Development of Next-Generation Electric Vehicle
Mitsubishi’s i-Mi EV

As a contribution to the trend of providing ecologically friendly cars Mitsubishi has developed the electric vehicle i-Mi EV based on the minicar i. To address problems encountered by existing electric vehicles, the i-Mi EV employs components such as high-capacity lithium-ion batteries and a compact high-performance motor. Mitsubishi Motors will perform joint researches with electric power companies and fleet monitoring tests to survey the market acceptability prior to commercial application.
Electric vehicle (EV) development by Mitsubishi Motors dates back as early as 1971, the year when Japan established its first agency governing environmental affairs, the then Environment Agency of Japan, to address air pollution and photochemical smog that were major social issues at the time.

At the height of Japan’s rapid economic growth, EV was expected to be the trump card in addressing air pollution and automakers competed to develop EVs. Mitsubishi’s EV activities began with the development of the Minica Van EV and the Minicab EV under commission by an electric power company and 108 units were delivered. The company continued to develop EVs, producing the Delica EV in 1979 and the Minica Econo EV in 1983 in response to the oil crises and air pollution.

In the 1990s, demand grew for protecting the ozone layer and reducing CO₂ emissions to address global warming. The EVs that Mitsubishi developed in this period were the Lancer EV and the Libero EV, which were delivered to an electric power company. This period also saw a boom in EV development by major automakers seeking to meet the requirements of the California Zero Emission Vehicle (ZEV) programme. Although Mitsubishi was not included among the automakers designated by the programme and thus had a relatively relaxed timeframe for developing products conforming to the ZEV requirement, the company actively evolved its EV technologies, developing in 1998 the FTO-EV that was powered by a large-capacity lithium-ion battery that could cover a much longer distance per charge, and in 2001 the Eclipse EV, Figure 1.

An EV depends on electricity for 100% of its power, so such vehicles make the greatest contribution to preventing air pollution and reducing CO₂ in the air. However, using electricity as the energy source introduces various problems that have prevented the electric vehicles developed so far by automakers from being marketed widely.

The three major problems are:
1. vehicle performance, including too short driving distance per charge and too long charge time
2. component technologies, such as the batteries and motors being too heavy, bulky and costly, and
3. battery charging infrastructure.

Due to the difficulty of overcoming these challenges, automakers have switched the focus of their research and development from EVs to fuel cell vehicles (FCVs) that do not emit pollutants while having relatively long driving ranges and hybrid electric vehicles (HEVs) that offer substantially improved fuel economy. Especially, with FCVs that can run on hydrogen, the driving range can be extended by enlarging the capacity of the hydrogen tank and the refill time can be shortened. FCVs are expected to be the ultimate ecologically friendly cars because the exhaust gas contains only water vapour. However, it will take a while before FCVs become widely used for reasons of component technologies such as the fuel cell, and infrastructure such as the hydrogen filling stations.

HEVs, which are regarded as a stopgap before fully-fledged commercialisation of FCVs, are now becoming increasingly popular. HEVs combine electric vehicle technologies (such as motor and battery technologies) with internal combustion engine technologies to achieve a substantial reduction in fuel consumption over the conventional internal combustion engine vehicles (ICEVs). HEVs also offer higher power performance than ICEVs, proving that hybrid technology can concurrently achieve both superior fuel economy and high power performance.