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.

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CHAdeMO in a few words

The leading global charging protocol since 2009

CHAdeMO is the DC fast charging standard designed for 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 has been commissioned in 2009.

The purpose of R&D was to develop a public infrastructure rechargeable in such a short time so that users can enjoy the driving performance of EV without worrying about range anxiety. Currently, these EVs are mass-produced along with CHAdeMO chargers, which can be found in Japan, USA, Europe, Russia, Australia, and other Asian countries.

CHAdeMO as IEC standard

CHAdeMO charging system is included in the drafts of international standard 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 first priority for CHAdeMO. This is why all chargers (34 types as of July, 2012) have to 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, accelerated with new suppliers coming into the market.

The unique name representing our philosophy

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

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 is at the stage of deployment for years

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

Today (Sep 2012), there are as many as 1,617 CHAdeMO chargers in operation and more than 57,000 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 vans


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


THINK:City


Protoscar : LAMPO2


Subaru : Plug-in Stella


Mazda : Demio EV


Optare

To be introduced


Mistubishi Motors : OUTLANDER PHEV


Nissan: eNV200


Mitsubishi Motors: MINICAB-MiEV (Truck)


Nissan: Infiniti EV

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

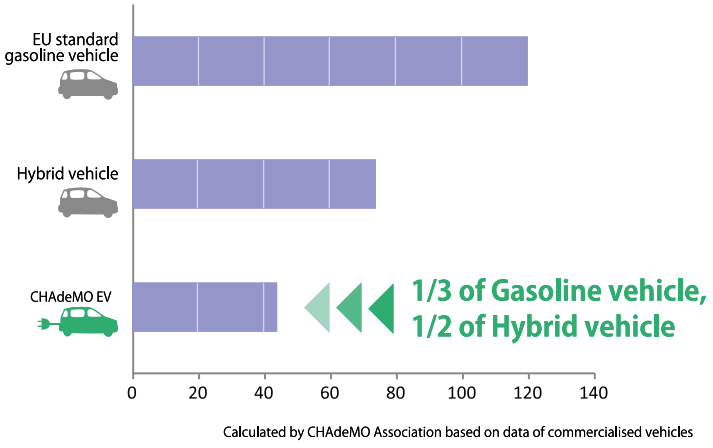
Electric vehicule is the answer to our environemental challenge

The world is facing an increasing urgency to reduce CO2 emission. Cities, regions and governments around the world share a similar objective in emission reduction and are forming global partnerships and cooperation to find the best route in reaching the reduction target of 80% by 2050[*1].

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 it obviously needs new technology to re-define their plan for urban mobility.

On average, the CO2 emission of CHAdeMO EV is reduced as little as **1/3** of EV standard gasoline vehicle and **1/2** of hybrid vehicle.

Comparison of CO2 emission (gCO2/km)



Calculated by CHAdeMO Association based on data of commercialised vehicles

Electric vehicles provide a unique clear solution to these pressing plans. Making sure that people have an access to the necessary charging infrastructure becomes high on the agenda of many urban communities.

CHAdeMO DC fast charging provides the best balance to urban users in terms of time, space and money. It allows the users to re-gain mobility in a short time, it can feed the electricity necessary for 40 km drive within 5 minutes, and 60 km within 10 minutes. With 30 minutes, you can almost fully charge your 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.

Newer CHAdeMO units have a smaller imprint and can be installed in many existing parking locations with limited civil engineering work. In addition, the price of CHAdeMO chargers has become dramatically affordable during past few years.

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

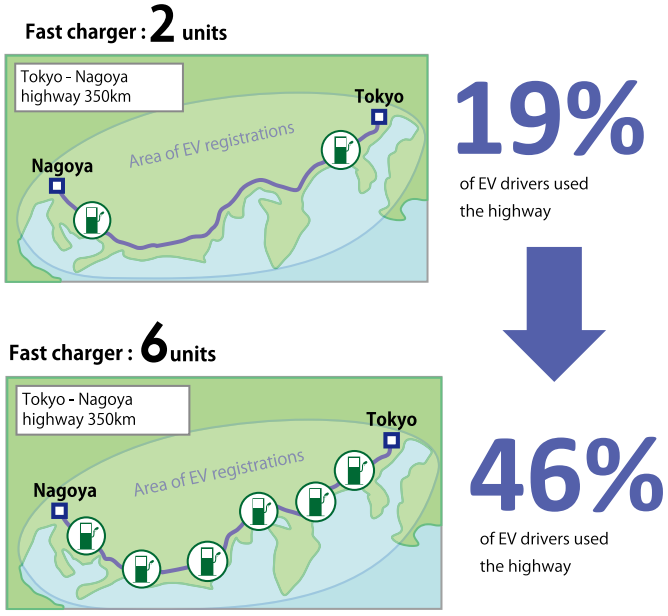
Fast charging extends driving freedom

	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 doubled the highway usage.

Only **20%** of all the registered EV drivers between the two cities drove the highway.

Thanks to CHAdeMO fast chargers, EV drivers using the highway have **doubled.**

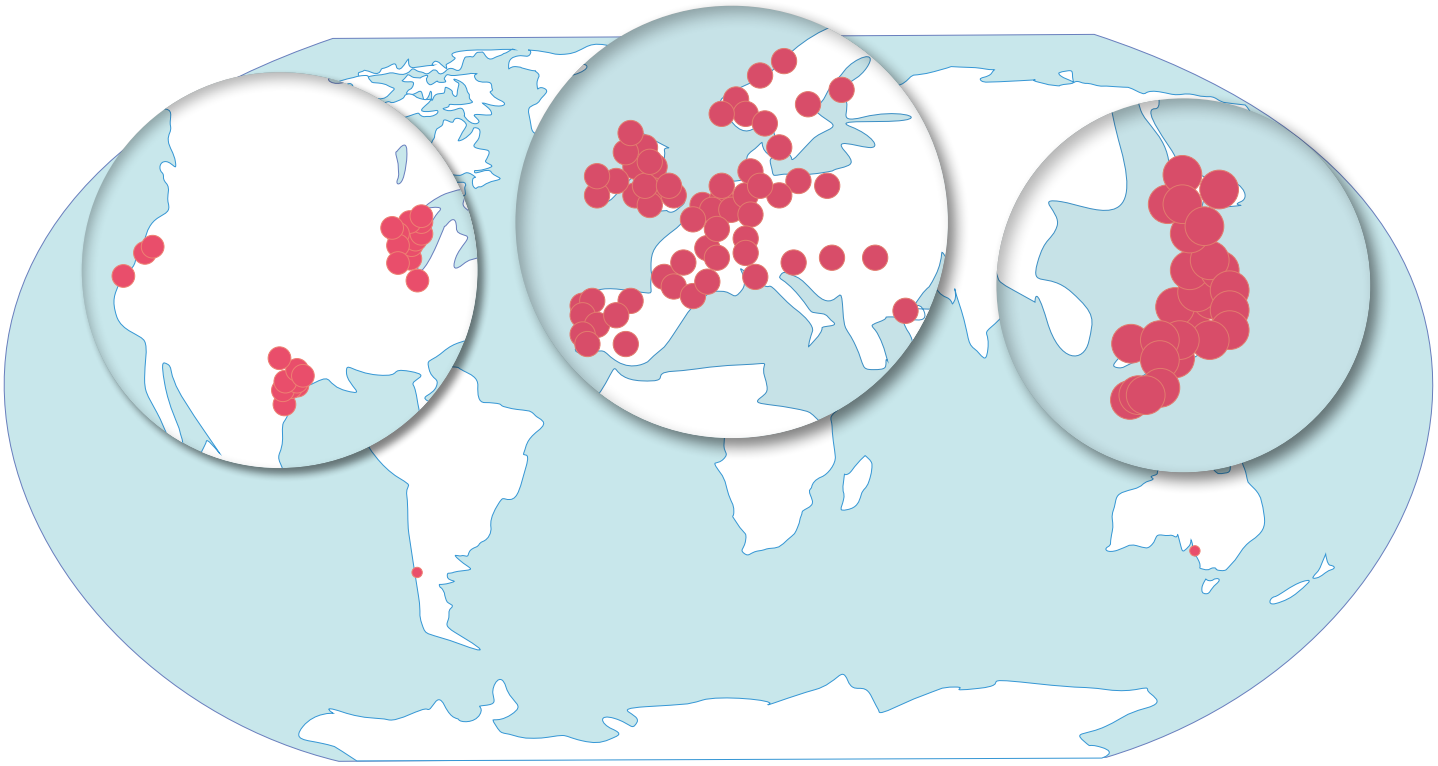


[*1] G8 and the EU made a political agreement on the CO2 reduction target in 2009.

«Global deployment is under way since 2009 and proves our commitment and success»

CHAdeMO charging points are being commissioned for operation every day

Deployment of CHAdeMO fast charger in the world



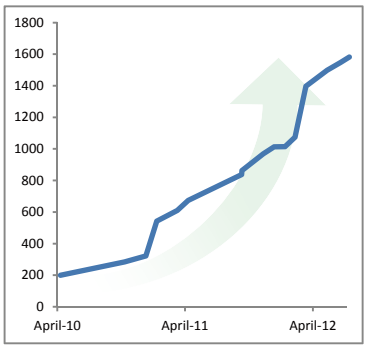
Why CHAdeMO is implemented by so many?

Already today, a number of countries and regions around the world are experiencing advanced e-mobility solutions using CHAdeMO fast chargers, and the number continues to grow.

Why is CHAdeMO implemented by so many?

We believe it is because our "DC fast charging" solution is matching the needs of all stakeholders including drivers, suppliers, installers, utilities, municipalities, and automakers. Incurred by the market competition among different manufacturers, infrastructure cost has become increasingly affordable, while offering more value added service to EV users.

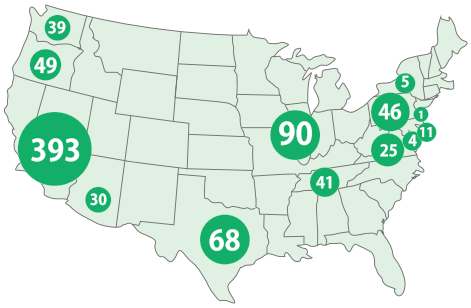
Evolution of CHAdeMO fast charger 2010 - 2012



Many regions have already acknowledged the benefit of DC fast chargers while an average of 100 additional units is being commissioned every month. More than 250 CHAdeMO chargers are in full operation in Europe today.

Installed & planned public fast charging infrastructures

Our reliable source indicates that more CHAdeMO fast chargers will be installed in 2012-2013.



The US

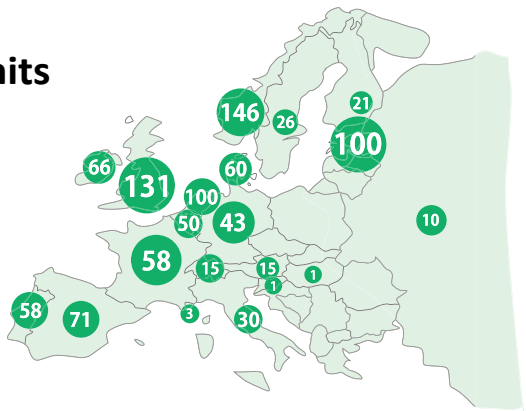
805 Units

- 711 Planned
- 94 Installed

Europe

1,008 Units

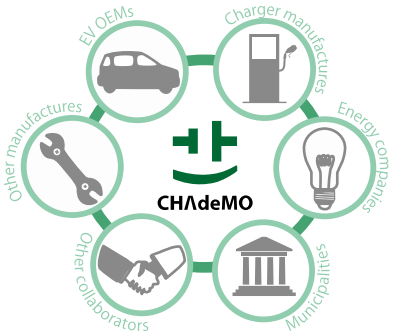
- 725 Planned
- 283 Installed



World-class international cooperation across industries

And more...

Open partnerships in different domains



One of unique advantages of the CHAdeMO association is its diversity in membership. As experiences accumulate, the association can provide comprehensive resources in building new charging infrastructure, and can help overcome the wide range of challenges facing project promoters.

The members of the association represent a set of diverse partners from multiple sectors of the industry who all share the same vision. CHAdeMO offers a unique open platform to share knowledge and experiences, and continuously improve its solution based on such dialogues.

Leading international partners from different sectors, both private and public, make up today's CHAdeMO association.

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

Energy companies, EV OEMs, charger manufacturers, municipalities and external certification bodies, these wide stakeholders prove the global acceptance of our reliable technology. As a result, public tenders are being issued regularly stating CHAdeMO as the reference for DC fast charging.

CHAdeMO is open and eager to accept new members who share the same vision to promote a sustainable mobility world.

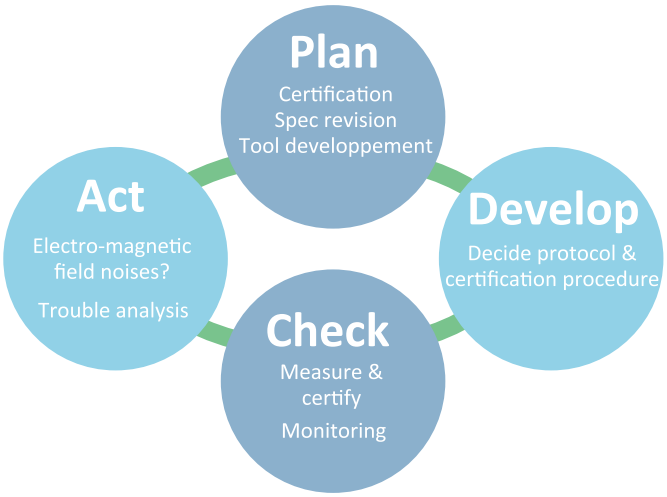
CHAdeMO basically defines the physical interface and the communication protocol between EVs and chargers necessary for DC fast charge. However, beyond this point, CHAdeMO offers complete freedom as to how to utilize and expand the technology.

The CHAdeMO solution is an open platform and ready to accept further development of services and business opportunities. The association is an open forum where innovative initiatives are proposed by new and existing members, including IT experts active in the field of smart grid.

Open Workshops: Share and progress

We organize Infrastructure Workshops regularly to share experiences in different cities and regions, and Technical Workshops to review and improve our technologies.

This active communication platform amongst members is a unique way to share and accumulate knowledge and experiences demonstrating the clear position of the CHAdeMO standard as the leading charging protocol.



Technical Workshop: 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 for deciding on next steps, as well as prioritizing future agendas.

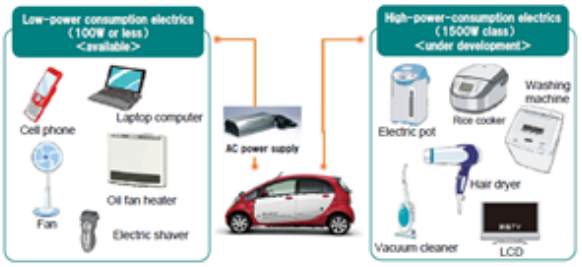
Infrastructure Workshop: Learning from the field and gathering deployment experiences

We organize regular Infrastructure Workshops where we openly share and discuss how the actual deployment and installation of CHAdeMO fast chargers are being conducted around the world.

During these discussions, suppliers, installers and users benefit from first-hand best practices from other regions and can often accelerate the implementation using valuable lessons learned from others. It covers issues ranging from the obstacles in the installation of the chargers to various IT options to support the EV charging network.

Examples of Infrastructure workshop 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 urban areas
- EV usage in disaster areas
- Infromation sharing of charger locations and availability



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

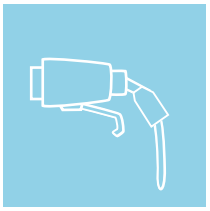
Safety First

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 for making the charging of 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 exclusive pilot signals and the data signals via CAN communication. 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 its unique electrical circuit design and the insulation checking procedure. Even if it does ever occur, the impact is limited within the human safety range.



Ideal ergonomics of the charging connecter

CHAdeMO is featuring 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.

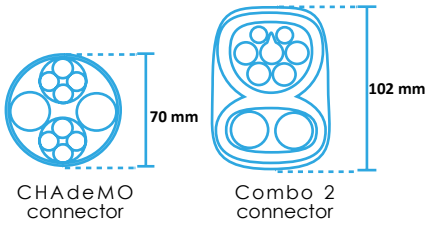
The connector interface is round-shaped and measuring 70 mm in diameter, which directly translates into the size of the connector that comes into the users' hand.

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

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

It is a common practice in electrical equipment industry to differentiate the geometry of the connecting interface when higher power level is required. CHAdeMO follows this practice knowing that dedicated connectors for different type of electricity are the industry wisdom to avoid any confusion by customers.

Using a single connector combining both AC normal charging and DC fast charging could have meant a smaller geometry on the vehicle side, but might not result in the compact connector held by customers. The independent AC and DC inlets on vehicle side of CHAdeMO, contrary to what has been said, have a clear advantage of allowing a flexible vehicle design, including a setting up on each side or at the front of the vehicle.



Future-proof flexibility

The CHAdeMO protocol is simply addressing the charging process with compatible EVs and leaves everything else open to service providers. The baseline is to limit the scope of standardization to the strict minimum to make sure that first and foremost charging is safe and interoperable. All other optional functions are left open to meet any specific local requirement. Furthermore, recognizing the heightened expectation for what EV can bring about, this flexibility is stimulating the innovative mind of investors both on the vehicle and infrastructure side.

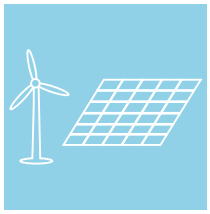
In discussing the extent of standardization of CHAdeMO protocol, the guiding principle should lie in the fact that IT service such as navigation system or communication of other type of data would be similar between Battery Electric Vehicles and Internal Combustion Engine vehicles.

Therefore it is natural to assume that the final chosen technology for communication could be the one equally used across all vehicle applications, not just for Battery EVs. The latest trend indicates that the mainstream goes along with wireless "telematics."

This will keep the current CHAdeMO system remain highly flexible and cost efficient.

Charging technologies altogether will continue to evolve and future systems based around inductive charging for example will rely on wireless communication. Therefore it could also be felt that wireless communication which perfectly goes along with the CHAdeMO protocol offers the best platform in the long perspective.

The flexibility that CHAdeMO offers in terms of optional features is greatly appreciated by operators of charging networks which are using different user identification and payment systems in different locations. Some prefer credit card payment, others RFID method or mobile phone payment. CHAdeMO fully embraces this market diversity and offers complete flexibility to investors.



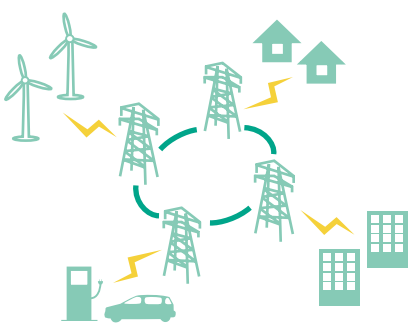
Compatibility with smart grid application

The mass deployment of Electric Vehicles very often goes hand in hand with an increasing share of renewable energy. The grid and the charging technology which connect the two worlds need to be ready to tackle this opportunity.

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

In this perspective, CHAdeMO is ready for Vehicle-to-Home systems and allows bi-directional charging, capable of addressing efficiently the future needs of the market.

Battery Electric Vehicles have large size state of the art batteries that will be an efficient asset for Vehicle to Grid (V2G) or Vehicle to Home (V2H) applications. Taking the example of V2H, Nissan and Mitsubishi have announced the early availability of their V2H systems which operates using the CHAdeMO protocol and connector. This V2H system can be connected with the roof top Photo Voltaic Panel and communicate with it for the optimal charge and discharge pattern. This comes as further clear evidence that CHAdeMO is already addressing the needs of both today's as well as tomorrow's market.



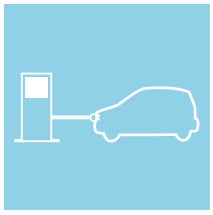
The importance of output power

One of the key trade-offs when installing a fast charger is that the optimal power output depends on two factors: the cost of delivering the required power at the infrastructure side, and the charging time which is also dependent on the battery performance and state of the technology.

Bringing the required power to the charger includes both the cost of the hardware as well as the cost of connecting to the grid at the required level. 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 continues to decrease and the performance of the battery continues to improve, faster and higher power chargers be eventually necessary. In fact, the geometry of CHAdeMO connector is designed to allow for 200A, which means it can almost double its power level.

On the other hand, the installation of 20KW units require much less output power and can be an ideal charging solution in certain urban or commercial areas where access to higher power level is not readily available. This flexibility on both ends of the charging power spectrum demonstrates the clear competitive potential of the CHAdeMO in the market.



The trusted and proven environment of CAN communication

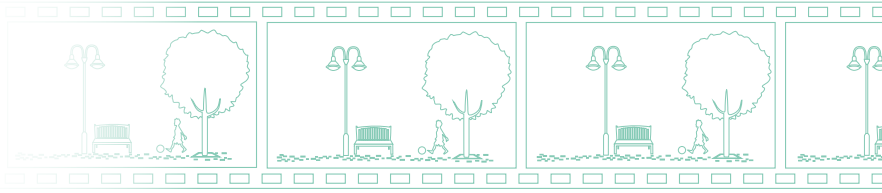
There are limited differences between fast chargers and normal chargers as both transform AC to DC and charge the battery with DC current. The battery and charger control unit manage the DC charging using a physical communication network on the vehicle called CAN. The only major difference is that for fast charging the equipment used to transform AC to DC is installed externally on the curb side but the concept remains similar as with normal charging.

Today, and on a daily basis, CAN is used as the preferred onboard communication network for all EVs as well as conbustible cars and thus recognized as the most reliable and proven solution over a number of years and across regions. Considering the advantage of being aligned with the operation of other vehicle control functions in the vehicle, CHAdeMO elected to remain within this known and trusted environment and use the CAN protocol therefore ensuring maximum safety and reliability to the users.

In Europe: CHAdeMO is servicing over 10,000 EV drivers

Today, the number of CHAdeMO fast charges installed around the world over passed 1,580 units (Aug 2012).

Scene 1
Urban area



Downtown street

Amsterdam, Netherlands

City of Amsterdam is an active member of CHAdeMO European Steering Committee. After first public fast charger was opened near the city ring of Amsterdam in 2011, there are 7 fast chargers in operation near petrol stations, at service-centers etc.

In the Netherlands, 34 fast chargers are currently operational and another ten to twenty are planned to be installed this year.

Barcelona, Spain

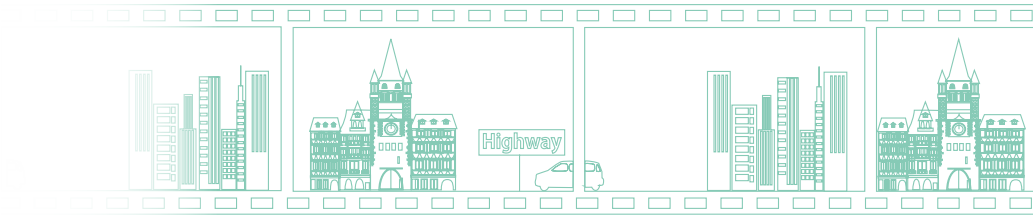
The first deployment of quick charger in Spain have inaugurated at a service station in Barcelona in 2011. Mayor Jordi Hereu of Barcelona has attended the inauguration event. More than 20 fast chargers are in service in Spain.

Shopping mall & other attractions

UK

One North East in the UK is accelerating its Initiative to host CHAdeMO Fast Charger. CHAdeMO fast charger is now in service in Metro Centre of Dalton Park, the Europe's largest shopping center. The location is just off a highway and expects to attract visitors around the region and tourists. The One North East region proceeds "plugged-in-places" initiative with plan to install total of 12 fast chargers and 1,000 normal chargers by 2013.

Scene 2
Inter-city



City to City -Fast charger on the hightway-

Germany

In 2011, the first CHAdeMO fast charger stations have been installed in Germany around motorway exits. Further collaborated with power companies, 13 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 wants 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 is 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 EU, the Federal Ministry of Economy and other regional governing bodies, the project has 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 using. 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 around the state. The chargers are placed every 50km across the country. Related to its green initiative, social workers are to drive 507 fast chargeable EVs. The installation is to be completed end of 2012.

Ireland

Project "Inter-urban Electric Drive" is deployed all around Ireland. Thanks to CHAdeMO fast charge point, Irish drivers enjoy stress-free inter-urban drives across the country. Today, 30 stations of the fast charge are already available in major urban locations. Convinced of the efficiency of the fast chargers, Ireland plans to install sixty more chargers.

Portugal

It has been the national policy to promote the usage of EVs and Portugal is one of the first countries who have deployed an inter-city CHAdeMO fast charger network. Installed between Lisbon and Braga in the North, the local drivers enjoy inter-city drives. Their commitment in EV and its infrastructure is indicated in recent news that the Portuguese Police Department introduced EV as their fleet, making them 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' opening. The first installation took place near the highway to Stavanger, close to the southern city of Sandnes, and today, 25 fast chargers are in service. Now multiple installers vigorously commission fast chargers around the country, including one nation-wide project by Ishavskraft.

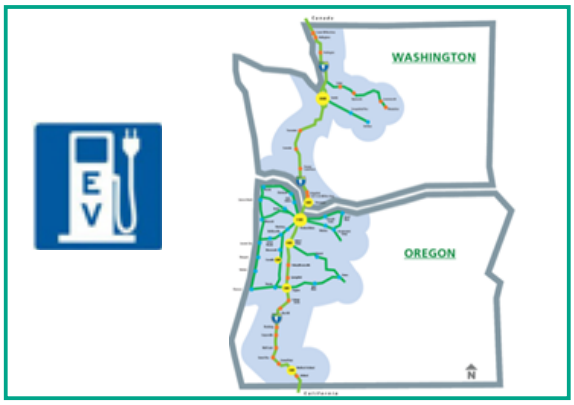
In the US : routes are more and more equipped with CHAdeMO fast chargers

California to British Columbia

The "West Coast Electric Highway"

The "West Coast Electric Highway" is a 1,300 miles-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 is finally opened in March 2012.

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



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 and now several more 7-Eleven at 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 some tens are planned to be installed in near future.

Drugstore

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

Drive Green and Shop Green

Many responsible consumers are more and more tended to drive sustainable. This is why the Whole Foods Market in Chicago have CHAdeMO fast chargers, so that their customers recharge their EVs while shopping tasteful organic products.