# Challenges of Eco-Car Strategy

By Isao ADACHI

Developing and marketing ecologically friendly cars – dubbed eco-cars – that emit less or no carbon dioxide ($CO_2$) have become a strategic challenge for automotive manufacturers to survive the global economic recession. This is because it offers a golden opportunity for them to beat the competition on the back of government subsidies for eco-car purchases introduced as a means of stimulating economic activity in addition to combating global climate change. Eco-car producers are classified into two groups – those of hybrid vehicles (HVs) holding the lead and those of electric vehicles (EVs) in hot pursuit. This article looks into how the two types of cars compare in terms of environmental friendliness and examines their fuel efficiency and other challenges, an attempt rarely made so far.

Take for example Toyota Motor Corp. and Honda Motor Co., which were the first automakers to put HVs on the market. The new *Prius* that Toyota introduced in May 2009 topped the domestic sales rankings for three straight months from June to August, exceeding 250,000 cars in cumulative orders for the model. Honda's *Insight* is also enjoying booming sales, with its sales target raised sharply. On the other hand, two other major Japanese manufacturers, Nissan Motor Co. and Mitsubishi Motors Corp., eye EVs driven by battery-powered motors as their strategic cars without their own hybrid models in place, emphasizing their environmental advantage. Nissan plans to start producing the EV model *Leaf* at the end of 2010 at a rate of 50,000 cars per year for sale both in Japan and abroad.

Which of the HV and EV models is actually more environmentally friendly then? The fact is such a comparison will never be complete without counting $CO_2$ gas released in the car production process. Since it is going to be an extremely complex undertaking, however, this article had no choice but to settle for comparing finished cars.

HVs have a system to convert previously wasted energy, such as braking-generated energy, into electricity and drive a motor, supplementing a gasoline engine. Hybrids reportedly have an overall energy efficiency of nearly 30% as compared with about 14% with gasoline engine cars. Hybrids have the advantage of not requiring any new investment in infrastructure, clearing one of the obstacles to becoming a widely used vehicle. The more *Priuses* were sold for wider use, the greater the reduction of $CO_2$ emissions would be. Given this, Toyota's public relations officer said, "We will seek to produce one million HVs a year sometime early in the 2010s." Efficient lithium-ion batteries are yet to be developed and manufactured, posing a major technological challenge. The Toyota official, however, said such batteries "can be supplied in 2010."

It is emphasized that EVs emit no $CO_2$ gas while running. That's for sure. However, electricity has to be generated by thermal, hydraulic or nuclear power. An EV's energy efficiency will have to take into consideration that of power generation, transmission, and battery and motor production. A power company says an EV powered by electricity generated 100% by thermal power is around 30% in energy efficiency. Assuming that 30% of Japan's electric power supply comes from nuclear energy and 8% from hydropower, a Nissan public relations officer said the amount of $CO_2$ released by an EV will be held down to 30%-40% of a gasoline car. The EV figure far outweighs that of hybrids.

EVs have relatively simple structures to their advantage. Their diffusion, however, will require price cuts, improved battery performance and availability of recharge stations. Nissan claims that a fully charged *Leaf* is able to run "more than 160 kilometers." When an air conditioner is turned on, however, the driving distance becomes much shorter. Plugged into a 200V outlet, it takes eight hours to charge an EV. With a high-speed 50kW recharge machine, it takes 30 minutes to reach an 80% charge. An EV no doubt has high potential as a viable eco-car, but these technological hurdles are left to clear.

How are fuel-cell cars hotly contested by various manufacturers coming along? A fuel cell is an epoch-making system using chemical reaction between hydrogen and oxygen to produce electricity. Toyota aims at developing a commercial fuel-cell car by 2015, but admits how to produce hydrogen is the bottleneck. Separating hydrogen from natural gas is considered most efficient, but the separation process results in a byproduct, $CO_2$, the processing of which is a difficult task. The separation process also needs electricity, which makes it appear that fuel-cell cars need a lot more time to take over HVs and EVs. JS

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Photo: Jiji Press


*Hybrid vehicles (HVs) and electric vehicles (EVs) fighting for supremacy as eco-cars: From left, Toyota Prius (HV), Honda Insight (HV) and Mitsubishi i-MiEV (EV).*