technology

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Executive Vice President

Exploring Diverse Paths to Viable Future Technology

Nissan's technology development is based on what we call the "Orchard Concept," which has three layers covering the whole scope of our engineering. The top layer is the Harvest Plan, representing our products. The middle layer is the strategy, which you can compare to seeding and growth. The bottom layer is soil enrichment—how we support these activities and sustain production for the future. The ten thousand people in my department regularly examine all these layers.

Nissan's global business plans, such as Nissan 180 and Nissan Value-Up, cover three-year periods. That span is very manageable in scope, and fosters firm commitments and concrete achievements.
We derive great strength from this strategy.

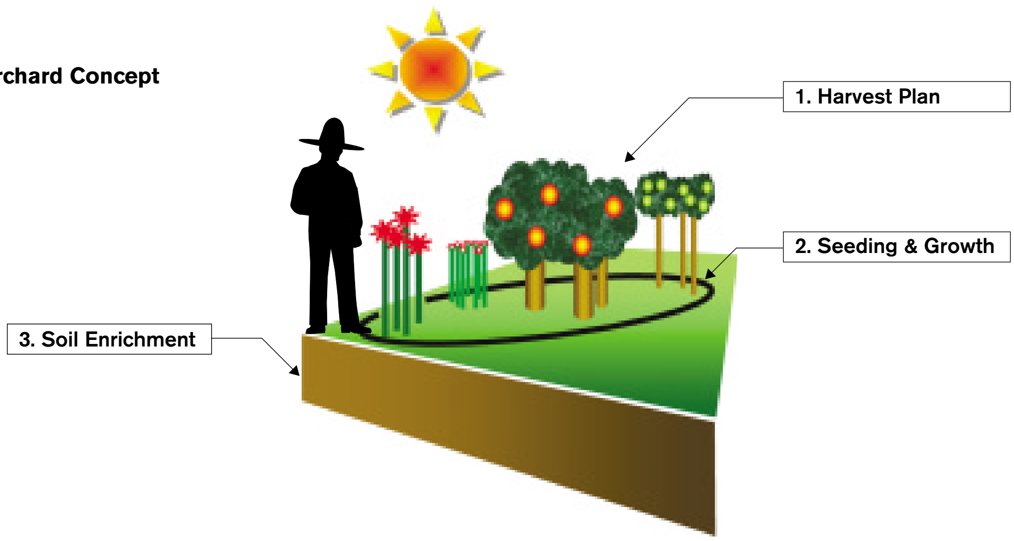
For R&D activities, however, three years is not long enough. We can develop vehicles that quickly, of course, but not core technologies like engines and powertrains, which typically take twice as long. So in fiscal 2005 we came up with the idea of a ten-year plan called Vision 2015. Vision 2015 has four different facets: safety, environment, dynamic performance, and what we call "Life on Board."

One of our primary safety goals is to reduce the number of accidents involving fatalities and severe injuries. Our goal is to reduce the number of Nissan-related automobile accidents, resulting in fatalities and serious injuries, in half by 2015, as compared to 1995.

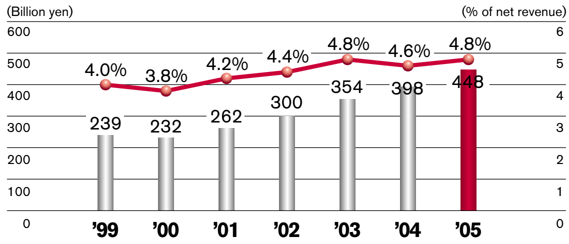
Our overall approach to achieve the goal is embodied by the "Safety Shield" concept. We have divided the accident environment into six categories: unforeseen risk, apparent risk, possible crash, unavoidable crash, actual crash, post-crash.

Previously we only looked at crash performance, such as how the vehicle protected passengers. Traffic accident trends indicate that fatalities are down significantly in Japan, but the number of accidents is rising, and our research shows that inattention, drowsiness and carelessness cause over 70 percent of them. We need to devise active safety measures that use the vehicle itself to help avoid accidents. Our "Distance Control Assist System" is a prime example of that. The system is especially useful in heavy traffic, where frequent braking occurs.

The Orchard Concept



R&D Investment



The system assists the driver control the distance between the driver and the vehicle in front, through the use of a radar sensor installed in the front bumper of the car behind. If the car in front decelerates, the system automatically applies the brakes in the rear car. Furthermore, if the system determines that the car in front is too close and that braking is required in the car behind, an indicator will appear on the instrument panel and a buzzer will sound simultaneously. The gas pedal will then automatically move upwards against the foot of the driver to assist the driver in switching to the brakes.

Our goal for the second facet of Vision 2015, the environment, is to reduce CO_2 emissions to the targeted value. Target value for technology development in CO_2 emission reductions is 40 percent by 2015, compared to 2005 level. To achieve this goal, we have a "Triple-layered Approach" concept that addresses the vehicle itself, driving behavior, and the traffic conditions.

We are currently developing fuel cell, electric and hybrid electric vehicle technologies.

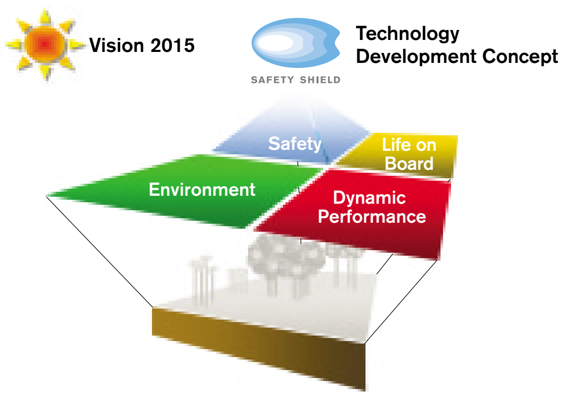
Reducing the size, weight and cost of motors and batteries are the key factors in promoting HEV, FCV, and EV. The lithium ion battery is a good example. We are ranked number one in research in this area, even above companies that specialize in battery manufacture.

We are also committed to fuel cell stack technology. We decided to develop our own after purchasing stacks from an outside vendor for a time, and managed that in fiscal 2005. Our first practical application came out this year.

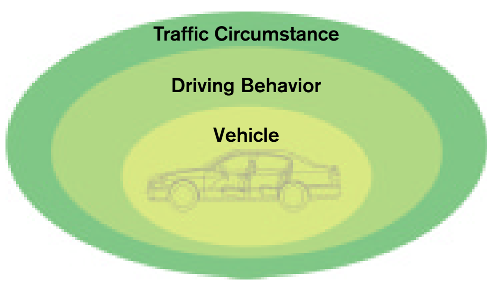
In addition to developing these advanced technologies, we continue to further strengthen our current technologies such as the CVT because we need to find a good cost-benefit balance. The CVT is a low-cost and effective solution in reducing CO_2 emission and another longtime strength of Nissan technology. Other car companies do use CVTs, but only Nissan incorporates them on models with higher-displacement engines such as 3.5-liter power engines. I believe our CVTs are the most sophisticated and best integrated in the world.

For the second layer, driving behavior, we're working on "Eco-driving Support." As an example, we've found that including a meter on the instrument panel showing real-time fuel use can change driving

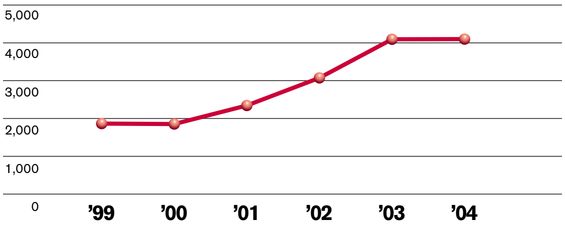
Vision 2015



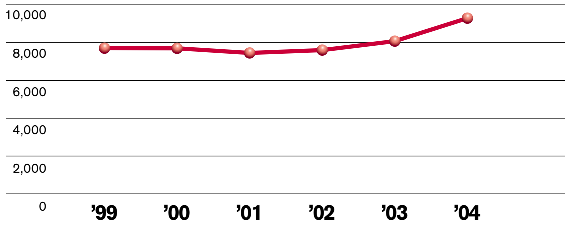
The Triple-Layered Approach



Patent Application



Registered Patents



habits. A survey we did on this revealed that fuel economy improves between 5 and 10 percent. This kind of support can help drivers save fuel.

The third layer covers traffic conditions—easing traffic, making driving less stressful, and warning of road problems. We started a project called the ITS Project about a year and a half ago to create the Intelligent Transportation System. We are working on this with both the private sector and government and regulatory bodies.

We are taking the first steps toward a solution locally, in Kanagawa Prefecture. The applications will be implemented later this year. If the test is successful, we can adapt ITS for use elsewhere in Japan and the rest of the world.

Nissan's engineers are renowned for creating cars with dynamic performance, the third facet of Vision 2015. We want every Nissan customer to sense the car's dynamic performance within thirty meters of driving. A related aspect is the "Life on Board" concept, which is the last facet. While in the car, the customer should instantly see both the car's quality—the handsome, well-crafted interior—and its ease of use, such as the navigation system, center box console and electronics.

Cost and weight reduction are never-ending tasks for engineers and vehicle development. We've successfully made such reductions, but this often involves a "slash-and-burn" approach. To ensure that we maintain the same level of performance over the long-term, we added the Cost and Weight Reduction Office in fiscal 2006. The new office will take a long-term view of the task, and will be working with universities and research centers in other companies.

Our Alliance with Renault also continues to work for us in many ways. More and more of Nissan and Renault's total production is now covered by the common platform, and this trend will continue. By using the same powertrains, engines and transmissions, we also avoid duplicating product development and parts manufacture.

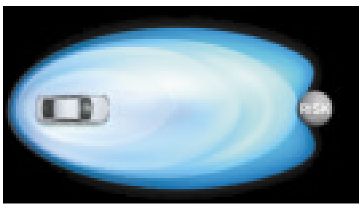
The value R&D provides to Nissan is trusted driving pleasure. In other words, we design cars that make "Life on Board" a blend of safety, driving performance, convenience and comfortable luxury. Through our various initiatives, we will build on that value.

Safety Shield

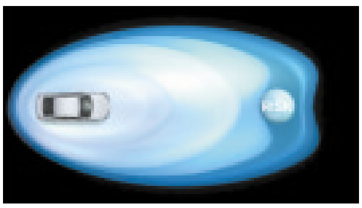
SAFETY SHIELD

The vehicle activates various technologies to help the driver, passengers and other road users avoid danger from normal driving conditions through post-accident conditions.

Helps the driver maintain comfortable driving



Helps the driver return to a safe driving mode in dangerous conditions



Helps reduce injuries and damage when a collision is unavoidable