

## Roadmap to Low Carbon Society from a Business Perspective: Nissan's Challenge



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Mitsuhiko Yamashita received a master's degree in aeronautical engineering from Kyoto University in 1979, and he joined Nissan Motor Co., Ltd. in the same year. In 1983, he was sent to study abroad at Massachusetts Institute of Technology. He became a director of the section 1 vehicle development department in 2001. After working for three years in the Nissan Technical Center North America from 2002, he became a vice president specializing in company research and development from 2005.

### 1. Nissan's Perspective

Climate Change was one of the major issues discussed at the Annual Meeting of the World Economic Forum in Davos in January, 2008. In the meeting, Collaboration and Innovation were recognized anew as the solutions for the climate issue facing the world.

### 2. Nissan's Challenge

#### 2.1 Nissan Green Program 2010

Ultimate goal of this program is to reduce environmental pollutants below natural absorption level. The program focuses on three major issues, i.e., CO<sub>2</sub> emissions, exhaust emission, and recycling resources.

As for the reduction of CO<sub>2</sub> emissions from motor vehicles, improvement of energy efficiency of Internal Combustion Engine (ICE) will bring a maximum of 30% reduction from the current level. The hybrid vehicle can halve CO<sub>2</sub> emissions. In order to achieve the goal set in Nissan Green program 2010, 70% reduction of CO<sub>2</sub> emissions, electric vehicles and/or fuel cell vehicles with renewable energy will play the key role.

#### 2.2 Triple Layered Approach

To reduce CO<sub>2</sub>, Nissan employs a Triple Layered Approach. The approach aims to make connections among cars, drivers and society, and to implement countermeasures for each actor. 40% reduction in 2015 is set as our internal technical target, which will come from 30% of countermeasures for cars, and 10% each for drivers and society.

##### (1) Challenges for vehicle technology

For both gasoline engine and diesel engine, high combustion efficiency and less environmental pollutants are the common goals, but feasible paths for the two are different. Some of the measures we are taking are a Variable Valve Event and Lift (VVEL) system for gasoline engine, and joint development of clean diesel engine by Renault and Nissan. These technological breakthroughs are expected to occur within a few years. After that, hybrid vehicle, electric vehicles and fuel cell vehicle will gradually contribute to reduction of CO<sub>2</sub> emissions from transport vehicles.

Technological innovation of batteries is a key to performance of electric vehicles. As the first step, the innovation has led to the introduction of small community EV for short distance transportation. Further development of batteries will bring bigger cars with long distance.

At the last Tokyo Motor Show, we exhibited a new concept car of electric vehicle, which consists of several technologies currently developed by Nissan. The first one is "By-Wire". This system has been already installed in airplane control system, and controls vehicles by electrical instead of

mechanical way. The second is robotic interface which gives advices to a driver. The third is in-wheel 4WD motor, and the forth is compact Lithium-Ion battery. Further technological innovations of these four technologies will bring us to a future transportation system with electric driven cars.

Burden sharing between public transportation and private transportation is a key for future society. A concept for future urban transportation system is under review. It puts EV as a core system, and the vehicle is assisted by Intelligent Transportation System (ITS), and has four key factors: Park & Ride from Rental Station, Efficient Traffic Control, Regenerating Electricity Sharing, and CO<sub>2</sub> free electricity.

#### (2) Challenges for “Driving Life”

Nissan’s Eco Drive Navigation System not only informs the drivers their current gasoline mileage but also ranks monthly average mileage. Last year, Nissan started the service which ranks drivers according to its actual fuel efficiency. Using this system, some drivers could improve 18% of mileage on the average. This implies that there is a lot of room to improve gasoline mileage by changing driving methods.

#### (3) Challenges for Society

Nissan has been conducting several demonstration programs for future transportation system, such as the program for the Intelligent Transportation System in Kanagawa prefecture. The ITS determines traffic condition by using road information gathered by Probe Car, and tells driver the fastest route through car navigation system. A similar program was carried out in Beijing, China.

### 3. Toward Low Carbon Society

Pathways toward Low Carbon Society will face three challenges. The first is how to create “Sense of Urgency” in the society to avoid the so-called boiled frog syndrome. The role of media is vital and how the manufactures like Nissan provide information is also important.

The second challenge is to realize sustainable LCS through “Collaboration and Innovation.” It is well recognized that global warming could not be solved by one entity alone, for instance, one nation, one society, or one company. How to integrate key stakeholders involved is quite important. Technology development is also an important factor. Nissan is committed to make full effort on technology development and engineering development.

The third challenge is how to develop global mechanism to combine CO<sub>2</sub> reduction and economic growth. It is quite possible that adequate regulation may lead to economical effect.

#### 4. ad finem

The issue we really have to ask now is “What kind of energy do we use?” During the 20<sup>th</sup> century, development of our society depended on crude oil. I think the 21<sup>st</sup> century is the new era towards diversified energy society. Transition might take some more time, but coming 20 or 30 years will be the key.