

SII – Sustainability Innovation Inventory

Authors: Abby Spinak, Dave Chiu, Federico Casalegno,
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Nissan’s “Eco-Drive and You” CARWINGS Service



Executive Summary

For car owners in Japan, Nissan has implemented a service to make drivers more knowledgeable about their environmental performance while they are on the road. The “Eco-Drive and You” program is a new function of Nissan’s telematic in-car navigation system, CARWINGS, which provides real-time traffic information and directions to drivers. Along with traffic data, CARWINGS software updated with the “Eco-Drive and You” program can show drivers their personal fuel consumption trends while they are on the road. In addition, it ranks each driver’s fuel efficiency among all owners of the same car model. Finally, “Eco-Drive and You” gives drivers tips to reduce their fuel consumption while driving.

CARWINGS and “Eco-Drive and You” have won a number of “best-practice” environmental awards in Japan, including the Agency for Natural Resources and Energy Director-General’s Award for Energy Conservation and an Eco-Products Award from the Minister of Land, Infrastructure, and Transport. While CARWINGS and Eco-Drive are currently only available in Japan, Nissan is adding a fuel efficiency gauge – which tracks both average and current fuel efficiency – to all new models worldwide.

What makes “Eco-Drive and You” a sustainable technology?

Individual reductions in non-renewable resource consumption habits are an important pillar of a more sustainable city, but they are often the most difficult sustainability measures to implement. The “Eco-Drive and You” program makes sustainable behavior choices easy and desirable, by both giving real-time feedback on fuel efficiency – thereby helping drivers save money – and by connecting individual actions to societal trends – thereby allowing drivers to visualize their individual contributions to a larger problem, carbon emissions.

Knowledge of real-time fuel economy demonstrably encourages drivers to change their driving habits. Nissan found during internal testing of its fuel efficiency gauge, for example, that making fuel efficiency data available to drivers resulted in smoother acceleration and braking and a 10% average improvement in fuel efficiency. “Eco-Drive and You” empowers drivers to make even more educated choices about their driving habits and rewards them with real-time feedback on the impact of those choices.

“Eco-Drive and You” also plays on the competitive nature of humans (and drivers!) by making fuel conservation into an ongoing game in which drivers can track their efficiency against each other.

Current Technology

Background on the Nissan Fuel Efficiency Gauge and CARWINGS

The Nissan fuel efficiency gauge, shown below, uses internal sensors to display both historical trends in driving efficiency and current fuel consumption information.



Figure 1: Fuel Efficiency Gauge Installed in All New Nissan Models Worldwide
(Image from: <http://www.greencarcongress.com/2007/08/all-new-nissan-.html>)

The CARWINGS program (see Figure 2) uses GPS and Bluetooth technology to provide current information about a specific car’s location, travel options, and aggregate driving trends. CARWINGS

receives information updates through the driver's mobile phone and is compatible with any Bluetooth enabled phone.

To facilitate use of the technology while driving and to increase system safety, CARWINGS is designed for drivers to operate through steering wheel switches and voice commands.



Figure 2: CARWINGS In-car Navigational and Driving Efficiency Software.

The CARWINGS program operates through a combination of steering wheel switches and voice commands (top photo), allowing drivers to access maps, real-time traffic information, nearby businesses, information about their personal driving records, and driving tips while they are on the road. (Photos from: <http://nissan.co.jp> and <http://blog.nissan-carwings.com>)

Eco-Drive and You

The Eco-Drive program combines the fuel efficiency monitoring of the fuel gauge with the real-time data capabilities of CARWINGS to provide drivers with three main services:

- **Driving Performance Statistics**, including current performance and historical trends
- **Eco-Drive Ranking** among drivers owning the same model
- **Driving Advice** to help drivers improve their fuel efficiency

CARWINGS uses a combination of audio and visual controls to deliver Eco-Drive information to drivers. The Driving Advice function is audio-only, allowing drivers to concentrate on the road while learning how to drive more efficiently. For reference purposes, members can also access their personal driving trends and rankings by logging into the CARWINGS website.

Figure 3, below, shows sample Eco-Drive displays:

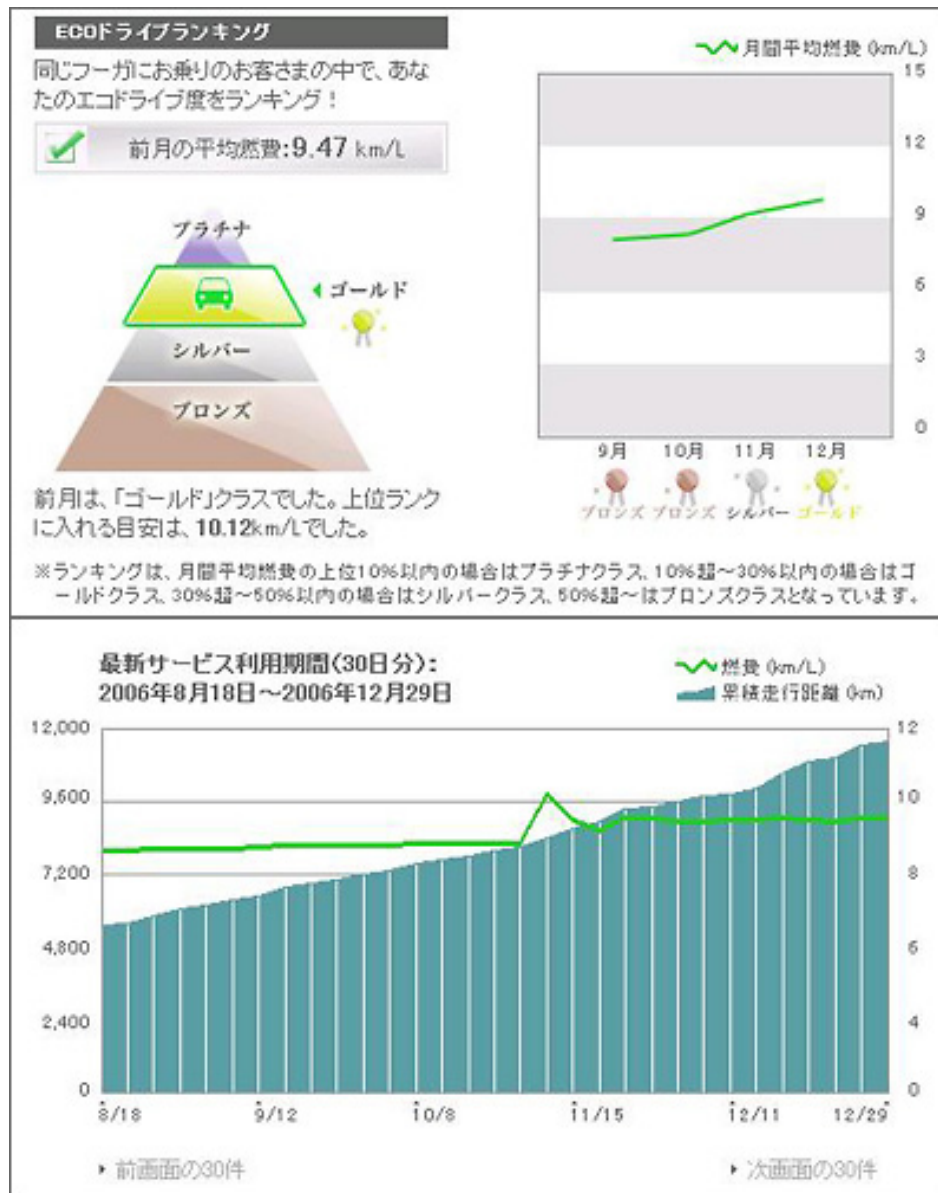


Figure 3: “Eco-Drive and You” Personal Driving Data. The top image shows how personal driving habits compare to other drivers with the same car model; the bottom image displays individual fuel consumption patterns.

(Images from: http://www.nissan-global.com/EN/NEWS/2007/_STORY/070122-04-e.html)

Technology & Experience Roadmap

While the CARWINGS software is currently only available in Japan, driving aid technologies that use mobile phones and GPS in other countries should be aware of CARWINGS for future potential coordination. Additionally, the CARWINGS “Eco-Drive and You” program could expand to include other eco-indicators that would add value for both drivers and car manufacturers. The following examples help identify potential directions for CARWINGS eco-functions:

Mobile Phone Traffic Monitoring

Because the “Eco-Drive and You” program will work with any Bluetooth-enabled mobile phone, it could easily be coordinated with mobile phone-based traffic monitoring programs, such as the “Mobile Century” collaboration between Nokia, Berkeley, and the California Department of Transportation and the TomTom-Vodafone partnership in the Netherlands. These traffic-monitoring programs use data on the positions and/or speeds of mobile phones along major roads to determine traffic conditions and then return real-time traffic information to either an in-car navigation system or the drivers’ phones. “Eco-Drive and You” software could make fuel consumption data available along with the traffic data already being collected from individual drivers’ phones, allowing transportation authorities and navigation companies to assess the impact of traffic on different roadways on total regional emissions. Aggregate fuel consumption data sent back to cars on the road could then help individual drivers see how their route choices contribute to regional emissions. City planners could use this data for air quality remediation projects near areas of heavy traffic.

Multimodal Navigation Systems

In addition to increasing the functionality of in-car navigation systems, “Eco-Drive and You” software could be incorporated into multimodal navigation systems designed for pedestrians. Companies such as Humanware and Navitime, for example, sell personal navigation devices and/or software that help people plan trips using public transportation, walking routes, and personal vehicles. These navigation programs allow travelers to compare different routes or modes of transportation. Adding historical data about an individual’s car to personal navigation software could allow travelers to compare different modes of transportation based on accurate estimates of their expected fuel consumption and overall price in addition to time and distance. Drivers stuck in heavy traffic could use their personal navigation software to find information about nearby public transportation alternatives, while their CARWINGS local business-finding software could tell them about parking availability to help them get out of traffic.

Additional Eco-Measurements

The Nissan fuel efficiency gauge, CARWINGS, and “Eco-Drive and You” are elements of Nissan’s ongoing Green Program 2010 Environmental Action Plan. The Green Program 2010 has three key goals (see Figure 4):

- Reduce CO₂ emissions
- Reduce other automobile-related emissions
- Develop a more closed-loop resource cycle for production, use, and end-of-life materials integration

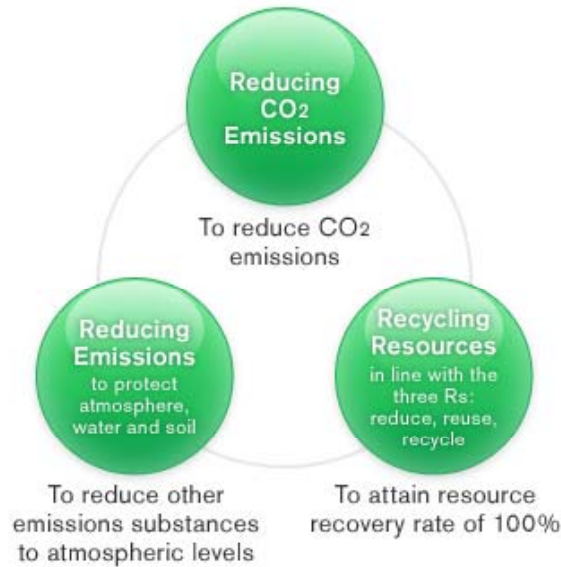


Figure 4: Nissan's Green Program 2010 Key Issues

(Figure from <http://www.nissan-global.com/EN/ENVIRONMENT/ISSUE/index.html>)

Additional car component sensors communicating with the CARWINGS monitoring system could help Nissan more effectively achieve all three goals. Better monitoring of emissions and automobile component diagnostics combined with aggregate data collection and analysis at a central location could, for example:

- Help diagnose cars with faulty or aging components that are contributing to emissions problems and offer parts-exchange programs
- Keep track electronically of available parts from cars that could be salvaged should the car be retired from use
- Monitor and track efficiency savings from onboard cycles such as heat recovery or hybrid technology
- Moreover, the “Eco-Drive and You” driving advice function could be updated with recycling tips and eco-friendly choices for car maintenance and repair.

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MIT Mobile Experience Lab, Massachusetts Institute of Technology

Design Laboratory

School of Architecture and Planning

<http://mobile.mit.edu>

Federico Casalegno

Dave Chiu

Abby Spinak

Cisco Systems, Inc.

Internet Business Solutions Group

<http://www.connectedurbandevelopment.org/>

James Macaulay

Nicola Villa

Shane Mitchell

