http://www.chademo.com

CHAdeMO

Our mission

Creating the optimal fast charging standard compatible for all EVs and deploying the infrastructure in order to accelerate the realization of e-mobility globally.

Contact

(Tokyo)
Secretariat of association
e-inq@chademo.com

(Paris)
Contact for European liaison
info@chademo.eu

CHAdeMO in a few words

The leading global charging protocol since 2009

CHAdeMO is the DC fast charging standard designed for modern Electric Vehicles, featuring the high density lithium-ion batteries and the compact yet powerful magnetic synchronized motors. The R&D of CHAdeMO dates back to 2005. After more than four years of thorough schedule of testing and on-site demonstration, the first commercial CHAdeMO charging infrastructure was commissioned in 2009.

The purpose of R&D was to develop a public infrastructure of fast chargers thanks to which people can enjoy driving EVs without worrying about the range of their battery. Currently, numerous EVs are mass-produced along with CHAdeMO chargers and can be found in the US, Europe, Russia, Australia, Japan, and other Asian countries.

CHAdeMO as IEC standard

CHAdeMO charging system is included in the drafts of international standards at IEC (IEC 61851-23 for charging system, 61851-24 for communication; and IEC 62196-3 for connector). Those standards are to be published in the summer of 2013

The Technology is our biggest strength

Safety is the overriding priority for CHAdeMO. This is why all chargers (34 types as of March, 2013) go through a strict certification process, ensuring that the quality is in full accordance with the CHAdeMO protocol requirements.

CHAdeMO features a "safety first" design to ensure reliable and convenient charging using the high electric power: several layers of control mechanisms and interlocking systems are deployed to prevent users from any electrical shock. The coupler has been continuously improved for better ergonomics and its development has been accelerated with new suppliers coming into the market.

The unique name representing our philosophy

The objective of CHAdeMO is to provide EV drivers with an opportunity to charge within 5-10 minutes for 40-60 km drive, and to charge 80% of the battery in less than 30 minutes. Assuming ubiquitous availability of such chargers this extends the real driving range and alleviates the nervousness of EV drivers called "range anxiety".

The association's name CHAdeMO originates from Japan, anecdotally meaning "let's CHArge and MOve", in English, and "while having a cup of tea" in Japanese.

CHAdeMO has been in deployment stage for years

CHAdeMO is the world first fast charging solution and represents a proven and efficient technology available to EV drivers.

Today (March 2013), there are as many as 2,496 CHAdeMO chargers in operation and more than 70,000 CHAdeMO compatible EVs around the world, which accounts for as much as 80 % of all the EVs on the road.

CHAdeMO Compatible EVs


Nissan : LEAF


Mistubishi Motors : i-MiEV


Peugeot:iON


Peugeot: Partner


Citroen: C-ZERO


Citroen: Berlingo


Toyota : eQ


MitsubishiMotors: MINICAB-MiEV


Micro-Vett: Fiorino


BD Otomotiv : e-Fiorino


BD Otomotiv: eTRAFIC


BD Otomotiv : eScudo


BD Otomotiv : eKANGOO


Honda : Fit EV


Protoscar : LAMPO2


Mistubishi Motors : OUTLANDER PHEV


Subaru : Plug-in Stella


Mazda : Demio EV


Optare


Mitsubishi Motors: MINICAB-MiEV

To be introduced


Nissan: eNV200


Nissan: Infiniti EV

CHAdeMO fast charging solution is an accelerator in the uptake of Electric Vehicles

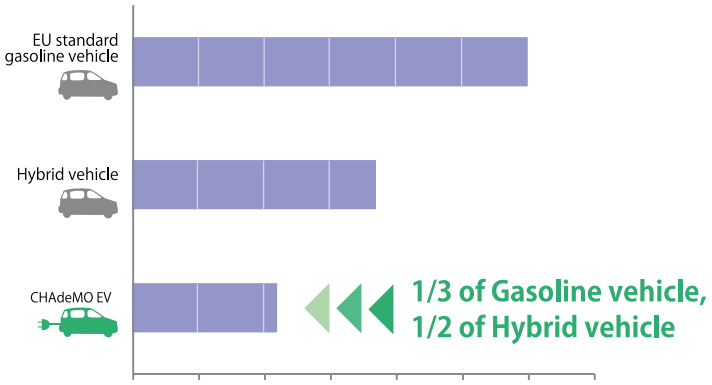
Electric vehicle is the answer to today's environmental challenges

The earth is facing an increasing urgency to stop the climate change. Cities, regions and governments around the world that share an objective of greenhouse gas emissions reduction form global partnerships and cooperate to find the best route to reach the target of 80% CO2 reduction by 2050*1.

Additionally, a growing number of metropolitan areas are facing serious air quality and noise problems. In many cities, the implementation of zero emission and zero noise zones is under way and calls for new technology to help cities to redefine their urban mobility strategies.

On average, the CO2 emissions of CHAdeMO EVs are reduced to as little as **1/3** of EU standard gasoline vehicle and **1/2** of hybrid vehicle.

Comparison of CO2 emission (gCO2/km)



Calculated by CHAdeMO Association based on data of commercial sed vehicles

Electric vehicles provide a unique solution to achieve the CO2 reduction targets and transform the mobility of today. This is why many urban communities put the creation of necessary EV infrastructure high on their agenda.

CHAdeMO DC fast charging provides the best balance to urban EV users in terms of time, space and money. It allows them to re-gain mobility in a short time as it can feed the electricity necessary for 40 km drive within 5 minutes, and 60 km within 10 minutes. With 30 minutes, they can almost fully charge their EV. This saves precious time of city dwellers and saves valuable spaces in the city by limiting the occupancy of charging spots by a single EV user.

Current CHAdeMO charging units have been considerably downsized and can be installed in many existing parking locations with limited civil engineering work. In addition, the price of CHAdeMO chargers has reduced dramatically in the past few years.

The CHAdeMO fast charging solution offers an ideal cost-to-performance ratio as compared to alternatives. With eight years of history behind us, we are convinced that CHAdeMO fast charging is the breakthrough technology for the global success of e-mobility.

Fast charging extends driving freedom

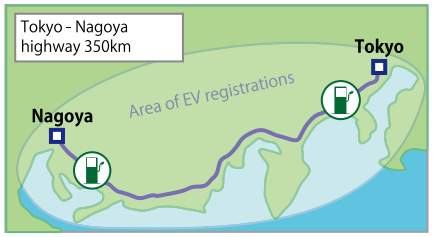
	Short Distance	Mid Distance	Long Distance
Length			
Charging type	Office charging	Destination charging	Pathway charging
Charger type	Normal	Semi-fast or fast	Fast
Charging Site	Home/Office	Urban area (Super Market, Mall, Restaurant, Parking Lot or Gas station in city)	Inter city / National network (Service Area, Gas station)

Fast charger installation increased highway usage.

Less than **20%** of all the registered EV drivers dared to take highway.

Thanks to CHAdeMO fast chargrs, the percentage of highway users more than **Doubled.**

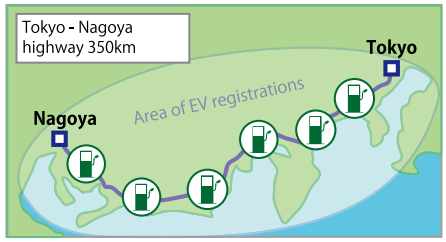
Fast charger : 2 units



19%

of EV drivers used the highway

Fast charger : 6 units

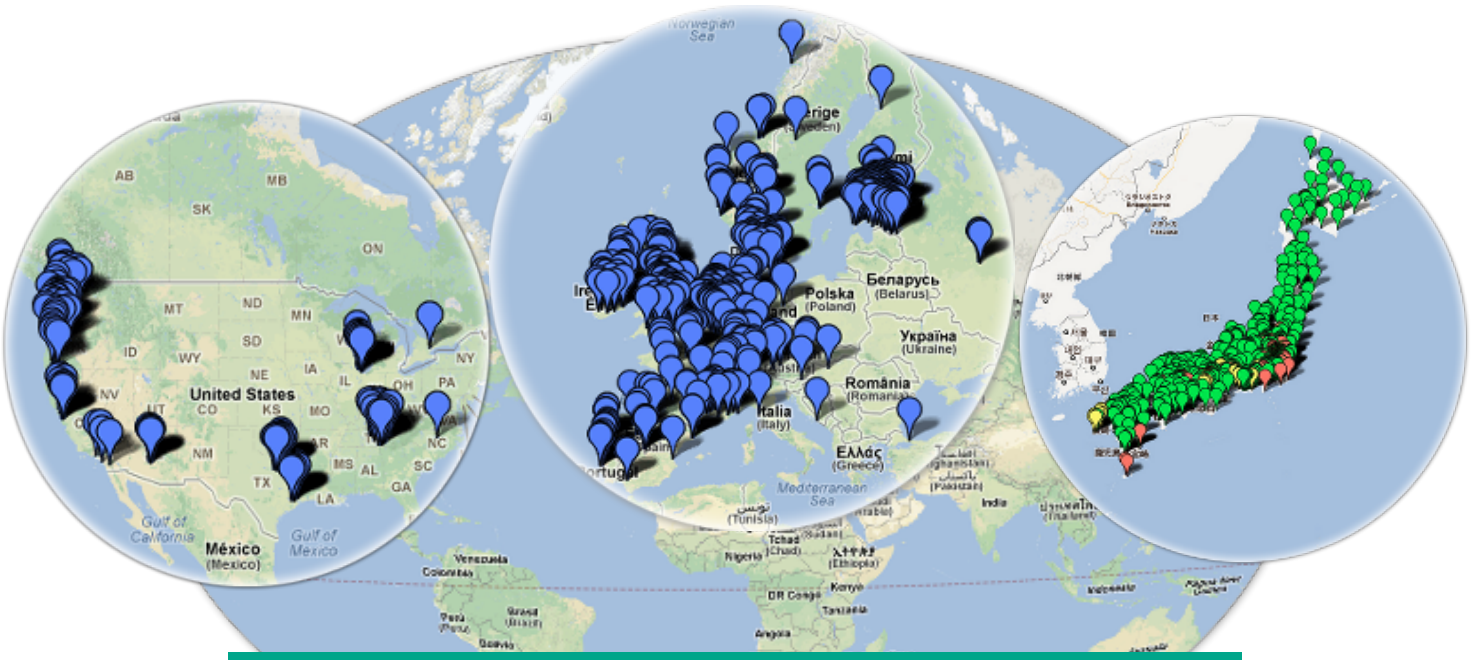


46%

of EV drivers used the highway

*1 G8 and the EU made a political agreement on the CO2 reduction target in 2009.

CHAdeMO charging points are being commissioned for operation every day



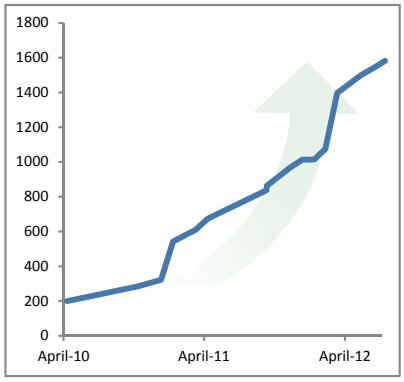
Deployment of CHAdeMO fast chargers in the world

Why is CHAdeMO implemented by so many?

CHAdeMO helps countries and regions around the world to advance their e-mobility strategies and their number continue to grow.

CHAdeMO is implemented by so many because our "DC fast charging" solution meets the needs of all stakeholders including drivers, suppliers of chargers, installers, utilities, municipalities, and automakers. Market competition among different manufacturers has made the infrastructure increasingly affordable, while offering more value added services to EV users.

Evolution of CHAdeMO fast charger 2010 - 2012



On average 100 CHAdeMO charging units are commissioned every month and more than 600 CHAdeMO chargers are in full operation in Europe today.

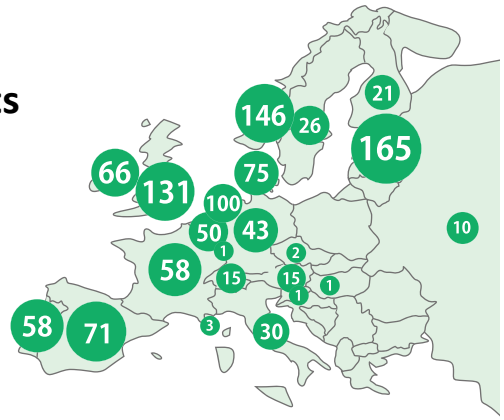
Installed & planned public fast charging infrastructure

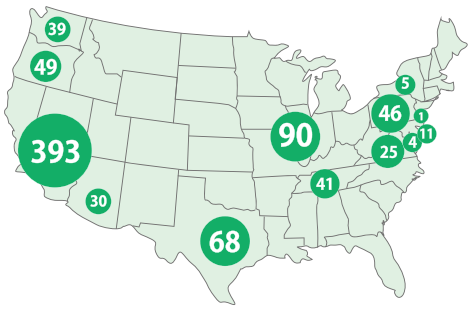
Based on public announcements, more CHAdeMO fast chargers will be installed in 2013.

Europe

1,045 Units

- 652 Installed
- 393 Planned





The US

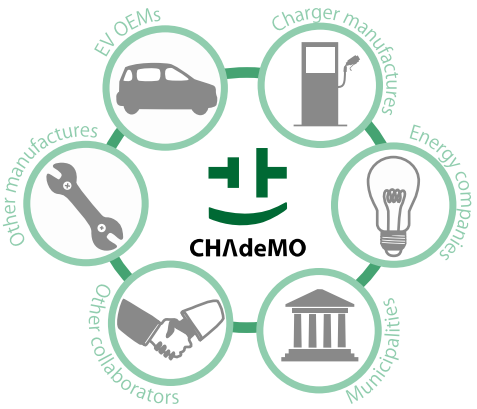
805 Units

- 94 Installed
- 711 Planned

World-class international cooperation across industries

And more...

Open partnerships with various stakeholders



Overall more than **430** organizations in **26** countries around the world are represented in the CHAdeMO association today.

The members of the association represent a set of diverse partners from multiple segments of the industry as well as public sector who all share the same vision. As experiences accumulate, the association can provide comprehensive resources in building new charging infrastructure and can help overcome the wide range of challenges e-mobility project leaders face.

CHAdeMO offers a unique open platform to share knowledge and experiences and continuously improve its solutions based on such dialogues.

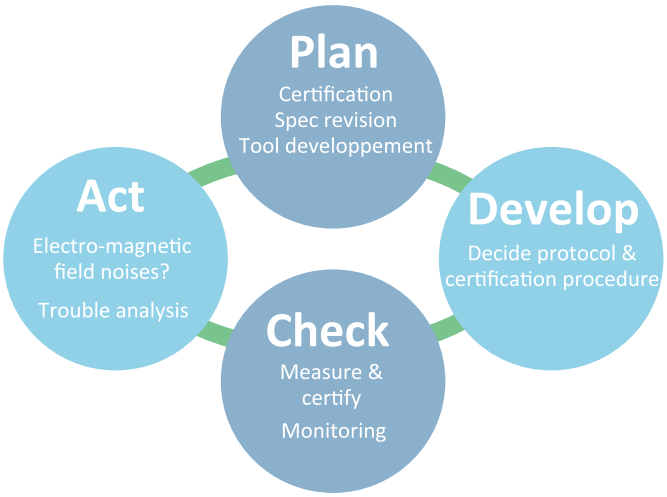
Energy companies, EV OEMs, charger manufacturers, municipalities and external certification bodies, all members of CHAdeMO prove the global acceptance of our technology. As a result, public procurment documents regularly state CHAdeMO as the reference for DC fast charging. CHAdeMO defines the physical interface and the communication protocol between EVs and chargers necessary for DC fast charge. However, beyond this point CHAdeMO offers complete freedom as to how to utilize and expand the technology.

The CHAdeMO solution is an open platform ready to embrace further developments of services and business opportunities. The association is a forum where innovative initiatives are proposed and discussed by new and existing members, including IT experts active in the field of smart grid. We are open and eager to accept new members who share the same vision to promote the world of sustainable mobility.

Open Workshops: Share and progress

Through technical and infrastructure workshops that we organize we encourage active communication amongst members. It is our unique way to share and accumulate knowledge and experiences confirming CHAdeMO standard as the leading charging protocol.

During these discussions suppliers, installers and users can benefit from experiences and first-hand testimonials from other regions and accelerate their fast charging implementation using valuable lessons learned.



Technical Workshops: An ongoing amelioration approach since 2009

Participants from different countries and regions are engaged in regular discussions regarding the improvement of the protocol, as well as certification procedures.

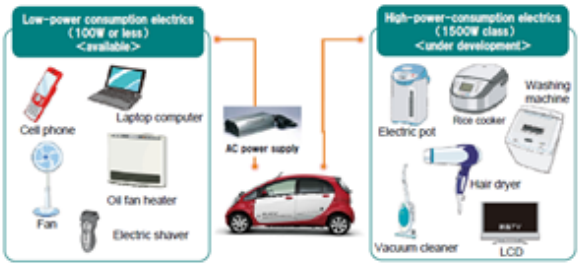
The outcome of these discussions is shared among all regular members to guarantee full transparency. The governance of these workshops is managed by the association and aims for open and active participation from all. The association is conducting regular surveys, and has accumulated a significant amount of feedback from all members. This input is being used to decide next steps and prioritize future agendas.

Infrastructure Workshops: Learning from the field and gathering deployment experiences

Infrastructure workshops are periodically organized where we openly share and discuss how the actual deployments and installation of CHAdeMO fast chargers are conducted around the world. They cover many new and exciting topics surrounding the recharding business ranging from the obstacles in the installation of the chargers to IT options to support the EV charging network.

Examples of infrastructure workshops recently conducted

- Development of the next generation smart grid: Technology that is compatible with the introduction of mass quantities of solar power generation
- V2H and V2G (Vehicle to Home, Vehicle to Grid)
- Photovoltaic system interconnection inverter
- User authentication/billing system
- Plug-In electric boat project
- The field test of EV charging facilities in collective housings (AC charging)
- Fast charging station rollout plan in urban areas
- EV usage in disaster areas
- Information sharing of charger locations and availability



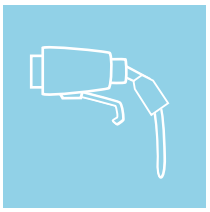
CHAdeMO: The fully proven fast charging system servicing customers around the world

Safety First

Users' safety is paramount. Securing a safe operation by the EV user in a self-service environment is essential since fast charging utilizes high input power with high electric voltage.

CHAdeMO takes all possible measures to make the charging as safe as possible and protect the user against any potential hazard while charging.
CHAdeMO has mandated the following safety principles to guarantee its safe operation.

- Communication is duplicated through the 'analogue' signals via pilot lines and the 'digital' data signals via CAN communication lines. These two communication routes can prevent false operation by defining action by AND condition, and stop order by OR condition.
- The interlocking hardware is structured so that the coupler is never disconnected from the inlet while charging, and no active electricity comes to the exposed terminal parts when disconnected.
- Electricity leakage is prevented through a unique electrical circuit design and the insulation checking procedure.



Ideal ergonomics of the charging connecter

CHAdeMO features connecting devices, consisting of a connector on the charger side and an inlet on the vehicle side. They have been designed to ensure the optimal balance between ergonomics performance, simplicity, and charging capability.

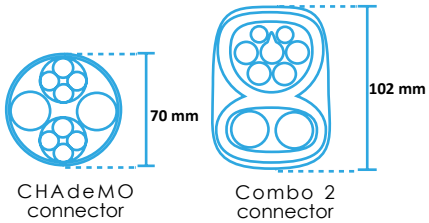
The connector interface is round-shaped and 70 mm in diameter.

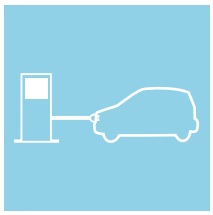
The dedicated DC inlet design allows CHAdeMO to keep the weight of coupler comfortably light for customers' everyday easy use.

The connector is manufactured and distributed by various global suppliers that have gone through extensive testing processes and years of design and development before the market deployment. As for normal AC charging, CHAdeMO-compatible vehicles utilize Type 1 or Type 2 connector (IEC62196-2), depending on the local standards. The AC and DC inlets can be independently positioned on the sides or front of vehicles.

It is a common practice in electrical equipment industry to differentiate the geometrical design of the connecting interface when higher power level is required. CHAdeMO follows this practice. Using different dedicated connectors for different types of electricity is the industry's common wisdom to avoid any confusion by customers.

Using a single connector combining AC normal charging and DC fast charging could lead to a smaller geometry on the vehicle side, but might not mean the compactness of the connector held by customers. The independence between the AC and DC inlets of CHAdeMO has a clear advantage of allowing a flexible vehicle design especially considering the wireless ac charging technology in the future.





The trusted and proven environment of CAN communication

Despite the difference in in their namesm DC fast charger and AC normal charger share one common principle: they both transform the electricity from AC to DC and charge the battery with the DC current. However, for the DC fast charger, the equipment used to transform AC to DC is so powerful that the charger is installed "off the board", usually on the curb side. To control this DC current coming from outside, EV needs to establish a communication network of high speed and reliability with the "off board"charger.

Today,CAN is used as the preferred communication network for all modern vehicles that consists of a number of onboard digital control units. For years it has been recognized as the most reliable and proven solution. Considering the advantage of being aligned with the operation of other control functions in the vehicle, CHAdeMO has chosen to remain within this known and trusted communication environment and use the CAN protocol to t ensure maximum safety and reliability to the users.

The importance of the output power

In determining the maximum power of DC fast charger, one has to consider two factors that present a typical tradeoff between cost and benefit : the cost of securing that maximum power at the charger location, and the time it takes to charge the battery, given the maximum power,

Securing the power to the charger incurs not only the cost of the charger power unit but also the cost of connection to the grid which typically depends on the strength of the grid in a given country/region. In this context, however, the majority of utility companies around the world supported CHAdeMO's view in eventually setting the most appropriate power level at 50KW.

In the future, as the price of the power units decreases and the performance of the battery improves, faster and higher power chargers could become necessary. The conductor geometry of CHAdeMO connector is designed to allow for 200A, which means it can almost double its power level to adapt to the market environment.

However, the issue of grid strength could remain unsolved. In this context, there are there are some CHAdeMO chargers that require much less output power, which can be an ideal solution in certain urban or commercial areas where access to higher power is not readily available. This flexibility on both ends of the spectrum, a higher power solution in the future, and a more practical solution for the moment, reflects the knowledge that members of CHAdeMO have accumulated from the market and the responsiveness of the standard to the changing conditions and needs.

Future-proof flexibility

The CHAdeMO protocol is specifying the charging process among compatible EVs and chargers leaving everything else open to service providers' choice. The baseline is that first and foremost charging is safe and interoperable. The scope of standardization is limited to the strict minimum and all other optional functions are left open to meet any specific local requirement. This flexibility is stimulating the innovative mind of those investors, both on the vehicle and infrastructure side, who recognize the heightened expectation in the market for what EV can bring about. .

In discussing the extent of standardization of CHAdeMO protocol, the guiding principle is that IT services that drivers look for such as navigation or telematics system or communication of other type of data are similar between Battery Electric Vehicles and Internal Combustion Engine vehicles.

It is natural to let the communication protocol for those added value services unspecified, and let customers use technology that is equally used across all vehicle applications and not just for Battery EVs. This would be even true, considering the life style of many EV drivers already making use of smart phones, cloud computing, and evolving ICT technology as a whole, where progress is taking place day to day.

The flexibility that CHAdeMO offers in terms of these optional features is greatly appreciated by operators of charging networks that use different user identification and payment systems ranging from credit card payments , through RFID method to mobile phone payments. CHAdeMO fully embraces this market diversity and offers complete flexibility to service operators.

Compatibility with smart grid applications

The mass deployment of Electric Vehicles very often goes hand in hand with an increasing share of renewable energy production. The grid and the charging technology which connect the two worlds need to respond to both.

To make sure that it does not result in additional strain on the grid, smart grid initiatives are here to ensure that the high level of communication and intelligence is implemented and to allow the charging to stop when it pushes demand beyond acceptable cost levels or supply capacity.

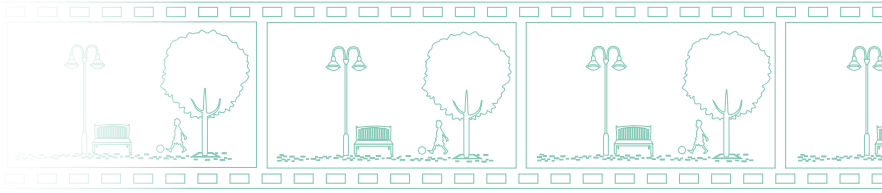
CHAdeMO allows bi-directional charging, capable of addressing efficiently the future needs of the market, therefore it is ready for Vehicle-to-Home systems (V2H).

Battery Electric Vehicles have large state of the art batteries that are an extremely valuable asset for Vehicle to Grid (V2G) or Vehicle to Home (V2H) applications. Nissan and Mitsubishi have already announced the availability of their V2H systems operating with the CHAdeMO protocol and connector. One application is to let this V2H system connected through Home Energy Management System (HOMS) with the roof top Photovoltaic panel and communicate with it for the optimal charge and discharge pattern. This is yet another evidence that CHAdeMO is already addressing the needs of both today as well as tomorrow.

In Europe: CHAdeMO is servicing over 20,000 EV drivers

Today, the number of CHAdeMO fast charges installed around the world over passed 2,490 units (March 2013).

Scene 1
Urban area



Downtown street

Amsterdam, Netherlands

After the first public fast charger was opened near the city ring of Amsterdam in 2011, CHAdeMO fast chargers are now in operation near petrol stations and highway service-centers.

In the Netherlands, 69 fast chargers are currently operational and another ten to twenty are planned to be installed this year.

Barcelona, Spain

The first deployment of a quick charger in Spain took place at a service station in Barcelona in 2011. Mayor Jordi Hereu of Barcelona has attended the inauguration event. More than 20 fast chargers are in currently service in Spain.

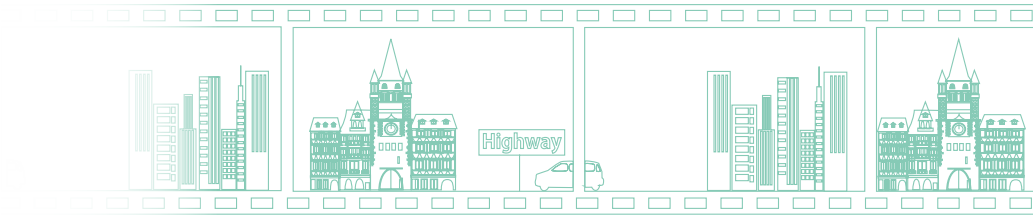
Shopping mall & other attractions

UK

North East England in the United Kingdom is accelerating its Initiative to host CHAdeMO fast chargers. They are now in Dalton Park, the largest outlet shopping center in North East, UK. It is located just off a highway and is expected to attract visitors from the region. In the UK, more than 60 fast chargers are in operation and more than 70 are to be added in 2013.

Scene 2

Inter-city



City to City -Fast charger on the highway

Germany

In 2011 the first CHAdeMO fast charger stations have been installed in Germany around motorway exits. As a result of a collaboration of power companies, 23 stations are strategically placed between Hamburg and Dortmund at motorway gas stations.

Beyond frontier

France-Germany

The French project "Energy Corridor Alsace" plans to install six CHAdeMO fast charging stations. The regional authorities launch those installations to promote development of e-mobility. The operation of the project is managed by SODETREL, a subsidiary of EDF group. This Alsatian project will be integrated into the French-German project CROME ("Cross Border Mobility for EVs"), which aims to demonstrate the possibility of driving with electric vehicles across the border thanks to public fast charging stations. The CHAdeMO fast charger installed in the shopping center parking in Alsace region is one of the first steps to realize e-mobility beyond the border.

Austria - Slovakia

Vienna in Austria and Bratislava in Slovakia are going to be connected by a "green" highway. The cross-border project VIBRATE plans to introduce a fast charging network beyond the bilateral frontier. Supported by the EU, the Federal Ministry of Economy and other regional governing bodies, the project inaugurated the first CHAdeMO fast charging station in June 2012. Several public organizations in the region of Vienna, Lower Austria and Bratislava introduced EVs for business uses. The cross-border fast charging network system will be used to analyze maximizing the opportunities around e-mobility in an effort to reduce GHG emissions.

Scene 3

Nation-wide

Estonia

Estonian government has a national project to create a network of 200 CHAdeMO fast chargers The chargers are placed every 50km across the country. As part of Estonia's green initiative, social workers are to drive 507 fast chargeable EVs.

Ireland

Ireland has been developing a nation-wide network of fast chargers. Thanks to CHAdeMO fast charge points, Irish drivers enjoy stress-free inter-urban drives across the country. Today, already 30 fast charge stations are already available in major urban locations. Convinced of the efficiency of the fast chargers, Ireland plans to install sixty more.

Portugal

Promoting EVs is inscribed into Portugal's national policy. It is one of the first countries who deployed an inter-city CHAdeMO fast charger network. Thanks to the fast chargers installed between Lisbon and Braga the local EV drivers can enjoy inter-city drivers. Portugal's commitment to EVs and their infrastructure is evident when considering the recent news that the Portuguese Police Department introduced EV as part of their fleet : the first security force in the world to do so.

Norway

In 2011, the Transport Minister Magnhild Meltveit Klepa has inaugurated the deployment of multiple CHAdeMO fast chargers. The first installation took place near the highway to Stavanger, close to the southern city of Sandnes, and today more than 60 fast chargers are in service. Now multiple installers, including one nation-wide project by Ishavskraft, commission fast chargers around the whole country.

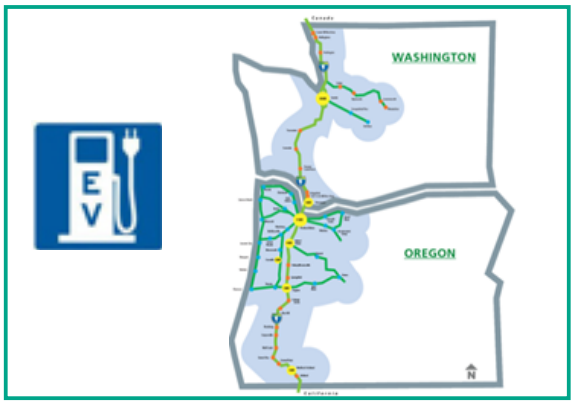
In the US: routes are more and more equipped with CHAdeMO fast chargers

California to British Columbia

The "West Coast Electric Highway"

The "West Coast Electric Highway" is a 1,300 mile-long, tri-state (California, Oregon and Washington State) network of DC fast charging stations along Interstate 5 (I-5) from the British Columbia to Baja California. Signed by the Governors of Oregon, Washington and California and the Premier of British Columbia in Canada in February 2010, the electric highway finally opened in March 2012.

In addition to the above Intercity Highway initiative, Northwest Oregon is also committed to "Electric Vehicle Corridor Connectivity" project to expand CHAdeMO fast charge network. There will be additional 30 fast chargers on major transport corridors.



Chicago, a leading green city

Seven-Eleven on Illinois Tollway Oases

7-Eleven, a convenience store chain, has installed their first CHAdeMO fast charger station in San Bernardino, California, in July 2012 and now several more 7-Eleven CHAdeMO chargers in Illinois Tollway Oases locations are in operation. The Governor of Illinois is committed to make the state the greenest state in the U.S. Indeed, the Chicago area now has 26 fast chargers installed and more are planned to be installed in the near future.

Drugstores

Walgreens, the nation's largest drugstore chain in major cities like Chicago, has started accommodating CHAdeMO fast chargers. 350 Green, a developer of EV charging station networks, plans to provide the infrastructure in New York City.

Drive Green and Shop Green

More and more eco-conscious consumers choose EVs. This is why the Whole Foods Market chain in Chicago has CHAdeMO fast chargers, so that their customers can recharge their EVs while shopping organic products.