This press pack accompanied the UK launch of the electric-powered version of the first generation Toyota RAV4, RAV4 EV, in 1996. Additional assets and information relating to the RAV4 range may be obtained from the Toyota press office if required.

TOYOTA LAUNCHES ELECTRIC VEHICLE PROGRAMME ON JERSEY

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TOYOTA LAUNCHES ELECTRIC VEHICLE PROGRAMME ON JERSEY

Toyota is launching a five-year European electric vehicle programme on the Island of Jersey. It follows similar exercises in both Japan and the USA. The programme, designed both to provide Toyota's engineers with a significant amount of vehicle performance data and to allow members of the public to try a state-of-the-art electric vehicle for themselves, is the culmination of more than 25 years' R&D by Toyota into electric vehicle technology.

Toyota's electric car programme on the island of Jersey will allow holidaymakers and the general public to rent an electric RAV4 EV - Toyota's most advanced electric car - for no more than it would cost to hire a medium class vehicle.

The 'Green' transport programme is being enthusiastically supported by the Jersey Government, the Jersey Electric Company, British Airways, the leading carrier to the holiday island, and by five prestigious hotels on the island, each of which will have a RAV4 EV and a charging station available for the use of its clientele.

It is planned that five RAV4 EV's will be in operation on the island. The RAV4 EV's will be rented to Jersey residents and visitors on a daily basis at competitive rates during the summer holiday seasons. Before the summer tourist season starts, and during subsequent winter periods, the cars will be made available for the use of the local community and municipal authorities.

Although electric vehicles in general still suffer from limited range and performance compared with conventionally-powered cars, on Jersey where there is a blanket speed limit of 40mph (65 km/h) and where the land mass is only 45 square miles (11650 hectares), the range of the RAV4 EV is more than adequate for a full day's motoring. Its range under urban driving conditions - thanks to state-of-the-art high technology Nickel Metal Hydride (NiMH) batteries specially developed by Toyota and Panasonic - is over 200 kilometres (124 miles).

Toyota has been actively involved in the development of electric vehicles for 25 years and although many prototypes have been built before, the latest RAV4 EV is the first to go into limited production. Sales started in Japan in September 1996 to municipal customers and Toyota has announced plans to sell around 320 RAV4 EV's to fleet buyers in the USA starting in 1998.

RAV4 EV's are already being monitored in use in both California and New York, but the Jersey initiative is the first time that any Japanese car maker has conducted a major electric vehicle evaluation in Europe. "We are very proud to be offering this state-of-the-art technology to Jersey for the project", said Mr Alan Marsh, Vice Chairman of Toyota Motor Europe.

"It is especially significant because it will allow a wide number of people - tourists and Jersey residents - to try an electric vehicle for themselves and I hope they will be impressed.

"Europe will undoubtedly offer sales opportunities for electric vehicles in the future and if this evaluation programme is as successful as we anticipate, it may provide a platform for marketing the RAV4 EV in Europe at a later date".

Senator John Rothwell, a member of the States of Jersey for 18 years and currently President of the States of Jersey Tourism Committee said: "There is a consensus view in Jersey that we must care for the island we love. We are concerned about the impact of traffic because there are a lot of cars on the island. So if anything can be done to reduce noise and emissions, then this must count as a colossal gain for both the local people and the tourists who visit us in such numbers.

"Bringing these five electric cars to Jersey is a very significant experiment. It is a small beginning, but what better place than an island like Jersey, which has a total commitment to environmental enhancement, to make a start? People know we are independent and we don't go in for frills or cosmetics or theatricals. So they'll see this as a genuine experiment that we initiated. It was us who approached Toyota when we saw their commitment to the electric car, and they liked what they heard, came to have a look and then struck a deal. And if through this experiment Toyota can demonstrate to millions of people that there is something on the way that will make life better for all of us, then they'll have done a great service to mankind", he said.

Jersey itself is a highly appropriate place for monitoring electric vehicles according to Michael Romeril, the environmental adviser to the States of Jersey: "It is a very heavily populated island with a very high level of car ownership", he said, " and though many people would think we perhaps don't have environmental problems, in fact we have congestion, pollution and all the other problems that mirror the environmental issues facing the rest of the world.

"Clearly the development of the electric car has significant environmental consequences and because we would like to be associated with those gains, we are fully supporting this new project."

Under the agreement for the electric car programme, the local Toyota dealer will lease the RAV4 EV's for five years on preferential terms from Toyota Motor Europe. The programme is being supported by Jersey Electricity Company which will provide the charging stations and electricity and help with the overall programme budget. British Airways is providing financial support, and five prestige hotels on the island - Longueville Manor, La Place, the Grand, L'Horizon and Chateau La Chaire - will each be providing highly-visible parking for the cars and their charging equipment and will be marketing the cars to their clients.

The RAV4 EV's will be available for hire for 20 weeks of the year, during the peak holiday season, and bearing in mind the financial support that will be provided by the partners in the programme, the RAV4 EV will be offered at a daily rate that is the same as that for a B-rate car - around £30 a day including insurance. At that rate, it is anticipated that the programme will be a major success, with the RAV4 EV's out every day of the season, as each of the hotels has on average some 30 cars a day out on hire.

In fact, Mike Liston, Managing Director of Jersey Electricity Company, one of the programme's supporters, says he hopes Toyota will soon be in a position to release more electric vehicles. "The current level of five RAV 4EV's on the island is only the beginning of the story. We hope to build up from here and certainly we anticipate 10 or 12 vehicles in the near future".

THE TOYOTA RAV4 EV - Product in Detail

The Toyota RAV4 EV is one of the world's most advanced electric vehicles, and one of the very few to be put into limited production. It is the latest of a series of more than 10 electric vehicles that Toyota has developed since starting serious research into the technology in the late 1960s.

The RAV4 EV incorporates the very latest electric vehicle technology including a nickel-metal hydride (NiMH) battery pack developed in conjunction with Matsushita Battery Industrial Co - better known as Panasonic. This goes some way towards addressing the major problem of conventional batteries - their weight and limited storage capacity. The nickel-metal hydride units are some 10% lighter than conventional lead-acid batteries, offer the promise of longer life and most importantly, offer about 1.5 times the energy storage capacity.

In total, the bank of 24 sealed 12V 95Ah nickel-metal hydride batteries weighs 450kg and has an expected life cycle of up to three times that of lead acid batteries.

They provide the RAV4 EV with maximum power of 45kW, peak torque of 165Nm, a top speed of 125 km/h (77mph) and a range in urban driving condition of over 200 km (124 miles). Recharging the batteries from a domestic supply via a 200V on-board charger takes 10 hours from fully drained to fully charged. A built-in timer allows the charge start and stop times to be programmed in to take advantage of cheaper electricity tariffs overnight.

While the range and performance of the RAV4 EV is still not adequate to compete on level terms with conventionally-powered vehicles - and the cost of the highly-sophisticated nickel-metal hydride batteries is prohibitive - the RAV4 EV is a further significant step on the road to developing a genuinely consumer-acceptable electric vehicle.

"Up to now electric vehicles have suffered from limited range and performance as well as limited battery life", commented the Chief Engineer of the RAV4 EV, Mr Masao Kinoshita. "However, with the development of the new Ni-MH battery, jointly developed by Toyota and Panasonic, rapid progress has been made.

"In particular," he said, "these batteries double the range compared with lead-acid batteries, and boost the maximum speed to 125km/h. And not only are Ni-MH batteries maintenance-free, but they also have up to three times the life of lead-acid units. The performance of the new batteries is optimised thanks to the adoption of a permanent magnet motor - a world first developed by in-house Toyota - and the further development of controlling technologies."

The innovative permanent magnet motor with integrated single-speed transaxle delivers power to the front wheels of the RAV4 EV. This compact and lightweight design offers excellent efficiency and high power output and takes maximum advantage of the motor's output characteristics.

The vehicle incorporates energy saving systems such as regenerative brakes that switch the electric motor into a generator to convert kinetic energy generated upon braking into re-usable electric energy, and thus help increase the range of the vehicle between recharges.

Specially developed tyres with very low rolling resistance further reduce energy consumption. They are made from a newly formulated rubber compound and are carefully shaped to minimise resistance. These tyres reduce the RAV4 EV's rolling resistance by about 35% compared to conventional tyres.

The RAV4 EV is fitted with a power steering system which uses an electric motor to operate a hydraulic pump that provides the power assistance. Separate electric vacuum pumps and brake boosters provide power assistance to the braking system.

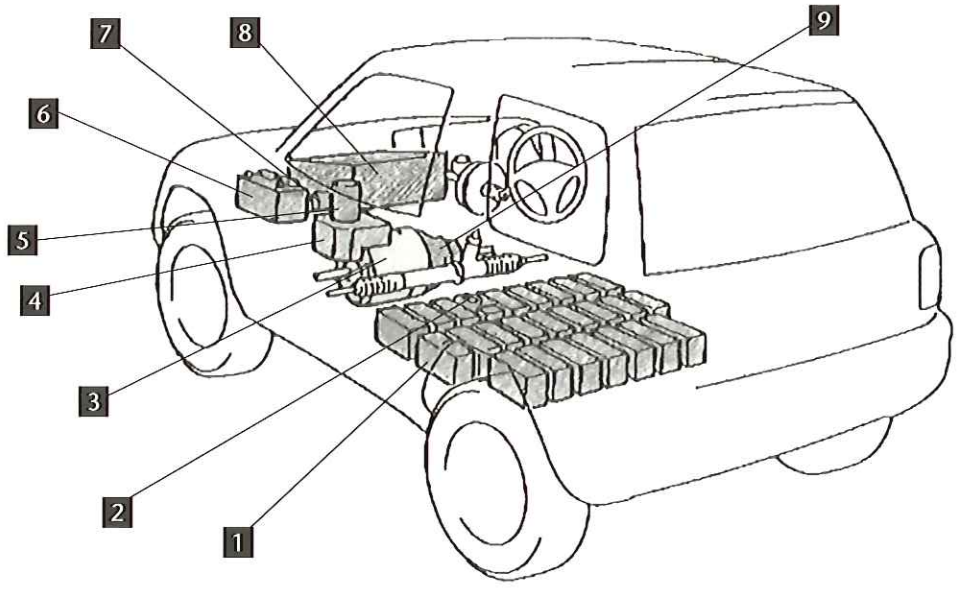
Among other innovative features of the RAV4 EV is a heated windscreen system that utilises transparent conductive film and an electric charge to keep the windshields clear.

A high-efficiency heat pump type heater/air conditioning unit is fitted. An inverter is used to control the air conditioner and reduce the amount of energy used. The unit, which uses the ozone-friendly HFC-134a refrigerant, can be operated in either heating or air

conditioning mode while charging the EV.

To ensure passenger comfort, heated front seats and an audio system are fitted as standard on the RAV4 EV. Unlike some other electric vehicle prototypes, the compact battery packs are under the floor and so the RAV4 EV offers genuine four-seat accommodation, bringing a step closer the goal of developing a practical and environmentally clean alternative for urban transport.

In addition to conventional safety features, the RAV4 EV is fitted with an automatic disconnect system that shuts off the high voltage from the batteries immediately in the event of a collision. When the ignition is turned off (i.e. the key position is moved to "accessory"), the main battery is immediately disconnected to ensure the safety of the vehicle and in addition, a safety plug can be used to disable the power system while the vehicle is being serviced.



1 Main battery unit
2 Safety plug
3 Permanent magnet motor
4 Inverter
5 Electro hydraulic pump for power steering
6 Auxiliary battery
7 Electric vacuum pump for brakes
8 Unit box
9 Single-speed integrated transaxie

RAV4 EV Specifications

Powertrain:	
Motor type:	Permanent magnet with integrated water-cooled AC inverter
Power output:	Peak intermittent 45 kW at 2600 rpm / continuous 20 kW
Maximum torque:	165 Nm at 2600 rpm
Transaxle:	Single-speed integrated front-wheel-drive
Battery:	
Battery type:	Sealed nickel-metal hydride voltage: 288 volt system (12v x 24)
Nominal Capacity:	95 Ah
Charger:	On board (AC single-phase 200-240v @ 30 amp.) 20 to 100% in 8 hours
Equipment:	
Steering:	Electro-hydraulic power rack-and-pinion
Brakes:	Regenerative motor braking and electric vacuum pump
Wheels/tyres:	16 inch steel / 195/80R 16 low rolling resistance
Heater/ A/C:	High-efficiency heat pump-tyre (non-CFC refrigerant)
Others:	Heated windscreen defogger; heated driver and passenger seats; AM/FM radio
Seating capacity:	4
Vehicle Dimensions:	
Length:	3695 mm
Width	1695 mm
Height:	1620 mm
Wheel base:	2200 mm
Performance:	
Gross weight:	1720 kg
Kerb Weight:	1460 kg
Top Speed:	125 km/h
Range per charge:	over 200 km (urban driving)

Toyota's commitment to low-emission vehicle research

Toyota's programme of electric vehicle research and development is part of a wider strategy aimed at investigating a wide variety of potential new energy sources for cars and trucks.

Research continues into methanol, natural gas and hydrogen-fuelled otto-cycle engines as well as methanol diesel engines, solar and gas turbine powered vehicles. The company also continues to investigate the potential of hybrid vehicles, such as the Coaster hybrid minibus and the Prius hybrid concept car. Just as importantly, Toyota remains absolutely committed to continuing the development of ultra-low emission internal combustion engines.

However, electric vehicles offer a number of potential advantages, not least that the vehicles themselves produce zero emissions in use and are extremely quiet in operation, which is a bonus in crowded urban areas.

Toyota has been at the forefront of electric vehicle research and development for over 25 years. As long ago as 1969 it started work on EV's as part of a six-year national programme of EV research and development sponsored by the Industrial Science and Technology Agency, part of MITI though it was not until 1983 that the first fully developed EV prototype was unveiled - the Corolla-based EV-10.

This early prototype showed the potential of EV's, particularly around town, in terms of low noise and zero emissions. Then, as now, the main thrust of EV development was to find ways of improving air quality by reducing exhaust emissions, particularly in urban environments, to research alternative energy sources and to seek the most efficient use of energy overall. In addition, of course, significant commercial benefits are likely to accrue to the winners of this particular commercial race.

The greatest obstacle to success continues to be that of battery technology. In relation to the energy that they can store, today's batteries are heavy and bulky units and this limits the range and performance of the vehicle - and also its practicality since passenger and luggage space is reduced. In addition, the costs associated with EV's are still substantially higher than those of a conventionally powered vehicle.

The EV-10 started Toyota's work in the quest to develop a practical, useable and economically viable electric vehicle. It was followed in later years by the EV-20, EV-30, EV-40 and EV-50, each of which explored different aspects of EV technology, such as different types of battery and motor, regenerative braking and other important areas.

A major breakthrough came in the early 1990's, when Toyota's EV engineering team developed the Town Ace EV commercial vehicle which, after a monitoring programme in 1992, went on sale in 1993 to local Government bodies for road tests. This was followed by the development of the Crown Majesta EV passenger car, which incorporated several advanced engineering features, and which was leased to the Tokyo Metropolitan Government in 1993 for research into commercialisation. Though this only had a range of

45km (28 miles) between charges, it offered large car comforts with a full four-seat capacity and included power assisted steering, four-wheel ABS, heat pump-type air conditioning and low rolling resistance tyres as part of its specifications. It also featured a sealed-for-life lead-acid battery, a technology that was taken up in 1993 with the EV-50 research vehicle.

The EV-50 passenger car took Toyota an important step further along the road to developing a fully practical electric vehicle. It carried its own on-board recharger which could be plugged directly into a domestic power supply for overnight charging. It also offered impressive performance figures for an EV - a top speed of 115 km/h (71mph), and a range of 110km (68 miles) in the Japanese urban driving cycle.

The lessons learned in the EV-50 programme were applied to the RAV4-EV, which went into limited production in 1995. Initially, vehicles were provided to the Tokyo Metropolitan Government and to Tokyo Electric Power Co. for assessment. By the end of the year, 10 RAV4-EV's were being monitored in Japan and a further 10 in the United States.

These examples featured a sealed lead-acid battery, which provided a top speed of 125 km/h (77mph) and an urban range of 120 km (75 miles). However, the vehicle was further developed to incorporate a state-of-the-art Nickel Metal Hydride (NiMH) battery, which boosted the maximum urban range to over 200 km (124 miles). The top speed reached 125 km/h (77mph).

Powered by these batteries, which offer better energy storage capacity in a lighter unit, the RAV4 EV convincingly won the 565 kilometre Scandinavian Electric Car Rally between Göteborg, Sweden and Oslo, Norway in August 1995. Driven by Swedish rally driver Thomas Radström and co-driver Benny Melander, the RAV4 EV completed the Rally, with its 18 timed special stages, a comfortable 28.76 seconds ahead of the second placed car.

The RAV4 EV cars for use in Jersey are similar in specification to the rally-winning car, featuring the same Nickel Metal Hydride batteries and powered by a permanent magnet motor with integrated water-cooled AC inverter driving the front wheels through an integrated single-speed transmission.

Work continues at Toyota to advance electric vehicle technology still further, with fuel cell electric vehicle technology offering a glimpse of a cleaner future on the road. Fuelled by hydrogen, fuel cell electric vehicles (FCEV) may become the clean cars of the future and Toyota has already developed its own unique fuel cells and a hydrogen-absorbing alloy storage device which is promising enough to provide an experimental FCEV with a target range of 250 km (155 miles) on a single charge of hydrogen.

For the time being, however, the RAV4 EV remains Toyota's most advanced electric vehicle.