SLOVAK SOLUTIONS FOR SUSTAINABLE DEVELOPMENT GOALS
Application Form
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GREENER MOBILITY: KNOW-HOW TRANSFER IN THE AREA OF ELECTROMOBILITY

(Analysis of the legal and institutional steps and syllabus for the project)

CONTENT

1 Wider picture

During United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 17 Sustainable Development Goals (SDGs) were created.

The SDGs replace the Millennium Development Goals (MDGs), which started a global effort in 2000 to tackle the indignity of poverty. [1]

At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.[2]

They were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.[3]

GOAL 13 – Climate Action - Take urgent action to combat climate change and its impacts[3].

2 The Paris Agreement

The Paris Agreement was adopted in in 2015.[4] Its central aim is to strengthen the global response to the threat of climate change by keeping the global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.[5]

North Macedonia signed it on 22.04.2016 and on 9.01.2018 it was ratified (Accepted, Approved). [6]

The EU and its Member States are among the close to 190 Parties to the Paris Agreement. The EU formally ratified the agreement on 5 October 2016, thus enabling its entry into force on 4 November 2016. For the agreement to enter into force, at least 55

countries representing at least 55% of global emissions had to deposit their instruments of ratification.

The EU has been at the forefront of international efforts to fight climate change. It was instrumental in brokering the Paris Agreement and continues to show global leadership.

The EU's nationally determined contribution (NDC) under the Paris Agreement is to reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990, under its wider 2030 climate and energy framework. All key EU legislation for implementing this target was adopted by the end of 2018. [7]

3 Climate & energy framework 2030

The 2030 climate and energy framework includes EU-wide targets and policy objectives for the period from 2021 to 2030.

Key targets for 2030:

- At least 40% cuts in greenhouse gas emissions (from 1990 levels)
- At least 32% share for renewable energy
- At least 32.5% improvement in energy efficiency

Under Greenhouse gas emissions – a cut of at least 40% the sub targets are:

- EU emissions trading system (ETS) sectors will have to cut emissions by 43% (compared to 2005) – to this end, the ETS has been revised for the period after 2020
- non-ETS sectors will need to cut emissions by 30% (compared to 2005) – this has been translated into individual binding targets for Member States. [8]

According to European Commission electricity as an energy vector for vehicle propulsion offers the possibility to substitute oil with a wide diversity of primary energy sources. This could ensure security of energy supply and a broad use of renewable and carbon-free energy sources in the transport sector which could help the European Union targets on CO^2 emissions reduction. [9]

4 European Economic Recovery Plan

Established in 2008 in response to economic crisis.

2.3.2 Continuing to invest in the future

d) Research and Innovation

9. Developing clean technologies for cars and construction.

To support innovation in manufacturing, in particular in the construction industry and the automobile sector which have recently seen demand plummet as a result of the crisis and which also face significant challenges in the transition to the green economy, the Commission proposes to launch 3 major partnerships between the public and private sectors:

In the automobile sector, a 'European green cars initiative', involving research on a broad range of technologies and smart energy infrastructures essential to achieve a breakthrough in the use of renewable and non-polluting energy sources, safety and traffic fluidity. The partnership would be funded by the Community, the EIB, industry and Member States' contributions with a combined envelope of at least € 5 bn. In this context, the EIB would provide cost-based loans to car producers and suppliers to finance innovation, in particular in technologies improving the safety and the environmental performance of cars, e.g. electric vehicles. Demand side measures such as a reduction by Member States of their registration and circulation taxes for lower emission cars, as well as efforts to scrap old cars, should be integrated into the initiative. In addition, the Commission will support the development of a procurement network of regional and local authorities to pool demand for clean buses and other vehicles and speed up the implementation of the CARS21 initiative.

In the construction sector, a 'European energy-efficient buildings' initiative, to promote green technologies and the development of energy-efficient systems and materials in new and renovated buildings with a view to reducing radically their energy consumption and CO2 emissions. The initiative should have an important regulatory and standardization component and would involve a procurement network of regional and local authorities. The estimated envelope for this partnership is € 1bn. The initiative would be backed by specific actions proposed under actions 5 and 6 on infrastructure and energy-efficiency;

To increase the use of technology in manufacturing, "a factories of the future initiative": The objective is to help EU manufacturers across sectors, in particular SMEs, to adapt to global competitive pressures by increasing the technological base of EU manufacturing through the development and integration the enabling technologies of the future, such as engineering technologies for adaptable machines and industrial processes, ICT, and advanced materials. The estimated envelope for this action is € 1.2 bn.[10]

5 European Green Vehicles Initiative

European Green Vehicles Initiative (EGVI) is the successor to the European Green Cars Initiative. The European Green Vehicles Initiative is a contractual Public Private Partnership (cPPP) dedicated to delivering green vehicles and mobility system solutions of the future which match the major societal, environmental and economic challenges. Launch in 2013, as part of the “Smart, Green and Integrated Transport” challenge of Horizon 2020, EGVI has succeeded to the European Green Cars Initiative (2009-2013). The latter was created in an ad-hoc manner in the 7th Framework Programme, in response to the global economic crisis of 2008, and led to the joint funding of 113 collaborative research projects. Bringing together stakeholders from three different European Technology Platforms (ERTRAC, EPoSS and Smart Grids) gathered into the European Green Vehicles Initiative Association (EGVIA) and the involved European Commission services (DG RTD, DG MOVE, DG Connect), the European Green Vehicles Initiative is following a system approach to tackle the challenge of decarbonization of road transport, and contribute to the transition to greener road transport, while boosting the innovative strength and competitiveness of the European economy.

Focus:

While the Green Cars Initiative was mainly focusing on passenger cars, EGVI cPPP is covering all types of vehicles, from passenger cars, trucks and buses to two-wheelers and new vehicles concepts. It focuses on the development and integration of technologies enabling the improvement of the energy efficiency of vehicles using alternative powertrains. Although the scopes of the two initiatives slightly differ, the approach and working methods developed are similar and based on the successful experience of Green Cars Initiative. EGVI is following an integrated approach to cover the entire process chain from resource application up to demonstration and creation of services, with the aim to extend research and development to innovation.

Mission:

The European Green Vehicles Initiative is promoting and facilitating pre-competitive research on road transport vehicles within the European Research Area. By identifying the research needs to achieve the targets set in European transport, energy and environmental policies, the EGVI cPPP is contributing to draft the path towards the decarbonization of the European road transport sector and will contribute to the achievement of the ambitious goal of reducing CO2 emissions from transport by 60% compared to 1990 level by 2050, as defined in the White Paper for transport from 2011. Beyond the decarbonization objective, the EGVI cPPP is also supporting the competitiveness of a sustainable transport system in Europe and beyond, development of markets, commercialization production and ultimately employment in the sector.[11]

Directive 2019/1161 - Clean Vehicles Directive

(Directive (EU) 2019/1161 of the European Parliament and of the Council of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles)[12]

The revised Clean Vehicles Directive promotes clean mobility solutions in public procurement tenders, providing a solid boost to the demand and further deployment of low- and zero-emission vehicles. The new Directive defines "clean vehicles" and sets national targets for their public procurement.

A "clean vehicle" is defined as follows:

- Clean light-duty vehicle (cars and vans): any car or van meeting the following emission thresholds:
    - until 31 December 2025: no more than 50g/km CO2 and up to 80% of applicable real driving emission (RDE) limits for NOx and PN;
    - from 1 January 2026: only zero-emission vehicles.
- Clean heavy-duty vehicle (trucks and busses): any truck or bus using one of the following alternative fuels: hydrogen, battery electric (including plug-in hybrids), natural gas (both CNG and LNG, including biomethane), liquid biofuels, synthetic and paraffinic fuels, LPG.

National targets

The national targets are defined as a minimum percentage of clean vehicles in the aggregate public procurement across a Member State. This means, Member States have full flexibility in how they distribute the effort across different contracting authorities

and contracting entities. A Member State has to meet at least half of the procurement target for clean buses in each period through the procurement of zero-emission buses.

Targets for clean light-duty vehicles

Member State	From 2 August 2021 to 31 December 2025	From 1 January 2026 to 31 December 2030
Luxembourg	38,5%	38,5%
Sweden	38,5%	38,5%
Denmark	37,4%	37,4%
Finland	38,5%	38,5%
Germany	38,5%	38,5%
France	37,4%	37,4%
United Kingdom	38,5%	38,5%
Netherlands	38,5%	38,5%
Austria	38,5%	38,5%
Belgium	38,5%	38,5%
Italy	38,5%	38,5%
Ireland	38,5%	38,5%
Spain	36,3%	36,3%
Cyprus	31,9%	31,9%
Malta	38,5%	38,5%
Portugal	29,7%	29,7%
Greece	25,3%	25,3%
Slovenia	22%	22%
Czechia	29,7%	29,7%
Estonia	23,1%	23,1%
Slovakia	22%	22%
Lithuania	20,9%	20,9%
Poland	22%	22%
Croatia	18,7%	18,7%
Hungary	23,1%	23,1%
Latvia	22%	22%
Romania	18,7%	18,7%
Bulgaria	17,6%	17,6%

Targets for clean light-duty vehicles

Member State	Trucks (vehicle category N2 and N3)		Buses (vehicle category M3) – half of the target to be fulfilled by procuring zero-emission buses*	
	From 2 August 2021 to 31 December 2025	From 1 January 2026 to 31 December 2030	From 2 August 2021 to 31 December 2025	From 1 January 2026 to 31 December 2030
Luxembourg	10%	15%	45%	65%
Sweden	10%	15%	45%	65%
Denmark	10%	15%	45%	65%
Finland	9%	15%	41%	59%
Germany	10%	15%	45%	65%
France	10%	15%	43%	61%
United Kingdom	10%	15%	45%	65%
Netherlands	10%	15%	45%	65%
Austria	10%	15%	45%	65%
Belgium	10%	15%	45%	65%
Italy	10%	15%	45%	65%
Ireland	10%	15%	45%	65%
Spain	10%	14%	45%	65%
Cyprus	10%	13%	45%	65%
Malta	10%	15%	45%	65%
Portugal	8%	12%	35%	51%
Greece	8%	10%	33%	47%
Slovenia	7%	9%	28%	40%
Czechia	9%	11%	41%	60%
Estonia	7%	9%	31%	43%
Slovakia	8%	9%	34%	48%
Lithuania	8%	9%	42%	60%
Poland	7%	9%	32%	46%
Croatia	6%	7%	27%	38%
Hungary	8%	9%	37%	53%
Latvia	8%	9%	35%	50%
Romania	6%	0,07	0,24	0,33
Bulgaria	0,07	0,08	0,34	0,48

* his requirement is lowered to one quarter of the minimum target for the first reference period if more than 80 % of the buses covered by the aggregate of all contracts awarded during that period in a Member State are double-decker buses.[13]

Directive 2014/94/EU -on the deployment of alternative fuels infrastructure

It defines alternative fuel: alternative fuels means fuels or power sources which serve, at least partly, as a substitute for fossil oil sources in the energy supply to transport and

which have the potential to contribute to its decarbonisation and enhance the environmental performance of the transport sector.

They include:

- electricity,
- hydrogen,
- biofuels
- synthetic and paraffinic fuels,
- natural gas, including biomethane, in gaseous form (compressed natural gas (CNG)) and liquefied form (liquefied natural gas (LNG)),
- liquefied petroleum gas (LPG);

Sets definitions for electric vehicle and charging points.

Electric vehicle means a motor vehicle equipped with a powertrain containing at least one non-peripheral electric machine as energy converter with an electric rechargeable energy storage system, which can be recharged externally.

Recharging point means an interface that is capable of charging one electric vehicle at a time or exchanging a battery of one electric vehicle at a time.

Normal power recharging point means a recharging point that allows for a transfer of electricity to an electric vehicle with a power less than or equal to 22 kW, excluding devices with a power less than or equal to 3,7 kW, which are installed in private households or the primary purpose of which is not recharging electric vehicles, and which are not accessible to the public.

High power recharging point means a recharging point that allows for a transfer of electricity to an electric vehicle with a power of more than 22 kW.

This directive defines minimum requirements for the member states to ensure appropriate number of recharging points by end of 2020. [14]

Other requirement of the directive is to ensure that charging stations are equipped with Type 2 (Mennekes) for slow charging and CCS Combo 2 for fast charging (minimum requirement). [15]

Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency

It introduces new provisions related to electromobility. Those provisions relate to requirements for installing recharging points and ducting infrastructure for new and existing buildings.

Short summary [16]

Scope		Member state obligation
New buildings and buildings undergoing major renovation	Non-residential buildings with more than 10 parking spaces	Ensure the installation of at least 1 recharging point Ensure the installation of ducting infrastructure for at least 1 in 5 parking spaces
	Residential buildings with more than 10 parking spaces	Ensure the installation of ducting infrastructure for every parking space
Existing buildings	Non-residential buildings with more than 20 parking spaces	Set out requirements for the installation of a minimum number of recharging points — applicable from 2025

The European Green Deal

Is one of 6 European commission priorities for 2019-2024

The European Green Deal provides a roadmap with actions to

- boost the efficient use of resources by moving to a clean, circular economy
- restore biodiversity and cut pollution.

It outlines investments needed and financing tools available and explains how to ensure a just and inclusive transition.

The goal is to be climate neutral in 2050. To do this, the European Commission proposed actions like European Climate Law turning the political commitment into a legal obligation [17] and the European Climate Pact that engages citizens and all parts of society in climate actions[18].

European Climate Law

It's a proposed law that is not yet binding. Its objectives are:

- Set the long-term direction of travel for meeting the 2050 climate-neutrality objective through all policies, in a socially-fair and cost-efficient manner
- Create a system for monitoring progress and take further action if needed
- Provide predictability for investors and other economic actors
- Ensure that the transition to climate neutrality is irreversible [19]

European Climate Pact

The European Climate Pact aims to inform, inspire and foster cooperation between people and organisations ranging from national, regional and local authorities to businesses, unions, civil society organisations, educational institutions, research and innovation organisations, consumer groups and individuals. It will be launched in the last quarter of 2020.

The Pact will encourage people and organisations to commit to concrete actions, designed to reduce their greenhouse gas emissions and/or adapt to the inevitable impacts of climate change.

The Commission will promote pledges (public commitments) and support relevant initiatives with knowledge/capacity-building, to boost their impact and inspire further action across Europe and globally.

In selected areas, the Commission could provide targeted support. At the start, these areas could cover:

- buildings, by stimulating advisory services, facilitating smart financing and assisting local authorities for energy efficient housing;
- mobility, by supporting cities and towns with knowledge, raising awareness, and possibly targeted financial support for sustainable urban mobility plans; and
- tree-planting, nature regeneration and greening of urban areas.[20]

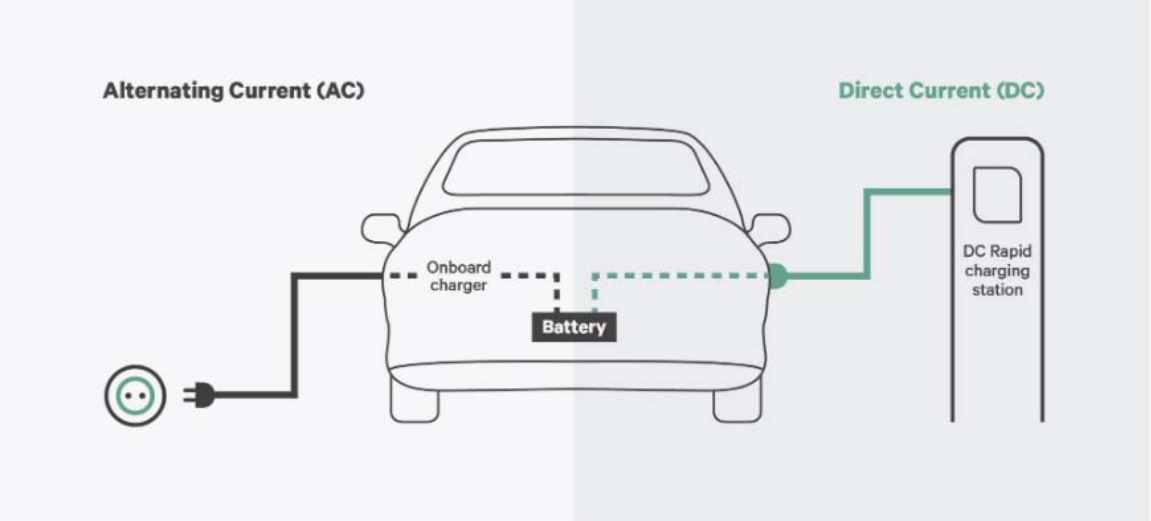
6 Technology of electrical car chargers

2 types of charging: AC and DC charging

There are two types of electric car chargers, based on th type of current: AC (alternating current, as we have in standard power outlets) or DC (direct current, as used in the batteries).

AC charging (Level 2) - Every electric vehicle has some kind of a charger (basically, an AC/DC converter) installed on board. It can be powered from a standard 1 × 230 V mains outlet (one phase), or two- or three-phase voltage 3 × 400 V. The maximum power of such charging (typically from 3.6 kW to 22 kW) is based on the capability of the on-board charger. The charging equipment is affordable and does not require special energy installations, it can be installed almost anywhere. It is meant to be used especially at home or office parking conditions - on the places where cars are parked for several hours.

DC charging (Level 3) - The DC charger delivers high power DC current directly to the battery of the car. (The devices that convert the high power from distribution network to DC are large and not suitable to be carried by the vehicle.) The maximum charging power is given by the charger capacity, battery capabilities and also the battery temperature (which needs to be managed). The basic type of fast charging stations works with outputs up to 50 kW, but new generation of vehicles with larger battery capacity can use charging stations with up to 350 kW.
In general, with fast charging, each electric car should charge up to 80% of capacity in 40-50 minutes. Fast DC chargers require more space.and large energy capacity (often their own transformer from the distribution network) and should be installed along motorways - on the places where cars stop on the long road trips and need to fill up as fast as possible.



Charging time for AC and DC charging is different.

Charging time - 100 km range (DC 50 kW / AC 22 kW)
Nissan Leaf - 15 min/2hours
Hyundai Kona Electric + - 15min/2hours
Tesla Model S 100D - 18min/1hours

Even if you have an AC charger with 22 kW, the real charging speed depends on the capabilities of onboard charger

The fastest AC charging today is 22 kW (some Tesla Model S, Renault Zoe)
3 phases x 32A x 230V = 22 kW

Many cars only have 3x 16 A charging (Tesla Model 3, Mercedes EQC, BMW i3)
3 phases x 16 A x 230V - 11 kW

Most small cars use only one of the three phases for charging (Nissan Leaf, Hyundai Ioniq, Huyndai Kona Electric, VW e-Golf, VW e-up, Jaguar iPace)
1 phase x 32A x 230V = 7 kW

There are currently 4 basic standards (connectors) used for charging

1. Type 1 connector - Japanese standard for AC charging using only single phase. (e.g. Mitshubishi or Nissan), it allows up to 7 kW.

2. Type 2 connector (sometimes called Mennekes) - the standard for AC charging in EU, allows single or three-phase charging up to 22 kW, With an adapter, this plug can be used also by the cars with Type 1 connector.

3. CHAdeMO - Japanese standard for DC charging, which allows charging with a maximum output of 60 kW (Nissan)

4. CCS (COMBO) - European standard for DC charging, Power up to 350 kW with cable cooling. With a Type 2 cable, it allows AC charging.

Economical aspects of charging infrastructure (!!!!!!!!!!update)

Input costs	350 kW	DC 50 kW	AC 22 kW
Charger price (€)	180 000 €	30 000 €	2 500 €
Transformer + connection (100m)	60 000 €	40 000 €	1 000 €
Total	240 000 €	70 000 €	3 500 €

Operating costs	350 kW	DC 50 kW	AC 22 kW
Cost of reserved capacity (EUR/monthly)			
Cost of reserved capacity - 350 kW	1 925 €	-	-
Cost of reserved capacity - 50 kW	-	275 €	-
Cost of reserved capacity - 22 kW	-	-	26 €
Other direct costs (EUR/monthly)			
Insurance	20 €	7 €	0 €
Own consumption	15 €	5 €	1 €
Maintenance	45 €	20 €	6 €
Total fixed monthly costs	2005 €	307 €	33 €

Load balancing function and street light charging

The energy capacity for charging is limited by the availability in the grid and the parameters of the charging cables. The need for cars is also dynamic. Different cars have different maximum charging currents. Almost full battery charges slower, charging speed is also affected by the battery temperature.

Therefore, when building a larger nest of EV chargers, it is economical to use dynamic load balancing functions. Smart EV chargers provide this function - the chargers communicate with the local management component to optimize usage of shared energy capacity.

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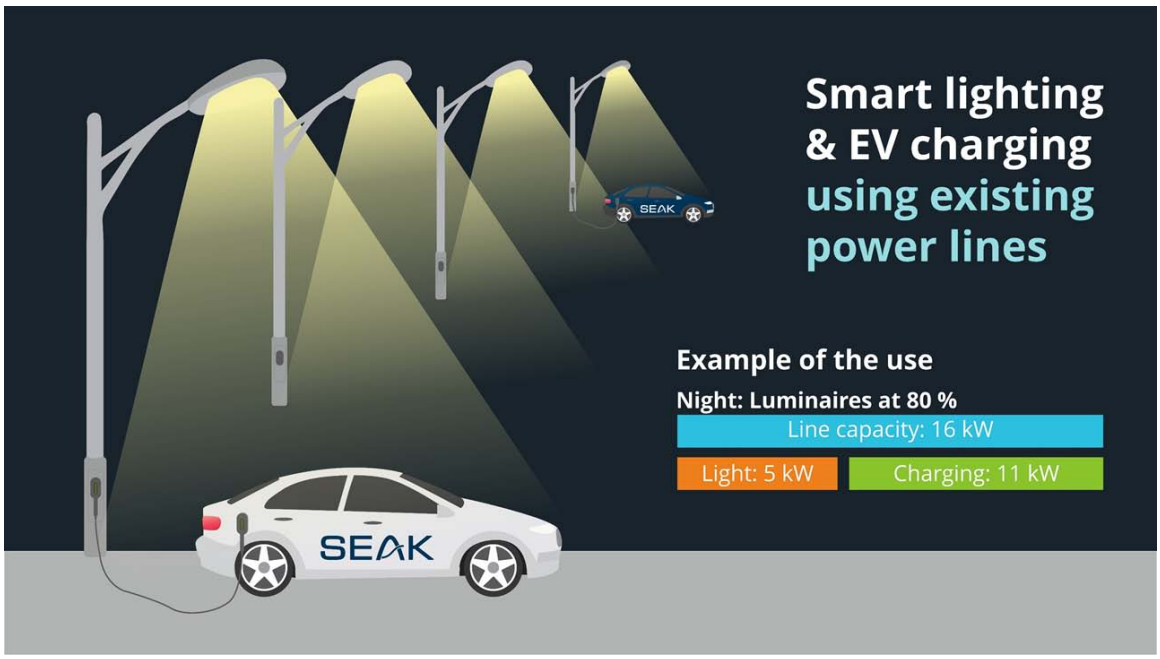
In the cities with street parking, the most economical solution for sharing one power line with multiple chargers is utilizing existing street lighting power grid also for cars.



During the day, street lighting remains in standby mode and we use full line capacity for EV charging. At night, part of the capacity is used for lighting, the rest is shared between connected cars. Intelligent dimming of luminaires (in times and places where no 100% intensity is required all night) increases even more the maximum power we can deliver to vehicles. Lighting always has priority, the rest of the capacity is automatically evenly distributed among charging cars according to their charging ability.

https://youtu.be/6C_VbEcZnVI

7 Payment for charging

While in the testing period the electricity is often provided for free to the drivers, in the long term this is not sustainable. Payment collection for charging is also evolving fast. The pricing/payment collection is handled typically by charging management systems (sometimes called charging backends).

Charging management system allows you to manage the status and configuration of chargers, individual users, their charger access / charging speeds, and charge their credit cards or get the reports for billing. You can also specify for each charger whether it charges without authentication (e.g. customer parking) or requires authentication (employee parking). The mode may change over time (free charging during the opening hours) or use only green energy (photovoltaics) for certain users.

Charging stations communicate with backend management system using OCPP protocol. This open protocol allows to manage various chargers of different vendors in a single system. Currently, the most adopted is OCPP 1.6/JSON.

Options of charging fee:
1. Consumption according to consumed kWh
2. One-time payment
3. Payment for minutes
4. Flat monthly fee
5. Combination of fees (for guests at the hotel for free etc)

Methods of user authentication (RFID, QR code, application)

QR-code authenticated charging

SMS authenticated charging

RFID authenticated charging

8 Installations in Europe

When is it appropriate to use AC and DC chargers?

AC chargers should be built where the drivers typically spend 1 hour or more. The more expensive DC chargers should be built where it is more important to charge the car fast - especially on a stopover during a long road trip.

AC charging stations (3-22 kW, charging time 1 - 16 hours)

- Apartment houses
- Family houses
- Offices
- Hotels and hospitals
- Company cars with night parking
- Shopping centres

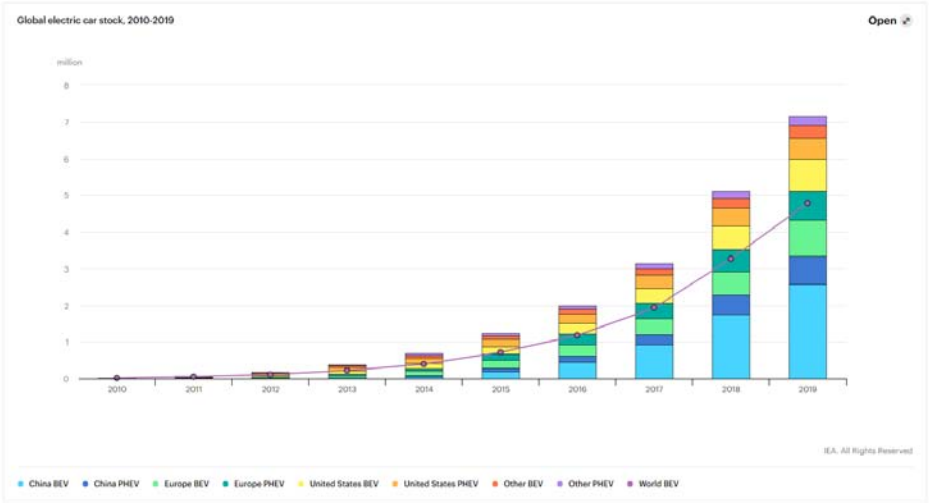
DC charging stations (up to 350 kW, 30 - 60 minutes)

- Gas stations
- Motorways, rest areas and parking lots
- Shopping centres

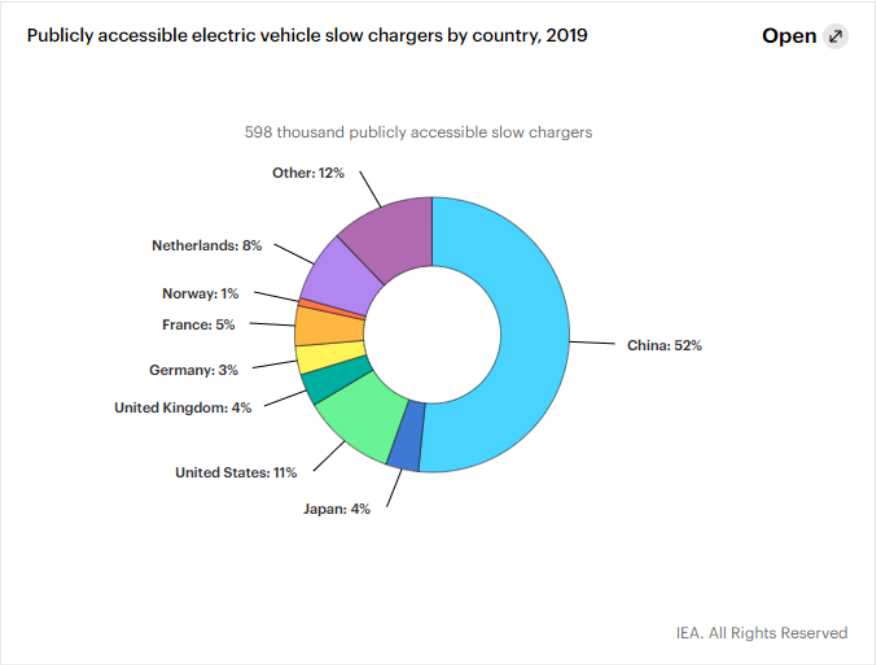
9 Electric car market overview [21]

Sales of electric cars topped 2.1 million globally in 2019, surpassing 2018 – already a record year – to boost the stock to 7.2 million electric cars.1 Electric cars, which accounted for 2.6% of global car sales and about 1% of global car stock in 2019, registered a 40% year-on-year increase. As technological progress in the electrification of two/three-wheelers, buses, and trucks advances and the market for them grows, electric vehicles are expanding significantly. Ambitious policy announcements have been critical in stimulating the electric-vehicle rollout in major vehicle markets in recent years. In 2019, indications of a continuing shift from direct subsidies to policy approaches that rely more on regulatory and other structural measures – including zero-emission vehicles mandates and fuel economy standards – have set clear, long-term signals to the auto industry and consumers that support the transition in an economically sustainable manner for governments.

After entering commercial markets in the first half of the decade, electric car sales have soared. Only about 17 000 electric cars were on the world's roads in 2010. By 2019, that number had swelled to 7.2 million, 47% of which were in The People's Republic of China ("China"). Nine countries had more than 100 000 electric cars on the road. At least 20 countries reached market shares above 1%



Most charging is done at home and work, yet deploying publicly accessible charging points is outpacing electric vehicle sales. The infrastructure for electric-vehicle charging continues to expand. In 2019, there were about 7.3 million chargers worldwide, of which about 6.5 million were private, light-duty vehicle slow chargers in homes, multi-dwelling buildings and workplaces. Convenience, cost-effectiveness and a variety of support policies (such as preferential rates, equipment purchase incentives, and rebates) are the main drivers for the prevalence of private charging. Publicly accessible chargers accounted for 12% of global light-duty vehicle chargers in 2019, most of which are slow chargers. Globally, the number of publicly accessible chargers (slow and fast) increased by 60% in 2019 compared with the previous year, higher than the electric light-duty vehicle stock growth. China continues to lead in the rollout of publicly accessible chargers, particularly fast chargers, which are suited to its dense urban areas with less opportunity for private charging at home.



10 Is electromobility really green? (and other common myths explained)[22]

1.Electric cars are expensive

The price very much depends on which vehicle you will compare the electric car with. Electric cars of a lower category initially had a range of about 200 km, which caused the position as just the second vehicle in the household. At prices over 30,000 euros they were not in competition with models with an internal combustion engine. However, the situation is changing with the arrival of models such as Tesla Model 3, Hyundai Kona Electric, Kia e-Niro or Kia e-Soul, which will offer the range of about 450 km with a price of about 40,000 euros, while they are technological equipment comparable to the highest equipment combustion models. Several countries support the purchase of electric cars with interesting subsidies.

2. Batteries have a short life and are expensive to replace

Most manufacturers assume a battery life of at least 10 years. However, according to recent experience, the battery will not break whole and mostly only one of the battery cells will be damaged. Therefore, the battery can be refurbished. Nissan also announced last year the price of a 24 kWh battery that was used in the Leaf model until 2015: USD 5,499 + installation in about 3 hours. Given that this is basically the only major investment in the life of a car, that's not so much.

3. It takes a long time to charge the battery

It depends on where you charge. Charging time depends on the capacity of the battery, the power of the built-in charger and the available power of the available connection. The fast charger takes charging to 80% capacity 30 to 50 minutes depending on the vehicle. With increasing the capacity of the batteries gradually increases the performance of fast charger stations so that this time is not extended. But you don't always need to charge the battery to 80 percent or more to reach the destination.

4. The range of the car is small

This fact was true in the previous generation of electric cars, when the vehicle had a range of less than 150 km. New generation of electric cars with batteries over 60 kWh allows already a real range of more than 450 km. Such vehicles are already possible considered as a replacement for a vehicle with a combustion engine. With the development of batteries, energy density increases batteries while maintaining their weight and volume, thereby increasing also the range of electric cars.
And let's be honest: how many times a year are you travelling more than 400 km and you are in a hurry so much that you cannot take 1 hour stopover?

5. Is driving an electric car cheaper?

If you charge at home, it's true. During normal driving (without driving on the highway), consumption is around 12 - 20 kWh/100km. At home charging for 15kWh/100 km you pay about 2 €, on a public fast charger you pay according to the operator about 6.60 - 7.50 €. The main way of charging should be charging at home or in a company where the price is significantly lower.

6. Is the electric car really maintenance-free?

In principle, the electric car is much simpler. It does not contain a number of components compared to internal combustion vehicles. Electric cars have no gearbox, clutch, turbo or anything like that. Due to the fact that most of the deceleration is realized by recuperation, there is also minimal wear of the brakes and the pads change after 300,000 or more kilometers in the normal driving style. The main maintenance therefore consists in the inspection of components, maintenance of the air conditioning, inspection of the battery, brakes and other mechanical parts.

7 . An electric car is more dangerous in an accident than a conventional vehicle

This myth is based on the fact that several photographs of burning electric cars have appeared in the media. It's similar effect as in air accidents. Because there are not many electric cars, their accidents are rare and all are publicized.

The truth is that physically damaged Li-pol cells are prone to ignition, when oxygen enters the cell. However, manufacturers know this well, and therefore batteries have multiple protections. The first level of protection is the location of batteries in the floor or under the rear seats. These parts are behind the deformation zones of the vehicle during typical accidents. Additional protection is the battery case. It is mostly multilayer and the whole battery is mounted in a solid, rupture-resistant frame. Gravitational protection provides additional protection a switch that automatically disconnects even in the event of a minor impact battery from the installation of the vehicle to prevent possible short circuits. Of course, even such a system does not provide 100% protection. If a strong impact occurs at a very high speed and the vehicle is damaged, the battery may be damaged and start burning. In this case, however, it usually doesn't matter if you're sitting in an electric, gasoline, or hydrogen car.

8. Fast charging shortens battery life

This information is true, but only valid if you used fast charging as the only way to charge. Fast DC charging is advantageous if you need to recharge for longer journeys. In this case, however, it is best to charge the battery to a maximum of 80% capacity. You charge the remaining 20% in almost the same time as the 80%. Slow AC charging using a 230 V socket or wallbox is much more gentle on the battery and extends its lifetime. It is generally recommended that out of 10 charges be at least 8 it was slow, which is typical anyway.

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