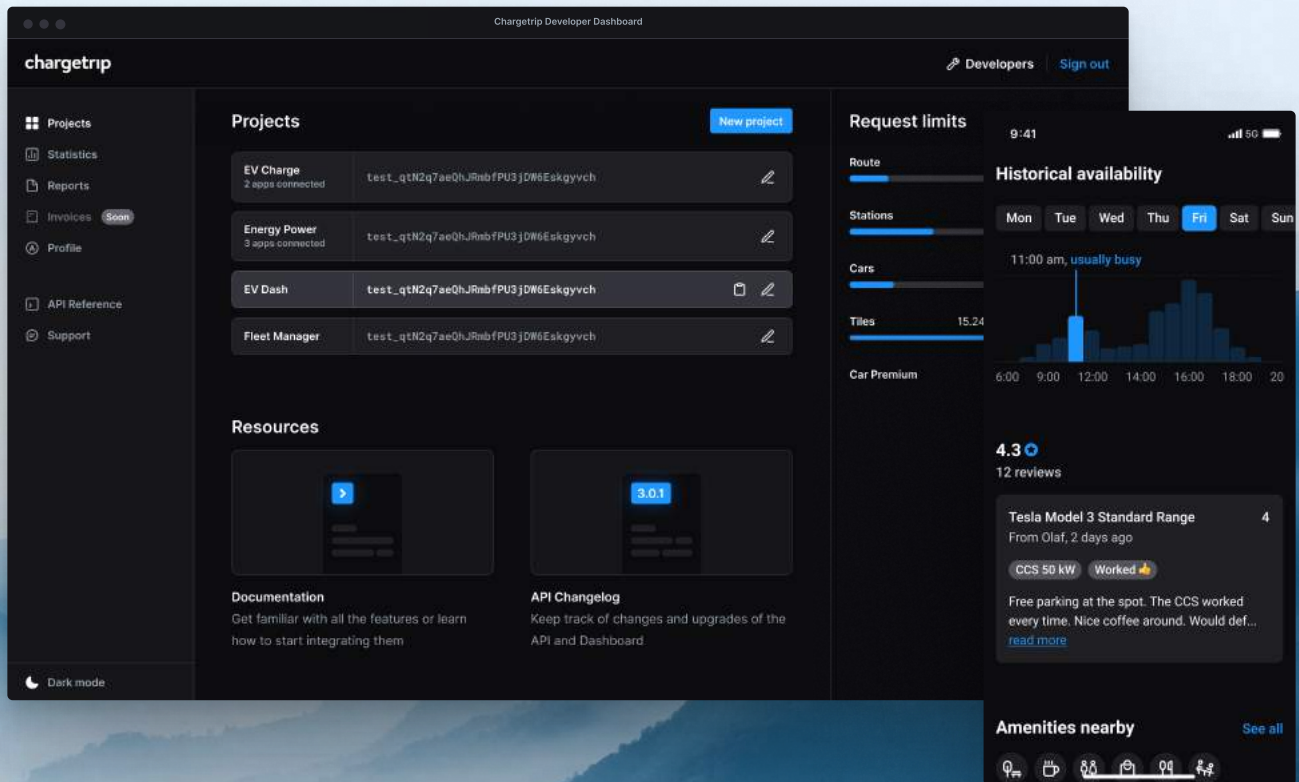


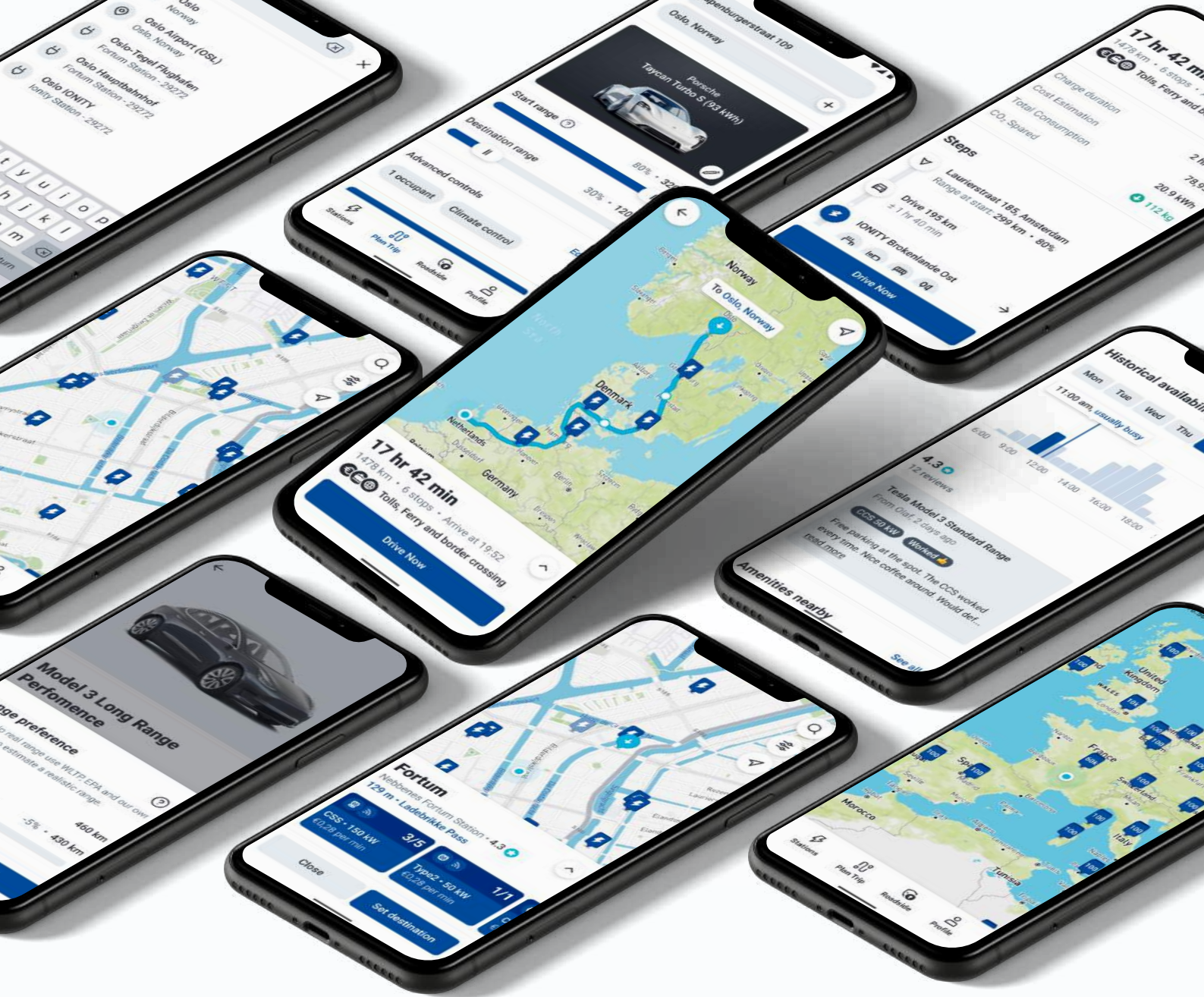
Our API

Our routing engine is exposed via the Chargetrip GraphQL API, a query language that outperforms other architectural systems.

CPOs and eMSPs can integrate Chargetrip's Routing Engine into their software stack to enrich their websites or companion apps. It can render a list of electric cars, plot stations on a charge map, and calculate routes.

Visual representation of the Chargetrip dashboard alongside a mobile application.





Visual representation of a ChargeTrip white-label application.

Our white-label applications

For those CPOs and eMSPs without a front-end, we offer white-label applications for web, iOS and Android, customizable to fit your brand. ChargeTrip always develops new features that are immediately available to our white-label clients — so you don't have to trouble your developers over it.

Why Chargetrip?

01

Set up your network as preferred operator

Chargetrip offers a solid but flexible technology. We can tweak the routing algorithm to favor your charge stations over your competitors, if the difference for the driver is minimal.

02

Smart EV routing with integrated EV and charge station database

Chargetrip comes integrated with a charge station database covering all of Europe: 110,000 charge stations and counting. However, we can ingest a custom database too.

03

Legacy free software architecture

The Chargetrip platform is cloud based and accessed through a developer-friendly GraphQL API. There is no bulky legacy software, integration is effortless and route computations are lightning fast.



Curious to see Chargetrip in action?
Reach out and we'll plan a demo!

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