



# eVehicles

The future of fleet?





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The impact of CO<sub>2</sub> emissions and climate change, oil dependence and the rising cost of fuel – these have all been prominent on almost every fleet’s agenda for some time now. Oil prices remain on a long term upward curve, pushing up running costs for fleets. Meanwhile, since the Kyoto protocol was conceived in 1997, governments in many countries have used fiscal measures to encourage fleets to adopt cleaner, greener vehicles.

In the European Union, motor manufacturers have been set clear targets to bring average CO<sub>2</sub> emissions for new vehicles down to 130 g/km by 2012. It is envisaged that this target will become more demanding in the future, with a goal of 95 g/km by 2020 widely expected.

So, despite failure to reach binding agreements at the United Nations’ recent climate summit in Copenhagen, it is inevitable that in coming years the reduction of carbon emissions will remain a strong feature of fiscal policy and vehicle taxation in many countries, and especially so in Europe. There is also little likelihood that oil prices will do anything other than continue their rise.

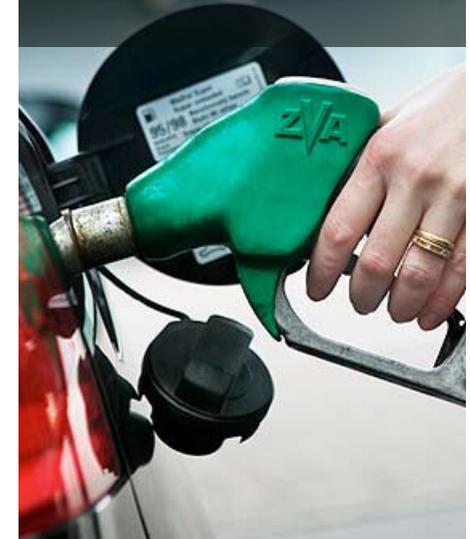
In this context, it is clear that simply improving internal combustion engine technology will not go far enough for most motor manufacturers to reach long term emissions targets. There has been debate over the ‘clean’ fuel of the future for some time, with both natural gas and biofuels receiving their moment in the spotlight in recent years. However, it now seems clear that over the next ten years, much of the focus will fall on electric vehicles.

For a significant number of motor manufacturers, power train electrification is at the advanced stages of development with a number of mass produced electric vehicles expected to come to market within two years. Expert forecasts vary, but it seems that by 2020 electric vehicles - or ‘eVehicles’ - could represent as much as 10% of new car sales.

### What is an eVehicle?

Today there is already a range of vehicles available or under development that can be classified as electric vehicles. Currently these are most commonly seen as ‘hybrids’ with the Toyota Prius often grabbing the headlines as

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the green vehicle of choice for Hollywood celebrities and other high profile figures seeking to enhance their environmental credentials.

There are two main categories of hybrid vehicles - parallel and series. Parallel hybrid vehicles are currently the most widespread and combine two forms of propulsion. In these vehicles both a petrol engine and an electric motor can drive the transmission. Some hybrid vehicles also use regenerative braking technology, which charges the battery when braking. Examples of parallel hybrids that are already established in the mainstream market include the aforementioned Prius and also a electric version of the Honda Civic.

“Hybrid technology has the advantage of partially reducing carbon emissions and dependence on oil.”



Series hybrids differ to parallel hybrids in that the diesel or petrol engine never directly propels the vehicle. Instead it powers a generator, which in turn either powers the electric motor or charges the battery. General Motors’ expect to release a series hybrid to the market in 2010 in the guise of the Chevrolet Volt (or Opel Ampera in the European market).

Hybrid technology has the advantage of partially reducing carbon emissions and dependence on oil. The technology is also available now, with little additional research and development required to bring it to the mainstream market. However, the reduction in emissions and fuel consumption are only really evident in low speed, low mileage driving environments such as towns and cities.

A third type of hybrid is the ‘plug-in’ variety which differ from normal hybrids in that the battery can also be charged by plugging it into the electricity grid. Amongst many other manufacturers Volvo, to take an example, is going to produce plug-in hybrids of existing

models like the C30 and the V70, with release to the market expected in 2012.

Hybrids aside, true electric vehicles have ‘zero’ emissions as they are propelled solely by batteries. Of course, whilst the vehicle has zero emissions, the generation of electricity required to charge the battery does create carbon emissions. However, even with the current mix of electric power generation, it is estimated that the power used is 40% cleaner than with gasoline. Moreover, with renewable energy generation likely to grow, this will make true electric vehicles even cleaner and greener.

Most manufacturers agree that Lithium-ion technology provides the best mix of power and energy storage for use in electric vehicles. These batteries are however expensive, which does pose challenges for mass adoption in the short to medium term. However, with cheaper running costs, motor manufacturers are suggesting that the total cost of operating these vehicles will be similar to conventional vehicles powered by the internal combustion

**Fig 1: The pros and cons of hybrid vehicles**

Advantages	Disadvantages
Uses existing infrastructure for fuel	Still emits CO <sub>2</sub> and other pollutants
Reduces CO <sub>2</sub> emissions	Only more fuel efficient in urban driving situation
No significant development required	Pollution from disposal of battery
Partially reduces dependence on oil	
Partially reduces running costs	

**Fig 2: The pros and cons of plug-in hybrids**

Advantages	Disadvantages
Reduces CO <sub>2</sub> emissions	Still emits CO <sub>2</sub> and other pollutants
Partially reduces dependence on oil	Some development still required
Partially reduces running costs	Public access to electric infrastructure still limited

**Fig 3: The pros and cons of true eVehicles**

Advantages	Disadvantages
Zero GHG emissions from vehicle	Production of electricity still emits pollutants
Reduces dependence on oil	Some development still required
Lower running costs	Public access to electric infrastructure still limited
	Lithium-ion battery is expensive

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engine. Examples of forthcoming models include the Nissan Leaf, Mitsubishi iMiev, Renault Fluence and Peugeot Ion. Some of these models are expected to arrive on the market as early as 2011.

### Critical success factors

There are three main areas on which the future success of eVehicles rests. The first is the need for governmental support and financial backing, along with close collaboration between governments, power companies and motor manufacturers.

It is expected that governments in many major western European countries - including France, Germany, the United Kingdom and the Netherlands - will offer significant incentives in the form of subsidies to purchasers of eVehicles. Given the success of recent subsidies (in the form of scrappage schemes) to new car sales in Europe, this could provide a timely and effective boost to the introduction of eVehicles to the mainstream.

Batteries also present one of the key challenges that must be addressed. eVehicle batteries are currently expensive to produce and must be replaced as many as three times over the life of the vehicle. Moreover, ways must be found to recycle them effectively in order to minimise environmental impact associated with their disposal. It is suggested that these batteries could be reused for static power storage in public places such as hospitals, but an effective infrastructure for this must be established if eVehicles are to be a success.

Finally - and crucially - the recharging infrastructure is deemed essential if eVehicles are to become more than a solution for short journeys, as batteries are unlikely to sustain

more than a 100 mile range with each full charge. There are already stated commitments from local governments in many major cities. The Mayor of London, for instance, has committed to a network of 25,000 charging points by 2015.

As such, it is expected that the growth of eVehicles will follow a similar pattern to that of mobile cellphones during the late 1980s and early 1990s, with major cities and other highly populated areas the first to see wide scale adoption through the introduction of publicly available ‘pay per charge’ points.

### An electric future for fleets?

Managing a fleet today is all about balancing its running costs with the needs of employees and corporate social responsibility with regards to the environment. When it comes to these different agendas, LeasePlan is seeing a growing realisation amongst fleet operators that the goals of each can converge. As organisations seek ways to reduce operating costs they are finding a surprising compatibility with the reduction of carbon emissions, which in turn acts as a useful

catalyst to justify and accelerate cost reduction programmes to employees.

That said, there are clearly some factors that must be considered by the fleet decision maker when assessing the feasibility of introducing eVehicles to the fleet. The first step here is the requirement to segment the mobility needs of both the business and drivers. At present, eVehicles might be very attractive for short distances, low speeds and local use such as ‘back to base’ urban deliveries. However, for high mileage groups such as field based sales reps, eVehicles are unlikely to be a practical solution in the first instance.

Directly related to this suitability segmentation is the availability of a charging infrastructure. For fleets running eVehicles, it could be cost effective to install a charging station at the main office or ‘base’ location. Quick charging facilities can provide turnaround times of as little as 15 minutes, solving many of the perceived problems around vehicle availability and resource optimisation.



### What to consider whilst evaluating an eVehicle?

Specific requirements to consider include:

- Total driving range of the car;
- The pure electric driving range;
- CO<sub>2</sub> emission targets/objectives;
- Size of the car, fit for purpose;
- The expected usage of the car;
- The load that can be stored;
- The engine torque;
- The top speed of the car.



It is also important to look at typical journey destinations. Whilst 'pathway' charging (that being a network of charging points along major trunk roads) is some way off, destination charging may make it possible to double the effective range of eVehicles.

With charging points likely to first appear within major cities, at public buildings and even on out of town industrial or retail parks, mapping typical journeys and destinations against charging networks could reveal the potential for use of eVehicles. Likewise, collaboration between groups of companies may act as an enabler for the growth of the charging infrastructure, albeit requiring a new approach to managing fuel expenses and mileage allowances.

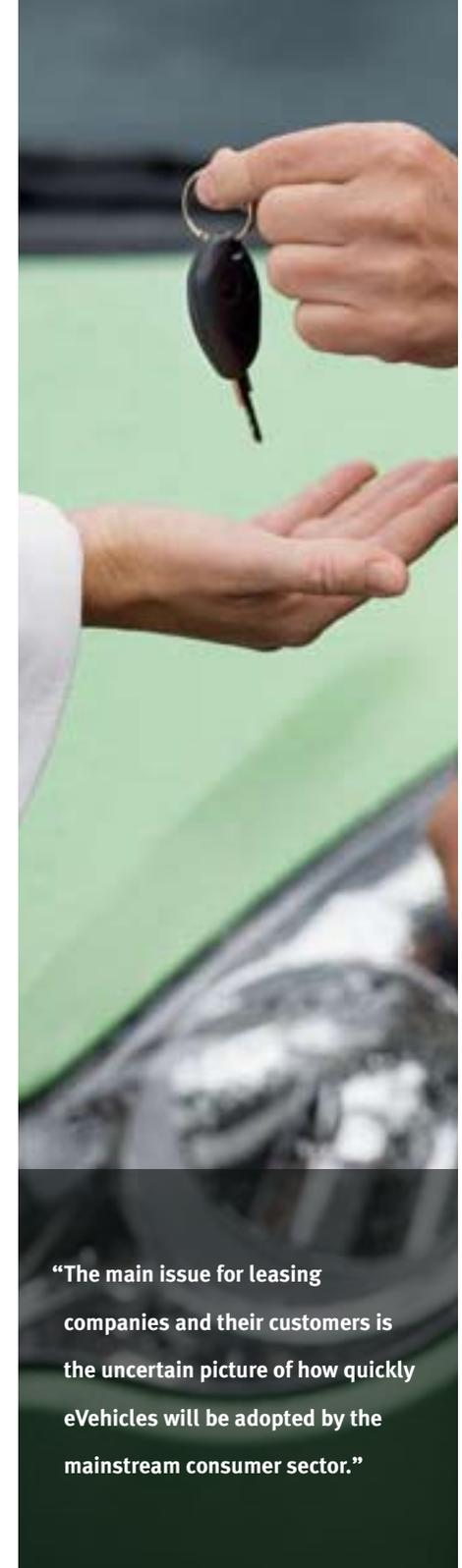
Collaboration between organisations could also act as a stimulus to the eVehicle market, ultimately bringing down the cost of ownership as manufacturing volumes increase. Indeed, there is already a large European consortium in place that includes, governments, banks, utilities and even advertising companies, which has issued a competitive tender for 3,000 eVehicles.

### How will eVehicle leasing work?

eVehicle leasing is expected to differ from conventional vehicle leasing, largely due to the investment required in batteries and the way in which these costs are spread through the life of the vehicle. There are questions over setting service and maintenance budgets, especially with respect to the cost of replacement batteries. It may even be that in time, if batteries are considered to have a 'second life' and therefore a residual value, they will be leased separately to the vehicles themselves.

Right now, the main issue for leasing companies and their customers is the uncertain picture of how quickly eVehicles will be adopted by the mainstream consumer sector, especially via the used car market. How this plays out will have a significant bearing on resale values and at this time makes residual value setting more challenging than for conventional vehicles. There is also the possibility that the pace of technological development could undermine residual values as technology improves over a short period.

Having said all of this, it is still almost inevitable that eVehicles will begin to break into the mainstream within the next five years, for fleets and consumers alike. The fact remains that governments and motor manufacturers are heavily committed to their development, with fiscal incentives and subsidies likely to ease concerns around high up front costs and uncertain resale values in the medium term.



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### What should fleets do now?

Current efforts by organisations to reduce fleet running costs through a more environmentally friendly policy are mainly focused on running more efficient, conventionally powered vehicles, along with a growing enthusiasm for hybrids.

Whilst mainstream leasing of true eVehicles is neither simple nor straightforward at this moment, it is expected that many of the uncertainties will be addressed in the near future. When this picture is a little clearer, proper cost-benefit analysis will become possible, and for many fleets essential.

In readiness for this, it can be a useful exercise for fleets fleet managers to begin studying the feasibility of introducing eVehicles to their fleet from an operational perspective.

Indeed, ConsultPlus - LeasePlan's specialist consultancy division - is already seeing a growing demand for this type of evaluation and is working with a number of international clients to this effect.

Ultimately, what is clear is that the timeline on electric vehicles is rapidly picking up pace. There is little doubt that there is a real commitment from all interested parties to support their development. In this vein, many of the issues discussed in this paper will be resolved in a short number of years, and in some cases months. As such, LeasePlan fully anticipates take up of eVehicles in the fleet sector to grow across the board, and in certain applications to become a key component of fleet strategy.

### How LeasePlan can help

LeasePlan International is the world's largest fleet management company and has helped many leading global organisations design, implement and manage successful fleet strategies.

LeasePlan's expertise across all aspects of sustainable fleet management provides global clients with a single source solution to a successful sustainable international fleet.

At a global level, LeasePlan International's Consultancy division, ConsultPlus can deliver advanced CO<sub>2</sub> reporting, advice in latest market and manufacturer trends and effective recommendations to reduce the impact of clients fleet on the environment.

For more details on LeasePlan International's approach to eVehicles and the feasibility of introducing them into a global fleet, please contact your LeasePlan International Account Manager.



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