

Electric cars

A sparky new motor

PARIS

The first mass-market electric cars are arriving in showrooms. They represent a big gamble for carmakers

THE star of this week's Paris Motor Show was a Jaguar supercar. The C-X75 can accelerate to 100kph (62mph) in just 3.4 seconds and has a top speed of 330kph. It is powered by batteries that are recharged by miniature diesel-sipping jet turbines. Although it is a mere experimental vehicle, the excited response shows that carmakers have come to see electric vehicles as part of their future. How large a part will depend on how drivers react to the rather less racy electric offerings from big producers such as General Motors (GM), Mitsubishi, Nissan and Renault.

The first mass-market electric cars are now arriving in showrooms in America, Europe and Japan (see table). They come in three flavours. Pure electric vehicles like Nissan's Leaf can be driven for 150km or so before they need to be recharged for six to eight hours. Range-extenders like GM's Volt (the Ampera in Europe) are powered by an electric motor that can be recharged either from the mains or by an on-board internal-combustion engine. Then there are familiar hybrids like the Toyota Prius, now being adapted to take a charging cord and with a longer electric-only range.

Mitsubishi was one of the first away, launching its electric i-MiEV in Japan in April. Production of European models began on October 6th, including versions for France's PSA group, which will sell the cars as a Peugeot ion or Citroën C-ZERO. But GM and the Renault-Nissan alliance are

making the biggest push into the mass market. The latter will launch four Nissan and four Renault electric models in the next two years. Carlos Ghosn, head of Renault-Nissan, believes that by 2020 one in ten new cars in Europe will be electric, while hybrids, such as the Prius, will have a similar share of the market.

Governments are solidly behind the new vehicles, which they see as essential for bringing down carbon-dioxide emissions and reducing pollution in cities. The Volt was one of the reasons why the White House propped up GM in 2009 when the carmaker entered bankruptcy. Dan Akeron, GM's new chief executive, says the company is committed to electrification and has other electric cars under development. Generous government subsidies are on offer: American buyers will be able to obtain up to \$7,500 towards the purchase of an electric car.

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Mr. Ghosn reckons incentives will be needed for another four years or so. He thinks electric cars will compete without subsidies against conventional cars only when production reaches about 500,000 per model. It is far from sure that cash-strapped governments will keep their wallets open that long. And other questions loom over the new electric cars.

The big one is "range anxiety". Drivers are not used to thinking precisely about how far they will drive before returning home. Electric cars (at least the ones without petrol engines to top up the battery) demand that they do. And some tests have suggested that manufacturers' claims about the ranges of their vehicles are optimistic. A car that is full of passengers and running the heating or air-conditioning will drain the battery more quickly. Yet the manufacturers believe these concerns can be overcome.

So far, BMW has carried out the biggest test of electric motoring. It leased 600 electric Mini Es to drivers in Britain, Germany and the United States. Before getting their cars most drivers said they expected the 150km range to be restrictive. But the driving patterns of Mini E users in Berlin turned out to differ only slightly from those in ordinary Minis. Even in California, land of freeways and long commutes, Mini E

Plugging in

Electric car	On-sale date*	Technology	Claimed electric-only range, km	British-market price ¹ , £
Mitsubishi i-MiEV	Apr 2010	Battery	160	23,990
Nissan Leaf	Dec 2010	Battery	160	23,990
GM Chevrolet Volt/Ampera	Dec 2010	Battery/range extender	64	25,000 ¹
Renault Fluence	mid 2011	Battery	160	18,000 ¹
Toyota Prius Plug-in	2012	Hybrid	20	tba

Sources: Company reports; *The Economist* ^{*}In first market ¹Net of government subsidy ¹Estimate ²Excludes battery

► drivers clocked up 48km a day, not far behind the American average of 64km. Most Mini E users recharged their cars at home, and some did so only two or three times a week rather than every night. BMW concludes from these tests that electric cars are suitable for most people and that range anxiety fades as drivers get used to them.

Another study, by Deloitte, a consultancy, found that three-quarters of Americans would not consider buying an electric car unless it had a range of 300 miles. But the carmakers do not have to convince everyone at the outset. In Deloitte's survey, those who were inclined to buy tended to be early adopters of new technologies. They were typically young with a much higher-than-average household income. They were living in an urban or suburban area—commonly southern California—and had a garage with electrical power where they could recharge the car. Such drivers would probably treat electric vehicles as second cars, and prize them for their green show-off value. Mr Ghosn sees electric drive as "a complementary technology".

A further problem, which government subsidies have not entirely eliminated, is "sticker shock". Electric cars are expensive. BMW reckons they will be a premium product, which is why it plans to launch a light electric citycar with a fancy composite body in 2013. Renault is trying to hold down prices by separating the cost of the battery from its new electric car, the Fluence. In Britain the car will cost around £18,000 (\$28,660) after a £5,000 government subsidy—about the same as a diesel-powered equivalent. Buyers will lease the battery for about £80 a month. Renault believes drivers who are used to paying regularly for fuel will tolerate this charge. Leasing the battery should also alleviate concerns about its reliability. GM is responding to the same concern by guaranteeing the battery in its Volt for eight years or 100,000 miles.

One issue that is important to many buyers is how the value of electric cars will hold up in the second-hand market. The answer will not become clear for several years. Some in the industry think that a shortage of cars could drive up prices, at least at first. But they could plummet if the batteries cause problems or users find the range of the vehicles too limiting.

Electric cars are evolving quickly. Although he refuses to reveal figures, Mr Ghosn says the cost per kilowatt-hour (kwh) of battery capacity for Renault-Nissan cars has fallen by half in four years. Earlier this year Boston Consulting Group estimated that electric cars will not be fully

competitive until costs fall to about \$200 per kwh. That would substantially reduce the cost of the 24 kwh battery used by the Nissan Leaf. According to industry rumours, Renault-Nissan has got its costs down to below \$400 per kwh, so if it can continue this progress its cars will become much more competitive.

Other technical improvements are on the way, including systems that could charge a battery in as little as five minutes. Such developments should make electric cars more usable and increase their popularity. But that will cause another problem: early adopters may find that technology changes so rapidly that their shiny new electric cars soon seem old-fashioned. ■

Microsoft's mobile operating system

Windows or curtains

SAN FRANCISCO

The software giant is desperate to make a splash in the smart-phone business

AT A company meeting last year, Steve Ballmer, Microsoft's pugnacious boss, spied an employee taking a photo on an Apple iPhone. He promptly grabbed the offending device and pretended to stamp on it. Microsoft would love to crush competitors in the smart-phone market, but it has repeatedly failed to come up with compelling offerings of its own. Now the software firm is gearing up for another assault on a business that is crucial to its future.

On October 11th Microsoft is due to unveil phones from manufacturers such as HTC and Samsung that incorporate its new operating system, Windows Phone 7 (WP7). An accompanying media blitz will seek to position it as an attractive alternative to Apple's iPhone, Google's Android and Symbian, which powers many Nokia phones (see chart). The stakes are high for Microsoft and for Mr Ballmer, whose stewardship of the firm is the subject of intense debate. Microsoft's share price has fallen by almost 20% since the beginning of this year, while the S&P 500 stockmarket index has risen by 4%.

Microsoft hopes not only to profit from selling licences for its software but also to push its other services via the phones. Bing, the firm's internet search engine, Xbox Live, its gaming platform, and Zune, its music and video player, are baked into the new operating system. Microsoft is also betting that WP7 will help it preserve its once vice-like grip on the workplace. That hold is slipping as firms let employees tote iPhones and Android-based devices use them for work.

The new phones boast a slick touchscreen interface and several novel features,

including one that makes it easier than on most smart-phones to post news and photos to social networks on the move. Microsoft has also laid down minimum standards to which phonemakers must adhere for things such as built-in cameras. Some earlier Windows phones suffered from poor hardware. "There isn't a thing about our approach to this business that we haven't changed," says Greg Sullivan, a Microsoft executive.

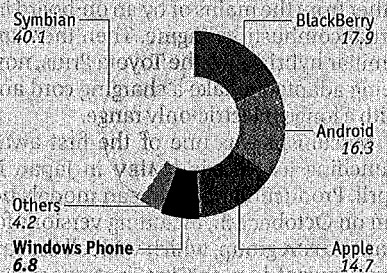
The firm is also expected to spend enormous sums promoting its new system. According to some estimates, it has earmarked \$400m-500m to boost WP7, an amount that is likely to be matched by phonemakers and telecoms companies that will offer the new devices. By comparison, Motorola, Verizon and Google spent \$100m on the launch of the Android-powered Droid smart-phone at the end of 2009, reckons Deutsche Bank. Microsoft is also taking to the courts. Last week it sued Motorola, arguing that the firm's phones violated some of its patents.

Such legal quarrels are unlikely to halt the rise of Android. Google's operating system is now the most popular one among recent buyers of smart-phones in America, although Apple will become a stronger competitor if it releases a Verizon iPhone, as has been rumoured. "Microsoft is way behind the competition and the chances of it catching up are fairly low," says Brent Thill of UBS, an investment bank. He points out that it will take time to persuade developers to create a rich range of software applications for Microsoft's operating system. IDC, another research company, reckons that by 2014 Microsoft will still trail both Apple and Android, as well as Research In Motion (RIM), the maker of the BlackBerry.

Hence persistent speculation in Silicon Valley that the software behemoth, which has a \$37 billion cash pile, might be tempted to bid for RIM, whose phones are popular with corporate road-warriors. If Mr Ballmer is still around to negotiate such a deal, it might be the best chance he has of putting Microsoft's stamp on the smart-phone world. ■

A meagre slice of pie

Global market share of mobile-device operating systems, 2010 forecast, %



Correction: In "Trading places" (October 2nd) we incorrectly said that in 2008-09 the Japanese filed 11% fewer international patents and the Chinese 18% more than the previous year. In fact, the Japanese filed 4% more international patents and the Chinese filed 29% more. Also, America has 1.4m patents in force, not 14m. Sorry.