

FRENCH ELECTRICAL VEHICLE MARKET



C, Centria tutkimus ja kehitys - forskning och utveckling, 4

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FRENCH ELECTRICAL VEHICLE MARKET

Centria ammattikorkeakoulu 2013

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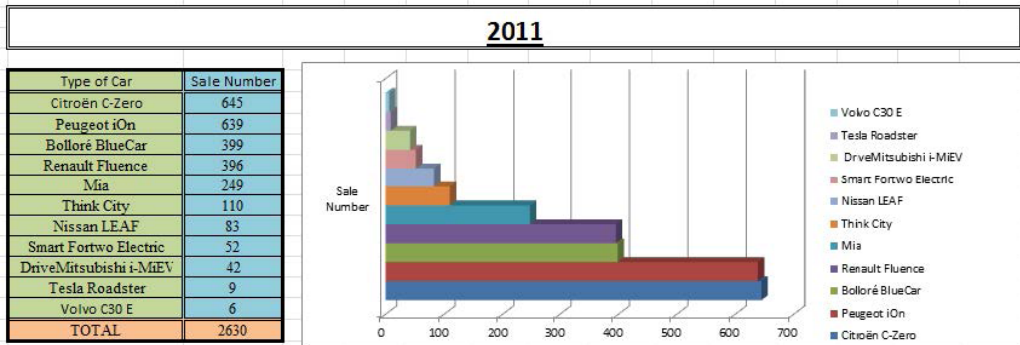
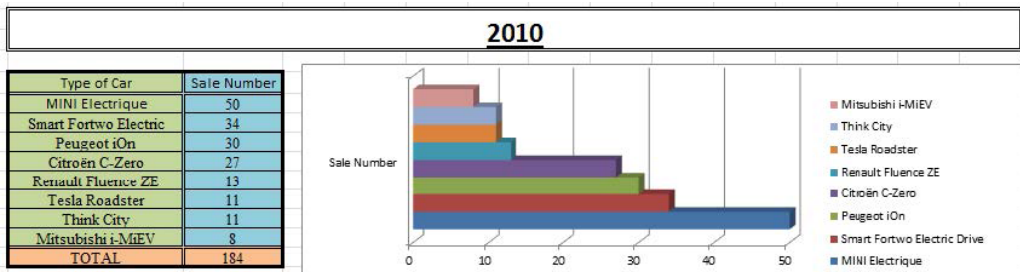
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1. Overview of the French Market

France has three huge automotive constructors: Peugeot, Citroën and Renault. Peugeot and Citroën are a same organization in a company named PSA, so they have the same project in research and development and for Renault it is the same case with the Nissan Company.

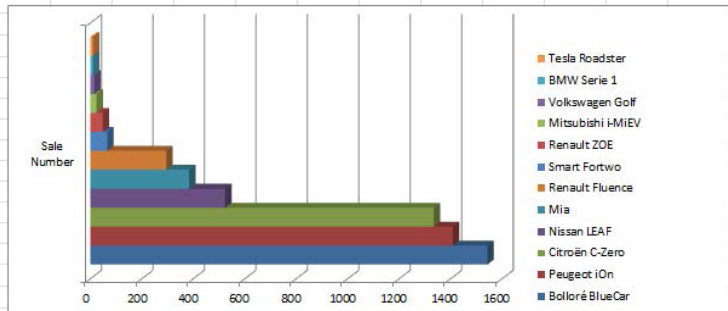
During all my research I noticed that the market of the electric car in France is very small but since the beginning of this year and the launch of several electric vehicles from French car makers the market grows up fast but stays still a small business.

I created an excel files to show the sales numbers:



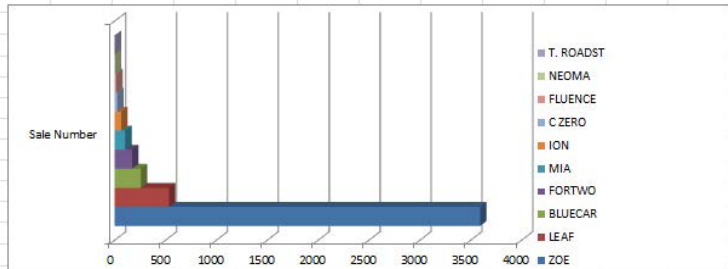
2012

Type of Car	Sale Number
Bolloré BlueCar	1543
Peugeot iOn	1409
Citroën C-Zero	1335
Nissan LEAF	524
Mia	384
Renault Fluence	295
Smart Fortwo	66
Renault ZOE	48
Mitsubishi i-MiEV	24
Volkswagen Golf	15
BMW Serie 1	10
Tesla Roadster	10
TOTAL	5663



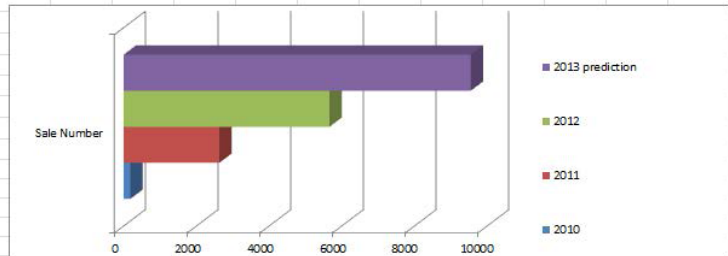
Beginning 2013

Type of Car	Sale Number
ZOE	3594
LEAF	536
BLUECAR	258
FORTWO	172
MIA	105
ION	66
C ZERO	26
FLUENCE	16
NEOMA	3
T. ROADST	1
TOTAL	4774



2010-2013

Type of Car	Sale Number
2010	184
2011	2630
2012	5663
2013 prediction	9548
TOTAL	18025



1.1. Comment and predication

As we can notice in the charts, the French market grew up very fast but the French customers continue to buy mainly French cars and, as we know, famous electric cars come now from Japan. In France we have 481 cars for one thousand citizens, which is less than in Finland. However, during these last two years the French market has been reducing constantly and French companies are having some difficulties, especially Peugeot. But for the electrical vehicles, the French market is special, because the government is one of those helping the most in the world to allow the citizens to access to this kind of cars.

Actually I don't see the number of electric vehicles grow that fast because, like in Finland, French customers need a car to travel long distances because big cities are separated by more than 200km. But I think that in the future we will see more and more "car sharing" like Autolib

used by the French, as it could become another way to travel with more mobility than urban transport and also more economic than using one's own car. The number of electric vehicles continues to grow, but I think the next big step will be made when companies start to change their vehicles fleet for electric vehicle. We are going in this direction because a tax is made on the CO₂ emissions for company fleet vehicles, so if a company doesn't want to pay this tax they will have to switch for an electric car.

The key of the electric markets is, like for other countries, the capacity to recharge faster and, of course, the range of the car. But I think the key of the market is actually not in the hands of the OEM but in the hands of companies of infrastructure, for instance DBT or Schneider Electric. Because if people start seeing how fast electric cars are recharged and recharge station in every city and every gas station, they will consider this kind of car like another one and not something "green" made just to help the earth and the environment. And that is what Renault has understood well because, in addition to the launch of electric cars, it has partnerships with a lot of infrastructure projects (especially with Schneider Electric) and is also starting to create its own recharge network with a project that I will detail more on page 24.

2. OEM's and their project

I had some difficulties to find projects from manufacturers, because it can be seen that electric vehicles are something very important for the future of the companies, and are for this reason kept secret.

2.1. Peugeot-Citroën

Website: <http://www.psa-peugeot-citroen.com/en>

Peugeot and Citroën are different automotive constructors but they form the same company with the same directions and also the same project. So at this time we don't have any specific projects for Citroën, this company has just taken off one electric vehicle, the Citroen C-Zero, which is the same than the Peugeot Ion.

Electric and Hybrid Vehicles:

Electric Vehicles:

Peugeot Ion: This car was created in collaboration between Peugeot and Mitsubishi, its cost is around 30 000 euros and you have 7 000 euros of bonus for the government. This car was launched in 2011. It is the same car than the Mitsubishi I-mev. This car has a range of 130 km, a capacity of 16 kWh in its lithium ion battery.



Hybrid Vehicles:

Hybrid₄ Technology: This technology is based on the fact that the diesel motor runs the front wheel and the electric motor is placed in rear axle. This technology, created by PSA, can be found in a lot of cars, for example in 3008, 508 or DS5. You can choose between ZEV (Zero Emission Vehicle, which is 100 % electric mode), Auto (Automatic Mode) and Sport (Dynamic behavior) and ₄WD to have four wheels all the time. The only problem is that the battery used with this technology is not lithium ion because this kind of battery costs too much money.



Peugeot 3008 Hybrid₄:

This car is the second best seller of the hybrid cars in 2012 in the French market. This car is a four wheel hybrid car and was launched in autumn 2011. This car cost 33 660 euros with bonus reduction (740 euros). But you can only have 4 km in ZEV mode for a maximal speed of 60 km/h. The consumption is 3,8 l/100 km with a rejection of 99 CO₂ grams.



Peugeot 508 Hybrid₄: This car costs 39 200 euros with 3 920 euros of bonus from the government. It uses the same technology than the Peugeot 3008. Peugeot declares a consumption of 3,6 l/100 km and a rejection of 95 CO₂ grams.



Peugeot 508 Hybrid₄:

It's the Avant version of the Peugeot 508 with same technology but a consumption of 4,1 l/100 km due to the weight of the car, and a rejection of 102 CO₂ grams.

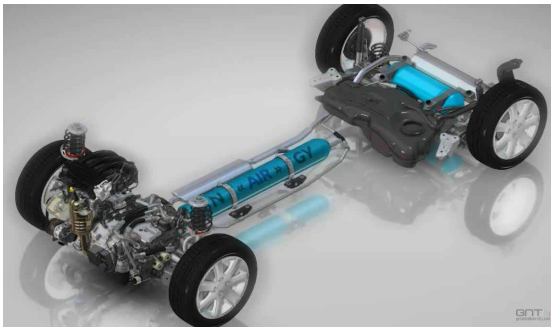


Citroen C-Zero: Same than Peugeot iON.

Citroen DS5 Hybrid4: It's a Citroen DS5 with Hybrid4 technology created by PSA. This car has a consumption of 6,5 l / 100 km for a price of 40 000 euros with a bonus of 4 000 euros.

Project:

Hybrid Air: Hybrid Air is not that interesting for us because the hybrid is not electric, but an accumulation of air pressure.



Velv for Véhicule électrique Léger de Ville (Light Electric City Vehicle):

Velv is a three-wheeler with a range of 100 km, and with an inside for three people and it is accredited for highway. It looks like the Renault Twizy. The target is to create a small ecological car for urban use.

Specifications: 2, 81 m, <700 kg

Energy: 8,5 kWh for 100 km of range just 85Wh by kilometer. The battery capacity is 20 Kwh.



HYdole: Dominant hybrid electric:



HYdole is a project that France is helping to develop. The target is to create a car which shows the potential of a Plug-in Hybrid Electric Vehicle. However, during my research I noticed that there were two kinds of Plug-in Hybrid Electric Vehicles, one which is just a normal hybrid that can be recharged in the house, and other which is an Extended Range Electric Vehicle where the oil is not used to tract the vehicle but to recharge the battery like the Chevrolet Volt or Opel Ampera. I did a lot of research to know what kind of car Peugeot uses for the project, but didn't find the answer. The car, however, looks like the first one. But there is not a real difference in the consumption of oil between these two kinds of cars.

This project looks like the new Toyota Prius but in PSA it's still a project. I hope Peugeot will move fast to a real car like the Ampera is, and if not, they will miss the beginning of the new automotive industry.

Parameters of the car: range of 500 km with oil and electrical battery. Emissions are <math><30\text{g CO}_2/\text{Km}</math>.

208 Hybrid FE:

This project is an association between Total and Peugeot to create the most fuel efficient car with the reduction of the weight of the car and the consumption of the engine combined to an electric motor. The target is to get $42\text{g CO}_2/\text{km}$ and $1,7\text{ l}/100\text{ km}$. This car will be presented in autumn 2013.



We can see that Peugeot doesn't have a 100% electrical project, but like in a lot of automotive companies many projects stay secret until the car gets out.

2.2. Renault (Nissan)

Website: <http://www.renault-ze.com/fr-fr/-5.html>

Test Contact: eirik.thais@renault.com ; +33176877318. Test Zone: Arjeplog, Sweden.

Electric and Hybrid Vehicles:

ZE: Is the electric technology promoted by Renault and Nissan for Zero Emission. The conception of the electric car for Renault is different than for other automotive constructors, because Renault decided to rent their batteries, which costs between 79 and 122 euros by month. Also, Renault doesn't have created a standard recharge, which means that a special WallBox is needed for recharging the battery. The WallBox costs 490 euros, with the installation of 370 euros. The possibility to know where the closest recharge stations can be found is optional and costs 150 euros for 3 years.



Personal Comment: The electric cars of Renault are not very expensive, but I think that it is better to make a higher price than to put more and more expenses, because it would create in the mind of the customer that the electric car costs a lot of money. But it is true that the rent of the battery could be a good way because the battery could be replaced for free and any autonomy would not be lost.

Renault Zoe: This car, launched by Renault at the beginning of 2013, is the best seller of electrical cars in France with more than 3 000 unit sales. This car costs around 20 000 euros, with a reduction of 7 000 euros from the government. The range of this car is around 170 Km and it has a capacity of 22 Kwh and a lithium ion battery. The recharge for full battery is approximately 8 hours but, like the Leaf, you can charge 80% of the battery in only 30 minutes with fast charger. This car was created for urban use; it is a small car between Mini and a Smart.



Renault Fluence ZE: This car is the electric version of the Renault Fluence. It has a range of 130 km and a battery capacity of 22 kWh. This is a family car like VW Passat and costs 27 000 euros with a bonus of 7 000 euros from the government.



Renault Twizy: This car is a mix between a car and a scooter and costs 7 000 euros with no reduction from the government as it is not considered as a car. It has an autonomy of 100 km and a capacity of 6,1 kWh.



With regard to Renault it needs to be reminded that this company is the same than Nissan. And in this automotive group it is Nissan that develops more the electric vehicle project.

Project:

With regard to electrical car projects, Renault doesn't share a lot of information.

Nissan:

Nissan just launched the new Nissan Leaf in 2013. They reduced the weight of the car, which allowed to increase the range a little bit, and to make the recharge faster.

They want to create a real image of a green car to overcome Toyota in this market, like it is shown in their project to create an electric race car for 24h du Mans.

2.3. Bolloré

Website: <http://www.bolloré.com/en-us>

The Bluecar is the only car launched by Bolloré. This car is famous in France because it is the car

selected to be the Autolib in Paris (page 57). The battery (LMP) has a capacity of 30 kWh and the range of the car is approximately 150 km. For personal customers the price is 20 000 euros with a 7 000 euros reduction from the government. This car was created for car sharing; it can already be seen in Paris, and it will be seen in Lyon and in Bordeaux in 2014.



2.4. EXAGON MOTORS

Furtive-eGT:

The first electric sports car, Furtive-eGT was launched by Exagon, a French racing team. This car can go up to 100 km/h in only 3,5 seconds and has a capacity of 53 kWh (for 3 000 recharge cycles) for a range of 300 kilometers. This car was launched 3 years ago, but the final and commercial version is not ready yet.



2.5. Mia

Website: <http://www.mia-electric.com/>

Mia is a small electric car with a capacity of 12 Kwh for a range of 100 km. The company has actually some problems with their sales, since Mia hasn't been sold more than 70 cars by month. The company is hoping to sell more than 200 cars by month before the year 2014.



2.6. Venturi

Website: <http://en.venturi.fr/home>

This French automotive company sells very expensive cars and only few units. Venturi has some electric cars.

Venturi Antarctica:

This car was created to do research in very cold areas like Antarctica. Antarctica is one of the regions of the world where pollution can be very dangerous for the environment, so a lot of scientists are waiting for this kind of car to explore. This car can work in a temperature of -50 degree Celsius and has a range of 150 km for a maximum speed of 40 km/h with its two electrical motors.



Venturi Electric: This is more of a technologic demonstrator than a real car. This car is energetically completely independent.



Venturi Fetish: This car is the first electric sports car. The price is 358 000 euros with a 7 000 euros bonus from the government. Venturi makes only ten Venturi Fetish cars by year, as all the cars are made by hand. The battery capacity is 54 kWh and its autonomy is approximately 300 km. This new battery generation is called Lithium-Ion Polymer. It is more expensive than a simple Li-ion but also easier to place and better in use, and also the battery is managed by a specific software developed by Ventec.



Venturi America: This is a concept based on and with the same specification than the Venturi Fetish but in a buggy version.

Venturi Voltage: This concept is a fruit of the collaboration between Venturi and Michelin to put inside a car, with the same battery specification than the Venturi Fetish, a four ActiveWheel Motor (see Michelin in page 16).

Venturi had also made some electric cars, for example the Citroën Berlingo which is used by the postal service in France.



2.7. Lumeno

Website: <http://www.lumeneo.fr/welcome.php>

Neoma:

Neoma is a small city car with a battery capacity of 14 kWh and with a range of 100 km for 22 000 euros with a 7000 euros bonus from the government, and an amount of 145 euros by month needs to be added for the rent of the battery.



3. Suppliers

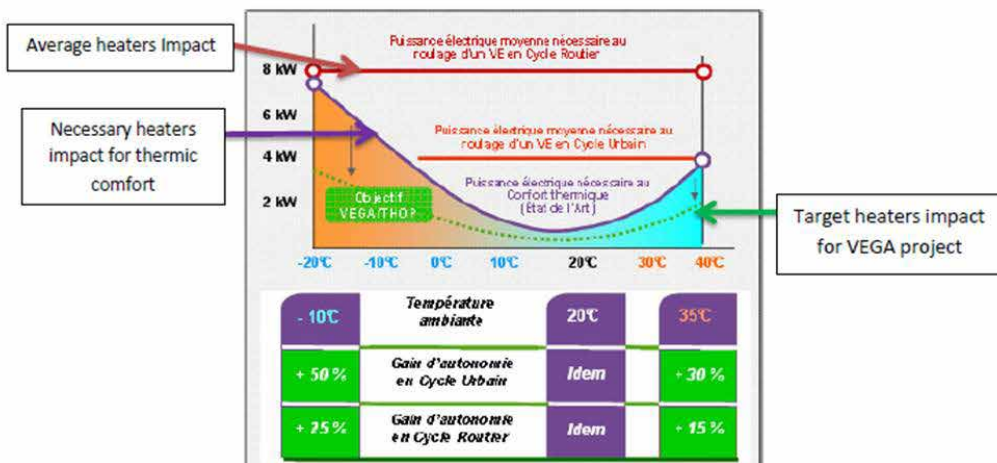
3.1. Valeo

Website: <http://www.valeo.com/en/the-group/>

Project:

Hybrelec: The hybrelec project looks like the Peugeot project called HYdole. The target of this project is to create a hybrid rechargeable car like the new Toyota Prius, with a 30% increase in the electric range performance, a reduction of 25% of the CO₂ emissions, and to develop an innovative way to manage the thermic variation in the car. This project will be finished this year and will allow to Valeo to develop this competence in electrical vehicles, to accelerate the commercialization of this kind of vehicles and to be able to create a car that can have a range of 200 km in all electric modes.

VEGA/THOP: It's the alliance between an electric car with a very long range and optimized heaters inside the car to extend more the range of the car. The target is to save 30% of the energy used by the heaters, for doing that they manage the air, use heat pumps inside the car and also choose a type of the glass with more efficiency to keep the heat inside.



3.2. Michelin

Website: <http://www.michelin.fi/>

Project:

Active Wheel: The new technology developed by Michelin is based on the fact that the engine, the brakes and an active damper are all inside the wheel. This way a lot of weight can be economized in the car and cabin of the car can be easily managed. This kind of motor is now tested on some urban electric cars. The only problem is the regulation, because it is now forbidden to create a car with only electric control that we name full by wire. The problem is in the brakes, because if there is an electric problem inside the car, a mechanical emergency brake is needed, the motor can be used to brake also and helps the electric brake.

I have already worked for this kind of project and it looks great, but the motor doesn't look powerful enough for the same kind of car than the Nissan Leaf but it could be a great extra engine.



3.3. SAFT

Website: <http://www.saftbatteries.com/market-solutions/motive-power-vehicles>

SAFT Company is specialized in developing and manufacturing lithium-ion batteries for industrial use, like hybrid or electric cars.

For electric vehicles they have four different kinds of rechargeable lithium-ion batteries:

- 48 V Mild-Hybrid Module: For Micro-hybrid and mild-hybrid vehicles with a light weight, a compact design and a service life of 10 years.

		POWER
Nominal characteristics at + 25°C/+ 77°F		
Nominal voltage (V)		48
Capacity (C/5) (Ah)		6
Rated energy (C/5) (Wh)		288
Mechanical characteristics		
Width (mm)		111
Height (mm)		197
Depth (mm)		364
Weight (kg)		10
Operating conditions		
Operating temperatures		- 20°C to + 50°C - 4°F to + 122°F

- 20V and 40V SLFLP Module: Quick and high recharge capabilities, like for regenerative braking application.

		ENERGY	POWER
Nominal characteristics at + 25°C/+ 77°F			
Typical voltage window, 20V module (V)			15 – 22,8
Typical voltage window, 40V module (V)		30 – 45,6	
Capacity (C/5) (Ah)	43		30 or 60
Rated energy (C/5) (Wh)	1 700		1 200
Mechanical characteristics			
Width (mm)		375	
Height (mm)		270	
Depth (mm)		114	
Weight (kg)		16	
Cooling		Liquid cooled / heated	

- 22 V Li-ion Module: Made for light mobility applications, twice as compact and four times lighter than a conventional battery technology.

		ENERGY
Nominal characteristics at + 25°C/+ 77°F		
Nominal voltage (V)		22
Capacity (C/5) (Ah)		45
Rated energy (C/5) (Wh)		990

Mechanical characteristics

Width (mm)		123
Height (mm)		265
Depth (mm)		190
Weight (kg)		8

- 24 V SLFP Module: Made for electric vehicles for a maximum range because it can be associated for more than hundreds of kWh in only one functional entity (each module have 2kWh).

		ENERGY
Nominal characteristics at + 25°C/+ 77°F		
Nominal voltage (V)		24
Capacity (C/5) (Ah)		86
Rated energy (C/5) (kWh)		2,0

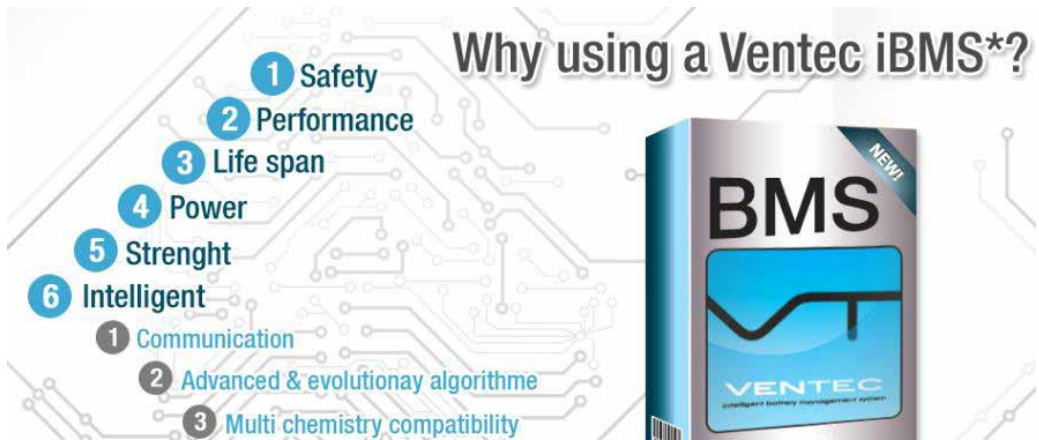
Mechanical characteristics

Width (mm)		445
Height (mm)		131
Depth (mm)		292
Weight (kg)		18,5

3.4. Ventec

Web Site: <http://www.ventec-bms.com/>

This company is in charge of intelligent Battery Management System. I found this company when I searched for Venturi electric car. This company builds everything in the electric part in Venturi cars, manages the recharge and the discharge of the electric battery.



4. Infrastructure

4.1. Technology

Normal/Accelerated/Fast Charging:

Electric vehicles can be charged in two different ways, with a normal electric charger at home or in a park station. These kind of installations have generally a power of 3kW (230V/16A) and the car needs from six to eight hours to be charged.

An accelerated charging station can also be used, powered by 22kW and allowing to the car to be charged in just one hour.

The fast charging station is an option powered by 43kW (400V/63A) for AC and 50kW (500V/100A) for DC electric network. This kind of stations can charge electric vehicles in less than 30 minutes.

Charge Mode:

Actually four different modes of charge can be used:

Mode 1: The first mode is a household socket (AC) with just a cable to link your car to it. This kind of installation can be difficult to secure and the available power is also one of the problems which is why a lot of OEM decide to move on to mode 2, to have a dedicated circuit for electric vehicles.

Mode 2: The second mode is like the first one, but the cable has a protection inside.



The first two modes were used for old electric vehicles, actually every electric vehicle is moving to the third mode.

Mode 3: This mode is the same than the first two, but with a protection device directly connected to the network and it is needed to use a specific cable charger, called Wall Box or recharge station, which can manage automatically the charge and cut it in case of a problem or when the batteries are full and allow to see the consumption of the car with some user interface.



Mode 4: This mode is used for fast charging with several secure installations because electric vehicles are directly connected to the main power grid (DC).

4.2. DBT-CVT

Website: <http://dbtcev.fr/en/>

This company, leader in electric vehicle recharge, was founded in 1990 in Douai (France), DBT has produced several products and also taken part in a lot of project like ModuloWatt. Actually there are 47 people working for this company, and it has some European distributors and recharge stations, for example in Finland, Sweden or Norway.



Charging Solutions:

Wall box series:

The wall box series is made to be put inside a personal habitation and can be fixed in a wall or in the ground with a support. This model can be made for normal recharge (3kW) or accelerated charging (22kw) with one or two plugs (16A /32A). There is also an optional identification control via key or RFID.



BBR series:

Like in the wall box series, one or two plugs can be chosen in 16A-230 V or 32A-400V for 3kW or 22kW, and there is a possibility for identification by RFID, magnetic car or numeric keyboard. The recharge station can be connected to a supervision network. BBR series is small, protected against environment corrosion and ideal for limited ground space like supermarket parking.



GNS series:

This installation has the same parameters than the one above, but this one is made for industrial installation. This recharge station is a compatible Open Charge Point Protocol (see page 33), an optional management and charging solution with also a LCD display for more information.



HRC series:

This recharge station is made to recharge two or four electric vehicles with the same parameters than other recharges seen above. This recharge system is created with a trapdoor to protect the recharge zone, and the station is considered like premium with a 4*20 cm LCD screen and a connection to the network recharge management.



Station connection through domestic plug



"Master" version (energy delivery + management)



"Slave" version (energy delivery)

Quick Charger:

This fast charger can charge in AC or DC electricity, works between -10 and 40 degrees but can be built for a temperature of -30 degrees with a cold option. Electric parameters: (22/43kW AC and 22/44 kW DC). Like the other one, there is a possibility to have wireless detection and network recharge management.



* Photo may differ from current product

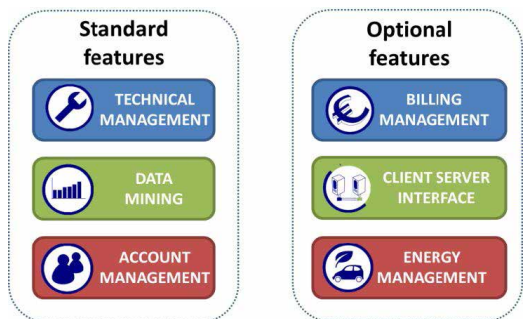
VERSION		Standard DC	Identification DC	Communication DC	AC & DC Identification	AC & DC Communication		
REFERENCE		501NQC002	501NQC003	501NQC004	501NQC005	501NQC006		
User interface	Emergency stop button	•	•	•	•	•		
	Start / Stop operating switches	•						
	LED status	•	•		•			
	Monochrome display	•	•		•			
	Color display			•		•		
Access control	RFID		•	•	•	•		
	NFC			•		•		
Payment system	RFID			•		•		
Communication	OCPP communication			•		•		
Protection	IP degree	IP55	IP55	IP55	IP55	IP55		
	Cold option	Optional	Optional	Optional	Optional	Optional		
Charging connector	Type 4	Type 4	Type 4	Type 4	AC	DC	AC	DC
					Type 2	Type 4	Type 2	Type 4
Charging mode	Mode 4	Mode 4	Mode 4	Mode 4	AC	DC	AC	DC
					Mode 3	Mode 4	Mode 3	Mode 4

Software Solutions:

There are four possible configurations:

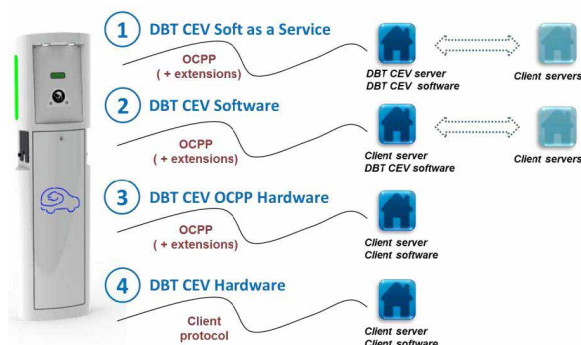
STANDARD SOLUTION	1	<ul style="list-style-type: none"> Local/new EV charging projects <ul style="list-style-type: none"> DBT CEV software / Web access Hosting on a dedicated DBT CEV server Turnkey solution 	
	CUSTOM-DESIGN SOLUTIONS	2	<ul style="list-style-type: none"> Communities or private fleets <ul style="list-style-type: none"> DBT CEV software / Web access Communication with client servers Interoperability (open source/free protocol)
		3	<ul style="list-style-type: none"> Specific EV charging projects <ul style="list-style-type: none"> Flexibility in software solution choice Communication with client servers Interoperability (open source/free protocol)
		4	<ul style="list-style-type: none"> Existing projects <ul style="list-style-type: none"> Flexibility in software solution choice Client protocol usage No review of existing software procedures

Standard and Optional features:



OpenChargePoint Protocol:

It is an open-source language code that allows several communications between the recharge station and the place where the system is managed. You can allow someone to access to the recharge, see the feedback of energy consumption, schedule charging sessions and control the recharge station.



Project:

Solar Charging with AdvanSolar (see page 46):

DBT produce the recharge for this solar carport made by the company AdvanSolar. The configuration of this recharge station is a 230V-16A like GNS or HRC series.

Independent Solar Carport with University El Hassan in Amman, Jordan with Net Energy:

This station, located on El Hassan Campus of the University of Amman, is completely isolated from the electric network and can charge a car in 4 hours with its 7kw (220V-32A) recharge station, where e-scooters or e-bikes can also be recharged. This was the first EV charging infrastructure in Jordan.

DBT has also created a Battery swap station for e-bikes and e-scooters and we can imagine that in a couple of years they will move on this kind of infrastructure for electric vehicles.

4.3. Schneider-Electric

Website: <http://www.schneider-electric.com/site/home/index.cfm/fi/>

Schneider Electric is a France-based multinational corporation that specializes in electricity

distribution, automation management and produces installation components for energy management. Now this company creates the majority of the electric recharge that can be found in France in the streets and also in homes.

Schneider is the constructor of the Wall Box for Renault electric cars, which is known for Schneider as EVlink residential (3/22 Kw for 50/60Hz, mode 3). They also made a lot of recharge for outside like EVlink Voirie (3/22 Kw for 50/60Hz, mode 3, with 2 plugs) or EVlink station (AC: 43kW with IEC 61309-2 plug or DC: 50kW Yazaki 125A plug, mode 4) which is a fast recharge system in urban cities as can be seen in the pictures below. They also participate in a lot of projects to develop the infrastructure for the electrical vehicles, especially with Renault.

Schneider has a department in Finland so maybe there could be a possibility for Centria to have a partnership with this company.

> Les bornes EVlink pour répondre à vos besoins et usages

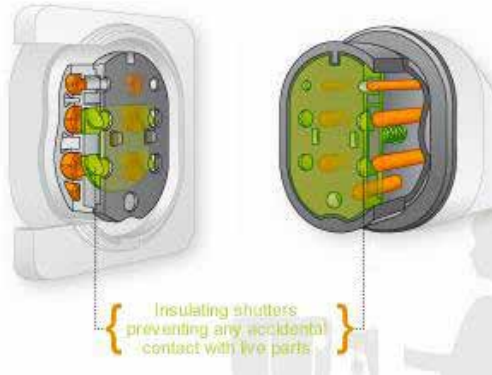
	EVlink Résidentiel borne à usage résidentiel, puissance de charge de 3,7 kW à 11 kW
	EVlink Parking borne pour les parkings d'entreprises, collectivités, et copropriétés, puissance de charge de 3,7 kW à 22 kW
	EVlink Voirie borne pour voirie, puissance de charge de 3,7 kW à 22 kW
	EVlink Station borne de charge rapide pour les stations services, puissance de charge de 43 kW à 50 kW

Project MOVEO-TREVE:

The target is to create a standard test to evaluate the capacity of a station to recharge electric vehicles. This project is multi-company managed by VERITAS but works with SCHNEIDER ELECTRIC. This project is run in order to have a complete test to classify the recharge stations based on the security, performance and the management of the energy, and also on the development of infrastructure of the electric recharge.

Label EV Plug Alliance:
Website: <http://www.evplugalliance.org/en/>

Created by Legrand, Schneider Electric and Scame, the target of this label is to create a safe recharge by using a dedicated plug as seen below.



- Compliance with rule IEC 61851-1 standard "Electric vehicle conductive charging system", IEC 62196-1 and IEC 62196-2 standard "Plugs, socket-outlets and vehicle couplers for conductive charging of electric vehicles".
- Commitment with rigorous testing, guarantees its users a high level of performance and durability.
- Number of operations: 10 000 cycles; Protection degree: IP44D-IK08; Flammability: 960°C-Vo; Temperature range: -40°C/+50°C

EV Ready:

EV Ready is a label created in 2011 by Renault-Nissan and Schneider electric. This label was made to create a uniform type of charge in all European Union. Now PSA and Mitsubishi have also taken part to this project with more than sixty other companies. All companies working in electric vehicle business, such as car makers or recharge makers and others can take part to this project. Actually everyone can declare their system EV Ready but in the future this label could become something that we have with the EU label and become a warranty of security and quality.

4.4. IER

This company is a subsidiary of Bolloré group that builds electric recharge stations and also some services of car sharing for Autolib and others, like the one used to recharge Autolib (electric car from Bolloré).



This company sells three different kinds of recharge stations:

IER 985: Is a wall-mounted sharing station for electric vehicles. This recharge system was made for indoor parking because some Autolib stations were settled in indoor parking. IER 985 can be controlled by network and people can identify themselves with a RFID card.

PRODUCT SPECIFICATIONS

Recommendation for installation	Residential, parking, hotel, shopping mall, offices
Type of charge	Slow - Semi-rapid
Control interface	
3 leds	Green: station active / orange: vehicle connected / red: default detected System turns on when plug is connected and detected or start button activated Delayed start possible, off-peak time and peak time management available
2 pushbuttons	Automatic charging interruption when batteries are full loaded
Identification by contactless reader	ISO 14443 A/B, MiFare, DESfire and Calypso Reading distance: 4 cm on MiFare ultraLight Support of SAM included for a cryptographic function
Load circuit functionality	
Power supply	3kW / 230V CA / 16A
Charge mode	Mode 2 or mode 3 connectors according to IEC 61851
Charging output	Identical phase and current
Socket	5-pin outlet type 2 IEC 62196 (YASAKI); 7-pin outlet type 3 IEC 62196 (SCAME); 3-pin outlet type E/F (domestic) Locked protecting cover
Charging kiosk / vehicle communication	According to the protocol IEC 91851
External communication	RJ 45 Ethernet port, modem 3G
Protection rating	IP44 and IK7
Security	Vehicle to the ground during the charge Self-diagnostic capacity for the charging station and the vehicle charging circuit. Power supply automatic switch off in case of default Overcharging protection, short circuits, insulation defects by circuit breaker and mandatory external leakage protection
Power supply	Single-phase current 230VAC - Circuit breaker included to prevent from overcurrent or short circuit An additional circuit breaker needs to be installed on the high power switchboard by an accredited company
Standards and approvals	EN61851-1: 2001 charge system for electric vehicles / EN61851-22: 2002 charge system for electric vehicles / CEI 61851-1: 2010 charge system for electric vehicles / NF C15-100: safety standards for electrical installations in France / EC standard
Operating temperature	-20°C to +50°C
Physical characteristics	
Dimensions (l x d x h)	340 mm x 347 mm x 226,5 mm
Weight	20 kg
Warranty	1 year standard

IER 981: Recharge station made to recharge Autolib cars in the streets with some special specifications (rustproof and urban damage proof); this station exists in two different models with one and two plugs.

PRODUCT SPECIFICATIONS

Installation Recommendation	Charging station designed for outside installation
Type of charge	Slow - Semi-fast
Control interface	Led display - 3 colors: green: kiosk available / blue: booked, charging / red: issue
Identification by contactless reader	Reader ISO 14443 A/B, MiFare, DESfire and Calypso Reading distance: 4 cm on MiFare ultraLight Support of SAM included for cryptographic function
Load circuit	
Power supply	3kW / 230V CA / 16A
Loading mode	Mode 2 or mode 3 connectors according to IEC 61851
Charging output	Phase and current identical to the upstream grid
Socket	5-pin plug type 2 IEC 62196 (YASAKI); 7-pin plug type 3 IEC 62196 (SCAME); 3-pin plug type E/F (domestic) on double BC version Locked protecting cover
Cable reel	3 m cable length
Charging station / vehicle communication	IEC 61851 protocol
External communication	CPL box
Protection rating	IP55 and IK7
Security	Vehicle to the ground during the charge Self-diagnosis of the charging station with automatic switch off in case of default Diagnosis of charge circuit of the vehicle with automatic switch off in case of default Overcharging protection, short circuits, insulation defects by circuit breaker and mandatory external leakage protection
Power supply	230V single-phase Circuit breaker 30 mA included in the kiosk for hiring Protection breaker from an overcurrent condition
Agency approval	EN61851 1: 2001 charge system for electrical vehicles EN61851-22: 2002 charge system for electrical vehicles CEI 61851-1: 2010 charge system for electrical vehicles NF C15-100: safety standards for electrical installations in France EC standard
Operating temperature	-20°C to +40°C
Physical characteristics	
Dimensions (l x d x h)	1125 mm x 283 mm x 325 mm
Weight	80 kg
Warranty	1 year standard

This kind of station can be monitored by the IER 980, which is a recharge management station used for car-sharing. This main station can manage six IER 981, customers can easily identify themselves with RFID (Multi language interface and video camera inside for surveillance) and after that plan a trip with an electric car or in case of trouble take contact directly with a call center.

4.5. Renault-Nissan

Infrastructure Project:

QuickDrop and Better Place:

http://www.youtube.com/watch?v=OHHvjsFm_88&feature=player_embedded

Better Place is an Israeli society which develops fast changing battery systems; this company has an agreement with Renault to recharge as a first step Fluence Z.E in this way and after all electric Renault-Nissan cars. The only problem is that they scheduled to sell around 100 000 electric vehicles but they only sold 1 000. And actually Better Place is in bankrupt of more than 870 million euros. But Renault continues to trust in this kind of recharge with its own system

called QuickDrop, which is the same than Better Place uses; a vehicle goes to a station where the empty battery is replaced by another one which is already full. The switch takes less than two minutes and allows to the customer not to wait for eight hours to continue their trip. The only problem is the implantation of this kind of stations and the investment to develop them. One more time the cost is the principal disadvantage; the price for the customer as they need to have a subscription which is very expensive, and also the price for the company in order to create this kind of service around the country. For now we can only see this kind of stations in Israel and also in Denmark.



Save Project:

The Save Project is developed in collaboration with EDF (French electricity company), Total and Schneider-Electric. This project is based on developing, in a small area of 400 000 habitants, a region where electric vehicles could be driven without any problems. This project started in 2011 and was run in order to see the need for the customer in the “electric life”. It was the largest electric mobility experimentation in France. Every partner had a definite role, Renault rented the electric cars, EDF supervised all the electric consumption, Schneider implanted its electric recharge and Total put a recharge station in its oil station.

The project ended in 2012, and there were some results: 65 electric vehicles were driven, 180 electric recharge stations were set up, and two test drivers out of three had ordered an electric vehicle after the experimentation. The project allowed to all companies to have a real utilization result in return which can help them in the future to create more efficient products.

PlugQuest:

PlugQuest is a smartphone application created by Renault to help the ZE customers to locate the next battery recharge stations to be built. In this application, the users take a picture and locate a place where they would want a recharge station to be built. Other users can do the same, or agree with a place someone already has suggested. If enough people locate the same place, Renault will implant there a real battery recharge station. This way Renault can answer with more efficiency to the needs of the consumers.

Leclerc:

Renault made a partnership with the French supermarket Leclerc to build a recharge station in

every market of the company before the year 2015, as in France the majority of supermarkets has also a gas station.

4.6. ModuloWatt

Website: <http://www.modulowatt.com/>

This company develops innovative ways to park and recharge electric cars:

They have developed a parking place with a light alert to let the customers know if the place is free or occupied, and that recognize a car automatically, allowing or not to park in this place, with the help of the wireless badge in cars to identify them.

They have also developed parking places like the one above with an electric cable to recharge electric cars.

The most innovating park/recharge station is one where the car is parked and the recharge will be made automatically with a connection between the car and the station (all the information, like SOC, and the payment is transferred wireless to the station).

Project:

AMARE: Automatic Mechanical Hooking with Electronic Appointment

Video: http://www.youtube.com/watch?v=oU-olwt2LWo&feature=player_embedded

This project has the target of creating a common recharge structure between all electric cars and making the same kind of recharge that we have with our mobile phones, where one charger can be used in different brand models. At first, a car is parked, is automatically connected and starts to recharge. In the case where another car arrives and wants also to recharge the battery, it will send a message to the first car, which releases a cable that connects automatically to the other one. This procedure repeats with every vehicle, allowing for several cars to recharge at the same time, as can be seen on the video.

4.7. Bornes Recharges Service

Website: <http://www.bornerecharge.fr/societe-en.php>

This company was created to help people to install and manage their recharge station at home and specially in buildings with a lot of people.

When buying an electric vehicle, a box needs to be put in the house to recharge the car, but when living in a building, the other people don't want to pay for the electrical consummation of one person. That is where Bornes Recharges Services can help. They install a wall box in the building, and with an identification number they know exactly how much the person consumes and take in charge the communication with the electric network to put this amount in the personal bill of the consumer and not in the building community bill. And if someone from the building wants to use the recharge station, it's easy to give them identification number to manage their bill and the consummation easily.



Like Bornes Recharges Services you have Park'n'plug (<http://www.parknplug.fr/>).

4.8. EVTRONIC

Website: <http://www.evtronic.com/index.html>

This company was founded six years ago and produces two different kinds of electric recharge.

FAST CHARGING:

BRVE 50 TOTEM:



Technical Specifications

Terminal type	Indoor ; Outdoor
Charge type	DC charge DC 500V / 125A / 50kW
Grid connection	400V AC / 100A tri
Material	Galvanized steel
Technology	IGBT
Certification	CHAdeMO compliant

Options

AC Charge	3 phases 400 V / 63 A / 43 kW 1 phase 230 V / 16 A / 3,6 kW 3 phases 400 V / 32 A / 24 kW
DC Charge	DC 500V / 125A / 36kW
Esthetic and color	On demand
Material	Stainless steel
Screen	Touch screen
Payment or identification	Credit card reader and / or RFID identification and / or prepaid card and / or GSM
Connectivity	Wifi or Ethernet cable
Vehicle detection	Yes
Individual energy meter	Yes

Environment And Safety

Operating temperature	-30°C -> +50°C
Storage temperature	-40°C -> + 85°C
Humidity	5% - 95% - Non condensing
Index sealing	IP 54
Standards	EC Compliant, EMC class B
Other standards	RoHS

Hardware Specifications

Dimensions (LxWxH)	1000 x 800 x 2650 mm
Weight	700 kg
Housing	Customizable

BRVE 50 KIOSK:



Technical Specifications

Terminal type	Indoor ; Outdoor
Charge type	DC charge DC 500V / 125A / 50KW
Grid connection	400V AC / 90A tri
Power factor	> 0.98
Efficiency	> 95% at nominal output power
Technology	IGBT
Certification	CHAdeMO compliant

Options

AC Charge	3 phases 400 V / 63 A / 43 kW 1 phase 230 V / 16 A / 3,6 kW 3 phases 400 V / 32 A / 24 kW
DC Charge	DC 500V / 125A / 36kW
Esthetic and color	On demand
Material	Full stainless steel
Screen	Touch screen
Payment or identification	Credit card reader and / or RFID ISO14443 identification and / or prepaid card and / or GSM
Connectivity	Wifi or Ethernet cable
Vehicle detection	Yes
Individual energy meter	Yes

Environment And Safety

Operating temperature	-20°C → +50°C
Storage temperature	-40°C → + 85°C
Humidity	5% - 95% - Non condensing
Index sealing	IP 54
Standards	EC Compliant, EMC class B
Other standards	RoHS

Hardware Specifications

Dimensions (LxWxH)	965 x 520 x 1990 mm
Weight	580 kg
Housing	Customizable

5. Solar Charge Infrastructure

Solar parking is not a new technology as it is already used in United States in big supermarkets to create energy and then use it inside the supermarket or resell it. What is new in the possibilities of using this electrical energy is to use it to recharge electric cars directly.

5.1. Technology

The principle is very simple, solar energy needs to be converted into electrical energy, and since the last 20 years this capacity to control solar energy is a complete success and allows to a lot of people to reduce their consumption of energy and even if they produce more than they need, they can resell the extra energy.

At the beginning, the solar panels capture sunbeam, to optimize the production the panels need to be oriented in the right direction and with an efficient angle. This energy will be converted by solar inverters and after stocked. After that, someone uses this energy to recharge their car (the company can decide to put normal or fast charger). The sun just provides the energy, and after the use of the energy depends on the choices of the company. It needs to be noticed that fast charging need special and secure infrastructure.

A solar charge infrastructure can be settled in an area that is electrically completely isolated,

because this kind of infrastructure can be self-sufficient. It can also be attached to the electric networks of the city if the solar production is not enough for the utilization.

5.2. France

Of course companies that have already worked on solar panels are in majority but we also see huge companies like GE (General Electric) working on this kind of recharge. Car manufacturers only support some projects but don't work directly on this kind of recharge infrastructure.

AdvanSolar:

Website: <http://www.advansolar.com/>

AdvanSolar is a French company based in Nice.

AdvanSolar sells different kind of recharge park station for cars, bikes or simply for computers.

The SUNPOD is the solar charge infrastructure made for cars.



This infrastructure can charge from one to four cars with traditional European outlets 230V/16A with IP 44 protection, occupying a surface of 60m². The roof has an angle of +/- 6 degrees. The solar panels have a production capacity of 7,2 Kw. It is also possible to take a vehicle detection option. The recharge stations are made by DBT.

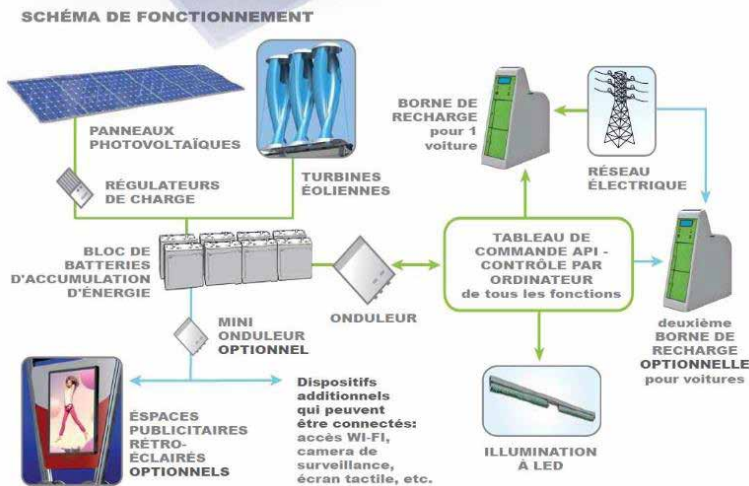
Energies-Sol:

Website: http://www.energies-sol.com/station_de_recherche_vehicules_270.htm



This company, specialized in solar panels, has launched several carport projects.

One project is called eco-synergy for electric vehicles: this carport combines solar and wind energy to recharge the batteries where the energy is stocked. For each carport there are two places for recharging electric vehicles and, like other recharge stations, electricity can also be taken from the urban networks. Customers can be identified by RFID card. Only 45 % of station batteries are allowed to be used by the customers, 35 % is used in case of emergency and 20 % for saving the capacity of batteries.



Carport Parameters: 6,12m * 2,6m* 4,7m, 230 V, 16A for 50Hz frequency and maximum power of 3, 5 kW. The batteries are made in gel-lead and the maximum power is 13, 92 kW for 14, 46 Vcc of maximal tension. For solar panels the maximum tension is 240Wp for a total power of 1440Wp. For wind pump, the maximum power for each turbine is 500 W.




5.3. Germany

Belectric:

Website: <http://www.belectric.com/en/e-mobility/>

Belectric is a German company also based in France, which has created some recharge stations around France.

At the beginning Belectric was specialized only in solar panels, but they have started to create their own solar carport with their own electric recharge terminal.

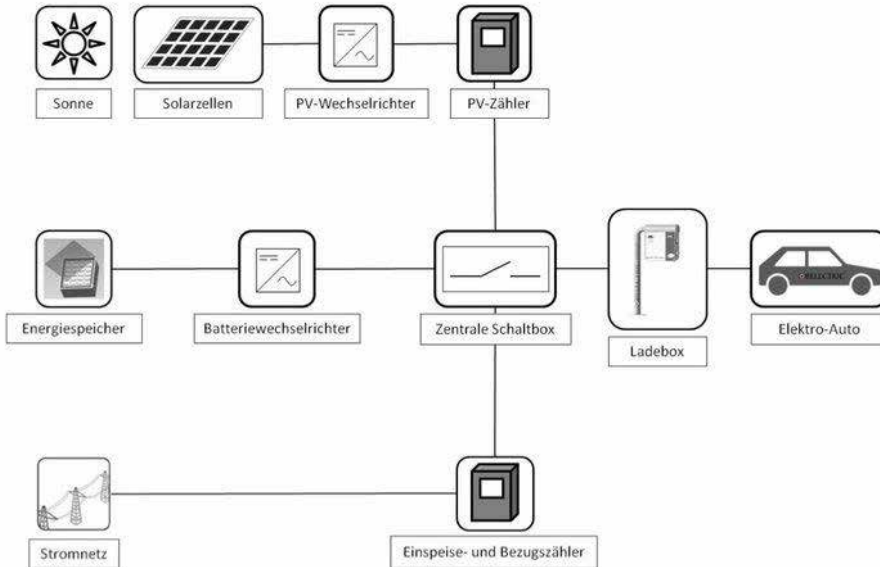
Charging Box Type	Online	Basic	Home
			
Output	3.7 kW, 11 kW, 22kW*	3.7 kW, 11 kW, 22kW*	3.7 kW, 11 kW, 22kW*
Charging Points	2	2	1
Plug Options	Mode 3 / Mode 1 charging plug e.g. Type2 according to IEC 62196 or standard grounded plug	Mode 3 / Mode 1 charging plug e.g. Type2 according to IEC 62196 or standard grounded plug	Mode 3 / Mode 1 charging plug Type2 according to IEC 62196
Online Portal	authenticating, monitoring, billing	-	-
Installation	stand-alone or wall mount (plug & play)	stand-alone or wall mount (plug & play)	wall mount
Branding	individual labeling possible	individual labeling possible	individual labeling possible

The recharges are very easy to install with their Plug and Play system, so if a recharge terminal doesn't work they can easily switch it. The utilization is also very simple, the system needs just to be activated with a RFID badge or a smartphone, and the consumption and the invoicing can also be managed on a special website.

All these recharges are delivered inside Belectric Solar carport. The production capacity of the solar panels is 4,9 Kw for two car places.



The utilization of this kind of infrastructure goes like this; it is possible to switch between solar energy and electric networks.



Schletter:

Website: <http://www.schletter.de/EN/solar-mount-system/carport.html>

This German company is similar to Belectric, as it too produces solar recharge stations with solar panels and recharge spots. At the beginning this company produced light metal products and then diversified their creations with solar panels and after that with solar carports. The carports can be done both for individual customers and for parking areas.



5.4. USA

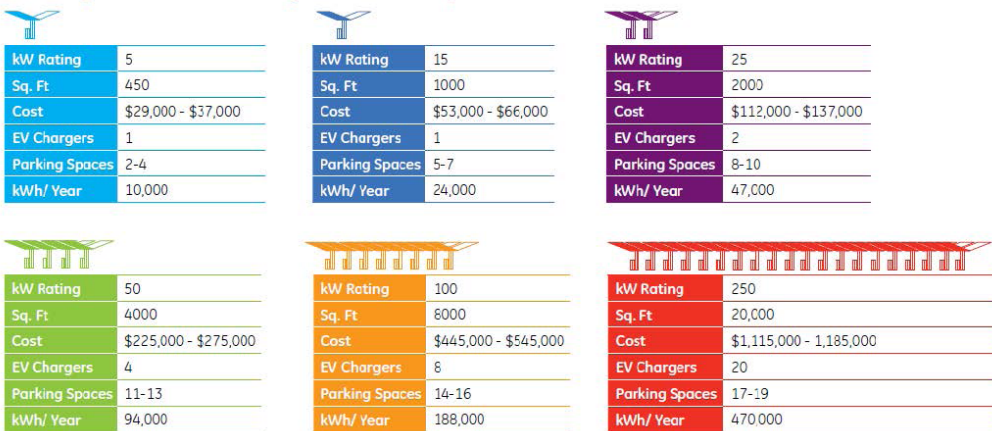
GE ENERGY:

Web site: <http://www.inovateussolar.com/ge-carports>

General Electric is one of the most important companies in the world. It works on every segment that has something to do with electricity, so it is not surprising to see that they are interested in developing the electric vehicle industry. The company develops its own recharge stations and now also solar recharge stations in association with Inovateus solar, a solar panel company created in 2003, and has several projects around USA with solar panels on industrial roofs, for example on IKEA stores.

Both companies decided to start collaboration in late 2011 in order to create a solar carport of 100 kWh that can recharge 13 electric vehicles. All solar panels needed for solar carport buildings by GE are made by Inovateus solar. Once more the target is to reduce the energy costs and if possible, to sell the excess generated energy.

GE gives some helping documents to choose what kind of infrastructure one wants to create. In the picture below there are indicated the cost and the productivity of different solar panel infrastructures.



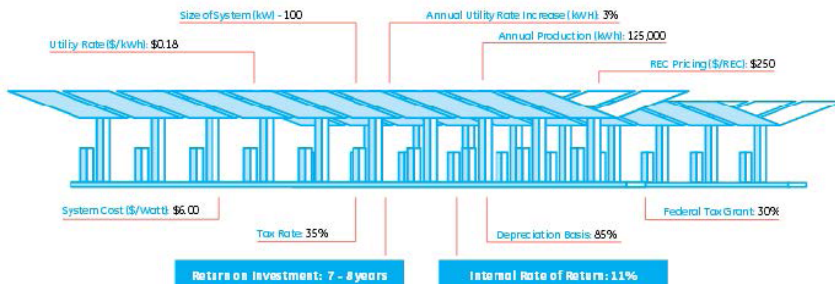
It is also possible to see and parameter everything you want to have on the website, in order to find the perfect solar carport. It is possible to indicate the location in order to know the insolation and also the number of electric vehicles that one wants to recharge.

Website: http://www.geindustrial.com/solar/solar_carport_calculator.htm

Financial Model:

Capital Purchase Financing Model*

The following example is based on an installation in New Jersey, capable of charging 20 cars per day. With a life expectancy of 20 years, the installation could pay for itself in 8 years or less:



GE Solar Carport 8 EV chargers:



GE solar carport started with 425 polycrystalline silicon solar panels which take the sun power. After, the energy in DC is switched into AC by GE. Solar Inverters can be managed by communication networks by the GE personal.

Technical Specifications		
Output Power	Nominal AC Power Nominal AC Voltage Nominal AC Line Current Nominal Grid Frequency Nominal Power Factor Power Factor Operational Range Line Distortion	600 kWAC 480 Vac (+/- 10%) 810 Aac 60 Hz 0.99 or greater -/- 0.9 Per IEEE519
Efficiency	Peak Conversion Efficiency CEC Weighted Efficiency Night Time Consumption	> 97.0% > 96.5% < 250 W
Input Power	Input Voltage Max MPPT Voltage Range MPP DC Current Max Isc	600 Vdc 300-600 Vdc 2,080 Adc 2,400 Adc
Dimensions	Height Width Depth Weight	2,350 mm 3,500 mm 1,300 mm 3,175 kg
Environmental Design	Outdoor Enclosure Operating Temperature	NEMA 3R (NEMA 3S Bridge and Controls) -20.0 to 50.0 °C

All this energy is stocked inside GE Lighting Panels and distribute to GE EV Charging Stations Watt Station or Wall Mount (pictures and specifications below).



Specifications

SAE Compliant	Level II per J1772
Vehicle Interface	SAE J1772 EV connector
Cable Length	15' 6"
AC Max Charging Power Output**	7.2 kW (240VAC @ 30A)
Voltage and Rated current	208-240VAC @ 30A
AC Power Input	208-240VAC requiring only Line 1 and Line 2, or Line and Neutral, and Earth ground
Short Circuit Rating	5kA @ 240 VAC
Recommended Service Panel Breaker	2-pole 40A breaker on dedicated circuit
Ground Fault Protection	Internal 20mA CCID with auto-re-closure, does not require a GFCI in service panel
Cold Load Start	Random start up between 0 and 5 minutes
Local Area Network	IEEE 802.3 ("Ethernet") compliant: 10BASE-T, 100BASE-TX
Network Communication Protocol	TCP/IP
Network Security	GE recommends that network be VPN and Firewall protected
Cellular Router (Optional)	EV-DO / HSPA
WiFi (Optional)	IEEE 802.11b/g compatible with Antenna
Metering Accuracy	< +/- 2% accurate for all values (Current, Voltage, Power & Energy)
RFID Reader	HID MultiClass RP15
Display	LED Icon
Standby Power	25W typical
Outdoor Rated	Enclosure NEMA 3R
Safety Compliance	UL 2231, UL 2251, UL 2594, cUL 2231, cUL 2594, NEC 625, SAE J1772, ETL and CETL listed
Surge Protection	6kV @ 3000A
EMI Compliance	FCC Part 15 Class A
Operating Temperature	-30°C to +50°C ambient (Operating temp. limit for cord reel is -15 Deg. C)
Operating Humidity	Up to 95% non-condensing
Approximate Shipping Weights	120 lb
Dimensions	51"H x 15"dia

The security of this installation is made by GE's Ever Gold™ Solar System; these boxes can easily be switched off in case of problems and also with GE AC Safety where the user can switch the system on or off.



5.5. Solar Carport Project

Zen e-drive:

The target of the project is to extend the number of solar recharge infrastructure, not with a cable recharge, but with a battery switch system. The customer arrives, takes off their battery pack and replaces it with one already recharged; the empty one will be recharged with the energy provided by solar panels or by traditional recharge by cable. This project is made for small urban electric vehicles. The car chosen for this project is a C-Zen made by Courb (with a 12,1 kWh battery capacity that can be charged in 4-6 hours).

VERT:

This project is developed by Renault and EDF. The target is to create an electric vehicle network in Réunion (a French island located in the Indian Ocean), based on a solar recharge station. This project is essential for an island like Réunion, because this region depends on hydrocarbon. Actually there are 50 electric cars testing the project, and the department is starting the second step of the project with the construction of a solar recharge.

6. Government's role

6.1. ADEME (Agence de l'environnement et de la maîtrise de l'énergie) and EDF

ADEME stands for Environment and Energy Management Agency. It's the same kind of agency that we visited in Oulu for the presentation of electric vehicles. This agency made a financial support in all projects that I listed above; in some cases this help was around 5 million euros, also for big companies like Renault, PSA or Michelin.

Right now the financial help is focused to develop a lot of projects on the management and creation of new recharge stations like EVER by VEOLIA Environment, CROME by EDF and INFINI DRIVE.

INFINI DRIVE: Manages the recharge of all electric vehicles used in postal services, allows the cars to recharge when the electricity is at the lowest price of the day and when the electric network is not in overloading. This project will edit a book for companies wanting to switch for electric vehicles, to help them organize and manage their infrastructure of recharge.

6.2. AUTOLIB

Autolib is a car sharing opportunity present in Paris and in some small cities around. Autolib was launched by the municipality of Paris in December 2011 after the success of Velib' (bike sharing in Paris), the principal being exactly the same.



Price Scale:

- With a subscription of 120 euros a year : 5,5 euros for 30 minutes of use
- With a subscription of 25 euros a month : 6,5 euros for 30 minutes of use
- With a subscription of 10 euros a week : 7 euros for 30 minutes of use
- For one day : 9 euros for 30 minutes of use

Autolib was mainly created for people living in Paris and also for foreign people who want to travel around Paris by car during one week or more. There is also the possibility to take a package for multi-driver.

After choosing the package that matches the best, the customer can directly take the car in the street in an Autolib station or choose to book a car for a trip, which allows to be sure to find a car in the chosen station.

The Autolibs are made by Bolloré, actually there are approximately 1 800 cars for 4 800 stations of park/recharge and 75 000 subscribers around Paris. This service costs to the city of Paris 50 million euros a year, and in order to be beneficial, the city needs 60 000 annual subscriptions, which are actually around 30 100. In Autolib stations there are also park and recharge stations for personal electric vehicles.



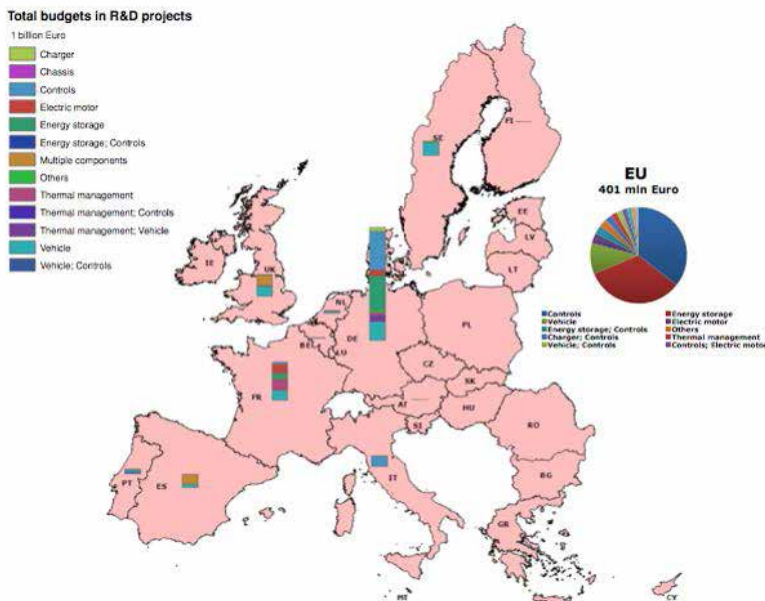
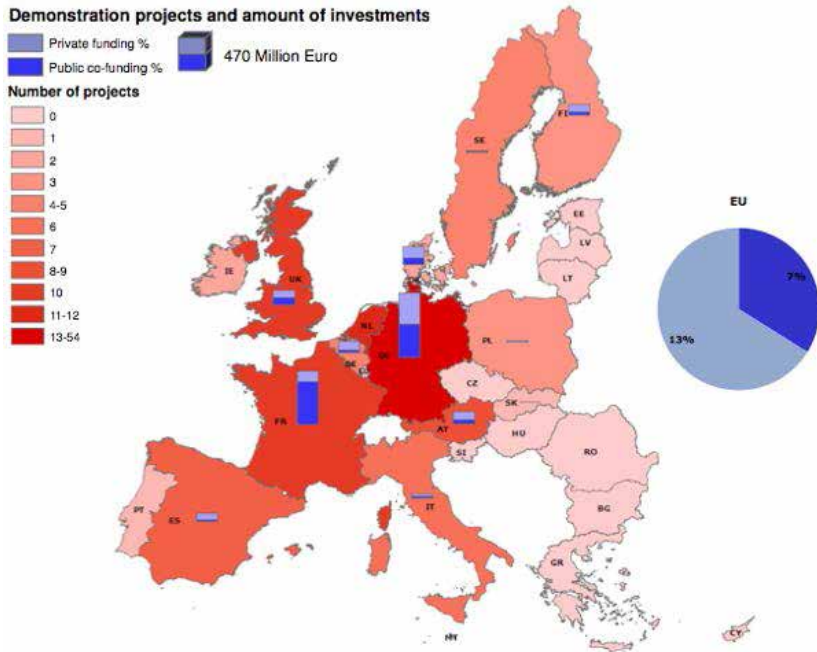
6.3. Electric Vehicles Politic

The French government helps drivers who want to buy an electric vehicle with a maximum bonus of 7 000 euros reduced from the price of the electric vehicle automatically, but it can't be more than 30% of the total price, so the full bonus of 7 000 euros can be touched for electric vehicles with a price of more than 21 000 euros. In some regions this help can increase to 8 000 euros. Another government help is that companies can earn the TVS, the tax on fleet automo-

tive, if they switch for electric cars. There is also a governmental website to help customers wanting to switch their vehicles for electric ones.

In Europe, the politic of French electric vehicles is one of the most motivating ones, but the only problem is that outside of Paris and big cities it is quite difficult to find recharge stations, and also the opinion of customers about electric cars have not changed at all.

6.4. French EV investments compared to other countries from European Union



7. Special Project

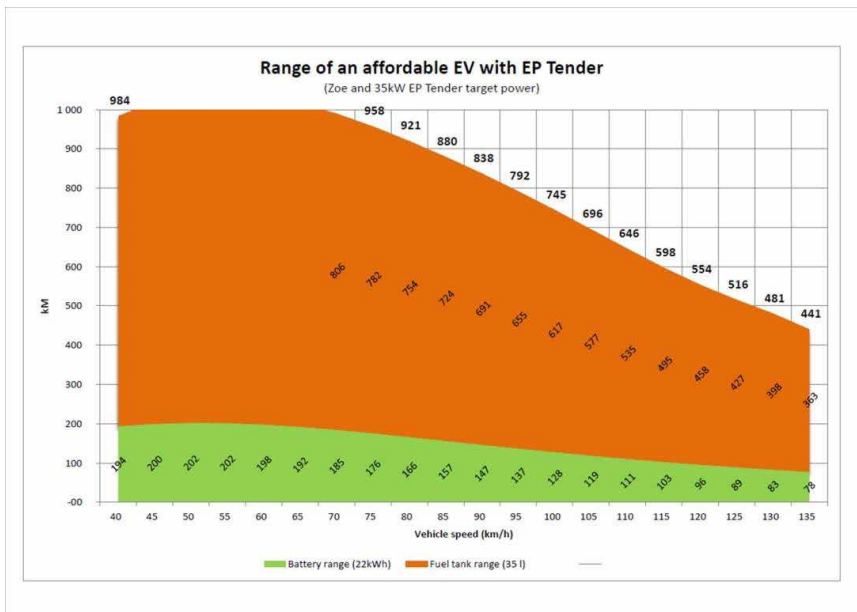
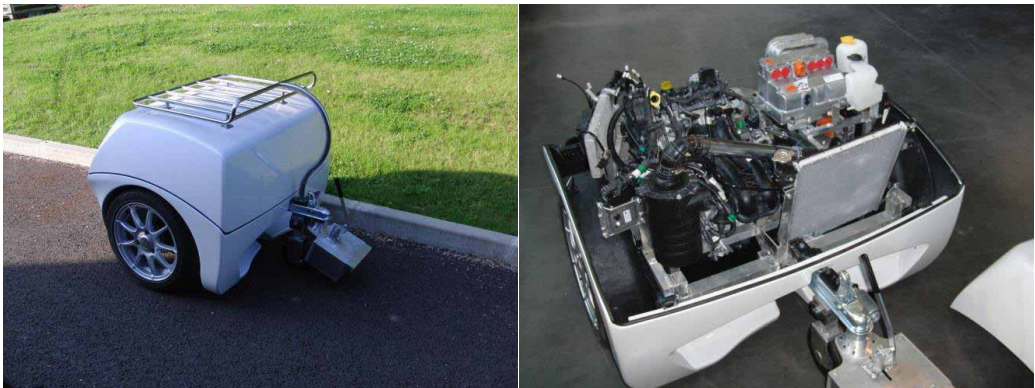
7.1. EP-TENDER

Website: www.eptender.com

This company, created by Jean-Baptiste Segard, has the target to extend the range of electric vehicles, not adding more battery capacity, but adding an external engine, like a trailer.

If an electric vehicle has a range of 100 km and needs an additional range, for instance for a holiday or other trips, one may have to wait a long time to recharge the car. To resolve this problem, an external engine can be added, which will recharge the empty batteries (the electricity produced is 400V for a power of 35kW). The prototype is actually in production and the first prototype will be finished in October for being tested.

The target is to launch in 2015 a service of location of this kind of trailers, because purchasing this kind of infrastructure could be too expensive for individuals.



8. Conclusion and Observations

During the redaction of this report about the French market of electric vehicles I noticed that France is a country where electric vehicles are actually a small business, but where the government, OEM and suppliers are making big efforts in order to make a real start in this industry. However, I think the problem with electric vehicles is the vicious circle that they are in because, in order to have more electric cars, there is a need to create more electric recharge infrastructures in the country, and only when companies will start to create more infrastructures, OEM starts to sell more cars.

In order to stop this vicious circle and to create a good one, with a real emulation between electric vehicle sales and the development of more infrastructures around the country, the French government is helping customers with considerable bonuses to help purchasing this kind of cars. The French government, via the ADEME is also helping companies (OEM, suppliers ...) to create, innovate and develop new projects, based on the transition for electric vehicles and their needs.

I think all countries really need to help customers if they want that there will one day be more electric cars than engine cars. This can be seen in Oslo, which is one of the cities in the world with the most electric cars, where the city is making free parking spaces for this kind of vehicles and is also creating many recharge stations.

Concerning WintEVE project and the possibilities of collaboration, I think the most important would be to find a partner for technical aspect in infrastructure, for instance Schneider Electric, it is similar to a Finnish company named ENSTO. A partnership with this kind of company could help WintEVE to develop the electric recharge stations in Finland and also to test this kind of infrastructure in Nordic environment, in order to create emulation for the sales of electric vehicles in the north of the world.

FRENCH ELECTRICAL VEHICLE MARKET

France has three huge automotive constructors: Peugeot, Citroën and Renault. Peugeot and Citroën are a same organization in a company named PSA, so they have the same project in research and development and for Renault it is the same case with the Nissan Company.

During this research was noticed that the market of the electric car in France is very small but since the beginning of this year and the launch of several electric vehicles from French car makers the market grows up fast but stays still a small business.

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