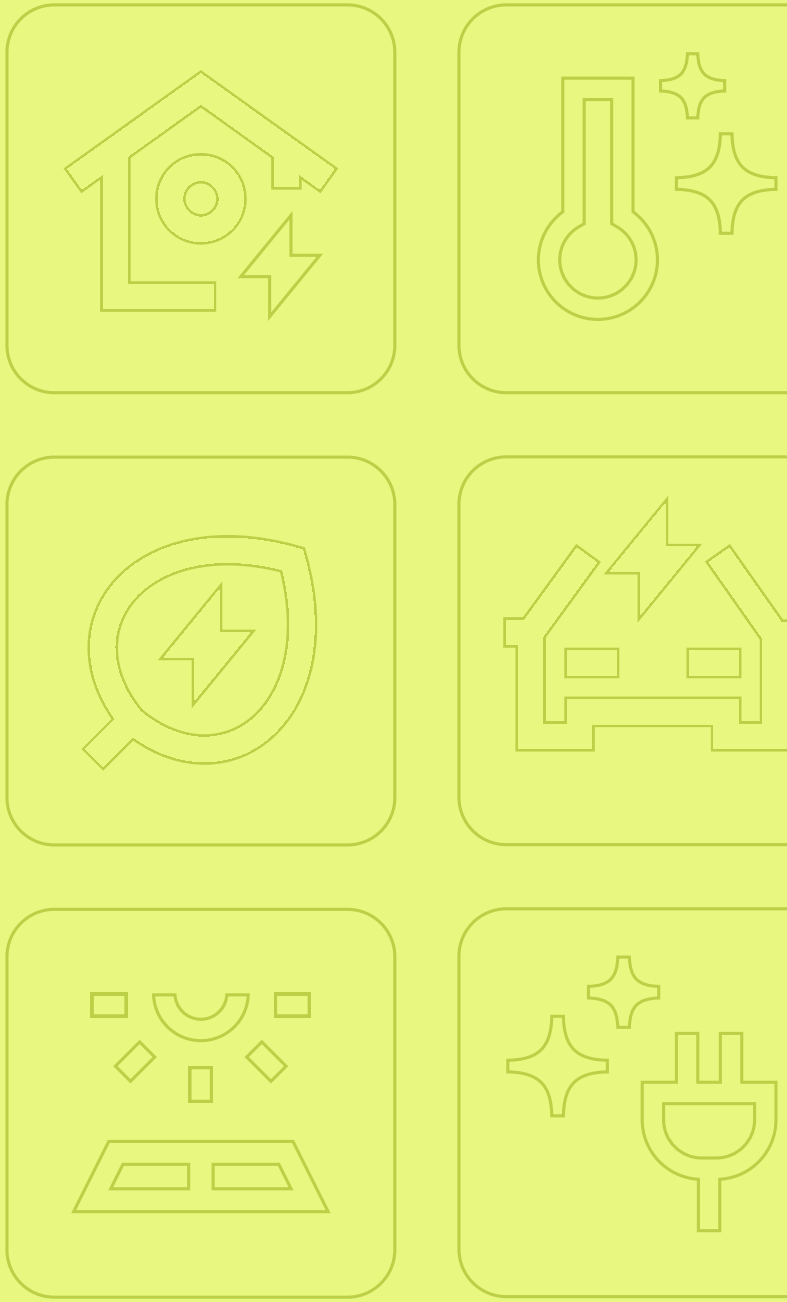
The beginner's guide to EV data



Enode

The EV opportunity

Building a sustainable energy system is one of the biggest challenges we face in our fight against climate change – and one of the most important.

But what if we told you that the solution was sitting on your driveway? Or, to be precise, 26 million driveways around the world?

Electric vehicles (EVs) have a critical role to play in our transition to a greener future. Today, transportation is responsible for a quarter of total global greenhouse gasses, and for almost half of all countries, it's the largest source of energy-related emissions. EVs enable us to reduce transportation's reliance on fossil fuels, and cut the carbon footprint of the sector.

But that's not all. EVs can also be used as distributed energy resources, giving us the opportunity to regulate our struggling grid system, and bring electricity supply and demand into balance.

EVs are essentially batteries on wheels, capable of consuming or producing electricity.

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And because the vast majority of them are connected to the internet via 4G, we can communicate with them, programming them to charge or discharge their batteries in response to grid conditions. We can make sure EVs only charge when there's plentiful supply of renewables (like when the sun is shining), and even get them to discharge surplus energy back into the grid when demand is at its peak.

And with more and more EVs hitting the roads each year, the potential value they offer is growing exponentially.

26

million EVs globally in 2022

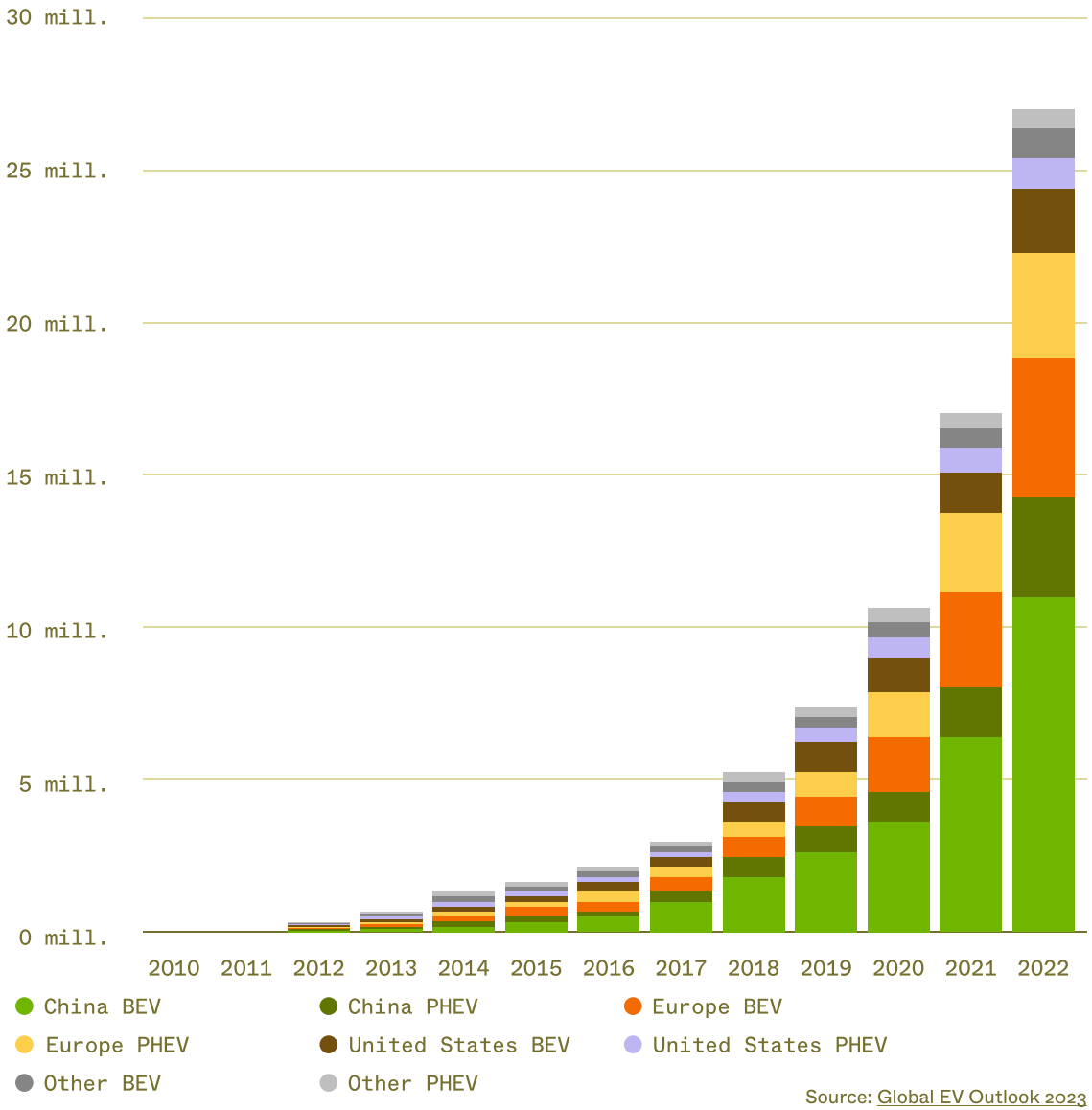
730

million estimated EVs globally by 2040

600,000

tonnes of C02 emissions from the power system saved per year with smart EV charging by 2030

Fig.1 **Global electric car stock in selected regions, 2010–2022**



Source: Global EV Outlook 2023

The role of EV APIs

So, how do we unlock that value, and start using EVs to their full potential?

Lots of apps and services are already coming to the market to help us do exactly that. Energy management software lets EV owners connect their vehicle to an app, from which they can manage and optimize their EV's energy consumption. From smart charging to fleet management, these solutions help reduce EVs' impact on the grid, maximize the use of renewable energy, and cut consumer energy bills.

At the heart of all of them is the API. APIs – or Application Programming Interfaces – are pieces of software that provide access to the data produced and stored by the car. They make it possible to send data and commands back and forth between the EV and the app, and are crucial enablers of these energy management solutions.

In this guide, we'll tell you all you need to know about EV APIs, the data they deliver, and the opportunity for innovation they represent.

What are EV APIs?

An API is an interface that connects a database (in this case, the EV's) with an app. It essentially acts as a pathway through which data can travel securely between the two. Developers can then use that data to build a range of solutions and functionality in their apps.

Your banking app is a good example. It's connected to your bank account via an API, which collects data (like how much money is in your bank account), and enables you to make payments, move cash around and create budgets in the app.

EV APIs do the same thing. They are a tool for communicating with 4G-connected vehicles, enabling you to send data and receive commands without the need for intermediary hardware.

Data

From the minute they roll out of the factory door, EVs produce a huge amount of data. Location data, driving patterns, battery information, and much more – this is all collected via API, and sent back to the manufacturer (like Chrysler or Rivian) on a regular basis.

After that, it's distributed to a variety of different systems, some internal and some external. One of the places it's sent to is the proprietary EV app, where drivers can see information like the location of the vehicle, temperature setting, if the doors are locked and so on in real time.

Commands

APIs don't only send data from the EV to the app. They enable two-way communication, so drivers can send commands from the app back to the EV, too. That means that if the doors aren't locked, drivers can lock them remotely using the app. They can also do things like open the windows, or turn on the AC.

Most importantly, APIs enable us to remotely control EV charging. This ability to stop and start charging in response to signals from the grid, the EV and the end user is what makes EVs such an exciting and important part of the energy transition. We'll talk more about this later in this guide.

API

Application Programming Interface

Connects a database with an app. Acts as a pathway through which data can travel securely between the two.

What data is available through EV APIs?

EV APIs vary significantly between brands. They don’t all provide the same data and functionality, and don’t all deliver it at the same speed.

Here's a quick overview of the main types of data you can expect most EV APIs to deliver.

Location

What it tells you:
Current location of the internal GPS

What it’s useful for:
Finding your own car

Finding the exact location of all the cars in your fleet

Odometer

What it tells you:
Distance driven since the vehicle was new (km or miles)

What it’s useful for:
Trip data and statistics

State of charge (SoC)

What it tells you:
Battery level (% or kWh), Charging state, Range (remaining km or miles)

What it’s useful for:
Understanding how much energy is stored in the battery

Understanding if the EV is plugged in and if it is charging

Understanding how far you can get on the current battery level

Car information

What it tells you:
Brand, Model, Production year, Fuel type, Battery size

What it’s useful for:
Finding the best way to charge your EV

Commands

What it tells you:
Control doors, Control windows, Stop/start charging

What it’s useful for:
Remotely locking and unlocking doors and windows

Creating and executing smart charging schedules

EV APIs

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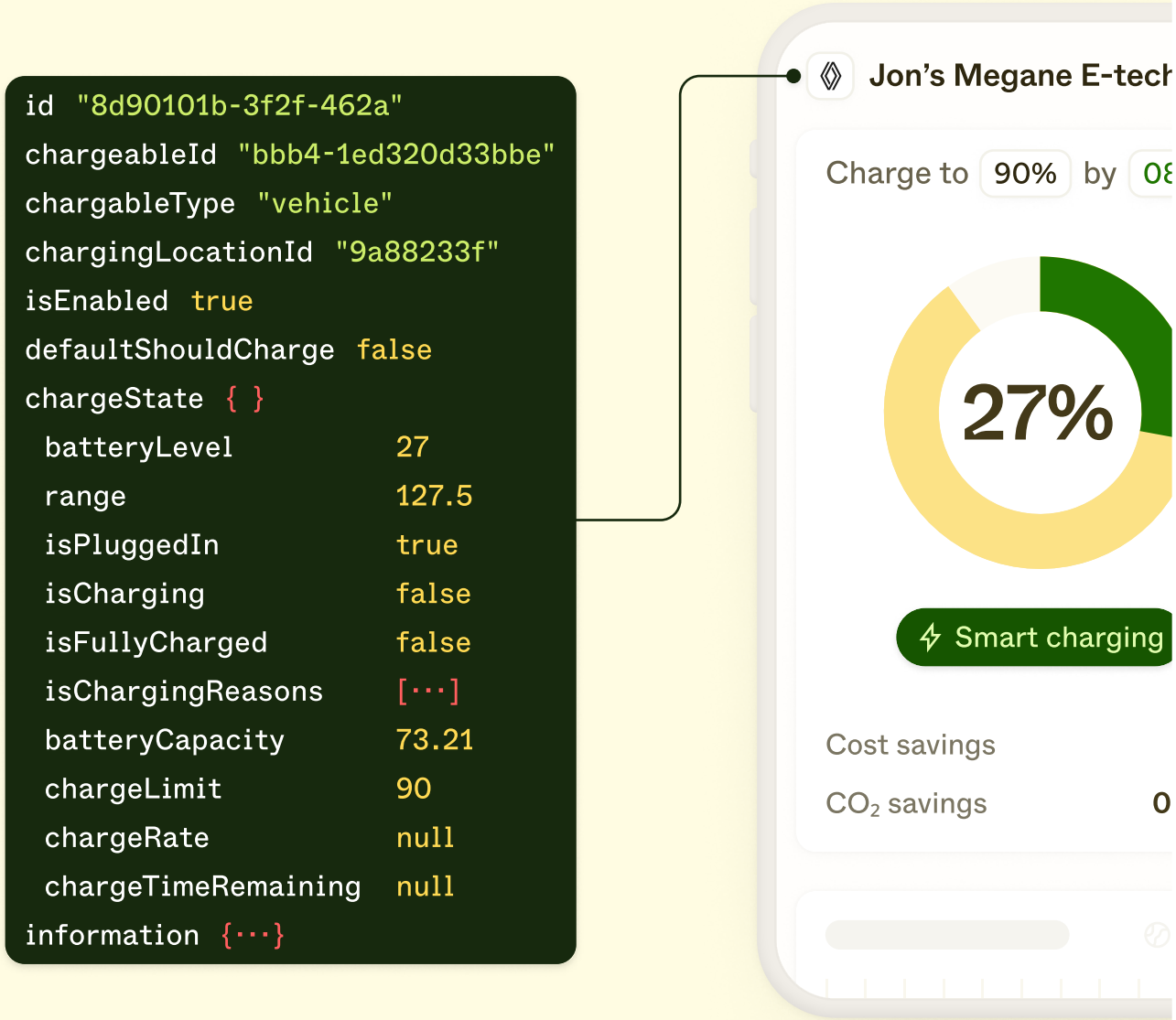

What can I build with EV APIs?

With access to this data and control over charging, you can build innovative energy management solutions that help customers get more value from their vehicles, and drive benefits back to the environment at the same time.

The possibilities are almost endless, but here are some of the leading use cases already taking the market by storm:

Smart charging

One of the easiest ways to unlock the latent potential of the growing number of EVs on our roads is through smart charging.

Smart charging shifts EV charging windows around both user preferences, and signals from the grid. Users can create a customized EV charging schedule that suits their lifestyle, stipulating that their EV must be fully charged by 8am, for example.

Smart charging algorithms continuously evaluate conditions in the vehicle and the grid. They identify windows of high renewable energy supply (and therefore lower energy prices), and automatically stop and start EV charging to align with them. The result is that less demand is put on the grid at times of low supply, the cost to charge the EV is reduced – and it's still fully charged by 8am.

Enode feature

Smart Charging

Enode's smart charging algorithm shifts electric vehicle charging to off-peak periods, reducing costs for end-users and helping balance the power grid load.

This could help users reduce their EV charging bill by up to 50%.

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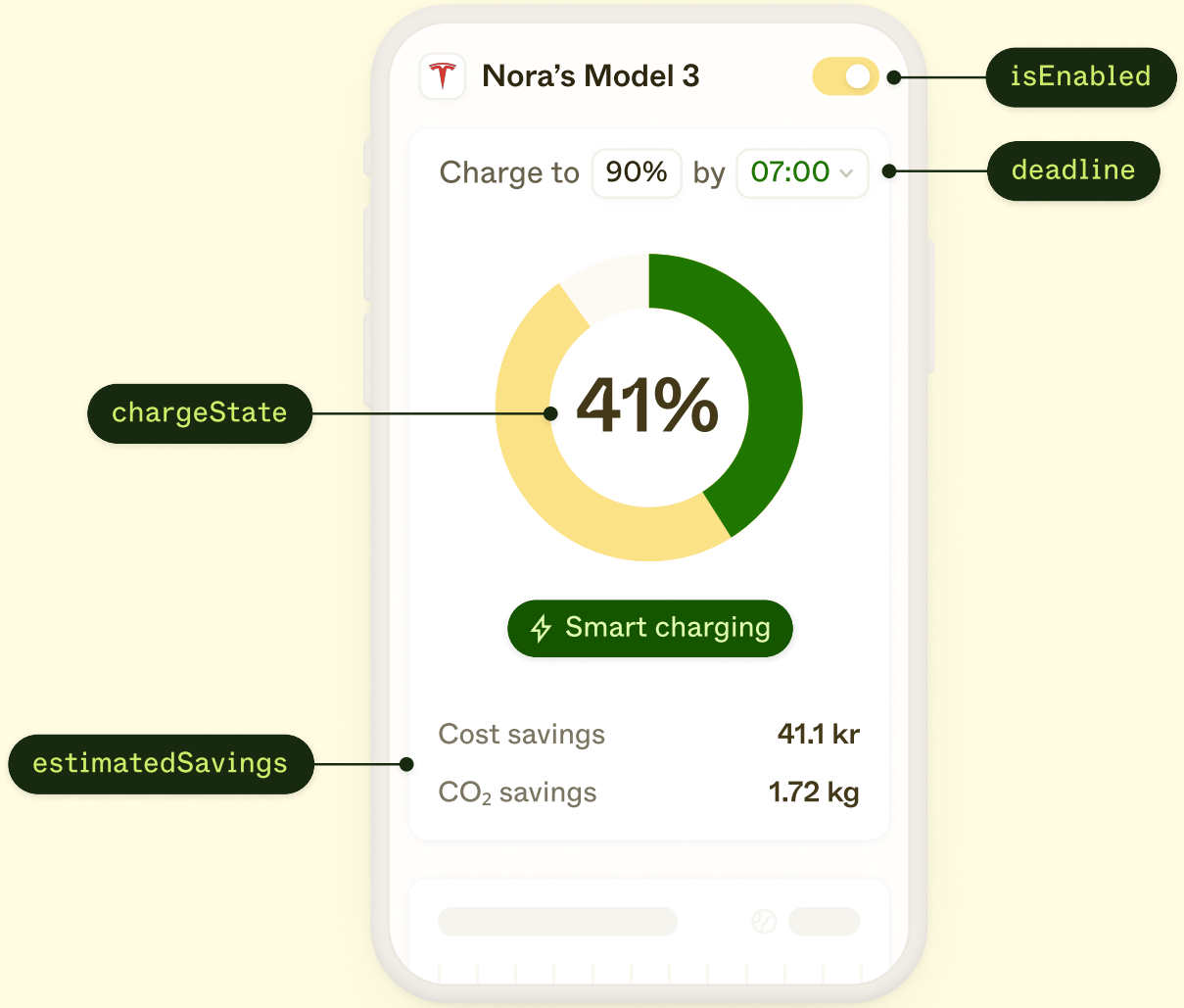

Trips and charging statistics

Giving EV users more data empowers them to become active participants in the energy transition, and reduce their environmental impact.

Data related to trips and charging is measured both in energy (kWh) and costs ($), but it's not usually displayed in brand-owned EV apps. With Odometer and SoC data from EVs, you can build a complete trip and charging history for the end-user. This gives them insights into their own energy usage, so they can make informed decisions to reduce their consumption and, in turn, reduce their energy costs.

Fleet management

As EV adoption grows globally, the next frontier in vehicle fleets will be connected cars. With that comes a growing need for smart management solutions. When you are managing a large fleet of vehicles, data like location, SoC and odometer are crucial to operating efficiently and responsibly.

The previous generation of fleet managers mostly relied on dongles connected to the On-Board Diagnostics (OBD) port of the vehicle. Thanks to the rise of APIs for data access, there's no longer any need for expensive aftermarket OBD installs. Instead, you can simply connect the fleet, and send all the data to a centralized hub via API.

Enode feature

Statistics

Trip and charging statistics gives users insights into their own energy usage, so they can make informed decisions to reduce their consumption and energy costs.

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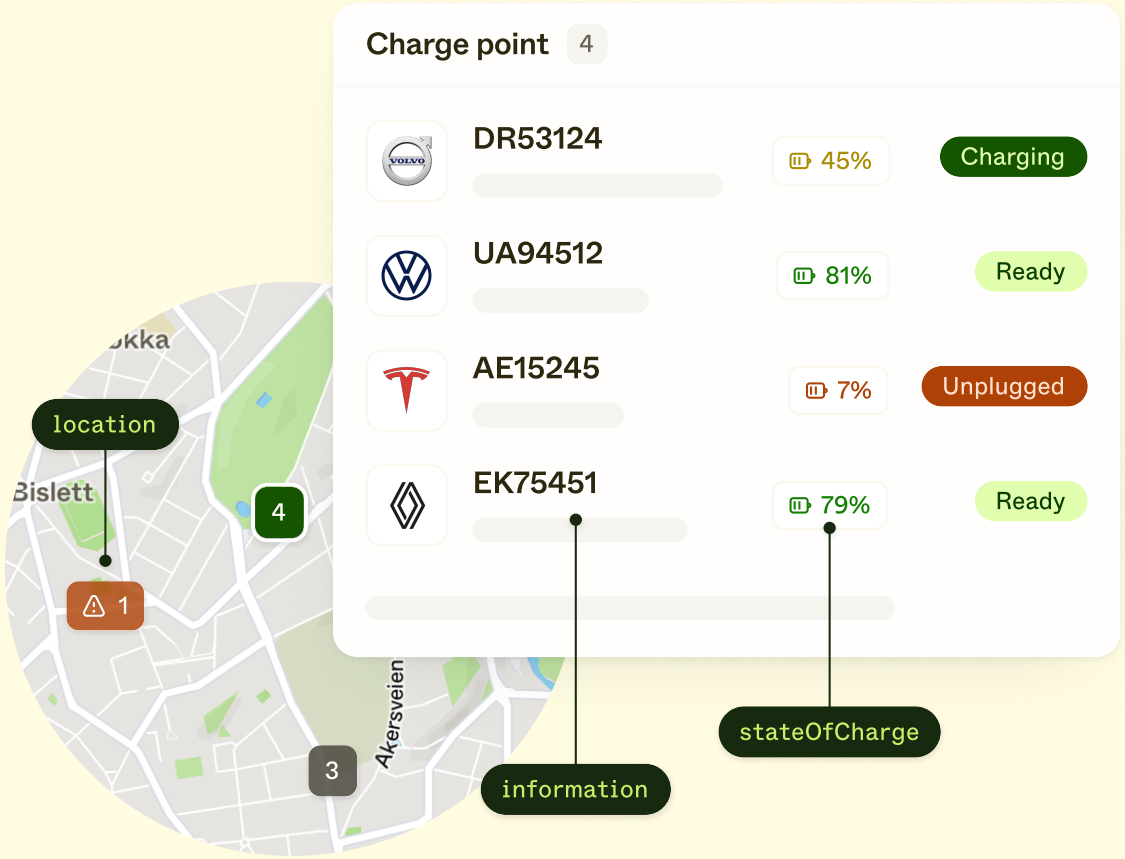

E-mobility

There are lots of ways that EV data can be applied in the e-mobility space.

One major pain point for drivers is range anxiety. They need to find the optimal route from where they are to where they’re going, and this needs to be based on live information about their location and SoC. Charging stations are owned by different operators and offer different interfaces and functionality, and often, they’re in use or out of order. This complicates real-time, cost- and carbon-efficient route planning.

With live SoC and location data delivered directly from the EV via API, drivers can rest easy. Specialist e-mobility apps automatically generate optimal routes, and adapt them to local conditions.

Enode feature

Route planning

Public charging & route planning reduces range anxiety by automatically accessing users’ EV battery State of Charge (SoC) and capacity in real time.

This information can be used to calculate and display nearby chargepoints, as well as estimating charging times so users can effectively plan their route.

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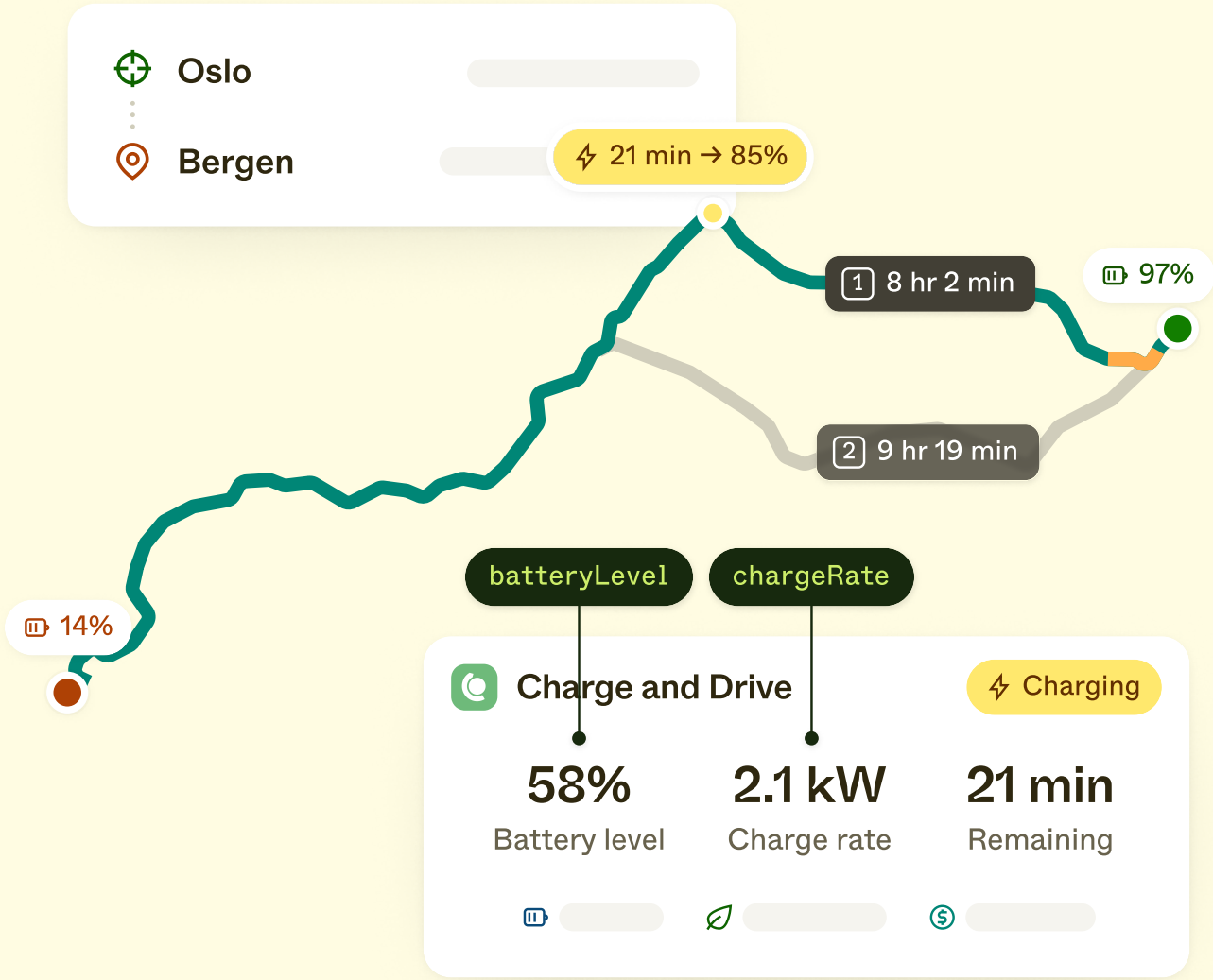
With live SoC and location data, specialist e-mobility apps can automatically generate optimal routes- and adapt them to local conditions.



How do I access EV APIs?

As you can see, EV APIs deliver a lot of valuable data, and enable a range of use cases that allow EV owners to get more from their vehicles.

But what's the best way to access those APIs, and start building on top of the data they provide? The first thing to remember is that EV data belongs first and foremost to the EV owner. They need to give consent to share their data before anyone else can access it.

After that, there are two potential routes you can take.

Build direct integrations with EV brand APIs

Building integrations to EV APIs yourself is one option – but it's very complex and resource-intensive.

As mentioned earlier, each EV brand has its own, proprietary API, which sends and receives different data, and offers different functionality. They aren't standardized, and there is significant variation in sophistication and maturity across the industry. Some brands offer a lot of data and controls, while others don't offer anything at all. Some work consistently and reply quickly to requests, and some don't. Few brands offer open APIs, which means making them interoperable with other hardware or software is a challenge.

This challenge is compounded by the speed with which new EV brands and models are coming to market. There are already several hundred on the market, with more expected to hit the roads in the next few years.

In order to develop solutions that can be used by the whole market, you'll need to build and maintain a separate integration for each model of EV. Each new integration adds engineering time and costs, and makes your system architecture and database organization more complex. This can limit scalability and, as a result, restrict your potential user base.

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Use all-in-one EV APIs

The other option is to use a single, third-party API to integrate with a wide range of EV brands at once. This standardizes the data and control across each, making it quicker and easier to build consistent user experiences across brands.

Using an all-in-one EV API reduces the strain on engineering teams. Rather than draining resources on building third-party integrations with an ever-growing list of EV brands, you can focus on building delightful, customer-centric user experiences.

At Enode, we've been building integrations to EV APIs since 2019. Today, we have the world-leading all-in-one EV API, with support for 30 brands and 300 models.

Enode

30

supported brands

300

supported EV models

"Using an all-in-one EV API reduces the strain on engineering teams."