

# Spark, plugs, etc

No whiff of petrol here, just the hum of electric motors. Viable? Driveable? Desirable? Or just jumped-up golf buggies? **Steve Moody** plays a round with the ECC Ev'ie, Mitsubishi i-MiEV, Smart Fortwo ED and G-Wiz 1

PHOTOGRAPHY: JOHN WYCHERLEY



## £495

It's the cheapest electric car you can buy. Only it's not really a car...

**PRICE** | £6,495  
**BATTERY/MOTOR** | Lead acid/  
AC induction motor  
**POWER** | 8bhp (1)  
**TORQUE** | 52lb ft

## £16,850

Yep, it's a Citroën C1. A C1 with an electric motor under the bonnet and batteries where the tank goes. So you'll know when you see one

**PRICE** | £16,850  
**BATTERY/MOTOR** | Lithium ion/  
AC induction motor  
**POWER** | 40bhp  
**TORQUE** | 112lb ft



**SMART FORTWO ED**

Old-gen Smart gets a new lease of life with battery-power. Smart around town, then. Out of town too?

**PRICE** | \$375pcm (lease)  
**BATTERY/MOTOR** | Liquid sodium-nickel chloride/permanent magnet brushless DC  
**POWER** | 35bhp  
**TORQUE** | 92lb ft

**MITSUBISHI i-MiEV**

Like the C1 it has five doors and fits actual people inside. You're going to need a subsidy to buy one, though

**PRICE** | \$20,000-\$25,000 (est)  
**BATTERY/MOTOR** | Lithium ion/permanent magnet synchronous  
**POWER** | 63bhp  
**TORQUE** | 133lb ft



**WHEN A GOOD** old dose of electricity has been used to power things, our world and the things in it have been transformed: lightbulbs, telephones, life support machines and 'ladies toys' were never so inanimate or useless again after being connected to a current.

But with car motors, the use of a watt or two to power it has generally had a diminishing effect. Less rampant rabbit, more asthmatic aardvark. The problems of harnessing the low-emission benefits of electric are huge when it comes to vehicles, principally because storing

or generating enough power to do more than outspurt a milk float requires whacking great batteries. Lots of them. And that means space, and weight, and cost.

And of course, the batteries tend to run out, fast. Unlike a hybrid, where you can switch to dear old fossil power and carry on, the only method of propulsion once the batteries have given up the ghost is gravity, or a hefty shoulder to the C-pillar. And once at a place where the current can flow back into them again, you'd better have a box set of *The*

*Sopranos* to plough through while you wait for the needle to hit full.

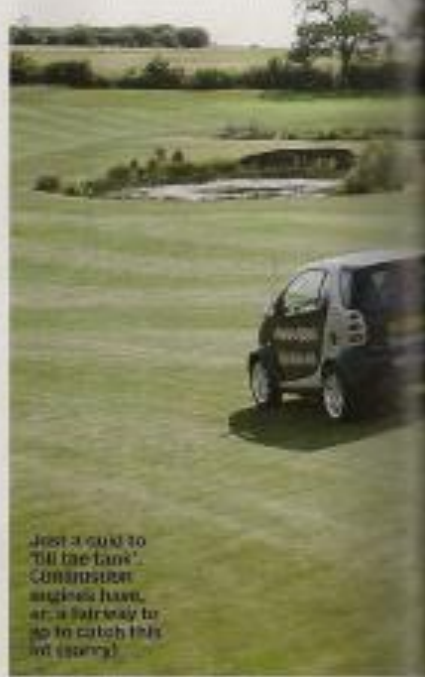
It's a worry, especially for the motorist new to electric avenue, and there's even a name for this psychological condition: range anxiety.

Which is why it is, with a dash of irony, that the only place to really use these vehicles emitting less than a bee fart is in the places where we are at our dirtiest - the city. Really, England's green and pleasant land is the place to be whiffing about silently, listening to the birds and the moos of cows, rather than ▶





You've got to look at the positives when your car is less powerful than an electric toothbrush



Just a walk to 'til the link'. Conventional engines have, er, a fair way to go to catch this lot (sorry)



Four big guys, 800 tiny car. Do they fit? Gee whizz, they do



picking black bogies out of your nose and being parped at by angry delivery bikers and shouted at by Latvians trying to flog you mobile phone ring tones.

So, we thought, let's take these cars on holiday, away from the cut and thrust of the urban punch up, for a lovely cruise through the countryside for a round of the game of Old Tom Morris, where they can meet their antecedents, the missing link between our legs and motive transportation: the golf cart.

We've gathered together a fourball of cars that represent best where the whole electric project currently sits: the G-Wiz I, a car of some notoriety and the biggest-selling model on the market over the past few years (albeit with a sharp drop last year), the Electric Car Corporation Ci Ev'ie (based on Citroën's C1 and the latest on-sale model), the Smart Fortwo ED (already trialled around Britain, it will go on limited sale next year), and the Mitsubishi i-MiEV, hitting the shops in the autumn.

## Driving range

**GOVERNMENTS ALL AROUND** the world are getting rather excited about electric cars and the possibility of near-zero emission motoring, with Her Majesty's Rabble one of the frothiest on the subject. The reason is that battery technology is on the cusp of actually offering some useful real-world benefit to the motorist.

Of the cars here, both the i-MiEV and Ev'ie use rechargeable lithium-ion batteries, a larger version of what's used in mobile phones and watches, while the smart and G-Wiz are to be strapped to them in the near future. They are the cutting edge of battery technology, because lithium is a light metal that can store twice as much energy relative to its weight than lead acid (G-Wiz) nickel cadmium or sodium-nickel chloride batteries, as in the case of the Smart.

Another advantage of lithium ion batteries is that they don't deplete on endless recharging,

retaining their energy memory, unlike most batteries which eventually store and deliver less as they get older.

But they are expensive. The batteries used in the Ev'ie are shipped from China, and cost about £120 a piece. With 16 under the bonnet, and 160 under the boot, it's easy to see how the Ev'ie ends up costing more than £16,000. Weight is also an issue. The combined mass of the batteries in the Ev'ie is twice that of a conventional engine you'd find in a C1, with power of 41bhp. So less power, and more weight.

Based on the first-generation Smart, the Ci packs 35bhp, and a top speed of 60mph, with 0-30mph in 6.5sec. Smart claims that a range of up to 70 miles has been achieved.

The i-MiEV is the sports car of the group: the electric motor develops 63bhp and 133lb ft of torque for a top speed of 87mph, and a claimed range of 100 miles. Mitsubishi reckons the car can recharge from flat-to-full in six hours, or fast-charge to 80% in just half an hour.





In effect, because they are all charged off a standard plug socket, and can run for more than 60 miles, the lithium ion cars run at the equivalent of about 250mpg, emitting nothing at all and costing less than a quid to fill up.

The G-Wiz I is old-school compared with the other three, using lead acid batteries with a sub-50-mile range reminiscent of those that whooshed old Milky and his bottles about before the supermarkets put him out of business. In fact, it's not really even a car. It's something called a quadricycle, a suspiciously dodgy moniker that has connotations of men with beards and stains in sheds ending up on the local news claiming to have invented the future of transport.

The primary criteria for a quadricycle are a maximum weight of 400kg (unladen, without batteries) and a maximum power output of 15kW. The G-Wiz I manages that, leaking out a meagre 6kW, or 8bhp, winning the title as the lowest-powered vehicle ever to appear on these hallowed pages.

But it only costs about 50p to charge up. You've got to look at the positives when your car is less powerful than your electric toothbrush.

## Drive for show...

**THE I-MIEV TAKES** more poking and fiddling to get going than Apollo 13. You have to stick a small pencil-shaped thing into a hole to disarm the immobiliser, then turn a switch (where the key would have been) to the pre-assigned position, whereupon a veritable Piccadilly Circus ignites on the display. Then on a further click to when a green 'ready' display message appears on the dash. And... nothing. An anticlimax.

As with all electric cars, apart from the odd sigh or whirr of a pump, there's nothing to tell you it is alive, which is a bit disconcerting. Only a tentative pump of the accelerator pedal and a sudden leap forward gives the game away. And of all four cars, the i-MiEV is the most

playful, bounding forward, with a cheery whistle and no little pace.

In fact, all the cars have the accelerative quality of Usain Bolt over the first 10 metres thanks to the instant torque inherent in electric motors. Unfortunately after that it's less bolt and more bore, the Mitsubishi excepted.

The basic G-Wiz is the worst culprit, whirring up to a less-than-heady 51mph at full chat, and that takes an age. And yet. Perhaps it was the gloriously sunny weather of Rutland and the wide, empty, sweeping, er, fairways, but it doesn't fail to bring a smile to your face. It is motoring as anyone who loves travelling for the sake of going somewhere in something unique will understand.

It's that feeling of exploration and uncritical enthusiasm you get when you slide into the seat of some rental horror on your first day on holiday. In a country where we are cosseted, tracked, regimented and legislated and you can't sit in a car without having had the wing mirrors ▶





signed off for crash-test worthiness and aerodynamic effectiveness, the G-Wiz feels refreshingly rebellious and honest.

It is what it is. Which, to be frank, is crap in the context of modern motoring. On a wet and windy rush-hour morning on the north circular, bullied by impatient lorries and lane-swapping addicts in their Porsches, I think this may not be a great deal of fun.

The Smart and Ev'ie are better and, after what seems like miles, climb to the summit of around 60mph. But for the Ev'ie, the arrival of even a minor hill sees all that pace struck off at a considerably faster rate than it was gained. Of course, as city cars they aren't likely to encounter too many challenging gradients, unless home is San Francisco, but the lack of power is a surprise in a world now swimming with the stuff in even the smallest petrol or diesel motors.

In fact, the feeling of utter helplessness without a lower gear to go for (the Ev'ie is locked into the C1's third gear), and the deepening whine as you decrease velocity with your foot to the floor, is rather depressing.

Of our fourball, the Smart feels the most nimble once you've got some speed to assist the heavy steering, mainly because of its inherently stiff shell and short wheelbase, while the unforgiving ride of the old Smart is actually useful here in ensuring the extra mass of the batteries doesn't shift the car's balance about too much.

The i-MiEV, it seems, has had an awful lot of attention put into its lively powertrain, but at the costs of dynamics. Even though the batteries are under the floor, thus giving it a usefully low gravitational centre, it handles with the alacrity of jelly. But it is pretty quick, and would give most small-engined petrol cars a run for their money, and beat quite a few.

Some of the fleets and local authorities that have trialled and used electric vehicles found one of the more unexpected issues was not around range or speed, but sound, or specifically, lack of it. The driver bimbbling along some suburban street becomes a silent assassin, lurching pedestrians with his plastic box should they decide to forgo the second Green Cross Code tenet of the chap who played Darth Vader: look. And I can vouch for the stealth of these things. I spent many a fine few metres in the Smart ED following a chap and

his pert girlfriend wandering down the middle of a quiet street on a lovely sunny day holding hands, and remaining blissfully unaware of my presence.

So the city of the future will be swarming with a mass of quietly bobbling cars, enclosing irate drivers, stuck behind witless pedestrian Progress. Right.

## The green fees

**WE ARE ABOUT** halfway through the first chapter of Genesis with electric cars, and that means drivers will have to pay a heavy price to join the zero-emission club. The cheapest, not surprisingly, is the G-Wiz at £8495, although the lithium ion version later in the year will double that. On its own, eight grand seems high for what you get, but relative to the others, it's a bargain. One thing to remember, though, is that the batteries have an expected lifetime of only two years. A replacement pack costs nearly two grand.

The only other car officially on sale, the C1 Ev'ie, retails from £16,850 – a price that is entirely reflective of the current cost of the batteries and then sticking them in a Citroën C1. As for the other two, corporate customers trialling the Smart are leasing them for £99 a month, although this is heavily subsidised by Mercedes-Benz. Don't expect much change

### EURO NCAP CRASH TEST RATINGS\*

#### ECC C1 EV'IE

Citroën C1 is competent in a crash. The Ev'ie? Electric



#### MITSUBISHI i-MiEV

Nobody's crashed one yet. On purpose, anyway

N/A

#### SMART FORTWO ED

Thank the Tridion safety cell for that score



#### G-Wiz I

Not tested. Don't do it for them

N/A

\*New rules for 2009 require standard ESP on 85% of cars sold and fulfilment of more stringent rear-end collision regulations to score a five-star result





There's no getting away from it – these cars are bloody expensive for what they offer

#### REALITY CHECK

	RANGE (MILES)	ROAD TAX	COMPANY CAR TAX
ECC C1 Ev'ie	60	£0	£303/£607
i-MiEV	100	£0	£450/£900
Smart ED	70	£0	£246/£495
G-Wiz I	48	£0	£153/£306

#### KEY EQUIPMENT

	ECC	i-MiEV	SMART	G-WIZ
AIR-CON	-	■	■	□
ALLOY WHEELS	-	□	■	-
AUTO	■	■	■	■
BLUETOOTH	-	□	□	-
CLIMATE CONTROL	-	□	-	-
CRUISE CONTROL	-	-	-	-
ELECTRIC MIRRORS	-	-	-	-
ESP	-	■	■	-
HEATED SEATS	-	□	□	-
IPOD CONNECTIVITY	■	□	□	-
LEATHER	-	□	□	□
PARKING SENSORS	-	-	-	-
PASSENGER/SIDE AIRBAGS	■	■	■	-
SAT-NAV	-	-	-	-
XENON LIGHTS	-	-	-	-

STANDARD ■ OPTIONAL □ NOT AVAILABLE -



from £20,000 when they do go on sale to the public. The i-MiEV, with considerable support from the Government, will be around £20,000 to £25,000 or available to lease for about £650 a month. Mitsubishi hopes it can get the price down to £17,000 with a fair wind on the yen and more support within a couple of years.

The Government needs to put money where its mouth is. Should the current shower still be in power, from 2011 they have promised those choosing an electric vehicle a grant of

between £2000 and £5000, which will turn these cars into a much more attractive financial proposition. Until that happens, it's difficult to predict how the market will react, how many will be sold, what level of support they'll get and how the used market will be affected. So nobody is posting any residuals yet.

Still, there's no getting away from it – these cars are bloody expensive for what they offer, even if they cost a few pence to refuel, and avoid road tax, the congestion charge and get preferential company car tax rates. ▶



G-Wiz I



HANG ON

Steering wheel is for hanging on to and giving rough hints to the G-Wiz about where you would like to point

1930s FRANCE

Cabin comes from an era in which carrying eggs unbroken across a Normandy field was the height of sophistication

CUP DROPPER

Make sure your passenger has asbestos pants: the chances of this contraption holding Starbucks' finest safely are dangerously low

ECC C1 Ev'io



POD LIFE

Vital statistics housed in this little pod: you'll watch the battery life meter like a hawk. Dropped slowly or our watch

EASY STICK

Two settings: forward for forwards and back for back. Even the misas can message that

FOUR SEATS AND ALL

This is a real car, with real seats and all the joys of motoring we've come to expect. Except air-con



A good walk spoiled?

THE G-WIZ LOOKS like it was designed by a seven-year-old with some crayons. Indeed, from the driver's seat, I couldn't shake the feeling that I looked like the recipient of a campaign on Blue Peter, the car bought for me with the proceeds of a thousand bring-and-buy sales.

It patently comes from another generation to the other three cars, struggling to meet

almost every standard by which you judge a modern car – but then it isn't one. Because of its quadricycle-shed inventor rating it also means it doesn't have to pass any crash tests. Handy really, because I'd wager it wouldn't, but then it seems unlikely you're going to get up enough speed on the city slog for that to become too much of a problem.

Aside from its looks and ergonomics, which find you hunched over the little plastic steering wheel like the dad in *The Incredibles*, your

hair scraping against the scratchy roofliner, there's the build quality.

The driver's door avoids union with the wheel arch panel by a good inch, both in the gap between the two and how much further sticks out. The slot from which a cup rattles out appears to have been cut by a feeble fencer with a rusty hacksaw in design technology. And you wouldn't trust your mocha latte to remain balanced and full in the tray that droops forth either. The hand-

## Smart Fortwo ED

**DIAL TRIAL**

This is the significant dial giving battery life, not the fuel gauge – whose 'empty' reading provoked one driver into range panic.

**AIR-CON COM**

The Smart purports to have air-con, but we've felt air spewing colder and more lazily from hand-gears.

**OLDIE BUT GOODIE**

We'd forgotten how the first-gen Fortwo's cabin is significantly cheerier than its straight-faced Germanic replacement.

## Mitsubishi i-MiEV

**SWINGOMETER**

Needle sweeps from charge to power, informing the driver of the direction of electricity – into the battery while braking or into the wide world while accelerating.

**COLD CALL**

Proper air-con – the only car here thus fitted.

**CLOSING FRIEND**

Meet the i-MiEV's door. It will become a close personal plastic companion, ruffling against you constantly.



is straight from rural France, being a pull-and-twist ratchet affair last seen on a rusty Citroën condemned to carrying wizened farmers reeking of stale Gauloise and their stinky chickens.

The rear seats fit two passengers – four grown men fit there; we tried. But it requires the two in the back to be of intimate acquaintance and place their feet into what footwell there is using the En Pointe ballet position. As for the boot, well, it's not really much use for carrying golf clubs. You might get your golf shoes in there.

Of the four, the Ev'ie feels the most useable, because little had to be done to the car's basic structure to electrify it – one of the main reasons why the Electric Car Corporation chose the C1 as the donor. Inside, only a little pod atop the instrument panel indicating battery range, and a gearstick with forward and back positions, belie its powertrain. It doesn't come with air conditioning though: that uses around 5% of a car's power, and when you've got so little of it to go around it's best not wasted on frivolities.

There are no surprises in the Smart, which is, er, just like a Smart, save for one of the stalky puddy things on the dash being converted to give you a battery life readout.

The i-MiEV looks clever and spacious and modernist with its pseudo-MPV bubble of a body (that of Mitsubishi's i), while the interior has the scaled down appearance of a people carrier too, thanks to the deep dash and high roof, but space is an illusion. Shoulder room is very poor, and you keep socking your elbow ▶



on hard plastic butted close up against you, while the interior's plastics reflect the not-quite-there efforts of most Mistubishi's and the doors clang and boing shut.

The dials are bespoke though, reflecting the extra budget spent, with a handy monitor telling you how much power you are using or when the battery is recharging – like all the cars here, the i-MiEV uses regenerative brake charging to restore energy to the battery whenever it can.

## The 19th hole

**THERE'S NO DOUBT** that running an electric car brings a plethora of compromises, big and small. You're reminded just how marvellously flexible and adaptable the internal combustion engine is after living with the limitations of electric for a while.

It seems unlikely that the battery-powered car will replace internal combustion for decades – and it will probably take hydrogen-powered fuel cells to get anywhere close for range and flexibility. But to use hackneyed corp-speak, these cars have a fitness for purpose: short, regular trips and commutes, and perhaps the odd round of golf too.

Of them the i-MiEV feels, and is, the most advanced, with a genuine turn of speed and a very decent range. We did plenty of driving over a day in it and the meter dropped to only 60%.

When it comes to packaging for city life, the Smart is still a fine product and the addition



Meet the electric car class leader. Clue: the blue one's electric but not really a car

of electric power makes perfect sense in this car. The introduction of lithium ion batteries will make it even more useable, but more expensive too.

The G-Wiz is barking mad, but you have to admire the approach: light, cheap and sparing, a product for getting from A to B and no more. In an age where everything is more complicated, heavier, techier and costlier, this is travel in its most stripped down form. Quite whether you can put up with that is a question each punter would have to ask themselves.

Which leaves the Ev'ie. It's eye-wateringly expensive but, unlike the smart and the i-MiEV,

you can buy one tomorrow. And it feels right, a solid car with decent range, making it the best choice currently on the market.

Taking these cars to play golf proves apposite. They are expensive and frustrating in equal measure. It would be easy to be snifty and derisory and claim the sector an electric cul-de-sac, and recommend you buy a small petrol supermini. But that would be missing the point. As you whizz off the tee and swoosh about the fairway there's a little spark of joy in these cars, the glimmer of a hope that, in fact, we are on the cusp of a new way of low-emission motoring. **EV**

## ECC C1 EV'IE

### Drivetrain

**BATTERY/MOTOR** | Lithium ion/ AC induction motor  
**POWER** | 40bhp  
**TORQUE** | 112lb ft  
**POWER TO WEIGHT** | 42bhp per tonne

### Performance

**0-30MPH** | n/a  
**TOP SPEED** | 60mph  
**RANGE** | 60 miles  
**CO2** | 0g/km

### Details

**FRONT SUSPENSION** | MacPherson strut  
**REAR SUSPENSION** | Torsion beam  
**LENGTH/WIDTH/HEIGHT** | 3435/1630/1465mm  
**BOOT SPACE** | 139/712 litres  
**WEIGHT** | 953kg  
**NCAP SAFETY RATING** | 4 stars

### Costs

**AUTOMATIC** | Standard  
**ELECTRIC WINDOWS** | Standard  
**AIR CONDITIONING** | n/a  
**CRUISE CONTROL** | n/a  
**METALLIC** | £370  
**INSURANCE GROUP** | TBC  
**ROAD TAX** | £0  
**COMPANY CAR TAX** | £303/£607  
**PRICE** | £16,850

### VERDICT ★★★★★

Citroën's C1 takes to electric power like a golf ball to a bunker. It's not cheap but it is practical – and available. The best choice here

## MITSUBISHI i-MiEV

### Drivetrain

**BATTERY/MOTOR** | Lithium ion/permanent magnet synchronous  
**POWER** | 63bhp  
**TORQUE** | 133lb ft  
**POWER TO WEIGHT** | 58bhp per tonne

### Performance

**0-30MPH** | n/a  
**TOP SPEED** | 87mph  
**RANGE** | 100 miles  
**CO2** | 0g/km

### Details

**FRONT SUSPENSION** | MacPherson strut  
**REAR SUSPENSION** | De Dion axle  
**LENGTH/WIDTH/HEIGHT** | 3395/1475/1600mm  
**BOOT SPACE** | 246 litres  
**WEIGHT** | 1090kg  
**NCAP SAFETY RATING** | Not tested

### Costs

**AUTOMATIC** | Standard  
**ELECTRIC WINDOWS** | Standard  
**AIR CONDITIONING** | Standard  
**CRUISE CONTROL** | n/a  
**METALLIC** | TBC  
**INSURANCE GROUP** | TBC  
**ROAD TAX** | £0  
**COMPANY CAR TAX** | £450/£900  
**PRICE** | £20,000-£25,000 (est)

### VERDICT ★★★★★

The most advanced technologically, with pace and range. But it's likely to be staggeringly expensive to buy

## SMART FORTWO ED

### Drivetrain

**BATTERY/MOTOR** | Liquid sodium-nickel chloride/permanent magnet brushless DC  
**POWER** | 35bhp  
**TORQUE** | 92lb ft  
**POWER TO WEIGHT** | 41bhp per tonne

### Performance

**0-30MPH** | 6.5sec  
**TOP SPEED** | 60mph  
**RANGE** | 70 miles  
**CO2** | 0g/km

### Details

**FRONT SUSPENSION** | MacPherson strut  
**REAR SUSPENSION** | De Dion axle  
**LENGTH/WIDTH/HEIGHT** | 2500/1516/1545mm  
**BOOT SPACE** | n/a  
**WEIGHT** | 854kg  
**NCAP SAFETY RATING** | 4 stars

### Costs

**AUTOMATIC** | Standard  
**ELECTRIC WINDOWS** | Standard  
**AIR CONDITIONING** | Standard  
**CRUISE CONTROL** | n/a  
**METALLIC** | TBC  
**INSURANCE GROUP** | TBC  
**ROAD TAX** | £0  
**COMPANY CAR TAX** | £248/£495  
**PRICE** | £375pcm (lease)

### VERDICT ★★★★★

This is what the Smart is destined for – with better batteries and a splash more performance it will become the perfect city commuter vehicle

## G-WIZ I

### Drivetrain

**BATTERY/MOTOR** | Lead acid/ AC induction motor  
**POWER** | 8bhp  
**TORQUE** | 52lb ft  
**POWER TO WEIGHT** | 12bhp per tonne

### Performance

**0-30MPH** | n/a  
**TOP SPEED** | 51mph  
**RANGE** | 48 miles  
**CO2** | 0g/km

### Details

**FRONT SUSPENSION** | MacPherson strut  
**REAR SUSPENSION** | Trailing arms  
**LENGTH/WIDTH/HEIGHT** | 2600/1300m/1600mm  
**BOOT SPACE** | n/a  
**WEIGHT** | 665kg  
**NCAP SAFETY RATING** | Not tested

### Costs

**AUTOMATIC** | Standard  
**ELECTRIC WINDOWS** | n/a  
**AIR CONDITIONING** | £846.61  
**CRUISE CONTROL** | n/a  
**METALLIC** | £651  
**INSURANCE GROUP** | 1  
**ROAD TAX** | £0  
**COMPANY CAR TAX** | £153/£306  
**PRICE** | £8495

### VERDICT ★★★★★

Great character in a favourite old shoe way, but lags way behind the rest. Lithium ion will improve range but can't do anything for build quality