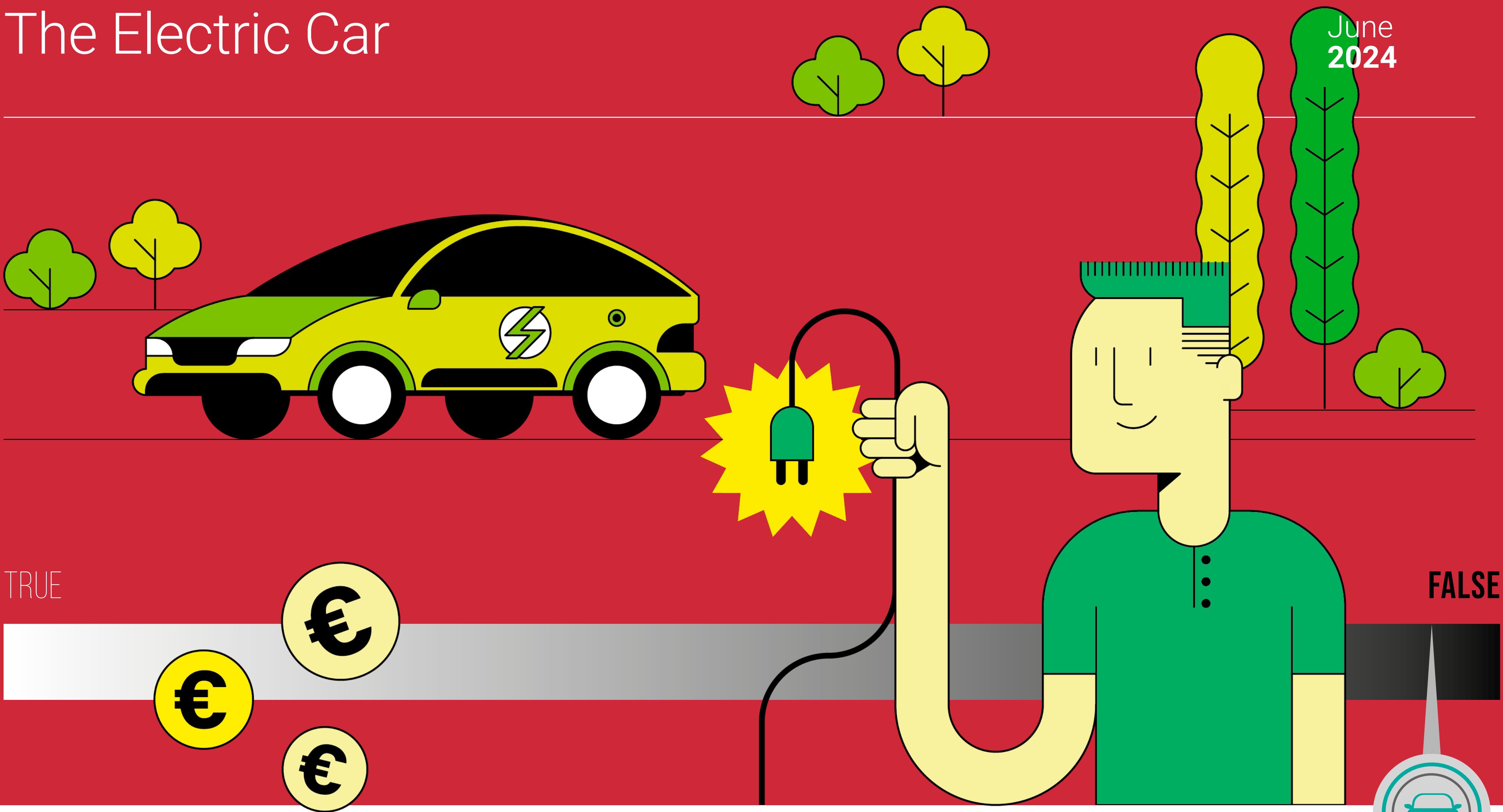
MYTHBUSTER

The Electric Car

Summary

June
2024



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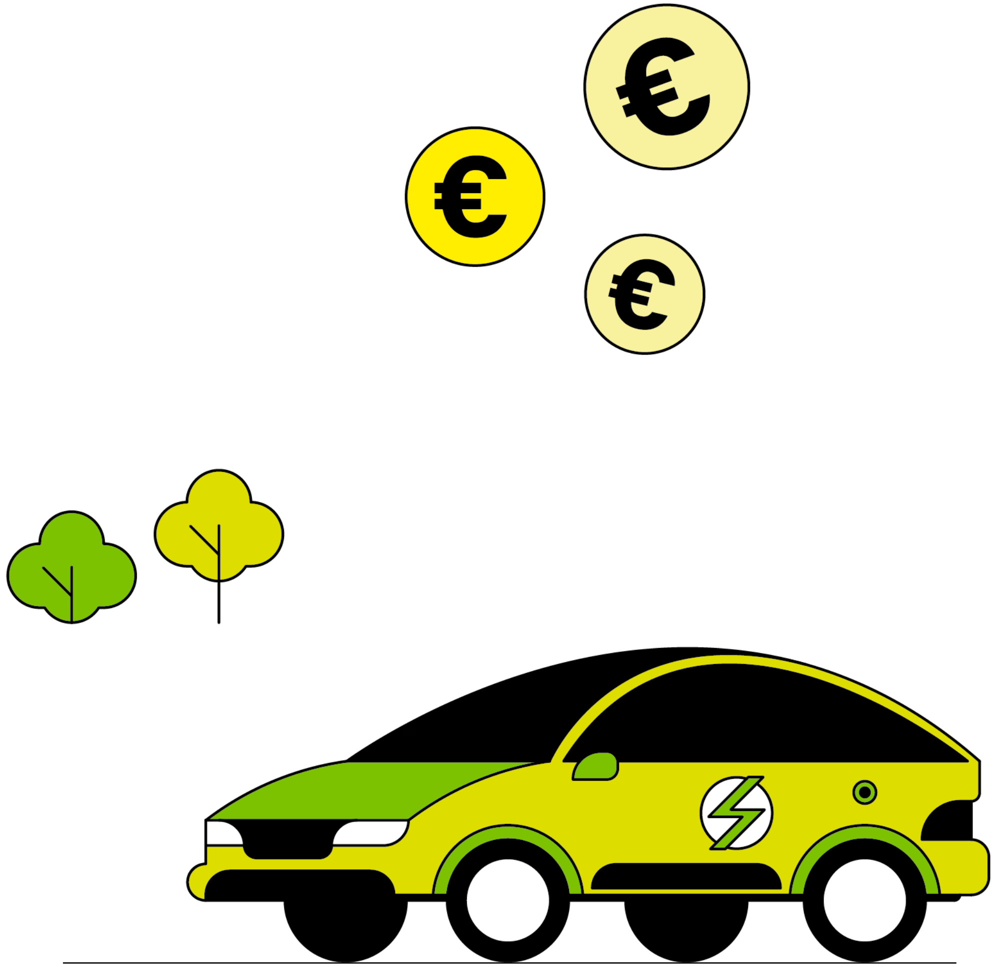

Report.
Mobility Mythbuster The Electric Car.

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THE ELECTRIC CAR

MYTH 1

MYTH 2

MYTH 3

MYTH 4

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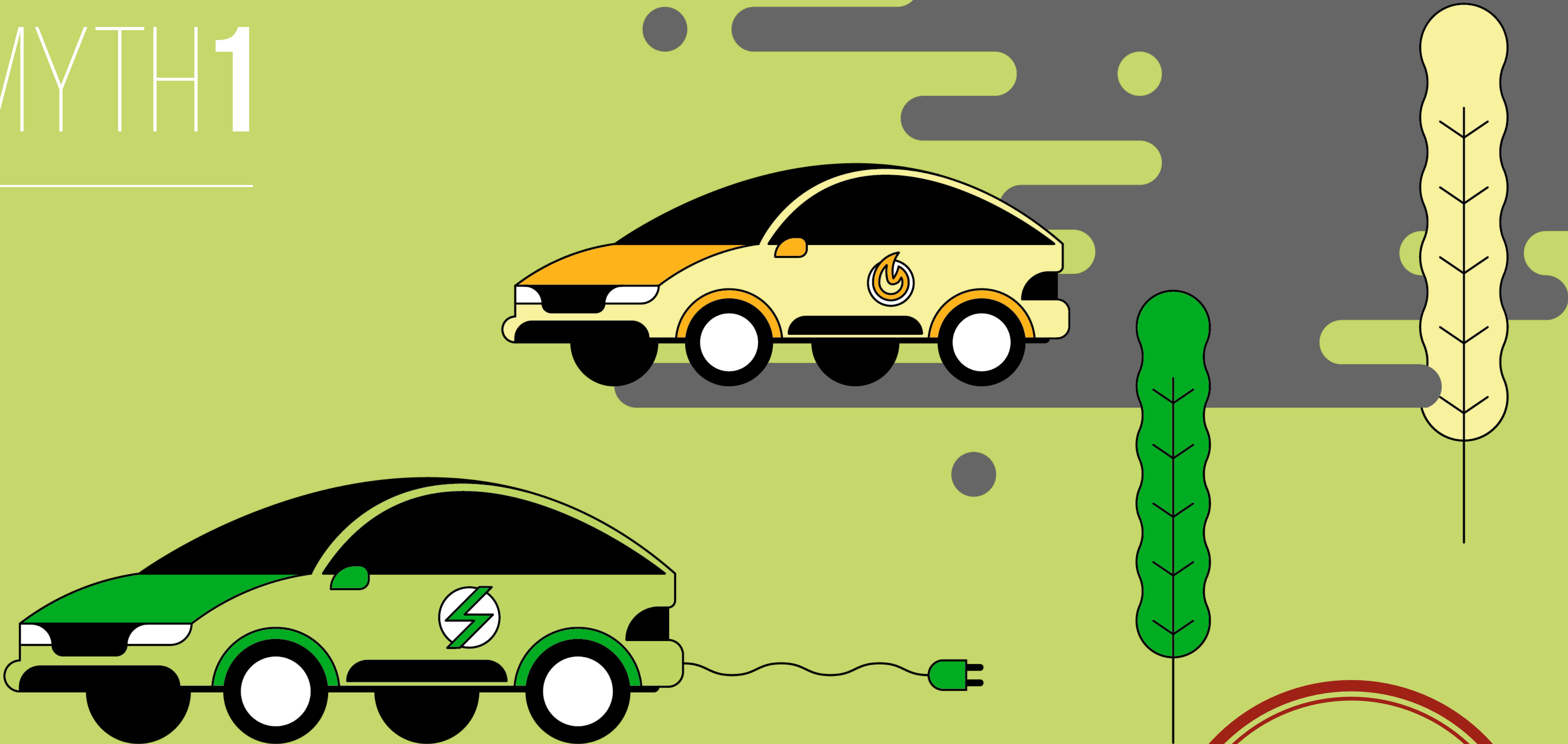
MYTH 1



THE ENVIRONMENTAL IMPACT OF THE ELECTRIC CAR IS THE SAME AS FOR CURRENT COMBUSTION ENGINE CARS

FALSE

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1

FALSE

THE ENVIRONMENTAL IMPACT OF THE ELECTRIC CAR IS THE SAME AS FOR CURRENT COMBUSTION ENGINE CARS

There are many references that demonstrate environmental benefits of electric cars, although it is true that their carbon footprint is not neutral, as battery charge efficiency must be considered, along with the entire electricity generation and distribution process (energetic mix). Even so, the emissions generated throughout the vehicle's life-cycle are lower in the case of 100% electric cars compared to the fossil fuel variety.

This myth has already been well refuted by a number of well-known international agencies. Although the most critical point in the generation of emissions for the electric vehicle is electricity production, it is also the one that shows a greater margin for improvement. The renewable mix in the European Union stood at 44% in 2023, with the figure for Spain being 50% for renewable sources. One of the keys to reducing the emissions of these vehicles is in the energetic mix. In the extraction of fossil fuels to move petrol, diesel or gas-powered cars there is no margin.

As well as positioning the origin of the energy that drives the electric car as the main element for guaranteeing its lower environmental impact, there are other factors that also have a positive effect on these vehicles. Examples of these are the lower number of components and, therefore, their manufacture and distribution, driving conditions, efficiency of the models, among others. On the other hand, no less considerable is the fact there are significant differences between countries that have a bearing on statements regarding environmental impact. For instance, electric vehicles, including all electrified versions (HEV, PHEV and BEV), are sustainable and viable in France and Brazil, not very sustainable in countries such as China and India, and completely unsustainable in Indonesia.

In short, the combination of studies shows that electric vehicles have a lower environmental impact than those driven by fossil fuels, and that they are competitive and shall be even more so with the optimisation of the electrical mix, progress in battery manufacturing technology and the development of second-hand battery usage and the recycling industry.

TRUE

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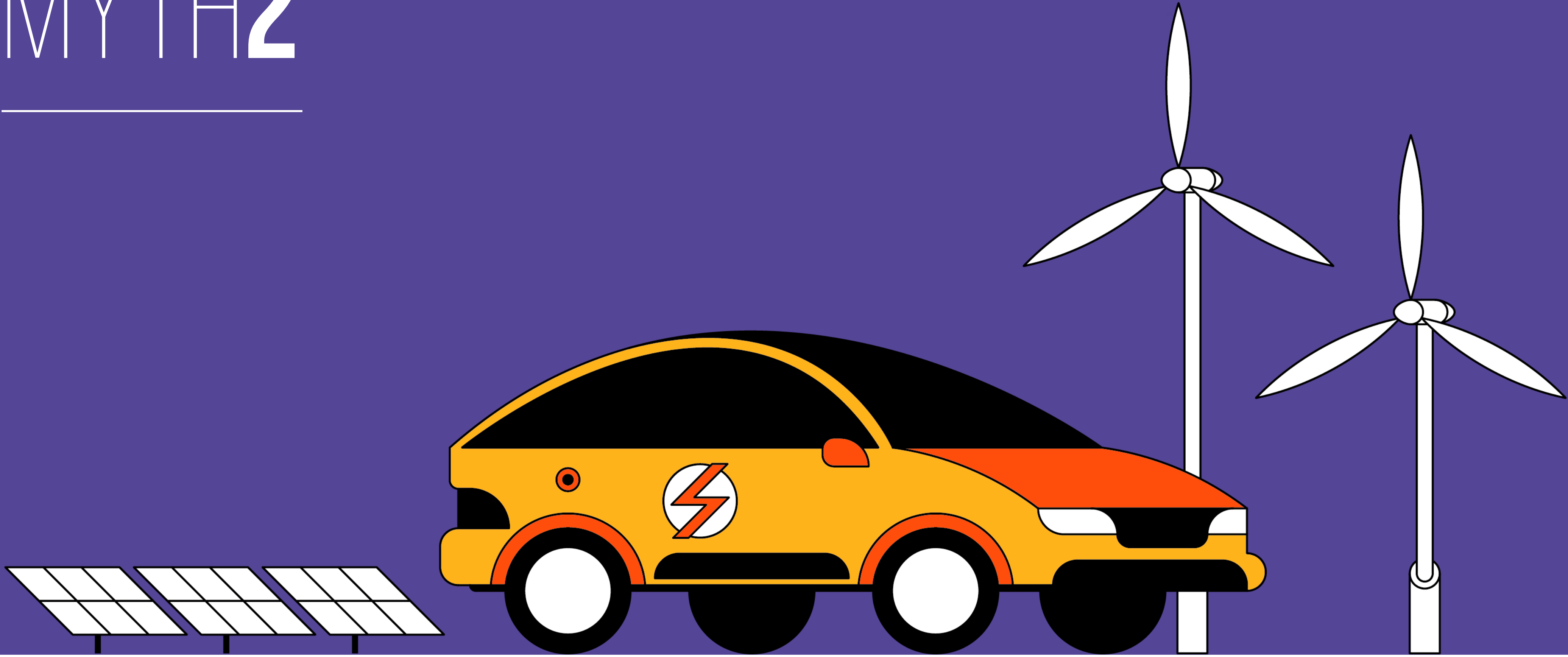
MYTH 2



ELECTRIC CARS DON'T USE CLEAN ENERGIES

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2

FALSE

ELECTRIC CARS DON'T USE CLEAN ENERGIES

Logically, electric cars use electricity in order to work. This may or may not be renewable, which rather than depending on the vehicle or technology itself depends on the energetic mix of the place where it is generated and used. In Spain, electricity generation changes throughout the day and depends on diverse factors. Depending on the time, the percentage of renewable energies exceeds non-renewables and vice-versa, although less frequently. The strong drive towards renewable generation means that clean energy consumption is on the increase. In 2023, 50.3% of energy was generated via renewables, according to the Spanish Electricity Network (REE).

Electric cars don't produce exhaust emissions and, according to the United States Environmental Protection Agency (EPA), even taking into account the electricity generation emissions of each country, studies show that the electric car is on average responsible for lower pollution levels than the fossil fuel combustion vehicle. Despite this, in the case of hybrids or plug-in hybrids the situation changes and, sometimes, isn't so clear. The majority of the models have relatively low electric provisions, meaning the use of fuel burning is predominant, save perhaps when being driven in cities at reduced speed.

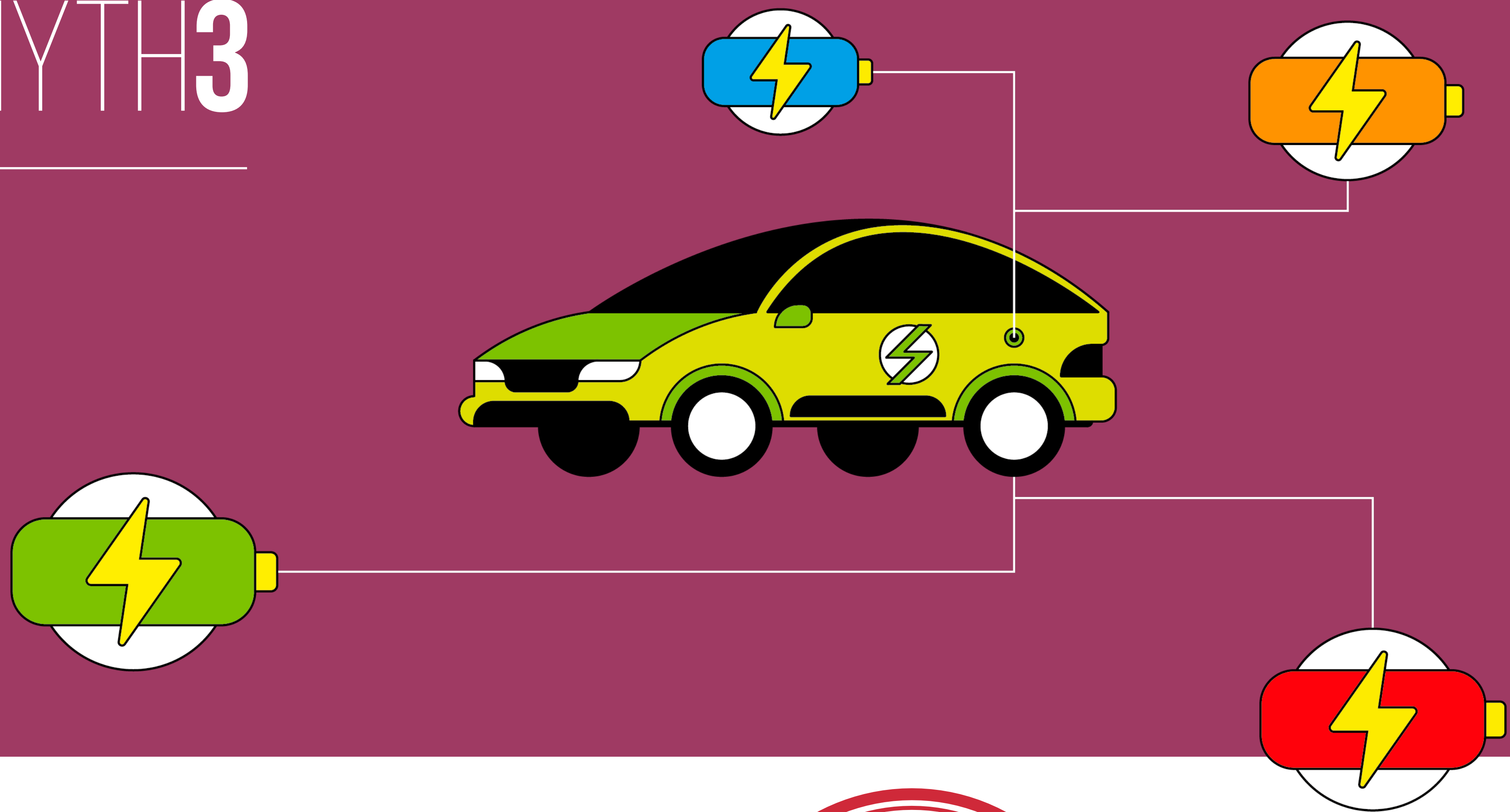
The Spanish Electricity Network has a very interesting information system, in which the figures for the generation of electric energy by technology can be consulted on a daily, monthly or yearly basis, along with the true demand produced and how it is generated in real time. According to the 2023 Spanish Electricity System Report, the capacity installed in the generating grid in Spain increased by 5.2%, with the year 2023 ending with 125,620 megawatts (MW), while the renewable installed power in the national electricity grid increased by 6.3 gigawatts (GW), with the percentage of installed power from renewable generation sources standing at 61.3% of the total installed power.

The renewable generation in the national electricity system in 2023 increased by 15.1%, therefore posting the historical maximum production with 134,321 GWh. In 2023, the share of renewable energy production in the national mix was the largest in history for the first time with a contribution of 50.3%. In conclusion, 100% electric cars do use clean energy in Spain. This is on the whole emission-free energy, which is growing as the percentage of renewable generation in the energy mix of each country increases.

TRUE

FALSE

MYTH 3



THE CHARGING NETWORK IS INSUFFICIENT

FALSE

3

FALSE

THE CHARGING NETWORK IS INSUFFICIENT

There is now a charging network for electric vehicles that can be generally considered as sufficient. Despite this, the distribution between urban and rural areas means that the availability of this infrastructure is highly unequal. Despite the number of quick charging stations being on the increase, coverage of charging stations will improve exponentially once the new European Alternative Fuels Infrastructure Regulation is implemented. High power charging stations continue to be scarce, to which work must be done as regards the installation of new points of this type throughout the territory.

The number of charging stations for electric vehicles is growing each year in Spain. However, according to comparative analyses, with an average of 610 public electric charging stations per one million inhabitants (motorisable population), Spain is situated far from the European average, which at the end of 2023 stood at 1,408 points (per one million inhabitants). According to the Spanish Association of Car and Lorry Manufacturers (ANFAC, 2024), at the end of 2023 there were 29,301 public charging stations available, with different power outputs and in the different Autonomous Regions. These are similar figures to those offered by the Business Association for the Development and Promotion of Electric Mobility[1].

This infrastructure deployment should pay particularly attention to population distribution in Spain. It is important for the location of the stations to guarantee territorial distribution in relation to availability. Nevertheless, at present just 15% of stations are found in rural areas, despite these representing three fifths of national territory. 96.6% of the population in Spain is concentrated in 39.7% of the 8,132 municipalities that exist in the country. Even so, the network is constantly expanding thanks to the measures for promoting electric mobility.

In addition to the national regulations, it is important to draw attention to the step taken by Europe, approving obligations in relation to the deployment of charging infrastructure. The new Alternative Fuel Infrastructure Regulation (AFIR) foresees the installation of a charging station every 60 km on the basic European Union road network and every 100 kilometres on the other routes that comprise the Trans-European Transport Network (TEN-T). With decisive progress in urban zones, this measure will have a major impact on rural areas if it takes advantage of the proximity of the road network to the main municipalities. According to a study by the Sustainability Observatory and ECODES in 2022, less than 45% of the road network then fulfilled this criterion of the maximum distance

TRUE FALSE

[1] In the first 6 months of 2024, both organisations determined that there were around 32,200 public charging points available in Spain.

3

FALSE

THE CHARGING NETWORK IS INSUFFICIENT

between high power charging stations indicated by the European regulation.

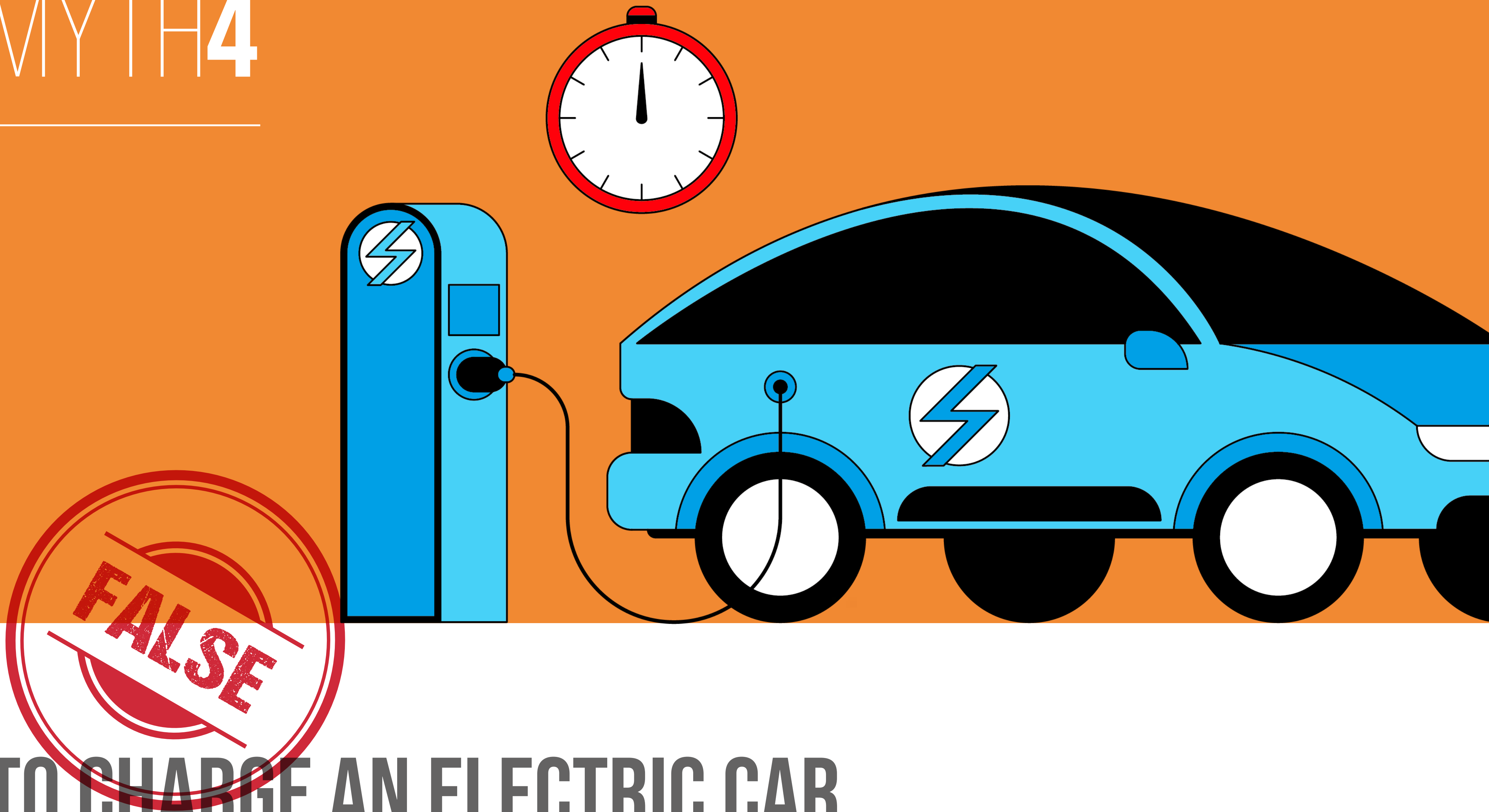
Likewise, another factor to consider is infrastructure interoperability. This allows users of these types of vehicles to recharge and pay at any public station easily and simply, irrespective of the operator. This factor is essential for encouraging electric mobility, particularly in places where there are not as many stations available, such as rural areas. In any event, it should be taken into account that the day-to-day refuelling of electric vehicles is linked to home, work or both, and that 90% of journeys would be possible with a range under 200km. According to a survey carried out by AEDIVE, only 5.8% of electric vehicle drivers have ever needed assistance due to a flat battery, mainly due to lack of foresight.

In conclusion, sufficient infrastructure exists to charge electric vehicles and make trips both within and outside cities. Nevertheless, a national roll-out plan is essential for facilitating the transition to the electric vehicle and guarantee more availability, especially in areas with low population density, where the majority of people drive private vehicles. The planning must include the installation of high power charging stations. Moreover, their existence will boost demand by reducing the current collective perception of unavailability.

TRUE

FALSE

MYTH 4



TO CHARGE AN ELECTRIC CAR I HAVE TO STOP FOR 1H

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4

FALSE

TO CHARGE AN ELECTRIC CAR I HAVE TO STOP FOR 1H

The charging time for an electric vehicle depends on various factors, the main examples being battery capacity and charger power. The higher the battery capacity the longer the complete charge time in exchange for providing greater range. For its part, the power supplied depends on the type of charger used, giving rise to different charge types. The higher the charger power, the less waiting time during the charge.

According to the type of charger used the following charge types can be distinguished:

SUPER-SLOW CHARGE

Uses a portable charger not exceeding **3.7 kW-16A**. This is placed between the vehicle requiring a charge and a *schuko* connector, which is habitually used for household appliances. With this charger it takes approximately **8h** to completely charge an electric vehicle.

SLOW CHARGE

Uses a single-phase charger with an output of **7.4 kW-32A** These are the types installed in charging stations located in home garages. As they offer double the power of the super-slow charge, on average they take half the time to charge completely discharged batteries, that is around **4h**.

SEMI FAST CHARGE

Chargers that can be found in car parks, supermarkets and offices. These, in contrast to the previous ones, are three-phase chargers that allow a greater quantity of energy to be transferred to the vehicle than single-phase chargers in the same amount of time. The power output range of these chargers is between **11kW-32A** and **22kW-32A**, taking approximately **3h** and **1h 30 mins** to perform a complete charge.

FAST CHARGE

Chargers that can be found at service stations. These are direct current chargers; in other words, in contrast to the previous examples, in which the vehicle converter changes the alternate current into direct current, these chargers have their own converter so that they input direct current into the vehicle thereby reducing charge times. These are chargers that reach **50kW**, resulting in an 80% charge of the vehicle in **30-40 mins**.

HYPER FAST CHARGE

As in the case of fast chargers, these are found in service stations, but far less frequently. The output supplied by these chargers can be up to **350 kW**, and they also require a current of at least 375A. They are able to completely charge the vehicle in under **20 mins**.

TRUE

FALSE

4

TO CHARGE AN ELECTRIC CAR I HAVE TO STOP FOR 1H

FALSE

It is important to clarify that not all electric vehicles are compatible with all charging types. This is due to the type of connector used. The two most common connectors used in Europe apart from the domestic *(Schuko)* type are the following:

TYPE 2 CONNECTOR (MENNEKE)

These are connectors used to perform a charge via alternating current, be it single or three-phase, to which the aforementioned classification would correspond to a slow or semi-fast charge.

CCS CONNECTOR (COMBO 2)

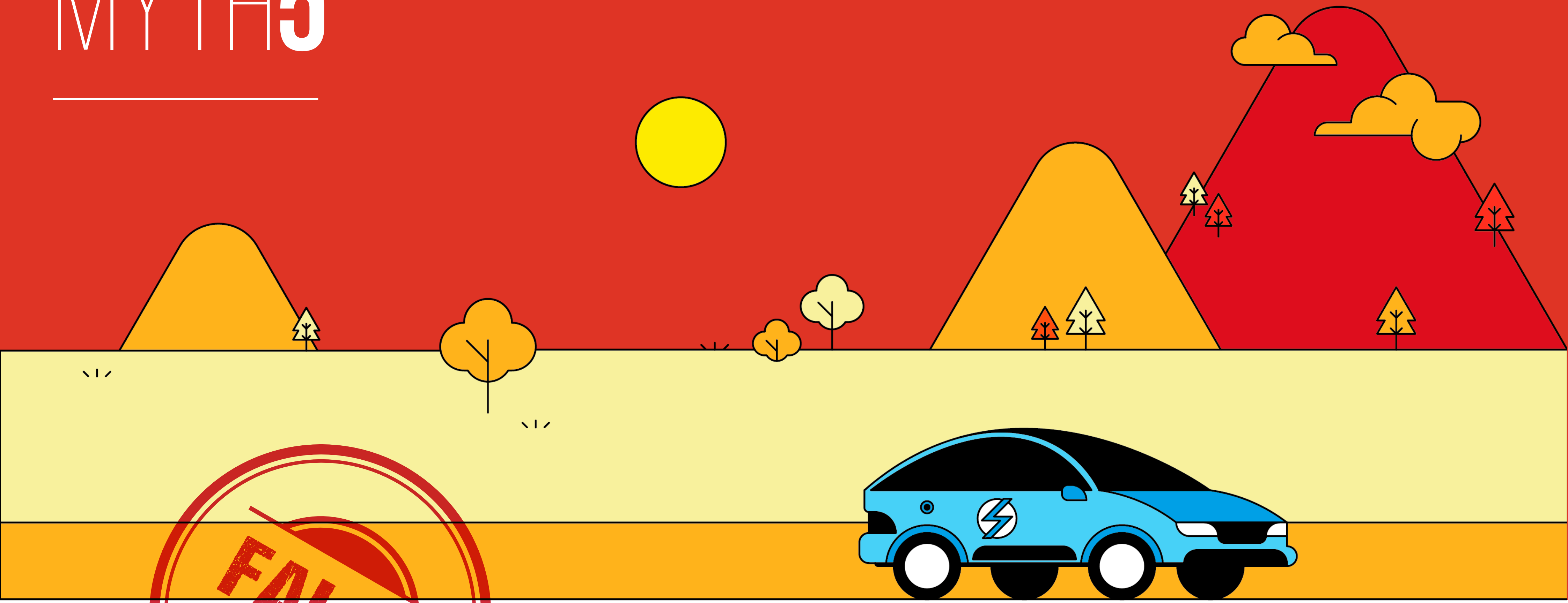
Connector located in service stations to perform a fast or ultra-fast charge via direct current.

Smaller models, normally used for urban journeys, don't usually have a fast or ultra fast charge option, and their charges are linked to the home, work or other services required by the user on a daily basis. However, the majority of commercialised models (medium and large) do offer the possibility of ultra-fast charging, if performed at specific stations in which this type of charge is available; or fast charging (on urban roads, electric charging stations, highways and places that provide specific services and offer this as an added option). These are all performed in under 30-40 mins for a charge state over 80%.

Manufacturers are developing 100% electric cars that have increasingly higher range with lower charging times as the capacity of their batteries increases. The vast majority of electric vehicles with current batteries are compatible with fast charging, and increasingly with the ultra-fast charge, allowing for journeys of over 300 km, with less than 30 minutes dedicated to charging up to 80% of the battery. At the same time, the ultra fast charging network is being extended to high-capacity roads and other strategic points to guarantee journeys, although it will still take time to achieve complete integration.

TRUE FALSE

MYTH 5



FALSE

I CAN'T MAKE A LONG JOURNEY WITH A 100% ELECTRIC CAR

5

FALSE

I CAN'T MAKE A LONG JOURNEY WITH A 100% ELECTRIC CAR

The concept or sensation of sufficiency in electric vehicle range does not just depend on the technological factor of the batteries used by some models or others and their technical characteristics, rather, to a greater extent, it is associated with the experience of the user, their needs and uses, way of life, place of residence and other particular and individual circumstances. It is true that at present the range of an electric vehicle, in any segment, is lower than that for vehicles driven by internal combustion technologies.

Considering that in daily use the electric car is refuelled at home, work or both, current ranges are sufficient for the majority of users. A big difference can be seen when a comparison is made between urban and inter-urban uses and if the use of air conditioning in areas or periods with extreme climates is considered. This difference is even found between real driving consumption and that stated in measurement protocols such as the WLTP (Worldwide Harmonised Light vehicles Test Procedure).

Battery technology is constantly evolving and, thanks to it, the range provided is increasing. Therefore, despite certain conditions while driving, the offer of electric vehicles has a range, both in real-world circulation tests and in the values declared for standardisation against the WLTP, which comfortably exceeds 300 km and, in many cases, 400 km in its lower limits. On journeys with distances exceeding this range, it is necessary to make a stop in order to charge the vehicle. Current electric vehicles are compatible with charges equal to or higher than 50 kW, considerably reducing charging time, taking on average between between 30 and 45 minutes to charge 80% of the battery, a time comparable to a rest stop on the road.

In conclusion, the range of current electric cars is sufficient for the large majority of journeys, including long distance trips. Obviously, this is taking into account that user experience is different and prior journey planning to adjust charge stop requirements is recommended.

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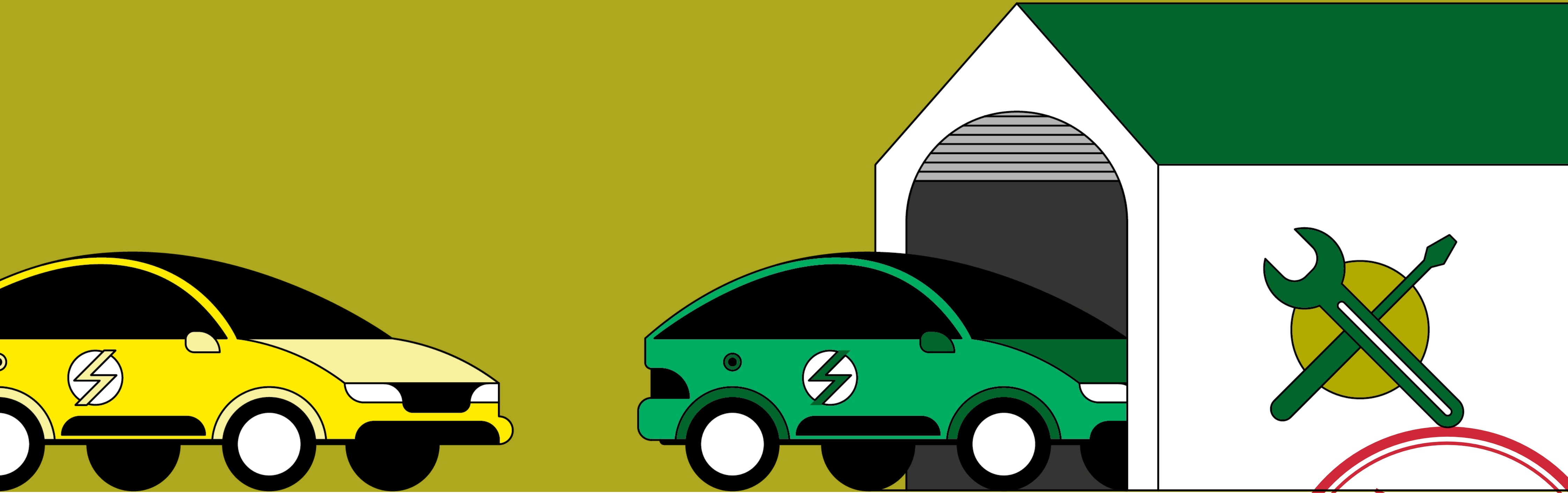
MYTH 6



ELECTRIC CARS ARE REPAIRED MORE OFTEN AND THEIR MAINTENANCE COSTS ARE HIGHER THAN THOSE FOR COMBUSTION CARS

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6

FALSE

ELECTRIC CARS ARE REPAIRED MORE OFTEN AND THEIR MAINTENANCE COSTS ARE HIGHER THAN THOSE FOR COMBUSTION CARS

Electric vehicles are mechanically simpler than combustion cars. They have fewer components, meaning less wear. For example, electric vehicles do not have manual transmission or a distribution belt, to which they do not require so many visits to the mechanic in order to substitute these elements, greatly reducing vehicle maintenance costs.

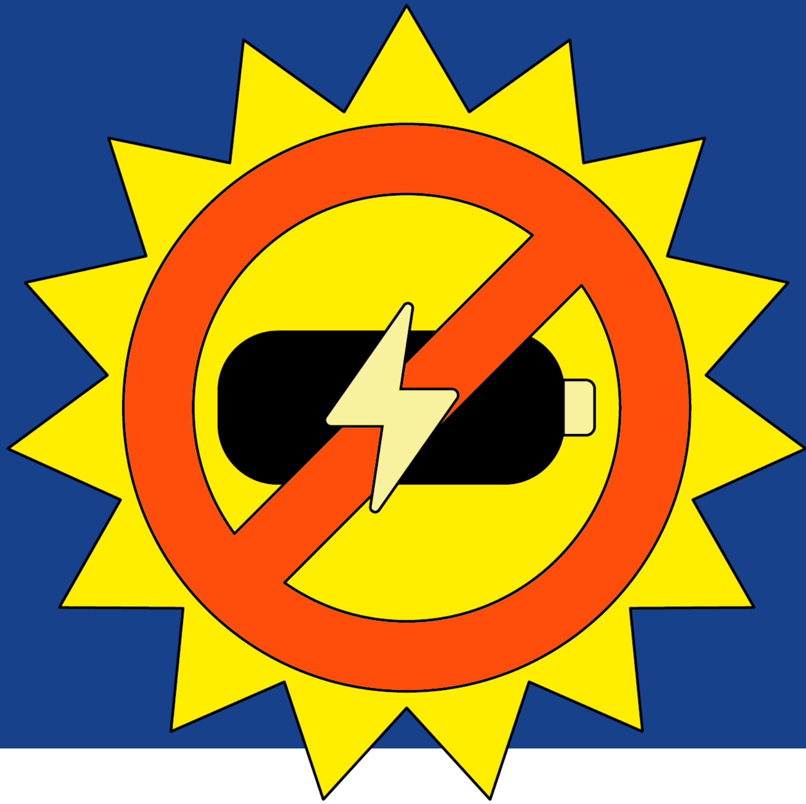
Nor do they need oil changes, because they do not generate residues specific to internal combustion engines. Brake pads have less wear on electric vehicles than on combustion vehicles. This is due to the existence of regenerative braking, also known as the Kinetic Energy Recovery System (KERS). The system harnesses the kinetic energy from the vehicle's inertia when braking, which is thermally dissipated by degrading the brake discs, reversing the operation of the electric motor acting as an electric generator so that it recharges the vehicle's batteries. The system assumes a percentage of the brake force which extends the life cycle of the brake pads by a proportional amount.

Although it is demonstrated that the costs of maintaining electric vehicles are reduced compared to their internal combustion equivalents, it is true that the technological maturity of both means that when it comes to their repairability, experience is a factor. Electric vehicles need fewer repair shop visits but, beyond studies, some consumer voices say that due to their lack of running-in they may suffer reliability problems. Given the robustness of electrical systems, and the faults that occur in specific vehicle systems, it is considered that the lower maturity of electric vehicles compared to those of conventional combustion is the reason for consumers having this opinion.

In conclusion, electric vehicles are required to pass inspection less frequently than combustion vehicles. This fact, together with the absence of certain mechanical elements that need to be replaced periodically, results in lower maintenance costs for the vehicle. Therefore, it can be stated that electric vehicles (especially those 100% electric) have lower maintenance costs and are repaired less frequently than their combustion equivalents.

TRUE FALSE

MYTH 7



ELECTRIC CAR BATTERIES EXPLODE EASILY

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7

FALSE

ELECTRIC CAR BATTERIES EXPLODE EASILY

Contrary to popular belief, the explosion rate for electric vehicle batteries is not as high as is commonly thought. The various reports published by different countries in the European Union specify that the fire rate for batteries from the distinct types of electric vehicles is equivalent to or even lower than that of combustion vehicles.

The explosion of an electric vehicle battery is the result of its inefficient temperature control by the battery thermal management system (BTMS). Batteries work optimally in a temperature range of 15 to 30oC. However, during their operation a large amount of heat can be generated by one or more battery cells. This leads the battery to lose temperature uniformity. In the event this temperature increase is not optimally managed, it may cause the recommended safety range to be exceeded, leading to the initiation of decomposition of the various cell components and giving rise to a series of exothermic reactions that result in thermal runaway, smoke and even fire.

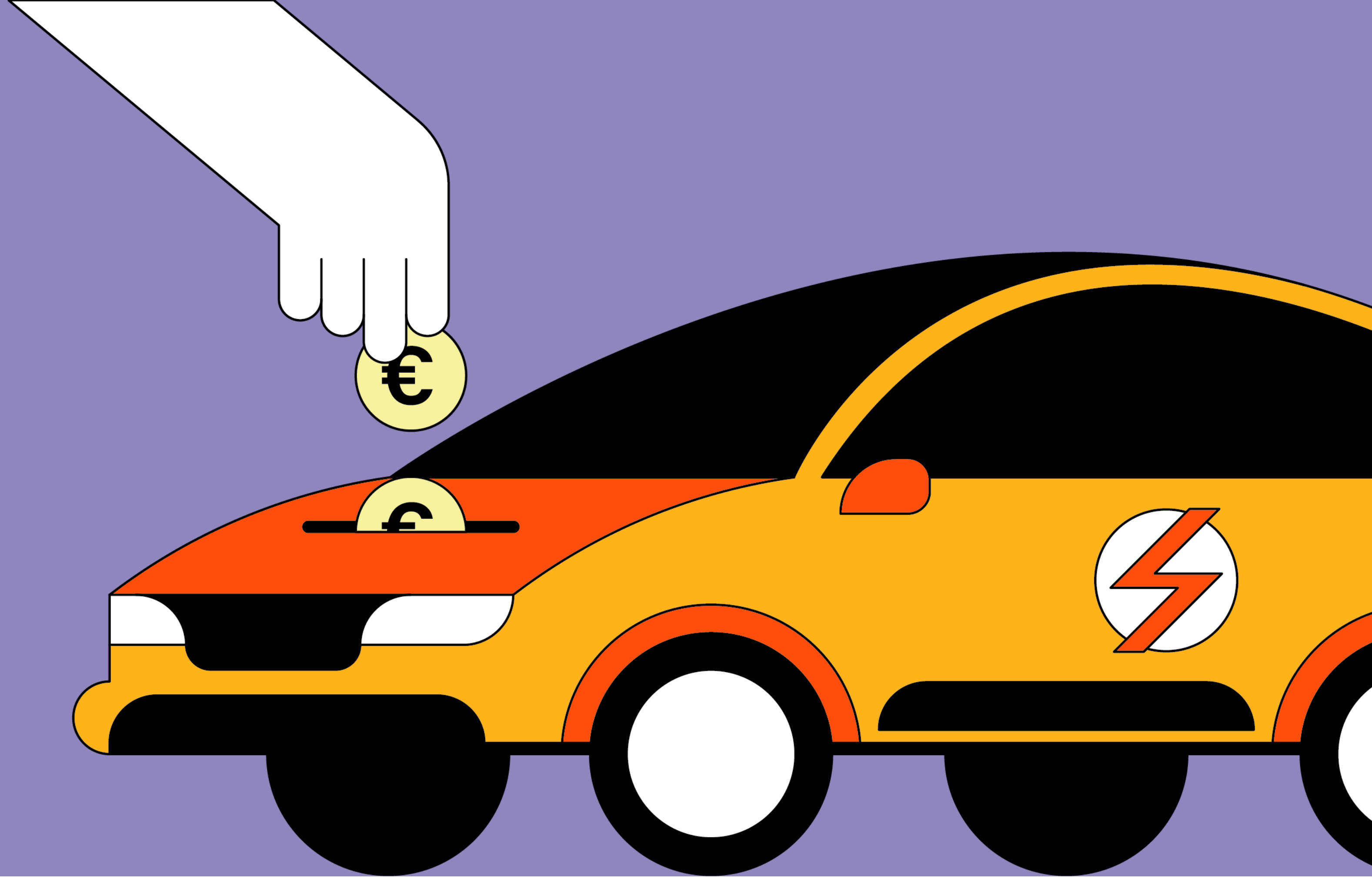
The exothermic reactions that cause this thermal runaway usually occur when the battery is used outside its working range and subjected to extreme electrical, thermal or mechanical abuse. An accident involving an electric vehicle may cause the battery to deform or it to be penetrated by an external object, although this is not the only circumstance that can lead to this situation. An electrical fault in the battery itself when subjected to an overcharge, forced discharge or short circuit are similar causes.

As well as the possible reasons, the frequency this occurs should be analysed. To this end, we shall reference two countries with a high proportion of electric cars. Between 2018-2022 Sweden recorded a total of 81 electric vehicle fires (81 cars, and only 22 due to the battery) when in the same period 656 petrol and diesel cars burned in similar circumstances. This supposes 0.015% of the total number of combustion vehicles, whereas 0.013% of electric vehicles caught fire. Sweden, furthermore, has registered a decreasing rate since 2020 Another European country where electric and hybrid cars dominate is the Netherlands. In the 2022 incident report, where 95% of vehicles correspond to electric or hybrid vehicles, it was determined that of the 306 incidents reported, a total of 179 vehicles caught fire. Of these, under half were directly the result of the battery.

The information available leads us to state that fires in electric vehicles are less likely than they are in internal combustion vehicles and, of these fires, only a small percentage are caused by the battery exploding. It is therefore determined that electric vehicle batteries do not explode easily.

TRUE FALSE

MYTH 8



ENERGY CONSUMPTION AND COST DOES NOT MAKE IT CHEAPER TO DRIVE AN ELECTRIC CAR

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8

ENERGY CONSUMPTION AND COST DOES NOT MAKE IT CHEAPER TO DRIVE AN ELECTRIC CAR

The consumption of a vehicle, be it electric or petrol, varies according to where and in what conditions it is driven. Consumption is not the same keeping a constant speed on the highway as it is in the city, where it is more common to drive at low speeds with a higher number of braking and starting processes. Petrol engines are designed to be efficient by constant driving at moderately high speeds, to which driving in the city or on highways at high speeds produces an increase in fuel consumption. In contrast, electric motors are more efficient than internal combustion engines, particularly when driving at reduced speeds, such as in the city. In addition, electric vehicles have the advantage provided by regenerative braking, acting as generators and allowing a complementary battery charge.

The average price of fuel in the peninsula on 12 April 2024[2] stood at €1.683/l for 95 unleaded petrol and €1.867/l for 98 unleaded. For its part, to consider the cost of an electric vehicle charge it should be taken into account that this varies depending on the charge power, with the price rising as it increases.

In addition, like its internal combustion equivalents, prices vary according to the supplier. In the home, the charge power sits around 7kW, to which the vehicle takes longer to completely charge. However, the charge cost is lower than that for public stations, depending on the tariff contracted and the period in which the charge is performed. To make an estimation for comparison, the following table contains the average cost in kWh:

kWh price according to charge type

Charge type		Cost (€/kWh)
Slow Charge (< 7,4 kW)	Day hours	0,2404
	Night hours	0,108
Fast Charge (50 kW)		0,446
Ultra-Fast Charge (>50 kW)		0,523

TRUE FALSE

[2] At the time this section of the report was created.

8

FALSE

ENERGY CONSUMPTION AND COST DOES NOT MAKE IT CHEAPER TO DRIVE AN ELECTRIC CAR

Once the different electric vehicle charge tariffs have been noted, it proceeds to compare the cost of fuel necessary to drive 100km taking a series of models as an example.

Fuel cost per 100km for petrol vehicles

Model	Minimum cost (€/100 km)	Maximum cost (€/100 km)
Mercedes-Benz Clase G	19,53	28,76
Land Rover Range Rover 5.0 V8 S/C 565 CV	17,57	26,45
Lexus RC F Executive	13,85	20,95
Opel Astra ST INNOVATION 1.6 T S/S 136 CV	14,20	15,44
SKODA OCTAVIA COMBI 2,0 TSI 140 kW (190 CV)	14,56	14,91
Peugeot 508 Active PureTech 180 S&S EAT8	11,36	12,96
SEAT IBIZA 1.0 TSI 115CV Start&Stop DSG-7 XCELLENCE	10,12	11,89
Volkswagen T-Cross Advance 1.0 TSI 81kW (110 CV)	9,94	11,18
Kia CEED 1.0 T-GDI Concept 100 CV	8,88	9,76
Toyota AYGO X CROSS s-CVT	8,70	9,23

TRUE

FALSE

8

FALSE

ENERGY CONSUMPTION AND COST DOES NOT MAKE IT CHEAPER TO DRIVE AN ELECTRIC CAR

The results obtained are those for optimal conditions in regard to ambient temperature, and upon performing a WLTP cycle. Nevertheless, as mentioned previously, extreme temperatures increase consumption by km driven of electric vehicle batteries, to which in the case of the most unfavourable situation, that is, temperatures of 40ºC, the cost of covering 100km would vary. Regardless, the differential margin is sufficiently wide to affirm that the energy consumption of electric vehicles, together with the cost of recharging their batteries, means it is more economical to drive an electric vehicle than its petrol and diesel counterpart.

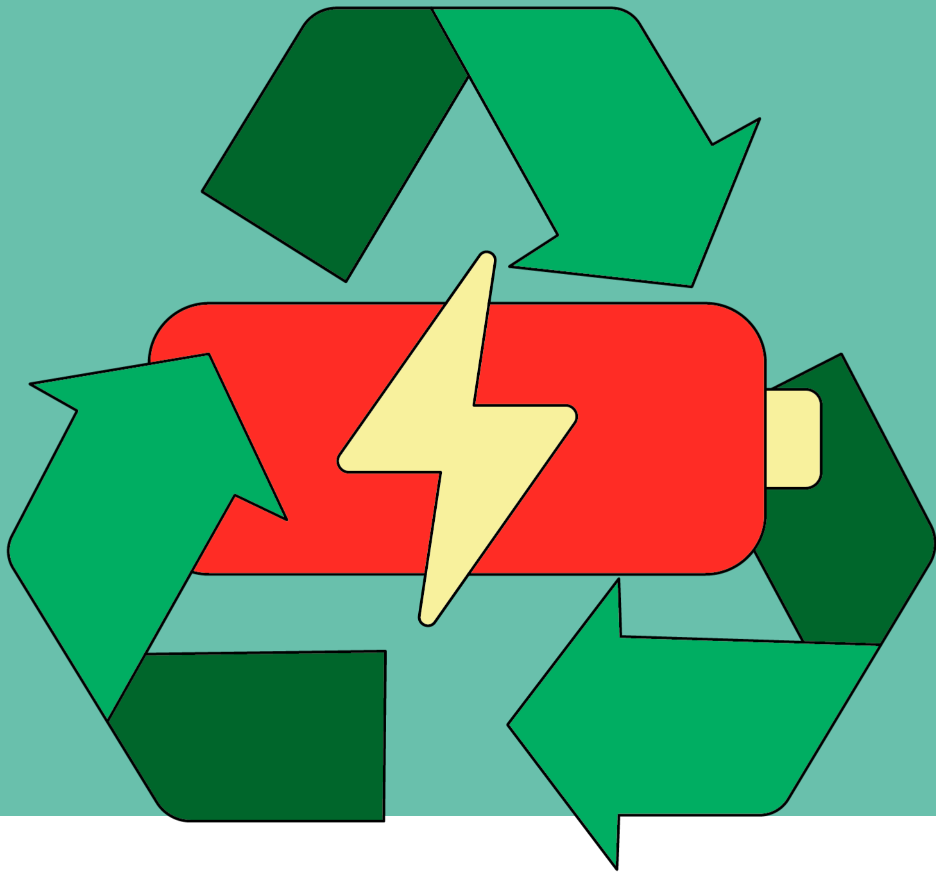
Cost (€/100 km) of electric vehicle charge by charge type

Model	Slow (Day)	Slow (Night)	Fast	Ultra Fast
Audi e-tron 55 quattro 300 kW	5,93	2,66	9,86	13,80
Polestar 2 Dual Motor Long Range Performance	4,76	2,14	7,92	11,09
Volkswagen ID.5 GTX 220kW (299 CV)	4,09	1,84	6,80	9,52
SEAT Mii electric 61kW	3,05	1,37	5,08	7,11
Hyundai IONIQ 5 160kW 73kWh RWD	4,04	1,81	6,72	9,41
SKODA ENYAQ 60 Bateria 58,3 kWh 132 KW (180 CV)	3,77	1,70	6,28	8,79
Kia E-NIRO Emotion	3,68	1,65	6,12	8,57
TESLA Model Y	3,77	1,70	6,28	8,79
Citroën ë-C4 Eléctrico 100 KW SHINE	3,68	1,65	6,12	8,57
BMW i i3 BEV i3	3,15	1,41	5,24	7,34

TRUE

FALSE

MYTH 9



ELECTRIC CAR BATTERIES CANNOT BE RECYCLED

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9

FALSE

ELECTRIC CAR BATTERIES CANNOT BE RECYCLED

The materials that comprise electric vehicle batteries can be recycled. However, their development, financial costs and the dangerous nature of the process, among other matters, make current recycling rates and the processes themselves, as well as their profitability, undetermined. In general terms, it is in an initial state of industrial implementation.

The materials from which batteries are made are varied, and likewise there are different types. On occasions they are highly toxic to humans, being heavy metals (cadmium), and very harmful to the environment. Their reuse should be one of the main objectives in order to reduce the consumption of prime materials, in turn boosting the circular economy. The new Critical Raw Materials Act of the European Union aims to reduce dependency on third countries of these essential materials, and it is envisaged that by 2030 10% will be extracted, 40% processed, 25% recycled and no more than 65% is to come from a single country outside the EU. Prior to this, the European Union adopted a new regulation on batteries and their waste that covers their entire life cycle, from production to reuse and recycling.

The Regulation thus establishes requirements in relation to end of useful life, for example collection targets and obligations, material recovery objectives and extended producer responsibility. For producers it establishes battery collection targets (63 % for the end of 2027 and 73 % for the end of 2030) and introduces a specific collection target for light transport battery waste (51 % for the end of 2028 and 61 % for the end of 2031). It also sets the target of lithium recovery from battery waste at 50% for the end of 2027 and 80% for the end of 2031. Likewise, this regulation foresees compulsory minimum levels of recycled content for batteries used in industry, starting, ignition and lighting and electric vehicle batteries, fixed initially at 16% for cobalt, 85% for lead, 6% for lithium and 6% for nickel. The recycling efficiency target from now to the end of 2025 is set at 80% for nickel-cadmium batteries, and 50% for other battery waste.

Various methods are used for recycling battery components. The Business Association for the Development and Promotion of Electric Mobility (AEDIVE in its Spanish abbreviation), in its 2024-2024 Electric Mobility annual directory, provides detailed information of the Processes and Stages of Lithium Battery Recycling from prior treatment to metal recovery. In turn, the United States Department of Energy has also defined different methods for recovering materials that comprise batteries: function, direct recovery and intermediary processes.

However, despite these increasingly innovative methods, batteries are still not being recycled adequately. The reasons for this situation are, in general, the associated costs. Furthermore, there should be a consideration of the dangerousness

TRUE

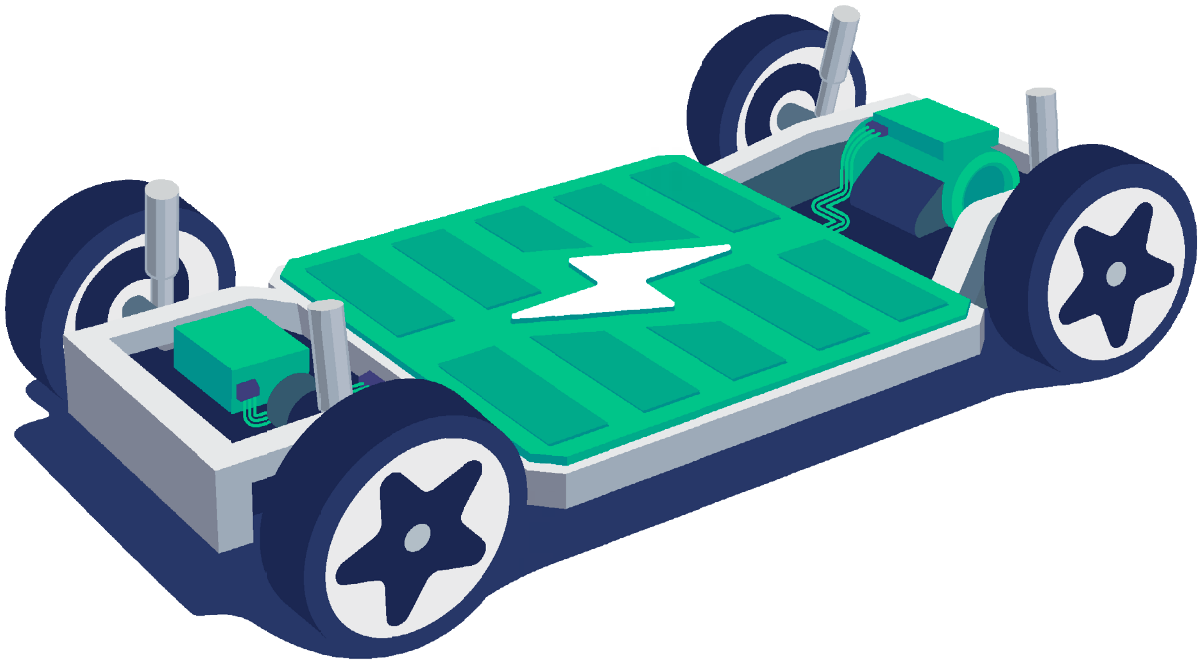
FALSE

9

ELECTRIC CAR BATTERIES CANNOT BE RECYCLED

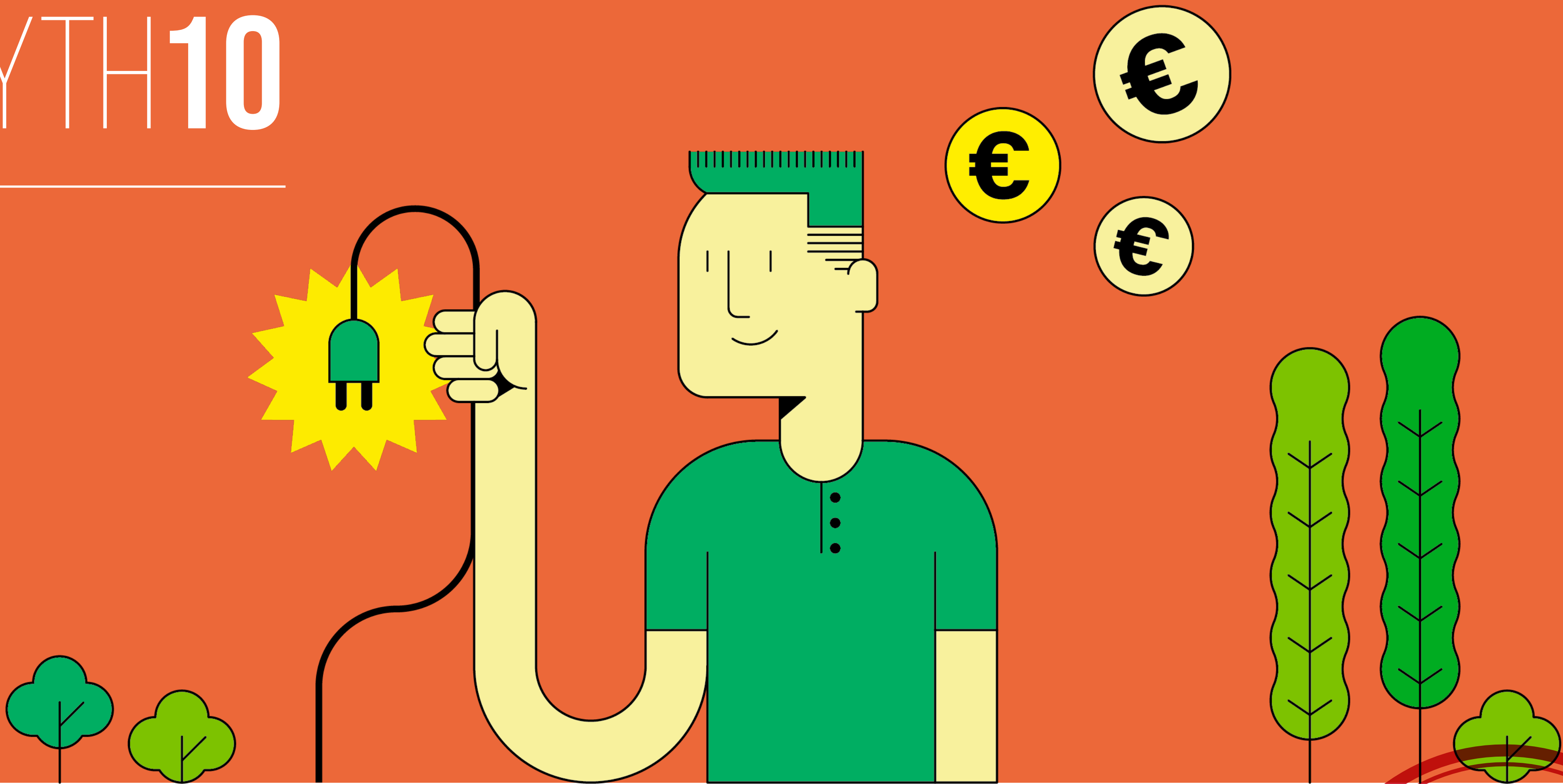
of these processes, which involve acids and extremely high temperatures. Further research is necessary to optimise component recycling, in order to stimulate the circularity of the economy of this sector and reduce the costs associated with these processes. However, at present, and thanks to current technology, up to 70% of components can be recycled. Despite this, it is considered more likely for electric car batteries to be reused, given their greater environmental benefits.

In conclusion, electric vehicle batteries can be recycled and reused, with clear targets already existing at European level to this end. It is nevertheless true that these processes still lack economically and environmentally viable infrastructure and solutions. There is still a need for a great effort of investment and research to guarantee a full recycling and reuse cycle.



TRUE FALSE

MYTH 10



HYBRID AND PLUG-IN HYBRID CARS ARE A BETTER ECONOMIC AND ENVIRONMENTAL OPTION THAN 100% ELECTRIC CARS

FALSE

ecodes
tiempo de actuar

10

FALSE

HYBRID AND PLUG-IN HYBRID CARS ARE A BETTER ECONOMIC AND ENVIRONMENTAL OPTION THAN 100% ELECTRIC CARS

Non-plug-in hybrid vehicles have batteries that provide a range of only a few kilometres, in contrast to the plug-in versions and, above all, those that are 100% electric. At present, and predominantly, increasing the level of electrification of a vehicle results in an increase in its purchase price. However, to determine the best economic and environmental option, both within the electric segment and compared to combustion cars, it is necessary to consider the fuel consumption, costs and emissions generated.

The results obtained from comparative estimations determined that conventional hybrids could be the most economic option. Attention must be paid, though, to the appearance of new 100% electric models at more reduced prices from China compared to European manufactured options, as well as the availability of grants and subsidies linked to the acquisition of the 100% electric variety. It can therefore be concluded that the total cost of ownership (TCO) makes 100% electric cars the most economical option today.

The consumption data for the different vehicles are determined via the performance of the standard cycle, which in the case of passenger cars is the WLTP. This cycle is on the whole carried out in electric mode for plug-in hybrid vehicles, resulting in rates of consumption considerably lower than the true figures, according to indications by the study carried out by the ICCT (International Council on Clean Transportation), where close to 9000 plug-in hybrid vehicles were analysed across Europe, which reached the conclusion that their true consumption (l/100 km) was three times higher than the certified figure. This was mainly due to the fact that, of the 100 km driven, only 45% were covered employing the vehicle's electric mode. This does not just mean an increase in the charging cost, but also in the emissions generated during circulation, which are equivalent to those generated by the conventional hybrid.

Moreover, when evaluating environmental impact, the entire life cycle of the vehicle in question must be considered, including its manufacture and the entire process involved in the energy used as fuel (obtaining of petrol and electricity).

TRUE

FALSE

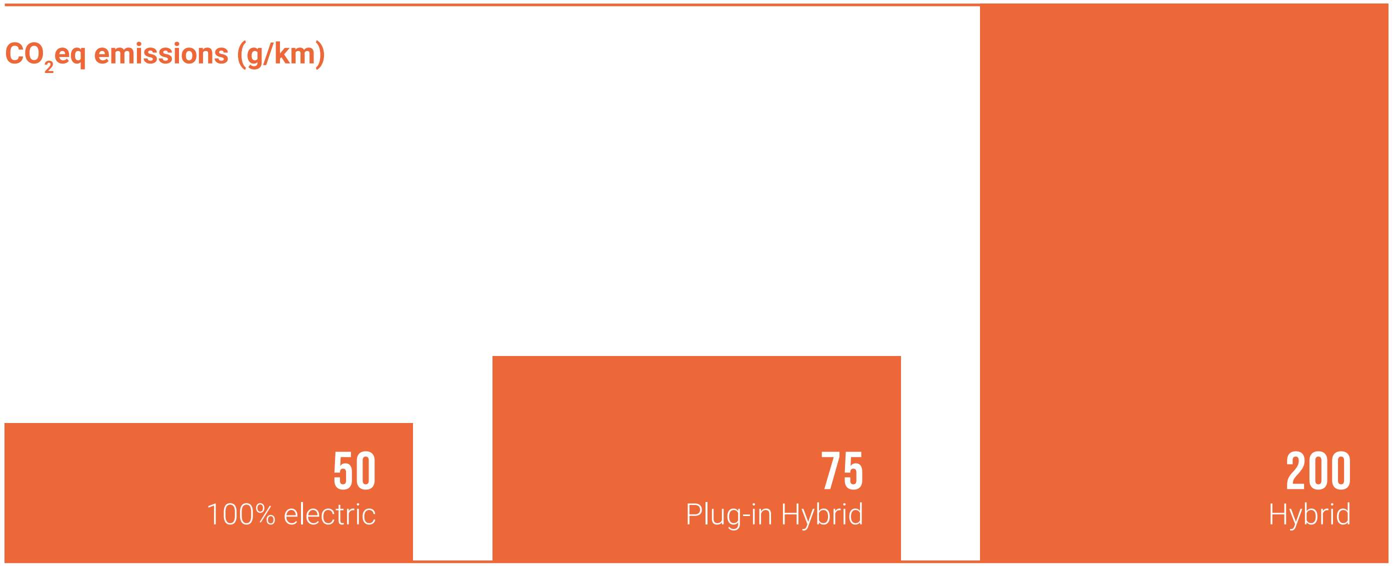
10

HYBRID AND PLUG-IN HYBRID CARS ARE A BETTER ECONOMIC AND ENVIRONMENTAL OPTION THAN 100% ELECTRIC CARS

As shown, the electric vehicle is the least polluting, following by the plug-in hybrid. However, these results are those obtained employing the certified consumption, which as seen above is not "realistic" for plug-in hybrids. The emissions generated when driving these vehicles can be 5 to 7 times higher than those obtained in the certified cycle, and can even exceed those of conventional hybrids (T&E, 2023).

In conclusion, despite being an initially higher investment at present, 100% electric vehicles are the most economic option, due on the one hand to a series of tax benefits and direct grants in their purchase and, on the other hand, due to the low cost of charging their batteries. The latter case becomes more relevant the more the vehicle is used. As in the case of the economic level, the emissions of the 100% electric vehicle are considerably below those of hybrids and plug-in hybrids, due to their zero emissions on the road and, obviously, those with petrol and diesel engines.

Figure 34.
Emissions generated by km including complete life cycle of vehicle. (Van Mierlo et al., 2017).



TRUE

FALSE

MYTH 11

ELECTRIC VEHICLES DON'T WORK IN THE COLD

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11

FALSE

ELECTRIC VEHICLES DON'T WORK IN THE COLD

As the United States Department of Energy itself points out, in cold temperatures, all vehicle batteries, including those in traditional internal combustion engine (ICE) cars, will encounter problems if proactive measures are not taken. Studies carried out in the US and Norway on electric vehicles concluded that in both cold and warm temperatures the reduction in range[3] is modest and the energetic cost similar to their combustion equivalents, to which the vehicles are able to continue functioning in appropriate conditions. Regardless, as for any other vehicle, it should be taken into account that driving conditions are going to greatly influence performance.

According to Glick, en Scientific American (2024), when electric vehicle batteries are charged, the lithium ions that transport the charge travel through a liquid electrolyte from one side of each battery cell to the other (between the positive cathode and the negative anode). As the vehicles consume the energy stored in the battery, the ions return to the opposite side. If a battery cools (during a cold snap, for example), the liquid path between the anode and the cathode thickens, slowing down the ions. This means that colder batteries can take longer to charge and may discharge quicker than in normal temperatures. In 2022, the average range of a battery electric vehicle (BEV) was 354 kilometres.

Norway is a country that had, in 2021, according to the European Automobile Manufacturers Association (ACEA), with 2,802,246 vehicles, a percentage of 16.2 % purely electric cars, considerably higher than that of all EU countries, whose average stood at 0.8%. There, in 2023, the figure for electric car sales reached 82% out of all sales. Taking this market and the geographical and climatic situation of Norway into account, its concern for the influence of climate in the functioning of electric vehicles is high. To this end, the Norwegian Automobile Federation (NAF, 2024) has for a number of years been performing an annual test on electric cars -the biggest in the world-

[3] The range of any electric vehicle is determined by two factors: the capacity of its fully charged battery and the efficiency of its electric drive train. In the majority of electric vehicles, one kWh of electrical energy from the battery pack will give between two and four miles of range. The US Environmental Protection Agency (EPA) publishes range estimates for all electric vehicles (US Department of Energy, 2024). Battery-powered electric vehicles don't use petrol, to which, in order to quantify their efficiency, it created a classification equivalent to miles-per-gallon (MPGe). MPGe is similar to normal MPG, but instead of representing the number of miles a vehicle can travel per gallon of petrol, MPGe represents the miles an electric vehicle is able to travel using the same amount of energy contained in a gallon of petrol. Currently, the EPA supposes that a gallon of petrol contains 33,705 watt-hours. In this document, the terms "MPGe" and "equivalent fuel economy" are used indistinctly and refer to the same measurement.

TRUE

FALSE

11

FALSE

ELECTRIC VEHICLES DON'T WORK IN THE COLD

to analyse the results of the influence of cold and heat in the performance of this type of vehicle. In the test, new electric cars are driven until they run out of energy. Every fifty kilometres the battery percentage and kilometres driven are noted. With this information the range reached in the climatic conditions of the country with the range indicated by the manufacture, outside the test laboratory, can be compared.

In winter 2022, the Tesla Model 3 LR Dual Motor covered 521 kilometres in the test. In 2023, another Tesla, the Model S Standard, broke this record with 530 kilometres on the clock when the car had completely run out of electricity. In the winter 2022 test the temperature was between 0 and minus 10 degrees centigrade, while in the 2023 edition temperatures were between 0 and 19 degrees below zero. In 2024, the vehicle that covered the biggest distance in the test (522 km) was the HiPhi, a Chinese electric vehicle that was, furthermore, that which lost the least (-33 Km) on the manufacturer's figure (555), a mere 5.9% less. This year temperatures fluctuated between 2 and 10 degrees below zero, with a strong wind created by storm Ingunn (NAF, 2024). Analysing the database relating to the tests performed in the last 4 years, the best result lost only 4% on the official km figure; the worst lost 36%.

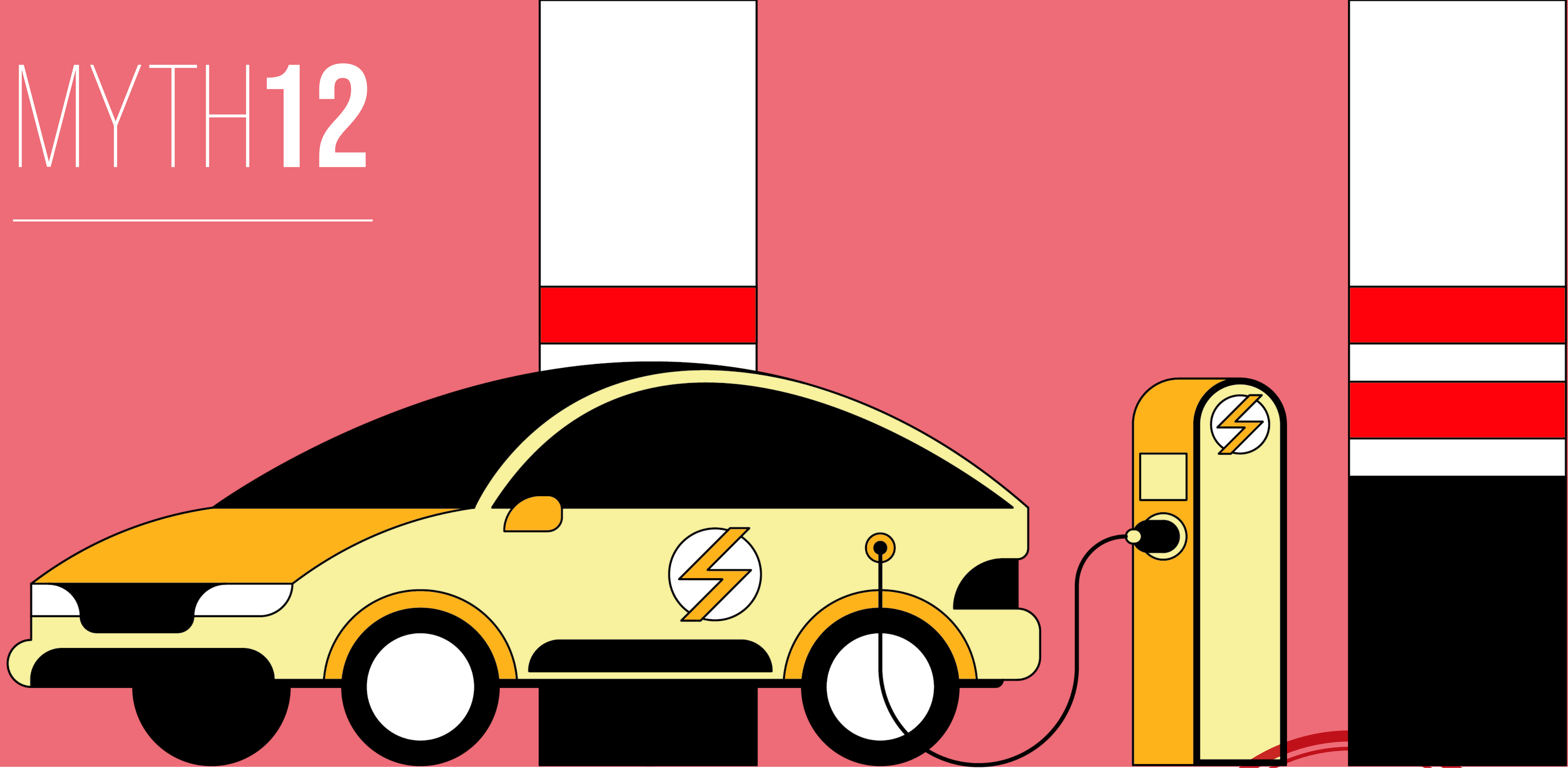
According to the American Automobile Association, Inc. (AAA), the range results for all electric vehicles published by the US Environmental Protection Agency (EPA) may vary in the real world, and do in fact vary, according to various factors: battery temperature, interior temperature, driving habits and conditions. It must not be forgotten that internal combustion engine cars also suffer the cold; their fuel economy reduces by around 15% at 20 degrees F (- 6.67°C), compared to what they would obtain at 77 degrees F (25°C) according to the US Department of Energy.

As for all vehicles, there are many factors that are going to affect performance, but taking into account some usage precautions, the influence of temperature can be moderate on the km of range that a 100% electric vehicle is able to cover. It is therefore untrue that vehicles using this technology are not suitable for driving in places with cold and warm climates, or that they stop working in them.

TRUE

FALSE

MYTH 12



I HAVE TO ASK PERMISSION FROM MY RESIDENTS’ ASSOCIATION TO PUT A CHARGING STATION IN MY GARAGE

FALSE

ecodes
tiempo de actuar

12

FALSE

I HAVE TO ASK PERMISSION FROM MY RESIDENTS' ASSOCIATION TO PUT A CHARGING STATION IN MY GARAGE

Authorisation on the part of the residents' association in order to install a charging station is unnecessary, as long as the installation is performed through the dwelling meter if done in a private parking space. Neither is authorisation required for installing an electric vehicle charging station for private use in the building car park, as long as it is placed in an individual garage space. The property owner is only required to send prior notice of the installation to the residents' association.

To perform the installation in a single family dwelling an exclusive charging circuit must be installed, but integrated into the building network. Regarding buildings of shared dwellings with a garage, various cases may occur. If the charging station is installed in the same building, the regulation allows a cable to be connected from the dwelling electricity meter to the charging station. In this case, the bill is the same for the two electrical installations. Another case is the installation of the charging station in a property separate from the residence. In this case, a request must be sent to the electricity supply company for a new supply point, with a separate meter and its corresponding additional bill. In this case the user will have two separate electric bills, one for their home and another for charging the electric car.

In any case, according to the provisions of article three of Law 19/2009, of 23 November, on measures for the promotion and procedural streamlining of rental and energy efficiency in buildings, adding section 5 to article 17 of Law 49/1960, of 21 July, on Horizontal Property, "the installation of a charging station for electric vehicles for private use in the car park of the building, provided that it is located in an individual parking space, will only require prior notification to the residents' association". As is logical, the cost of the installation and electricity consumption shall always be charged to the owner/tenant of the parking space, and never to the residents' association.

In conclusion, your residents' association cannot stop you from installing a charging station for your electric car in the garage. Neither is it necessary for it to approve or accept it, given that being informed in writing is sufficient. Obviously, the association shall not be responsible for costs. It is also important to remember that connecting the charger to the residents' electricity is not permitted. In this regard, it is necessary to have a line with an independent meter next to the residents' association line for the named contract holder.

TRUE FALSE

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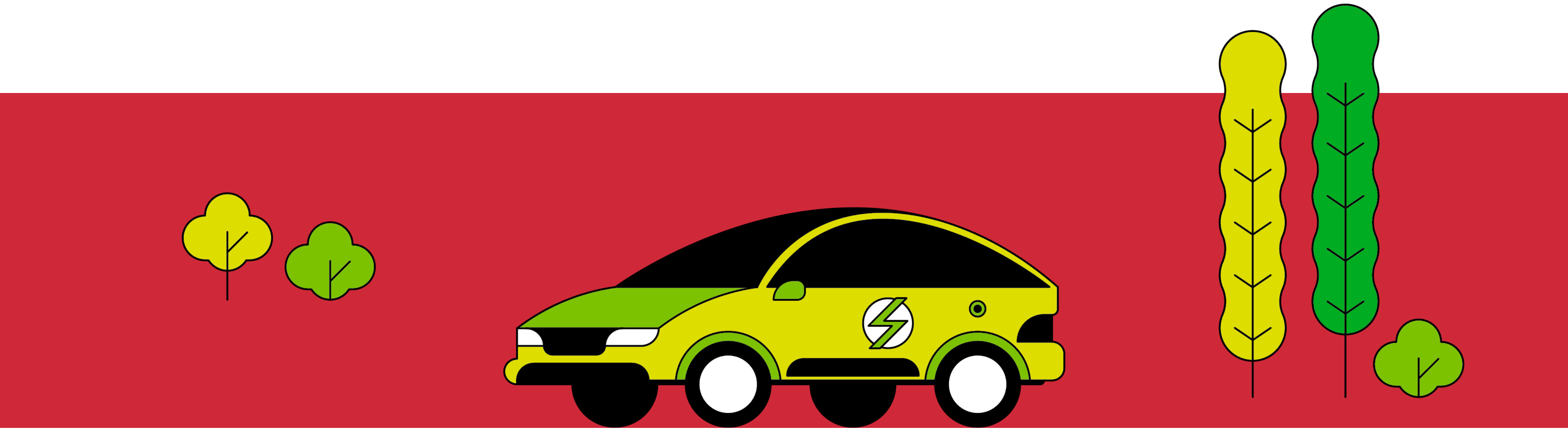

MYTHBUSTER
THE ELECTRIC CAR

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