



For , the future is electric

| by *Hughes Belin*

Is the electric car going to be the car of the future? Nissan, the Japanese automaker, believes so. It is about to start the mass-production of the first generation of electric vehicles.

On 2 August in Yokohama, Nissan unveiled the Leaf, its latest electric vehicle destined for mass production. Nissan may not be alone in the race to produce the first fully electric car, other car manufacturers such as Daimler, Mitsubishi and PSA are also in the running, but Nissan have the edge. The Leaf is the only car in the world from a large manufacturer that has been designed to be fully dedicated to electric propulsion from the beginning. All other existing electric cars (or those under construction) either were initially propelled with ICES (internal combustion engines) and have been adapted to electric propulsion or else they are cars aimed at a niche market, such as the Th!nk in Norway.

A global car manufacturer like Nissan does not embark on a project involving the mass production of electric cars without careful planning and a belief that it will succeed. In the Nissan European headquarters in Rolle, Switzerland, managers are confident that 10% of the total car market will be electrical by 2020. The market is ready for clean vehicles and Nissan has thought of everything to convince future buyers that EVs (electric vehicles) will meet their needs.

You don't need a PhD in marketing to know that psychology is a fundamental element when deciding whether or not to buy something and that buying a car is a very personal thing. So this is where Nissan started: they asked themselves what would prevent the average consumer from buying an EV? Or rather why have EVs, thus far, failed to penetrate the market?

'Limited range, poor design, high prices and a limited choice of models' are four reasons put forward by Jérôme Lacroix, Strategy and Business Transformation Manager at Nissan Europe. The first is by far the biggest handicap for the EV. Consumers developed "range anxiety" which needed to be addressed as a priority. Nissan therefore concentrated its strategy on this element. The company developed its own batteries, which are nothing short of technological wonders.

A survey conducted by Nissan in May 2009 revealed that 80% of Europeans drive less than 100 km in a typical day. In order therefore to attract a potential 90% of car users, Nissan set out to design a car that could travel 160 km (100 miles) on a single charge in order 'to satisfy real-world consumer requirements'. To this end, it has been producing lithium-ion batteries in collaboration with NEC Corp since 2000. These high-tech batteries have many advantages over other batteries (lead-acid or nickel): they have twice the energy density, a 50% higher power output, are more compact and have greater layout flexibility thanks to their laminated structure. In addition they retain 80% of their capacity after 6 years of use. They also give Nissan the edge against its competitors because the car is literally 'built around the battery', which is located under the seats. In the case of the Leaf, it weighs 250 kg (including 4 kg



of lithium). The battery's laminated structure gives it flexibility, allowing it to be adapted according to need as the layers can be removed or added as required. Each element has a power of 145 Wh/kg. Mass production is scheduled to start this year as part of the Nissan-NEC joint-venture known as Automotive Energy Supply Corporation (AESC).

But the battery capacity is not sufficient to eliminate "range anxiety". One also needs to be able to recharge it at home in a reasonable time, as well as being able to give it a quick charge away from home to give a real sense of freedom. A full charge at home – directly via the plug – will take up to 8 hours. A quick charge up to 80% of the battery capacity using a specific plug for EVs will take only 30 minutes – 'just enough time to do your shopping'. This is another high priority element of the Nissan strategy. High voltage plugs must be made available to EVs to recharge anywhere. Otherwise, back to square one in terms of "range anxiety".

Media hype |

Nissan has an alliance with French car manufacturer Renault which owns 44% of its stock (and of which Nissan owns 15% shares). The alliance enables synergies that are beneficial to both companies. The Nissan Renault alliance has established many different partnerships with national, regional or local authorities in order to secure a commitment to promote EVs – in general and not restricted to Nissan or Renault EVs. "Today, nothing exists and nothing will exist if no one pushes for it", explains Lacroix.

Despite the media hype surrounding climate change which frequently emphasises the negative impact of traditional cars, in practice nothing seems to have changed except for the introduction of a few hybrid cars. Many "environmental" parties, notably in Europe, have called for a "green deal" with car manufacturers, hard hit by the financial crisis: yes to aid, but only to produce non-polluting vehicles, but no such deals have been made.

In this respect, the EV would be an interesting option to push. Eurelectric, the European electricity industry association, has plenty of arguments in favour of the electric vehicle. In terms of energy efficiency, EVs are four times more efficient than ICEs (internal combustion engines). In terms of energy security, the penetration of electric vehicles will result in a corresponding drop in oil dependency (currently 97% in the European transport sector). If the electricity needed is produced with locally produced energy sources, the savings made on the petrol bill will be re-injected into the economy.

Eurelectric also estimates that should all cars convert to EVs overnight, the electricity demand would only increase by 15% in the EU-27. In other words, the gradual increase in the number of EVs on the road is not going to cause any major disruptions. The sector will be able



The Leaf's charging port. Photo: Nissan

The EV is made for this era in which children are surrounded by remote controls, networks and monitors



to adapt to increased demand. 'None of the electricity generators has told us that it would necessitate any additional investment. There won't be any consequence for the grid for the next 10-20 years', says Lacroix.

On a practical level, Eurelectric estimates that the level of penetration of EVs will depend on the willingness and ability of local authorities to overcome the administrative barriers to the installation of charging infrastructures, on public investment in these infrastructures as well as tax and other incentives to promote the use of EVs (road tolls, use of taxi and bus lanes, reduced parking fees, etcetera). Eurelectric has also recommended that car taxes no longer be based on the 'archaic power and engine capacity ratings' but rather on CO₂ emissions.

Curiously absent |

This is precisely one of Renault-Nissan's ongoing projects worldwide: convincing governments of the importance of the development of a national EV infrastructure, including the installation of quick charging points for EVs and the implementation of fiscal and non-fiscal incentives to enhance the appeal of EVs. Fiscal incentives are essential because according to the Nissan business model, these incentives will mean that an EV could be bought for the same price as a car with an ICE.

Things at the moment are moving. Renault-Nissan is in the process of negotiating approximately thirty partnership agreements globally, among others with the city of Phoenix in the US, the State of Tennessee, the State of Oregon, Monaco, Denmark, the United Kingdom; Switzerland, the Netherlands, Spain, and most importantly: Portugal. Setting a good example, this small European country has guaranteed a 4,000 euro tax reduction and has set a 20% target for EVs in publicly owned fleets. There will be 750 plug-in stations in Lisbon and 400 in Porto by 2011 as well as coverage throughout the rest of the country by means of hundreds of quick chargers. Portugal also looks to be the country to take the lead in the manufacture of batteries for the European market, along with the UK. The involvement of the former Portuguese monopoly, EDP, was key, because electricity distributors will be responsible for installing plugs outside people's houses.

Electricity companies are following these developments closely and progress is being made in terms of standardisation. In November 2008 an initiative to normalise EV charging infrastructures involving at least twenty international electricity companies and original equipment manufacturers was launched with Daimler and RWE at the helm. Only a few points still need to be agreed upon before this group can propose new draft standards to international organisations to replace existing standards which no longer comply with the latest technologies, such as quick charging. Either way the main stakeholders are in agreement over the choice of technologies.

The European commission, interestingly enough, is curiously absent in the debate. In fact the Commission does not have a strategy for the electric vehicle. Despite its latest €108 million call for tenders within the 7th R&D framework programme, entirely devoted to developing the electric vehicle, it remains silent on the subject. And yet, the latest legislation on CO₂ emissions favours the electric vehicle. There is little doubt that the new Commission that becomes operational in November will be obliged to reconsider its policies in the light of the latest developments in the sector.

In much the same way as the mobile telephone, the electric car, as conceived by Nissan, may well revolutionise the car market. It is made for the current era: an era where children are surrounded by technology, remote controls, networks and monitors, all operated with rechargeable batteries or networks. And it could take off very quickly, as illustrated by the immediate success of the mobile phone, meeting perfectly consumers' needs. Nissan already has a whole range of vehicles on the drawing board. The next one will undoubtedly be a delivery van. ■



The Leaf's digital meter. Photo: Nissan

'There won't be any consequence for the grid for the next 10-20 years'