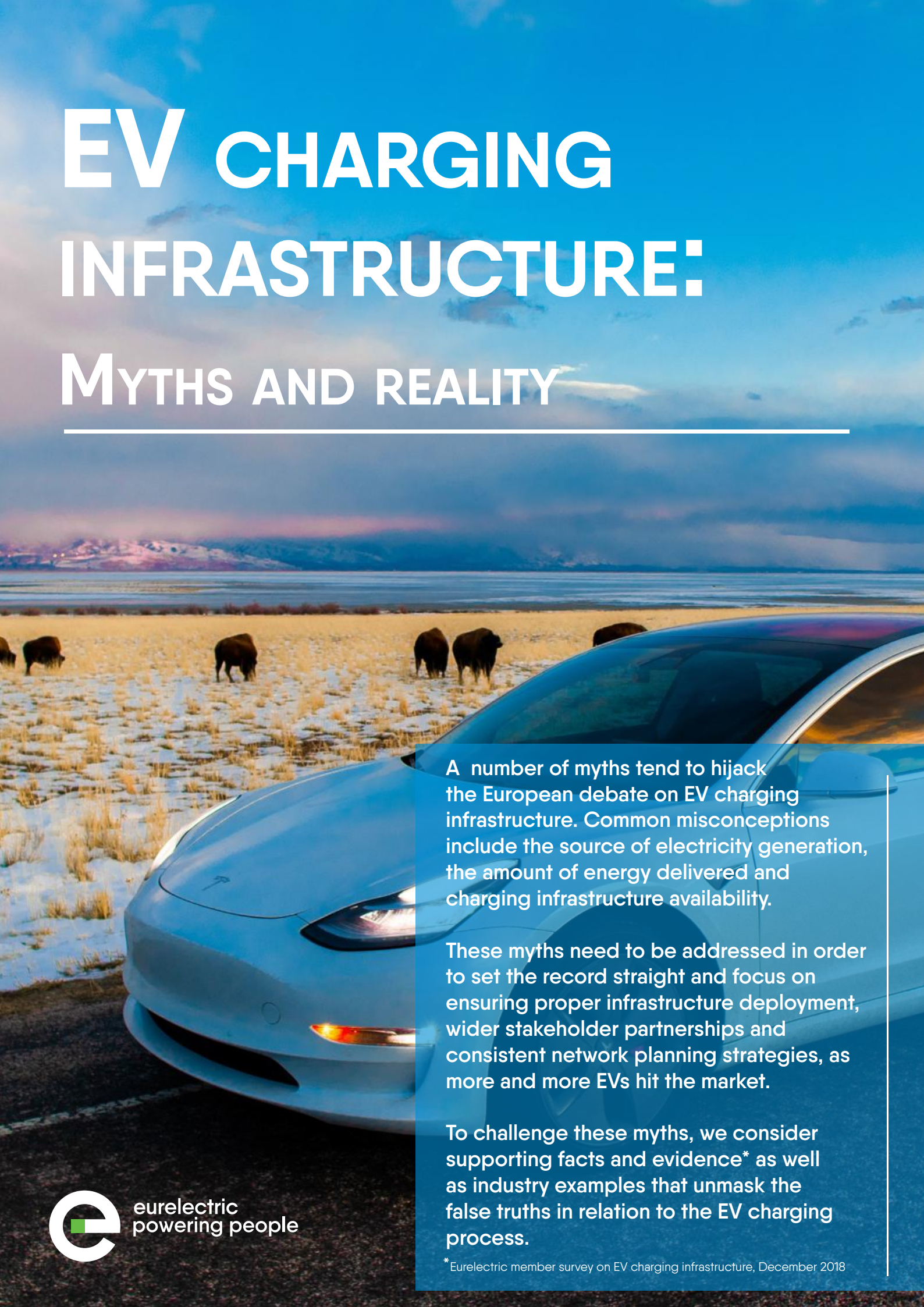
EV CHARGING INFRASTRUCTURE:

MYTHS AND REALITY



A number of myths tend to hijack the European debate on EV charging infrastructure. Common misconceptions include the source of electricity generation, the amount of energy delivered and charging infrastructure availability.

These myths need to be addressed in order to set the record straight and focus on ensuring proper infrastructure deployment, wider stakeholder partnerships and consistent network planning strategies, as more and more EVs hit the market.

To challenge these myths, we consider supporting facts and evidence* as well as industry examples that unmask the false truths in relation to the EV charging process.

*Eurelectric member survey on EV charging infrastructure, December 2018

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Myth #1: Electric vehicles use dirty electricity from coal. Switching to an electric vehicle will just mean that a similar amount of pollution comes from the electricity generation rather than from the tailpipe of my car.

Short answer: 58% of electricity generation across the EU is already carbon neutral. It is also possible in most Member States to choose charging points, which use renewable electricity. 93% of the EU population has the option of using 100% renewable electricity to charge their vehicle.

Evidence: In 2018 Europe's electricity consumption had an average carbon intensity of 296g CO2/kWh and this will continue to decline. Today, an electric vehicle powered with the average EU electricity mix emits 60g CO2/km, which is lower than any fossil fuelled vehicle.[1] In all countries where the electricity CO2 content is below 600g CO2/kWh, which is the case of 26 EU countries, entry level electric vehicles already have significantly lower emissions compared to an efficient combustion engine car.[2]

Charging with 100% renewable electricity is also currently possible through green offers for consumers, contracts with certified providers, or certification with Guarantees of Origin. In some countries this is being set as a key condition in public tender applications for public charging infrastructure.

Myth #2 : Mass switch to electric vehicles will make the electricity grid collapse. Investments to make this grid stable would be way too expensive.

Short answer: As the share of electric vehicles grows, it is possible to significantly limit the additional investments required in electricity distribution grids thanks to smart charging. Cars are parked 95% of the time, which gives quite some flexibility, and EV batteries can be used to help stabilise the grid while their owners are remunerated for this service. That is a win-win!

Evidence: Let us imagine that 80% of all passenger cars are electric, this would entail a 10- 15% increase in electricity consumption. Add to this significant levels of electrification for buses and trucks: this would at the same time reduce by two the total amount of energy consumed in transport![3] That is because electric vehicles are 5 to 6 times more

1 Assuming electric vehicle efficiency of 0.20kWh/km
2 Electric Vehicles: Technology Brief, p.35
3 Decarbonisation Pathways Study, p.32

energy efficient than the best combustion engines[4].

When it comes to managing the peak electricity demand and the low-voltage grid, smart charging can solve most challenges at the local level and in residential areas. This also brings opportunities for EV drivers!

In **the Netherlands** the Living Lab for Smart Charging[5] demonstrates that it is both possible and scalable to completely optimise the interaction of EVs with the grids: the electricity produced by wind and solar can be stored in EVs and sent back to the grid when it is most needed.

Myth #3: We are still facing a chicken or the egg debate. The charging infrastructure must be built before people adopt EVs.

Short answer: There is no chicken and egg debate any longer. The charging infrastructure is already developed and available in countries where the EV market develops fast. At the end of 2018, there were 150,000 publicly available charging points across Europe.[6] Looking at EV customer behaviour, we see that early adopters rely largely on home and office charging[7]. This trend will continue in the future, as we expect that 85% of charging will happen at work place and at home as millions of EVs hit the roads in the next decades.

Evidence: It is key to better understand the infrastructure needs across the continent and this is where to role of policies becomes crucial. Currently, public support schemes for charging infrastructure exist in 18 EU countries, with many also targeted at users who do not have a garage or a driveway parking spot.

For example, **Ireland** offers grants for the installation of home charger units since the start of 2018. **Finland** offers subsidies for developing charging infrastructure in housing cooperatives.

The role of cities is also vital in providing availability to charge EVs to everyone: **Stockholm** has dedicated "charge streets" where operators can easily reserve and build charging points, whereas cities in **the Netherlands**[8] and **the UK**[9] have established demand-driven systems, in which charging infrastructure is placed according to the needs of EV drivers.

A vast majority of projects have also been deployed along the European Union's Trans European Transport Network (TEN-T) (Fast E, Ultra E, Corridoor, Ionity, E-Via Flex-E, Fastned, Gdzieladowac, to name a few). In 2018, Europe's highways had 28 fast charging points per every 100 km[10], providing security and comfort to those driving long distances as more fast chargers are put on the roads in the next years.

4 Eurelectric Decarbonisation Pathways study, Scenario 2.
5 The Dutch revolution in smart charging of electric vehicles
6 European Alternative Fuels Observatory
7 Smart charging study, Eurelectric, 2015
8 Plan Amsterdam The Electric City
9 Power my Street
10 EAFO data

Myth #4: Charging an electric vehicle takes too long

Short answer: EV charging speeds depend on the performance of the charging unit and on the capacity of the battery. While faster charging power (at 150kW and higher) is becoming increasingly available, the number of vehicle models suited for those speeds is still limited.

Evidence: As already mentioned, most of the time EV owners charge overnight while sleeping – which is even more convenient than stopping at a fuelling station and much cheaper compared to petrol prices. If you were to use an 11kW wallcharger at home, it would take just under six hours during the night to charge a 60kWh battery, with which you can drive at least 300km.[11] However, plug a car with a similar range into a 150kW fast charger and within 20 minutes the battery will be 80% charged. In cooperation with European utilities, Ionity has recently developed 350kW next generation chargers, which can drop that duration to just 8 minutes, thus guaranteeing consumer satisfaction and secure grid connections.

In the world of heavy-duty vehicles, there is an ongoing standardisation process for high-power charging going beyond 1MW to ensure high-speed charging for e-buses and e-trucks.[12] This would mean that a Tesla Semi truck with a range of 800km could easily charge to 80% in only 30 minutes.

Myth #5: Fine, you managed to convince me. But you cannot charge an EV in the rain.

Indeed, there is little to say here. You cannot charge EVs in the rain because you will get an electric shock and the vehicle systems will blow off. Come on! You did not fall for that, did you? EV charging infrastructure conforms to stringent safety standards and waterproofing connectors is mandatory. You can certainly top up at an unsheltered charging point outdoors when it is raining.

11 Assumptions based on average vehicle efficiency of 0.20kWh/km
12 CharIN Starts Development Of Fast Charging Beyond 1 MW