

Zero Emission Strategy

Creating a New Zero-Emission Society

Hideaki Watanabe Corporate Vice President



Nissan intends to be the global leader in zero-emission mobility. Our ultimate goal is to create a society that is environmentally responsible and also enriches people's lives. While other makers are developing electric cars, the following activities will demonstrate that we are a sustainable mobility promoter, moving forward with strategic initiatives and a value chain that range far beyond any model the auto industry has seen.

The Renault-Nissan Alliance, for example, has already formed more than sixty partnerships with governments, cities and other organizations around the world to educate the public, create excitement, and accelerate demand for zero-emission cars. Many of these governments are providing purchasing subsidies and low-interest loans to support the introduction of our EVs, build our battery production plants, and create the necessary infrastructure.

We have devoted many years to developing new technologies that reduce CO₂ emissions, including advances in internal combustion engines, hybrids and fuel-cell vehicles. Our new electric vehicle, Nissan LEAF, is the outstanding result of efforts to go beyond that and reduce emissions to zero. Along the way, we've also developed proprietary core technologies, including the electric motor, inverter and battery.

Our flat laminated-cell lithium-ion battery is one of the core technologies that will make zero-emission mobility a reality. We have spent nearly two decades developing the battery technology on EVs such as the Prairie Joy, Altra and Hyper Mini. Along with providing affordable, innovative and well-engineered electric cars, we want to lead the development and production of lithium-ion batteries through our joint-venture company with NEC Corporation, Automotive Energy Supply Co., Ltd. (AESC). AESC, formed in 2007, is the key to mass-producing these power cells.

We began trial production last July at our Zama Operations Center, and by 2011 we will have an annual production capacity of 90,000 units there.

Although we are still months away from the start of sales for Nissan LEAF, we have already devised action plans for recycling nearly 100 percent of the vehicle weight, including the secondary use of the battery, which retains around 80 percent of its storage capacity even after five years. To harness that remaining performance and provide society with new energy storage solutions, we will begin what we call the "4R" business with Sumitomo Corporation, which covers the reuse, refabricate, resell and recycle aspects. Refabricated batteries have incredible potential as storage and backup cells in the wind generation and solar businesses, for example. This will also result in high residual values for electric-car batteries, which in turn will reduce the cost to our customers and support our ongoing commitment to reducing the environmental impact of automobiles. We expect to launch part of this venture around the start of sales of Nissan LEAF. We are considering the end process even before we put our EV on the market.

Infrastructure is naturally essential to our success in this big venture. Our partner in the U.S., Electric Transportation Engineering Corp., is building around eleven thousand quick-charge and normal-charge stations in major population centers in Arizona, California, Oregon, Tennessee and Washington with the support of the U.S. Department of Energy. In Europe, we have a comprehensive partnership with the government of Portugal to introduce zero-emission mobility nationwide. Up to 320 vehicle-charging locations will be up and running there by 2010, and by the end of 2011 a total of 1,300 should be operational.

In Japan, local governments and third parties have already installed about 160 quick-charge facilities. Nissan will also offer normal charging facilities through its entire

network of 2,200 dealerships in Japan. Roughly two hundred dealerships will also offer quick-charging systems. We will commence sales of Nissan-developed in-house quick chargers in Japan through our regional parts sales affiliates. By offering these quick chargers to the market at a competitive price, we seek to accelerate the deployment of the infrastructure required.

✦ Making EVs a Global Phenomenon

We want to make it clear that we are not aiming for a niche market or to be an exotic option. Our strategy is to craft attractive, competitive vehicles, produce them globally, and sell in volume. In this way, we will drive down the cost and make EVs even more affordable.

We are taking full advantage of our Alliance with Renault in this drive. We will share the results of cooperative research and development, invest on battery production, strengthen global partnerships and pursue other strategies that will generate a range of global synergies. We have already announced the construction of five battery plants in the U.S., the U.K., France, Japan and Portugal. Our plan is to produce up to 500,000 batteries a year.

Starting in October 2010, Nissan will begin manufacturing Nissan LEAF in Oppama, Japan, with an annual production capacity of 50,000 units. Nissan LEAF will also be manufactured in Smyrna, Tennessee, U.S. from 2012 and from 2013 in Sunderland, England, U.K. with production capacities of 150,000 and 50,000, respectively.

Vehicle choice is another key to our strategy. In addition to Nissan LEAF, Nissan will introduce an e-LCV, an exciting urban EV commuter, and a new Infiniti luxury sedan EV. Renault is also coming out with four EV models, so we will be able to offer a variety of vehicles to customers. This diverse lineup will provide us with great market coverage.

✦ Nissan LEAF—More Than an Eco-Car

Most of the attention is being focused on Nissan LEAF's environmental performance. However, we want consumers to know that this is a true C-segment vehicle for normal use, seats five people in comfort, has a spacious trunk, presents absolutely no compromise in style or performance and clears the strictest impact safety standards in every region.

That said, our EV is also innovative, exciting and fun to drive. In contrast to a standard internal-combustion engine vehicle, Nissan LEAF's smooth and linear acceleration comes from the electric motor that instantly generates maximum torque from a starting position. The car just takes off immediately when you press the accelerator pedal, providing acceleration superior to that of a 3.5-liter V6 engine.

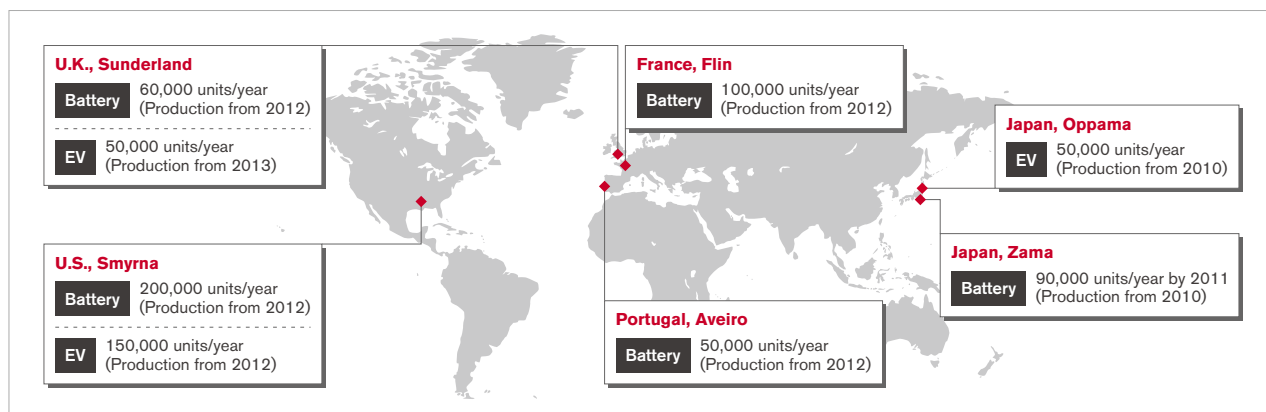
Unlike a car with a front-mounted engine, Nissan LEAF's weight is distributed in the center because the battery is positioned close to the middle of the chassis. That makes the car very stable yet nimble. Although Nissan LEAF may be positioned in the C segment, this handling and driving quality imparts the feel of a vehicle two grades higher.

EVs run silent, of course, which is a blessing in a noisy world. There has been some concern, however, that quiet EVs and hybrids can surprise pedestrians as they approach. We designed a system to alert pedestrians that a vehicle is approaching. When driving at a low speed (below 30 km/h), the system emits a sound from a speaker at the front of the vehicle. Pedestrians can hear the car moving when it reaches 30 km/h. Therefore, when Nissan LEAF achieves this speed, this "approaching sound" will automatically turn off and restart when coming back to low speed, less than 25km/h.

In many senses, Nissan LEAF is a completely new vehicle that redefines the driving experience. And until you get behind the wheel of one, you will not know how special it truly is.

+ Chart:

BATTERY / NISSAN EV MANUFACTURING CAPACITY



✦ A True Game Change in Lifestyle

Nissan LEAF and the EVs that follow will also change lifestyles. For example, instead of hunting for a gas station and refueling, you just go home and plug it in. You'll also be able to use quick chargers at shopping centers and other gathering places, allowing you to power up even while you dine or shop. Using a 200-volt power source, you can charge up to 100 percent in around eight hours, and the quick-charging system takes about ten minutes to provide a range of fifty kilometers.

Consumers occasionally express concerns that they will exhaust the battery while out on the road. However, over 80 percent of the world's drivers average less than one hundred kilometers (62 miles) each day, and many far less. As measured by the U.S. LA4 standard, Nissan LEAF has a cruising range of 160 kilometers—100 miles—on a full charge.

There are various aspects to alleviating range anxiety that involve what the car can do and support outside of the car. Incorporating the latest information technology, Nissan LEAF vehicles will be in contact with our global data center. The system will show route suggestions and provide the location of the nearest charging station. Information is updated and accessible on demand so that drivers will always have the latest, accurate information. A user-friendly onboard screen provides continuous feedback, including battery capacity and maximum driving range.

When the air conditioner is on, the driving range can be affected. However, the vehicle can be pre-cooled or heated while it is still plugged in, so that the car is ready and comfortable for the driver. This will reduce the energy required to cool or heat the car after you embark on your trip.

Nissan LEAF's regenerative braking system also increases range. By applying the brake or reducing the speed by decelerating, the electric motor acts as an electric generator. To encourage the use of this regenerative braking capability, there is a driver-controlled Eco mode setting, which can also be used to reduce acceleration power and air conditioning, and improve driving range by 10 percent when driving in urban areas.

In addition to the technologies featured in Nissan LEAF, we are analyzing various other solutions to ease range anxiety. These include rent-a-car services at exceptional bargain rates for particularly long trips and the feasibility of 24-hour support lines in certain countries.

The spread of electric vehicles promises to reduce CO₂ emission, transform our cities and towns into more people-friendly places and change our lifestyles for the better, especially as more key infrastructure elements like non-contact charging stations and park-and-ride lots appear. Quiet, non-polluting EVs can also travel in areas that restrict the entry of gasoline-powered cars because of their emissions. Those are just a few of the reasons Nissan is determined to build a sustainable global society filled with EVs.



Nissan LEAF