

This press pack accompanied the UK launch of the first generation Prius in 2000. Changes to the model during its time on sale can be tracked using the Timeline feature on the Prius archive web page. More information about the Prius range can be obtained from the Toyota press office.

TOYOTA PRIUS: CAR OF THE FUTURE ON SALE IN 2000

KEY POINTS

- World's first production hybrid vehicle
- Electric and petrol power sources for clean emissions and exceptional fuel economy
- Double the fuel economy and half the CO₂ emissions of a comparable car
- CO, HC and NOx emissions reduced to 1/10th of Japanese minimum requirements
- 28km per litre fuel economy*
- On sale in the UK Autumn 2000

*Japanese 10-15 driving mode

SHORT STORY

When the Prius made its world debut at the 1997 Tokyo Motor Show, it attracted enormous interest as the first internal combustion/electric hybrid passenger car to enter volume production, at a planned rate of 1,000 units per month. The question then was how well it would succeed in the Japanese domestic market for which it had been developed.

By August 1998, 11,000 units of the Prius had been delivered to customers in Japan, and the level of demand was such that the production rate was increased to 2,000 units per month. Today, feedback surveys from customers show a notably high rate of

satisfaction with the car, with an overall customer rating, on a 1-5 scale, of 4.1. Where features of the car were concerned, consumers gave particularly high ratings for interior space and ease of entry, freedom from vibration and noise, driver visibility and instrument layout. The scoring indicated no particular weak points (the lowest rating of 3.0 was for luggage compartment space.). These results reflected the success of the Prius designers in making the car (as had been the intention) competitive in every way with its conventional counterparts, making no technical concessions to its uniquely clean and economical drivetrain.

In July 1998 Toyota announced its intention to develop the Prius for export to Europe and to North America, to provide motorists with a means of reducing the environmental burden, both of CO₂ emissions (because of better fuel economy) and of noxious emissions. A total export volume of 20,000 units per year is foreseen. The development required for export markets is considerable, since factors such as the internal combustion engine characteristics, the gearing of the transmission and the algorithms of the electronic control software must be adjusted to the requirements of each market, and then matched to each other to ensure the same smooth performance which has impressed Japanese consumers. Among the factors taken into account are the different driving patterns and habits of consumers in each market, for example, the generally higher cruising speeds found in Europe. In its present form, the Prius is optimised for Japanese speed limits (maximum 100kmh on motorways) and for the extremely congested traffic conditions found in many Japanese cities.

Technical background

The Prius is powered by a specially developed hybrid powertrain, the Toyota Hybrid System (THS) which enables the Prius to benefit the environment in two ways. First, in a typical driving cycle, its emissions of unburned hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NO_x) are reduced to about 10% of the levels demanded by current Japanese regulations. Second, its outstanding fuel economy – 28km per litre in the Japanese test cycle – means its emissions of ‘greenhouse’ CO₂ are also significantly reduced.

However, the design of the Prius is in no way compromised by its use of the pioneering hybrid powertrain. It is a compact and practical four-door saloon, exceptionally quiet,

comfortable, well equipped, and easy to drive, designed to the same high standards of active and passive safety, quality and durability as any other Toyota model. In addition, as a further contribution to the quality of the environment, the Prius has been designed to achieve maximum recyclability. This has been achieved with the aid of materials technology recently developed by Toyota, including the easily recycled Toyota Super Olefin Polymer (TSOP), which is used for many of the moulded interior and exterior fittings, and recycled soundproofing product (RSPP), which is made from recycled automotive shredder residue. The company will eventually set up operations in each of its markets to collect and recycle the high-technology batteries when necessary. It should however be noted that the battery bank in the Prius is much smaller than those used in battery-powered electric vehicles (EV's), and it is also anticipated that its batteries will last longer since they are not subjected to the continual deep-cycling operation of 'pure' EV batteries.

Toyota Hybrid System

The THS is a carefully integrated package whose mechanical components take up little more space beneath the bonnet than a conventional transverse engine and front-drive transmission. The unit consists of a specially developed high-efficiency 1.5-litre 4-cylinder gasoline engine, a compact and high-torque electric drive motor and a separate generator using similar technology. It works in conjunction with an 'energy buffer' formed by a bank of advanced nickel-metal hydride (Ni-MH) batteries, of a type similar to those used in the RAV4 EV electric vehicle, which are housed immediately behind the back seats. Naturally, the Prius batteries never need external recharging since they are always maintained at a constant state of charge by the engine via the THS. The various mechanical elements of the THS are connected by a power splitting device, in the form of an epicyclic geartrain, which enables the engine output to be divided between driving the wheels and turning the generator. In this way, the THS also acts as a continuously variable transmission (CVT) to drive the front wheels.

The key to the mechanical efficiency of the THS, and thus to the economy and low emissions of the Prius, is the electronic control of power flow between the mechanical and electrical elements to ensure that energy is conserved at all times, instead of going to waste. The system ensures that the engine always operates at maximum efficiency and with extremely low emissions. The main function of the engine is to drive the

wheels, but any excess output is used to recharge the batteries. Regenerative braking also recharges the batteries. In turn, the batteries supply extra power, via the drive motor, when required for hill climbing or overtaking. In situations where the engine cannot run efficiently or where it would produce relatively higher emissions – for example, when the car is at a standstill and the battery bank is already at its optimum charge level – it is switched off altogether. Starting from rest is normally accomplished in electric drive only, the engine starting as the Prius picks up speed.

A principal requirement when designing the THS and the Prius was, that despite the much improved fuel economy and very low emissions, the car should be no more difficult to drive than a conventional model with automatic transmission, nor should it be any less comfortable. In practice, the Prius is driven in exactly the same way as a conventional automatic model. Control of the THS is entrusted to its electronic control system, which manages the flow of power around the system. This optimises economy and also ensures the system is completely smooth in operation, the driver remaining unaware of the engagement of the electric drive motor to provide extra power, or even (except for the sound) of the stopping and restarting of the engine. The driver of the Prius is however provided with a 15cm (5.8-inch) monitor display, housed in the dashboard, which shows the energy usage and recovery status of the THS.

This display also serves as a general 'information centre' showing the time, details of the audio system selection and any warning messages relating to the car as a whole.

Engine and drive motor

The 1.5-litre, 4-cylinder 16-valve engine in the Prius was specially developed as part of the THS. Because of the way in which the THS operates, the engine's operating conditions differ from those of a conventional unit in two important respects. First, it does not need to offer immediate transient response as changes in the driver's demand for power are taken care of by the system which alters the output power-split or provides additional electrical power rather than altering the operating condition of the engine. The engine could therefore be designed for maximum efficiency and minimum emissions at its main operating condition, assisted by Toyota's Variable Valve Timing-intelligent (VVT-i) and by a compression ratio of 13.5:1. Second, the engine never exceeds a speed of 4,000rpm. This has enabled it to be made lighter with lower internal friction losses than a

conventional engine. The engine's maximum output, at 4,000rpm is 58PS and its maximum torque, at the same speed, is 10.4kg-m. The permanent-magnet drive motor provides its maximum torque output of 31.1kg-m from 0-940rpm, and maximum power of 30kW (40PS) from 940rpm to its maximum speed of 2,000rpm. The battery bank, which is much smaller and lighter than in a 'pure' electric vehicle, has a capacity of 6.5Ah.

Prius – a modern car in every sense

Quite apart from the special qualities provided by the THS, the Prius makes use of Toyota's latest technology in every area of vehicle design. The structure of its roomy four-door body, with its long cabin and short overhangs, and with a drag coefficient of only 0.30, employs high-strength steels and reflects the latest results of research into passive safety. The driver and front seat passenger are provided with safety belts with pretensioners and force-

limiting devices as well as airbags. The front seats are also equipped with Toyota's whiplash injury lessening (WIL) feature which reduces the risk of neck injury in a rearward impact. The cabin interior features a higher than normal sitting position for the driver, creating better visibility and making for easier entry and exit, and a 'walk-through' front seat area created by the dashboard mounted transmission selector and foot-operated parking brake.

The chassis includes MacPherson strut front suspension with lower L-arms for accurate tracking and good insulation of road shocks, and a compact torsion-beam rear suspension which leaves space for a roomy luggage area behind the battery compartment. The 165/65-15 tyres were specially developed to provide low rolling resistance. The steering is electrically rather than hydraulically assisted, so that assistance is available at all times and not just when the engine is running. The turning circle is a tight 9.4 metres in diameter. The brakes are ventilated discs at the front with drums at the rear; ABS is standard.

Standard equipment in the Prius includes a high-efficiency air conditioning system, which includes a pollen and particulate filter. A navigation system is offered as an option, and makes use of the existing 15cm (5.8-inch) dashboard display.

Awards

It's no surprise that one of the most enlightened pieces of recent automotive engineering has received a number of awards. Prius was voted Japanese Car of the Year in 1998 and has received many awards since, The following have been awarded in the UK.

Prius won the environmental award category in the 1998 IBCAM Institute for Vehicle Technology auto design awards in 1998. This was presented to the Prius after its first UK public appearance at the 1998 British International Motor Show.

In February 1999, Prius won a prestigious AA award in recognition of Toyota's continued efforts to reduce vehicle emissions. "The Prius already meets known future European emission standards," said John Maxwell of the AA. "Our award acknowledges Toyota's commitment to reduce the impact of the car on the environment."

In June 1999, *Engine Technology International* magazine voted the THS drivetrain, 'Best Eco-Friendly engine of 1999' in its International Engine of the Year Awards.

A Royal Society Esso Energy Award followed in October 1999 and is different in recognising the people behind successful technology like Prius. The award is made for any application of science, engineering or technology leading to the more efficient mobilisation and conservation of energy resources.

Takeshi Uchiyamada is the team leader and driving force behind the eco-friendly Prius that produces half the carbon dioxide emissions and just one tenth of the toxic emissions of comparable petrol engined cars. The Prius achieves this by using the Toyota Hybrid System (THS) and the award is just deserts for Uchiyamada's efforts.

A NEW WAY TO DRIVE A NEW TYPE OF CAR - PRIUS ONE

The Prius is a real step forward in terms of technology. It represents genuine progress in developing cleaner and more efficient means of transport, combined with the practicality of a family sized car. However, even given Toyota's outstanding reputation for reliability and the proven track record of the car in Japan over the past five years, Toyota recognise that many may have questions about future resale values and the ultimate recycling of the car at the end of its life.

In order to remove any such worries, Toyota is committed to keeping many of the responsibilities normally associated with driving a car, such as the disposal and recycling of the Prius at the end of its useful life.

This unique relationship will allow people to enjoy the many benefits of this amazing innovation while being freed from many of the traditional responsibilities.

To do this Toyota has created Prius One, a comprehensive package that covers most motoring costs. One single monthly payment covers the cost of the car and all maintenance and servicing requirements. This commitment to the Prius throughout its lifetime ensures that only highly trained Hybrid Technology Centres will service and maintain the vehicle and that when the time comes the recycling of the car, its hybrid technology and battery, is carried out cleanly and efficiently.

Even for customers who do decide to buy outright, Toyota would like to be offered first refusal on resale of used vehicles, as it believes it will offer the best price. Likewise for cars at the end of their life, Toyota is willing to ensure that the recycling of the car and its components is carried out properly and with the minimum of environmental impact. From manufacture to the end of the car's life, Toyota wants to ensure that Prius receives the very best care and attention, maximising its benefit to the driver and the environment we all live in.

Prius One – How It Works?

Prius One is a straightforward and attractive alternative to conventional ownership, providing all the benefits of driving a car with none of the risk associated with outright purchase. Based on a fully maintained contract hire agreement, Prius One is available on new vehicles over an initial three-year period. Longer periods can be individually agreed with Toyota Financial Services.

Budgeting is made incredibly simple, as there will be no unforeseen servicing and maintenance charges lurking down the road. All these will be taken care of by a fixed monthly payment. Drivers will know exactly how much they will spend on motoring costs during the term of the agreement and will be completely protected against any fall in the price of used cars. Once the agreement comes to an end all they have to do is hand the

car back to Toyota, via a Hybrid Technology Centre, who will deal with the rest. Prius One is a simple and worry free way to drive the technology of the future.

For business customers 50 per cent of the VAT on monthly rentals and 100 per cent of the VAT on the maintenance element can be reclaimed if they are VAT registered.

Based on 12,500 miles per year including maintenance. Additional mileage charged at 34p per mile (inc. VAT) *Includes acceptance fee of £82.25 (inc. VAT)

Maintenance Package

The Prius One package includes the following;

- Routine scheduled servicing
- Mechanical repairs (required through fair wear and tear)
- Replacement tyres
- Relief vehicle in the event of mechanical failure
- Renewal of Road Fund Licence in 2nd/3rd year
- RAC cover including European cover
- Extended Club Toyota membership
- Accident Management Service

SPECIFICATION – PRIUS VERSUS COMPETITORS

How do you classify Prius? It is a hybrid car, but it is also a very well specified, refined family saloon that happens to offer exceptional fuel economy in urban and city traffic.

Against Other Hybrids

As a hybrid, Prius has currently only one rival, the Honda Insight, but beyond the powertrain there are no other comparisons. Prius is a fully practical four-door saloon with a full size boot. It is also better specified and costs less to buy than the Honda.

Lower Medium Saloons

Looking at comparable small saloon cars the best selling is the Ford Focus 1.6 litre petrol. Prius is obviously better in fuel economy and emissions – an important factor for

company car taxation – but it is also better specified than the Focus Ghia. Add in all the extras you need to bring the Ford up to Prius level and the Toyota costs 5.5 per cent less, and that's before you start saving money on petrol and tax.

Better Than Diesel

Some will look at Prius in relation to diesel saloons, seeking fuel economy and lower running costs. Against two of the best, the big selling Peugeot 406 HDi LX and the VW Bora 1.9 SE TDi, the Prius wins. Prius offers almost half the fuel consumption of the VW on the urban cycle and bests even the long-legged Peugeot on the combined cycle. Of course, where Prius really wins against the diesels is in lower emissions. At just 114 g/km CO₂ the Prius will attract a much lower tax bill than either the VW (143g/km) or the Peugeot (150g/km).

Finally, given Prius' undoubted status as the most technologically advanced family car on the market, there will be customers who are attracted to it as the smart thing to have in the city. Here it arguably rivals the Mercedes A class - Prius costs less and is better equipped. It also wins on emissions and fuel economy. For city

HYBRID TECHNOLOGY CENTRES

In July 2000 Toyota GB began a phased programme to select nominated dealerships in major towns and cities throughout the UK to become Hybrid Technology Centres (HTC's).

This specialised dealer network was developed to supply and service the Toyota Prius. There are two fully trained hybrid technicians at every centre.

Each HTC is thoroughly assessed to ensure it meets a range of environmental standards. These are:

- The waste storage area is to be contained, secure, demarked and with an impermeable surface
- Bulk surface storage of any liquids with the potential to pollute should be in fully bonded tanks

- Special wastes produced should be stored in separate and clearly marked containers and waste should be transferred to recognised waste management companies operating in full compliance of the law.

HTC's are committed to playing their part in addressing the environmental aspects of all business operations as part of Toyota's global commitment to minimise environmental influences.

Servicing

Toyota Prius has an internal combustion engine the same as a conventional car and the hybrid technology requires no servicing. The servicing experience for Prius customers is hassle free with a 'Health Check' minor service at 10,000 miles and a major service at 20,000 miles. In addition the Prius is the first car to be offered a pan-European five-year/60,000 mile warranty covering all mechanical parts.

LIST OF HYBRID TECHNOLOGY CENTRES

(Open since Mid-October 2000)

NAME	LOCATION	NAME	LOCATION
Abercromby Toyota	Edinburgh	Johnsons Toyota Liverpool	Bootle
Arnold Clark (Aberdeen)	Aberdeen	L & S Copcutt & Son	Worksop
Arnold Clark (Glasgow)	Glasgow	Lindop Bros (Queensferry)	Deeside
Arriva Bristol (Central)	Bristol	Mark Kass	Romford
Beadles Medway	Gillingham	Marshall of Cambridge	Cambridge
Bill Allen (Gloucester) Ltd	Gloucester	Marshall Rolfe	Southampton

Border Carlisle	Carlisle	McCarthy Bromley	Bromley
Bury St. Edmunds	Bury St. Edmunds	McCarthy Sidcup	Sidcup
C D Bramall	Plymouth	Monty's of Sheffield	Sheffield
C D Bramall	Milton Keynes	Motorline	Canterbury
Camden Motors	Dunstable	Nick Whale	Coventry
Charles Hurst Toyota	Belfast	Octagon Toyota	Reading
Ryburn Teeside	Yarm	Pinkstones	Stoke-on-Trent
Culvers Stockport Ltd	Stockport	Richard Nash	Norwich
Currie Motors	Twickenham	RRG Bolton	Bolton
Currie Motors Barnet	Hertfordshire	RRG Salfords	Salfords
Dingles	Norwich	Ryburn Cardiff	Cardiff
Donelly & Taggart	Co. Londonderry	Shields Automotive	Glasgow
Farmer & Carlisle	Loughborough	Somerset County Cars	Somerset
F Cross & Sons	Doncaster	Stadium	Neath
Fish Brothers	Swindon	Steven Eagell	Buckinghamshire
Freelance Toyota	Jersey	Struan	Perth
Gordon Lamb	Chesterfield	Sturgess	Leicester
Harpers of St Albans	St Albans	T G Holdcroft	Stoke-on-Trent
Hartwell Leeds South	Leeds	T W Hawkins	West Ewell
Hills Automobiles (Woodford)	Woodford Green	Toll House	Horsham
Hodgson Toyota Newcastle	Newcastle Upon Tyne	Toyota World	Birmingham
Hylton of Telford	Telford	West End	Preston
Inchcape (Guildford)	Guildford	Westover Toyota	Wimborne
Inchcape	Nottingham	Westlands	Stourbridge

(Nottingham)			
Inchcape (Oxford)	Oxford	WKB Toyota	Havant
Jemca	Greater London	WKB Toyota	Waterlooville
John Roe (Motor Sales)	Grimsby	Yeomans	Brighton
Johnsons Toyota	Huddersfield	York Toyota	York

TOYOTA PRIUS TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION	
Length	4275mm
Width	1695mm
Height	1490mm
Wheelbase	2550mm
Front track	1475mm
Rear track	1480mm
Kerb weight	1240kg
Engine installation	Transverse
Engine configuration	In-line 4-cylinder, 16-valve DOHC
Displacement	1496cc
Bore x Stroke	75.0 x 84.7mm
Compression ratio	13.5:1
Maximum power	58PS at 4000rpm
Maximum torque	10.4kg-m at 4000rpm
Fuel system	Electronic fuel injection (EFI)
Fuel capacity	50 litres
CO ₂ emissions	120g/km
Fuel consumption	28km per litre (in Japanese)

	test)cycle)
Drive motor	Permanent magnet type
Maximum power	30kW from 940 - 2000rpm
Maximum torque	31.1 kg-m from 0 - 940rpm
Battery bank	40 nickel-metal hydride battery modules
Battery capacity	6.5 Ah
Front suspension	MacPherson struts
Rear suspension	Eta-beam axle
Steering	Rack and pinion
Front brakes	Ventilated discs
Rear brakes	Leading trailing drums
Tyres	165/65-15 low rolling resistance
Anti-lock braking	Standard
Air conditioning	Standard

PRIUS EQUIPMENT LIST

SAFETY	
ABS with EBD	✓
Wide view door mirror	✓
High mounted rear stop light	✓
GOA (crash resistant body structure)	✓
Front and rear energy absorbing crumple zones	✓
Side impact door beams	✓
Front seatbelts with pretensioner and force limiter	✓
Adjustable front seatbelt anchors	✓
SRS airbags (D+P)	✓
Head impact protection (soft upper materials)	✓
Child protection rear door locks	✓
ISOFIX child seat restraint system	✓
Hybrid system immobiliser	✓
EXTERIOR	
Multi reflector halogen headlamps	✓
Bumpers – colour keyed	✓
Door mirror, door handles – colour keyed	✓
Rear spoiler – colour keyed	✓

INTERIOR	
Central information display with digital speedometer, fuel gauge, shift lever indicator.	✓
Liquid crystal multi-information display showing average and instantaneous fuel consumption energy monitoring, outside temperature, audio operation	✓
Full map satellite navigation system/6-disc CD autochanger	Opt
Integrated audio with CD/radio /cassette and 4 speakers	✓
CFC-free automatic air-conditioning	✓
Electric power steering	✓
Tilt steering wheel	✓
Power door mirrors	✓
Power windows front and rear (Drivers side auto up/down with jam protection)	✓
Window heat absorption glass	✓
60/40 foldable rear seats	✓