International Post Corporation

August 2009 | IPC Strategic Perspectives | print | next

# On Electrical Vehicles



# Introduction

The last 20 years the world has turned into a global village and this has resulted in an increase in transport.

Since 2000, the number of vehicles produced globally has increased by 28 percent[1].In China alone, road vehicles increased by a factor of ten between 1990 and 2005[2]. This has resulted in a fourfold increase in the number of kilometers driven in China during this period.

Much of the increase in vehicles may be attributed to road freight transport[3] a main artery for the postal industry. In the USA, the total distance travelled by trucks and vans was 40 percent higher in 2005 than in 1990, while in Australia that increased by 88 percent. No continent is showing a decrease and growth in the road freight transport sector is expected to continue in the future[4].

This will inevitably have a major impact on the environmental, especially on carbon emissions. If no actions are taken, **$CO_2$ emissions are expected to increase by 55 percent** among the EU-27 compared to 2005[5]. That certainly is not moving in the right direction.

The environmental impact of passenger cars in Europe has decreased as a result of recent actions to reduce carbon emissions, but not to the degree necessary to offset road transport emissions. Although there are low emission cars on the market, they are not sold in high enough volumes to make a real impact. To make a real difference, carbon emissions from passenger vehicles should be reduced by 70 percent from the levels emitted in 2000, by the year 2050[6].

In addition to contributing to the warming of the planet, these emissions are directly harming people's health. In Austria, France and Switzerland for example, six percent of all deaths, about 40,000 a year, are attributed to air pollution. In addition, air pollution results in over 25,000 new cases of chronic bronchitis and 800,000 new cases of asthma and bronchitis each year.[7]

This *IPC Strategic Perspective* focuses on electrical vehicle development and how the advent of this alternative to fossil fuel powered transportation can have an impact on the escalating emissions, global warming and adverse health effects we are experiencing with the increase in road transport.

Why electrical vehicles as a solution? Because, the implementation and market penetration of this alternative power source can be accomplished in a relatively short amount of time.

1. Source: http://www.worldometers.info/cars/
2. Source: Transport in China: Energy Consumption and Emissions of Different Transport Modes, p.10.
See also: http://www.ifeu.de/verkehrundumwelt/pdf/IFEU_et_al(2008)_Transport_in_China_GB.pdf
3. Road freight transport contains for example Light Delivery Vehicles and Freight Trucks.
4. Source: International Transport Forum, World Trends in Road Freight Transport.
See also: http://www.internationaltransportforum.org/jtrc/infrastructure/heavyveh/08Christensen.pdf
5. Source: Are trucks taking their toll?, p. 6. See also: http://www.transportenvironment.org/Publications/view/cid:3-start:10
6. Source: http://www.nissan-global.com/EN/IR/INSIDE/INSIDE-SP/ATB2008/page04.html
7. Source: Bellagio Memorandum on Motor Vehicle Policy, p.9. See also http://www.theicct.org/documents/bellagio_english.pdf

# Possible Solutions

In the car industry, there are a range of actions that could be taken to reduce carbon emissions, from the cheap and relatively easy solutions, to the more complex and substantial changes. The cheaper and easier solutions involve improving fuel efficiency and eco-friendlier fuels.

The more substantial solutions involve producing electric and hydrogen cars in line with the Intergovernmental Panel on Climate Change (IPCC) targets that recommend a carbon emissions reduction of 80 to 95 percent compared to the 1990 levels[8].

## Same Fuels – Different Rules

There are some things we can do with the existing petroleum fueled internal combustion engine that can reduce carbon emissions by 10 to 20 percent, which is a valiant effort, but not good enough.

These are just a few suggestions for improving fuel efficiency:

- Make use of the "Start / Stop" principle: When a car stops at a traffic light, the engine automatically switches off. When the clutch pedal is engaged, the engine automatically switches back on.
- Produce smaller, lighter cars with a smaller engines.
- Make the truck design more aerodynamic.
- Provide cars with a catalytic converter.
- Offer eco-driver training to reduce fuel consumption through improved driver behaviour
- Ensure correct tire-pressure

*An example of an aerodynamic design – Deutsche Post DHL in the UK: The Teardrop Trailer*

## Getting in Touch with Nature

Although sometimes controversial, the biofuel option includes an adaptation of the internal combustion engine (ICE): by replacing gasoline or diesel with fossil fuel substitutes that have lower carbon emissions, hence…eco-friendlier fuel.

There are three categories of eco-friendlier fuels:

- Compressed Natural Gas (CNG) which combines lower carbon emissions with lower nitrogen emissions. This fuel can be mixed with biopetrol, which can further decrease $CO_2$ emissions.
- Liquefied Petroleum Gas (LPG) which is produced from oil and is already available at most service stations. It reduces carbon emissions by 15 percent. In theory, every gasoline vehicle could be transformed into an LPG fueled vehicle by installing a tank.
- Biofuels are made from biological sources, mostly plant material. The two most well known are bio-ethanol and pure plant oil (PPO). These fuels can reduce carbon emissions up to 30 percent, if produced in a sustainable way. The problem is finding the filling stations to service them.
- Bioethanol and biodiesel can also be mixed with fossil fuels, even without adapting the engine, if the biofuel percentage is low enough. If the engine needs adaptation, the vehicle can drive on any mix of classic fossil fuels with biofuels. These vehicles are called flex-fuel vehicles.

The production of biofuels has been criticized by the UN, the IPCC and other environmental and social groups as being a possible competitor to food production; an argument that is gaining momentum and will require a harder look.

8. Source: Actieplan Elektrisch rijden, p. 8. See also http://www.cmmn.org/fileadmin/klanten/cmmn/documents/090323_Actieplan_Elektrisch_rijden_cmmn_def.pdf

## Back to the Future: Electricity and Hydrogen

Electric and hydrogen vehicles make use of a totally different engine technology. Some of these cars have no carbon emissions at all. Zero, nada, none… That is why they are referred to as **zero-emissions vehicles.** They don't have an internal combustion engine and as such would make the car industry completely independent of fossil fuels. So what's the hold up?

**Electric vehicles**

Electric vehicles use electricity from a battery known as "fuel". There are several types of electric vehicle.

- Full Electric Vehicles only use an electrical engine with a battery to raise energy to drive the wheels. If this energy is produced sustainably, the carbon emissions can easily be reduced by 100 percent[9]. However, when the electricity originates from coal or another unsustainably sourced power plant, this will have a negative overall environmental impact.
- Hybrid Electric Vehicles have two energy sources. They combine the electrical engine with an internal combustion engine. There are several types depending on the range of carbon emission reductions; Micro Hybrid: 5 – 10 percent; Mild Hybrid: 10 – 20 percent; Full Hybrid: 40 percent[10].

If the hybrid car's battery can be recharged using the domestic power grid, the car is called a plug-in hybrid car. It can drive a few dozen kilometers on electricity, and functions as a full hybrid car.

Because of its use of fossil fuels and a combustion engine, the carbon emissions of hybrid cars are not zero. In fact, a hybrid car only reduces carbon emissions by 30 to 50 percent even when taking into account the potential of future technology[11].

However, a full-electric vehicle can reduce carbon emissions up to 100 percent providing the electricity is generated in a sustainable way[12].

*Chevrolet Volt*

To really have an impact, there should be at least one million electric vehicles in a country the size of Germany, which had 46 million cars on the road in 2005[13]. This is exactly the target set for 2020 by the German federal government (August 2009)[14].

But, there are plans to aim higher. The electrical driving action plan in the Netherlands (Actieplan Elektrisch Rijden) aims to have one million electric vehicles in the Netherlands by 2020. This would account for around 15 percent of all passenger vehicles. Spain with 20 million cars in 2005, also wants to achieve one million electric cars by 2020 through their Movele project. The Irish government plans to switch ten percent of all cars, trucks and buses to be powered by electricity by 2020.

9. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.31. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
10. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.31. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
11. Source: http://www.nissan-global.com/EN/IR/INSIDE/INSIDE-SP/ATB2008/page04.html
12. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.31. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
13. Source: Eurostat
14. Source: http://www.manufacturing.net/News-Germany-Wants-1-Million-Electric-Cars-By-2020-081909.aspx

**It's not rocket science…or is it?**

Hydrogen cars also use electricity, but not from a battery. Their energy is induced by a fuel cell, containing two electrodes (one positively charged and one negatively), a catalyst and a membrane. Hydrogen atoms go through the fuel cell where the catalyst breaks them into protons and electrons. The protons pass through a membrane, while the electrons go through a circuit which induces the energy to drive the wheels. In the last phase, the electrons are recombined with the protons and oxygen atoms to form water molecules with the only emission being plain water.

If hydrogen is produced in an eco-friendly way, this option becomes the ideal solution. However, at the moment, according to the US Department of Energy, 48 percent of the worldwide hydrogen production comes from gasoline, 30 percent from oil and 18 percent from coal sourced power plants[15].

Hydrogen production through the electrolysis of water only amounts to four percent globally. The energy needed to split water into hydrogen and oxygen can be generated either by nuclear power or solar energy.

A good example of hydrogen production by solar energy is the Hydrosol II project, located in Almeria, Spain. This project, the largest of its kind, started in 2002 and is funded by the European Union to promote renewable energy. It produces around three kilograms of hydrogen each hour, equal to a 100 kW thermal output.

The set-up of hydrogen production for the car industry as well as the supporting distribution network will require substantial investments, because of the required new infrastructure (pipelines and fueling stations). Nevertheless there already are first steps to implement hydrogen cars. For example, the USPS has been testing two Chevrolet Equinox fuel cell vehicles.

The US Department of Energy Secretary, Stephen Chu decided recently to decrease hydrogen research spending to USD 100 million in 2010[16]. The US government doesn't see large-scale industrial maturity for hydrogen before 2020. Their short term focus is on technologies that contribute to carbon emission reduction and a faster return on investment; this should be seen in the context of the struggling US car industry.

In June 2009, the US government did however give financial support to Ford, Tesla Motors and to Nissan, all of which are investing in electric vehicles or batteries[17].

**Although the hydrogen car might be the preferred long-term solution, the electric vehicle is the best short-term answer to carbon emissions from vehicles, as long as the electricity used is sustainably produced.**

15. Source: http://www.hydrogenassociation.org/general/faqs.asp#howmuchproduced
16. Source: http://www.nytimes.com/2009/05/08/science/earth/08energy.html
17. Source: http://www.ft.com/cms/s/0/c2ccb40a-6058-11de-a09b-00144feabdc0.html

# Hybrid Vehicles: Plugging Into the Future

## Overview of latest initiatives

Currently there are several models of hybrid cars on the market, however fully electric vehicles are still rare.

The Toyota Prius, a hybrid car, launched in Japan in 1997, was one of the first successful initiatives. Over the last ten years more than one million Prius models have been sold worldwide[18]. At the end of 2009, Toyota will introduce a plug-in hybrid version of the Prius.

*Toyota Prius*

Since the introduction of the Prius, other car manufacturers have followed suit. In May 2009, the Th!nk car, a fully electric vehicle built in Norway, was launched. Other recent introductions include the Honda Insight, Lexus hybrid SUV (the RX) and the Tesla Model S.

Over the coming years, more plug-in hybrids are expected to enter the market; the Volvo V70, Mitsubishi i-Miev, Renault Kangoo BeBop, Chevrolet Volt and Jaguar XJ. In the USA in 2010, the Chinese electric car Coda will be introduced with a range of about 200 kms; this car is designed by the Italian firm Pininfarina.


*Honda Insight*

*Tesla Model S*

18. Source: http://en.wikipedia.org/wiki/Toyota_Prius#cite_note-Toyota0309-1

## Benefits

There are definite benefits to be derived from the shift to electric vehicles. First, they can reduce carbon emissions significantly. When using sustainable sources for energy production, the carbon emission of a fully electric vehicle can easily be reduced up to 100 percent.

Secondly, using electric vehicles also substantially improves the air quality in cities[19].

Third, an electric vehicle also produces less noise. When the speed stays below 60 kilometers an hour, these cars are much quieter than the current ICE cars[20]. In the future, car batteries will also function as energy storage devices to support the grid at times of peak energy use.

And finally, a fully electric engine (without a combustion engine) contains fewer parts that would need replacement, repair or maintenance and therefore would result in running costs being reduced by 30 to 50 percent[21].

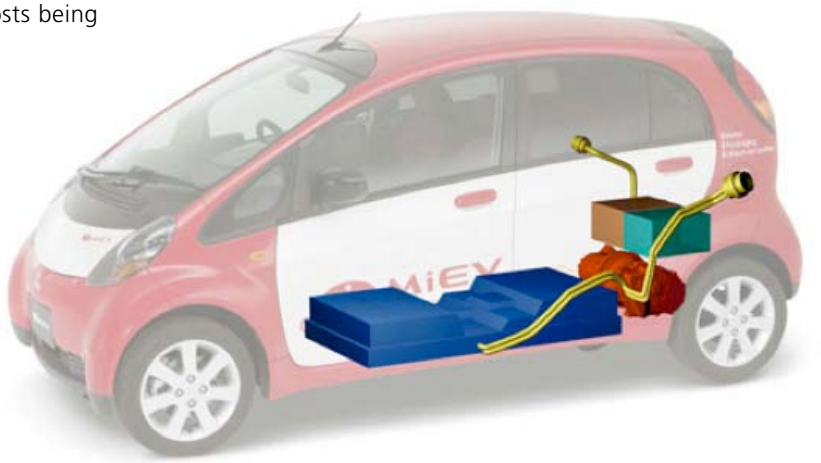
## Challenges

Although there are benefits and electric vehicles offer a lot of advantages and opportunities, setting up an electric vehicle system presents many challenges regarding the car's battery.

The first hybrid cars used Ni-MH batteries These batteries were too large and the price was too high. Due to the demand for stronger, smaller and better performing batteries for mobile phones and laptops, these batteries improved.

Today many electric and hybrid cars use Lithium-Ion batteries. This type of battery is lighter, smaller and more efficient compared to Ni-MH batteries.

Although Lithium-Ion batteries have improved, there are still hurdles to overcome:




19. Source: Elektrisch autorijden, Evaluatie van transities op basis van systeemopties, p.21. See also http://www.rivm.nl/bibliotheek/rapporten/500083010.pdf
20. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.33. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
21. Source: Electric Drive Vehicles For Mail Delivery: Identifying Key Issues, p.3.
See also: http://www.prc.gov/prc-docs/library/refdesk/techpapers/prcstaff/Ravnitzky%20Eastern%20Conf%20%20Paper.pdf

## Range

The average range of the current Lithium-Ion batteries is 150 kilometers , and according to the critics, this is not good enough.[22]

However, this would be sufficient for a large majority of people for their daily commute. According to the Dutch action plan for electric driving, 91 percent of people in the Netherlands do not drive more than 150 kilometers per day[23]. In Germany, 80 percent of car drivers do not exceed 50 kilometers a day[24]. In his presentation at the IPC Senior Executive Forum on 'Energy the Next 20 Years' (January 2009, Washington DC), Keith Cole, director advanced technology vehicle strategy of General Motors, stated that around 78 percent of daily journeys in the United States are less than 40 miles (60 kilometers).

Occasionally people travel of course further than 60 – 150 kilometers, perhaps during holidays or on the weekend; however the temporary use of a hybrid or even combustion engine car could accommodate this.

One solution is for dealers to offer a package deal containing availability to use an ICE or hybrid car when purchasing an electric vehicle. It is likely that, due to improvement of technology, this system will only be needed temporarily.

*Nissan Mixim*

In fact, car batteries have already improved tremendously. The second generation Toyota Prius battery is 15 percent smaller, 25 percent lighter and 35 percent more powerful than the first generation battery. The Nissan Mixim car, which is planned to be launched in 2012, has a Lithium-Ion battery with a range of 160km. And now there is an electric battery available to provide a small Tesla sports car with a range of 400 kilometers (244 miles).

22. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.11. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
23. Source: Actieplan Elektrisch Rijden Achtergronddocument, p.40. See also http://www.natuurenmilieu.nl/pdf/090323_achtergronddocument_elektrisch_rijden_dhv_kl.pdf
24. Source: http://www.worldcarfans.com/109030217505/opel-ampera-officially-unveiled-video

## Battery Cost

The battery cost is another potential obstacle. According to Business Week, a Lithium-Ion battery will add at least USD 8,000 to an electric vehicle's total price[25].

Although these costs can partly be recovered over time by lower maintenance and repair costs, the battery price is expected to decrease with mass production.

A way of dealing with these higher costs could be through a lease contract. Purchasers of electric vehicles could pay a monthly fee for batteries (expected to be around USD100 - 150). Several car manufacturers including Th!nk, Chevrolet and Nissan are already considering this service in their product offer. This could also be an interesting business model for power suppliers.

There is already a similar offering for boats from the Dutch boat battery specialist Posthuma. They offer a lease programme for boat batteries, including the battery and the charger. Posthuma is responsible for the battery's maintenance. The client just has to ensure the battery is charged in the evening. More information about this battery lease programme can be found on http://www.posthuma-electric.nl/PosthumaLeaseprogramma.htm

Another way to reduce battery cost is the use of the full battery life-cycle, including the "second life". After some time, when Lithium-Ion batteries are not powerful enough anymore, they still have 80 percent of their power left. These batteries can be applied usefully in other machinery, like boats, power back-up or computer farms. The battery owner resells their battery or, in case of leasing, switches their battery for a new one.

**Recharging or Replacing the Battery**

No matter what the range of a battery, it will always need to be recharged and this creates concerns when using national grids. Will they be able to cope with the extra demand for power? According to a 2009 study in the UK by a consortium including Jaguar, Land Rover and E-on[26], the UK grid will be able to cope. A medium-rise in the number of full-electric and plug-in hybrids would have a much lower impact on the UK power grid than earlier estimated. The study assumed a ten percent market penetration of plug-in hybrids and full-electric vehicles in the UK vehicle park and no upgrade to the current power grid. The 'worst' case scenario was an increase of two percent (approximately 1 Giga Watt) of the daily electricity demand. Off-peak domestic recharging, during the night for example, will not have a substantial impact on peak demand.

In the long-term, with more full-electric vehicles on the roads, increasing the demand for the power grid will need to be adapted or upgraded.

There are several techniques or ways of recharging batteries:


25. Source: http://www.mixedpower.com/research/battery-cost-holding-back-hybrids-and-evs/

26. Source: http://www.ricardo.com/en-gb/News--Media/Press-releases/News-releases1/2009/UK-power-infrastructure-has-capacity-for-significant-rise-in-use-of-electric-and-plug-in-hybrid-vehicles/

**Smart Grid and Vehicle-to-Grid**

Consumers' preference for recharging car batteries is in the early evening hours during peak electricity demand. Special electricity tariffs could be introduced to encourage overnight recharging, in order to spread the total energy demand.

When more electric vehicles are used, there will be a need for better management of the power grid to handle peak demand. The power grid should become a smart grid, a "digital upgrade" of the power grid, with a computer system monitoring consumption and registering failures and peak demand. The grid would be linked to a database registering who uses the electricity, when and for what purpose. Based on such data, power distribution could be made flexible to meet demand.

With a smart grid, the consumer not only buys energy from their supplier, they can also sell it to back to the grid. This concept is known as "Vehicle to Grid" or V2G. A full electric vehicle or plug-in hybrid car connected to a smart grid will return previously stored energy when the vehicle is not in use.

In January 2009, Newark became the first American city to approve the use of an electric vehicle to store and provide power to the local power grid. This project was carried out in cooperation with the University of Delaware. The university is now testing V2G at two outlets within the city's service territory.

**Public Charging Locations**

For drivers without their own garage or recharging points, public charging locations will be required. The most likely places for these would be: near offices, railway stations, shopping malls and public car parks.

These sites would need to be weather and vandalism proof. To become an effective public network it should cover the whole country, continent and ideally the world, and be connected to smart grids.

Charging out-of-home also needs a credible billing system. There are already several systems. Currently, drivers can pay a single charging session by placing a toll free call to the 24/7 number on each charging station, or by becoming a ChargePoint Network subscriber by going to www.mychargepoint.net and opting for a monthly subscription plan. Other future payment options include using a smart credit/debit cards to authorize a recharge session, or using a standard credit or debit card at a remote payment station to pay for charging.

Another hurdle to overcome is the standardization of the plugs. In May 2009, the European standard for a charging point's plug was chosen. The winner was the design from a company called Mennekes. The plug works both for 230-Volt and 400-Volt connections. In the US, the J1772 will be the new standard for plug-in vehicles.

It is not a problem that this plug differs from standard domestic plugs, as it can easily be converted with an adapter. And of course the car manufacturers can produce cars that can be recharged using different voltage systems, like the Mitsubishi i-Miev.

*(Public Charging Locations continued)*

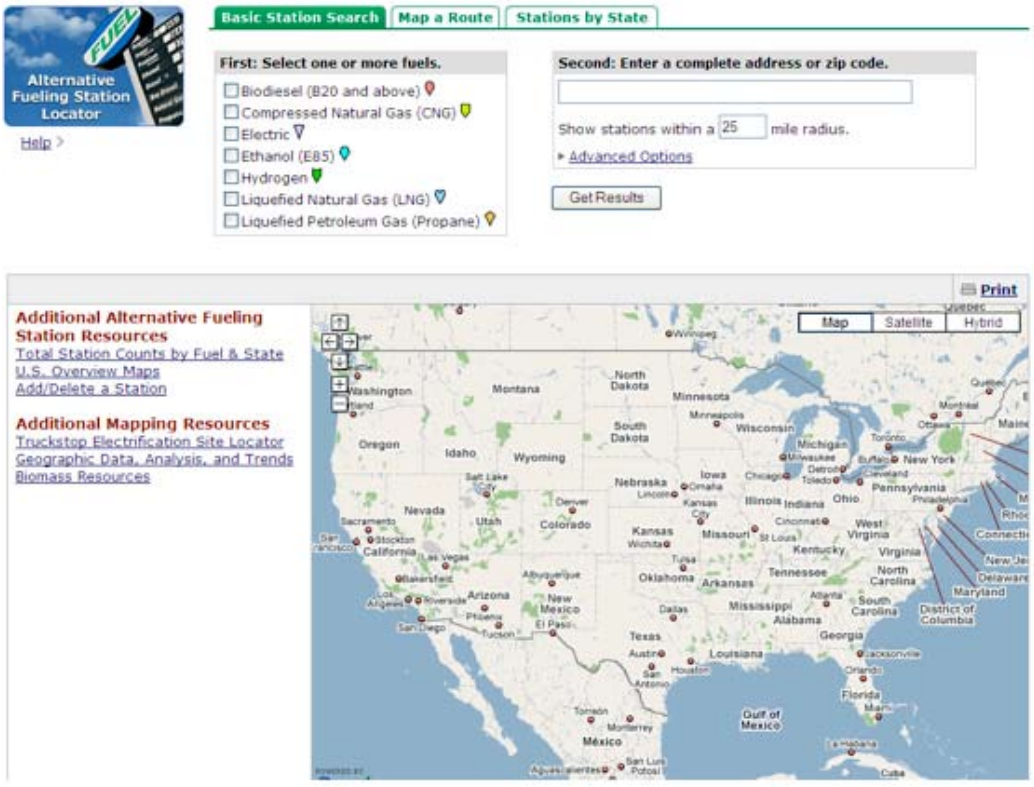
A number of countries have already started setting up public charging locations. At the end of 2008, Coulomb Technologies planned to install 40 electric vehicle stations in the state of California. In 2009, this network is being expanded to 28 states in the US and into Canada.

To locate a charging point, the US Department of Energy has developed an Alternative Fueling Station Locator. On this website people can find nearest 'alternative fueling station'. The website can be downloaded to mobile phone, Blackberry and other handheld devices.

(http://www.afdc.energy.gov/afdc/locator/stations/).

In Spain, the city of Madrid plans to install 58 public charging points in parking garages. The city of Seville also has plans to install 75 pre-paid recharging points in the most popular public parking spaces, for example near airports and public buildings.


In the Netherlands, the government and the electricity providers are planning the installation of 10,000 public charging points for electric vehicles by 2012.



**Fast charging**

The current average charging time of a battery is eight to twelve hours. This can be unpractical, especially at public charging stations. No one will want to wait at a station for eight hours while their battery is recharging.

A fast charging concept can solve this problem by recharging a battery in 10 to 15 minutes.

These kinds of system have already been developed by the American company Aker Wade[27], which recently introduced their Level III fast charging stations. The city of Charlottesville, Virginia, is planning to establish a rapid charging station for a small fleet of plug-in hybrids, provided with Aker Wade technology.

**Battery switching**

Another way for (fast) charging is battery switching; replacing the whole battery at a station or a car dealer instead of recharging the battery itself.

This concept has been developed by Better Place[28], a company founded in California in 2007. In May 2009 they opened the first battery switching station in Yokohama, Japan. They are also planning to build an infrastructure of battery switching stations in Denmark in 2011. In addition there are plans in Israel, Australia, Hawaii and California to install battery switching stations.

The fully automated battery replacement process can be completed in less than five minutes, which is approximately the same time as refilling a conventional car fuel tank today. In effect, the set-up of these stations is similar to a car wash operation. The critical success factor to these operations will be the standardization of car batteries.

**Inductive charging**

One of the latest methods of recharging a battery is by inductive charging. With this technology, electrical energy is transferred by a process called Inductive Power Transfer (IPT)[29]. This process uses magnetic forces to transfer electrical power from a transmitter to a receiver, without the use of cables or connections.

For recharging the battery of an electric car, a transmitter could be built under a road surface. The receiver on the vehicle would consist of a steel plate underneath the car which would be connected to the car's battery. Current implantable road electrification devices achieve more than 75 percent transfer efficiency at an operating distance between the transmitter and receiver of less than 10 cm[30].

This way of recharging is much easier and more convenient than wired charging. Electric vehicles could be charged anywhere cars are parked and without cables and plugs making it much safer. In the unlikely event of contact, the high frequency used (10 kHz to 40 kHz) would not cause electrocution.

This technology is already used for mobile phones, smart phones and now even a Wii game console can be recharged through inductive charging. In New Zealand, Uniservices IPT[31] is a company already promoting this technology. Further research and pilot projects will be required to determine the commercial viability of inductive charging.

27. Visit their company website at http://www.akerwade.com/
28. Visit their company website at http://www.betterplace.com/

## Changing Hearts and Minds

**The Driver's Mindset**

For electric cars to really "take off", a change in the mindset of the consumer will be required in addition to financial incentives. Information and communication on the benefits of electric vehicles is essential. If consumers realize that electric vehicles could offer them advantages, they could be convinced to accept, support and purchase electric mobility. But they are going to have to be convinced that the extra upfront cost is worth it for them and for the environment. Advantages will have to be apparent and communicated effectively. They will need to include convenience, cost savings and cleaner energy. Companies with a large vehicle fleet such as postal operators can be important advocates in this change process. If employers and employees are enthusiastic, they will 'spread the word' to their friends and family.

Market research shows that one of the reasons the Prius was so successful is that its unusual design clearly marked the driver as environmentally responsible and this provided great differentiation to Honda's hybrid offering. Brand identity is very important.

# The Postal Industry and Electric Vehicles

## Advantages for the Postal Industry

For the postal industry there are additional advantages derived from an electric vehicle fleet. They include:

- Increased purchasing power, given the size of the postal vehicle fleet
- Infrastructure to recharge batteries on premises
- Fixed and limited traveling distances. The average postal route is predictable and fixed in terms of distance with many stops and starts in cities.
- Reduction of carbon emissions and lower operating cost per kilometer

## Case Studies

**Chrysler's Electric Postal Delivery**


On Earth Day 2009, Chrysler announced that they will provide the United States Postal Service (USPS) with a fleet of 250 full-electric vans based on the Town & Country model. In Europe, this model is better known as the Grand Voyager.

The key infrastructure for charging will be delivered by Duke Energy and ConEd, which will equip post offices in strategic regions of the United States with a charging infrastructure.

The Lithium-ion batteries will be delivered by A123Systems, and will also be able to store energy.

These batteries have a range of approximately 35 kilometers (20 miles). This range should meet USPS requirements.

Another postal initiative from USPS is the three-wheel (T3) electric vehicles in Florida, California and Arizona. The T3 is powered by two rechargeable batteries, has zero gas emissions and costs four cents a mile to operate.

Chrysler also announced they intend to apply for the US Department of Energy's 'Transportation Electrification Stimulus Program' (a federal grant). This money would enable the vehicle manufacturer to establish a nationwide fleet of zero-emission electric vehicles. These could also be used for mail delivery.

29. http://www.uniservices.co.nz/pageloader.aspx?page=1484d0d0d0
30. http://en.wikipedia.org/wiki/Wireless_energy_transfer
31. Visit their company website at http://www.uniservices.co.nz

**TNT Drives Clean**

TNT has already demonstrated its environmental engagement with the "Driving Clean Program", which aims to reduce carbon emissions. One of the first initiatives was the conversion of its parcel delivery vans in Amsterdam to biodiesel vehicles. TNT has also tested biodiesel trucks in India.

In Italy, hybrid cars were tested, however the results showed that emissions decreased by only eight percent, which was insufficient for TNT.

TNT also tested electric vans in Rotterdam in 2007, equipped with the ZEBRA batteries. This initiative is a part of the Rotterdam Climate Initiative which aims to reduce carbon emissions in the city by 50 percent by 2025 compared to 1990. The electricity for the vehicles comes from a 'water power plant', which results in the car being entirely emission-free. But again the evaluation was not positive: the batteries were very intensive to maintain and the drivers often forgot to recharge them, which damaged the batteries.

Currently, TNT is testing electric vehicles equipped with Lithium-ion batteries and has ordered 60 full-electric vehicles. The first tests on these cars and vans were positive and the company is very happy with this new initiative. The battery is still a little bit too expensive, but according to TNT, this is partly compensated for by reduced maintenance costs.

TNT is not only testing electric trucks and vans; they are also electrifying home mail delivery. At the beginning of 2009, TNT started to test electric scooters with Lithium-Ion batteries in the Dutch towns of Veenendaal, Meppel and Emmeloord, where the average route is between 25 and 45 kilometers a day.


**Japan Post**


Japan Post is also looking at electric vehicles, having undertaken an evaluation study in June 2008. Key factors included the need for carbon emission reduction and the awareness of Japan Post's CEO having worked previously for Toyota, and thirdly the high fuel prices in 2008.

In July 2009, Japan Post signed a five-year contract for 40 electric cars which will be split between two models, including the Mitsubishi i-Miev (illustrated).

These cars have a Lithium-Ion battery with a range of about 160 kilometers, which is completely charged in 14 hours through a 100 volt domestic outlet. When plugged into a 200V industrial outlet charging only requires seven hours. With the Mitsubishi-built quick-charge system 80 percent of the battery can be charged in just 30 minutes.

The second model is the Stella plug-in car from Subaru, which is also powered by a Lithium-Ion battery. The car has a range of 80 kilometers and weighs about 1060 kilograms in total, battery included.

Over time Japan Post plans to buy 24,000 electric cars for mail delivery.

**Additional Postal Initiatives**

In January 2008, Deutsche Post DHL became the first logistics company to test hybrid trucks. The trial included DHL Express operations in the UK and mail transport in Germany. Two suppliers were chosen for this test: Mercedes-Benz (the Atego BlueTec Hybrid) and Mitsubishi (the Fuso Canter Eco Hybrid).

In 2007, Groupe La Poste released an international tender for the supply of electric test vehicles. Two candidates were selected: PSA Peugeot Citroën and Venturi, and Fiat together with Micro-Vett / Newton.

Groupe La Poste started testing the vehicles in the summer of 2008 and evaluated the test vehicles six months later. The choice of the supplier for 500 electric vehicles is expected to be made at the end of 2009. The objective is to order 10,000 electric vehicles by 2012.

At the beginning of 2009, Royal Mail had been testing two 'egg-shaped' Matra vehicles for three months in the cities of Oxford and Essex. The vehicle has a battery range of about 45 kilometers (30 to 35 miles) and is used for mail delivery. Royal Mail may replace a fleet of diesel Vauxhall Combo vans if these tests prove positive.

**Initiatives from Fedex**


In December 2008, FedEx introduced its first ten electric Modec vans for parcel delivery in the center of London. The vehicles are full-electric and contain a Lithium-Ion battery with a 150 kilometers range. The battery is relatively easy to remove and will be leased by FedEx.

First results are very positive; the van's performance and handling is superior in urban environments. The driver's comfort is also very good.

In Paris this April, FedEx introduced vehicles that were originally designed as small urban cabs, and transformed them into small delivery vehicles. During the test period over 2,400 documents and small parcels were delivered. In busy parts of Paris (with about 15 stops an hour) the vehicle has proven to have a high level of efficiency. These vehicles are environmentally friendly because of their zero carbon emissions. Because they are allowed to access 'pedestrian-only' areas, this vehicle brings FedEx 'closer to its customers'. FedEx is considering buying extra vehicles and testing them in other parts of the French capital.



## Conclusion

The current postal initiatives can be a real stimulus for the electric vehicle industry. The more orders vehicle manufacturers receive, the more they will invest in the development of electric vehicles. Postal initiatives can also convince other businesses and the public on the benefits of electric vehicles.

At the IPC Annual Conference in Edinburgh on 15 May 2009, the Chairman of the IPC Board, Jean-Paul Bailly referred to the planned purchase of 100,000 electrical vehicles that will be made by Groupe La Poste, together with the French state and five companies over the next five years, and extended an invitation to other postal administrations to benefit from the combined purchasing power of this initiative."

Collective purchasing power is something that not only the postal operators can engage in, but also they can be joined by their key customers. Indeed in the environmental stakeholder engagement research carried out by IPC in 2008, many corporate customers identified their willingness to work with the posts on the combined purchase of low carbon vehicles in order to improve buying power and to reduce costs.

Of course smaller posts do not always have the scale advantages to invest in electric vehicles. If smaller posts work together or with larger posts, economies of scale can be shared. The postal industry is already cooperating together on a global basis to measure and improve the efficiency of carbon emissions through the IPC Environmental Measurement and Monitoring System (EMMS), therefore such cooperation could be extended to the purchase of electric vehicles.

TNT and Royal Mail postal drivers have been very positive about the new electric vehicle initiatives in their companies. These drivers can now function as opinion leaders by spreading the positive feedback among their colleagues and family and friends.

Electric vehicles are no longer science fiction. As one of the largest global vehicle fleet operators, postal companies are actively testing and deploying electric vehicle technology as part of their emission and cost reduction programmes and can serve as early adopters and advocates of new alternative fuel technologies.

International Post Corporation



## ABOUT THIS PUBLICATION

***IPC Strategic Perspectives* is an in-depth look at issues relevant to the postal industry.**

***IPC Strategic Perspectives* is sent out exclusively to IPC member posts. If you have an idea for a topic of interest for an upcoming issue, please contact us via email at publications@ipc.be or send your submissions to:**

**IPC**
**Head of Communication**
**Avenue du Bourget, 44**
**1130, Brussels**
**Belgium**