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AIR QUALITY

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Air Quality Policies and Philosophy

Nissan approaches air quality by focusing on two points: greener exhaust emissions and providing a pleasant in-cabin environment to customers. In this way, we will strive to consider ecosystems while pursuing mobility that provides more comfort and security to customers. According to the State of Global Air 2018 report issued by the U.S.-based Health Effects Institute (HEI), 95% of the world's population currently lives in regions where particulate matter smaller than 2.5 μm (PM2.5) exceeds the 10 $\mu\text{g}/\text{m}^3$ basic level specified by World Health Organization (WHO) Air Quality Guidelines. Furthermore, the Organization for Economic Cooperation and Development (OECD) predicts that the global population will exceed 9 billion by 2050, with around 70% of people concentrated in cities, making air pollution in urban areas an even more pressing issue.

For an automaker, air pollution stands alongside climate change and congestion as an issue for cities in particular that must be remedied. Nissan is advancing its efforts to improve air quality with two approaches:

1. Promoting Zero-Emission Vehicles

Electric vehicles (EVs), such as the Nissan LEAF, which has cumulative global sales of more than 470,000 units as of March 2020, are an effective tool for reducing air pollution in urban areas. As a leader in this field, we are promoting zero-emission mobility and infrastructure construction in

partnership with national and local governments, electric power companies and other industries.

2. Enhancing Internal Combustion Engines

We have proactively set voluntary standards and emission-reduction targets for conventional internal combustion engines. With the ultimate goal of making automotive emissions as clean as the atmosphere itself, we have developed a wide range of technologies and achieved the results listed below through cleaner combustion technologies, catalysts for purifying emissions and countermeasures against gas vapors from gasoline tanks. We will continue our efforts to ensure cleaner exhaust emissions from internal combustion engines, which remain the most commonly used in the automotive market.

- Sentra CA (released in the United States in January 2000): The world's first gasoline-powered vehicle that satisfied all the exhaust gas requirements set by the California Air Resources Board to receive Partial Zero Emissions Vehicle (PZEV) certification.
- Bluebird Sylphy (released in Japan in August 2000): The first passenger vehicle made in Japan to achieve Ultra-Low Emission Vehicle (U-LEV)* certification.

* U-LEV: Vehicle that produces 75% less nitrogen oxide (NOx) and nonmethane hydrocarbon (NMHC) than the 2000 emission standards level in Japan.

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Improving In-Cabin Air Quality

With autonomous drive technologies currently in development and projected to be in practical use from 2020, drivers are expected to spend more time in their vehicles, making it even more important for that space to be pleasant and safe. The Nissan Green Program 2022 (NGP2022) is calling for research and development not just to make exhaust emissions cleaner but also to improve in-cabin air quality as well.

As part of our continued efforts concerning volatile organic compounds (VOCs)* such as formaldehyde and toluene, Nissan is further reviewing and reducing materials for seats, door trim, floor carpet and other parts as well as adhesives. We voluntarily set more stringent standards than those of the Japanese government and automotive industry body regulations, and have applied them to all new vehicles introduced to the market from July 2007 onward.

* VOCs: Organic chemicals that readily evaporate and become gaseous at normal temperature and pressure conditions.

Reducing VOC Emissions from Production

Nitrogen oxide (NOx), sulfur oxide (SOx) and VOCs are recognized as common forms of emissions created by vehicle manufacturing facilities. We are taking firm measures to ensure that management standards and systems for atmospheric emissions are thoroughly followed; and working to reduce both VOC exhaust volumes and the use of VOC-emitting substances to levels lower than required by national regulations.

We are actively working to increase the recovery of cleaning solvents and other chemicals in order to reduce the amounts of these substances emitted from our plants ahead of the implementation of new regulations in each country where we operate. Also, we are systematically introducing water-based paint lines that emit fewer VOCs and improving thinner-solvent recycling rates to reduce our use of VOC-emitting substances.

As one example, the water-based paint line in the Nissan Motor Kyushu Plant has VOC emissions of less than 20 grams per square meter of painted surface, which is top-class in the industry. These lines have also been adopted at two Aguascalientes plants in Mexico, the Resende Plant in Brazil, the Smyrna Plant in the United States, the Huadu Plant in China and other plants.

Additionally, we have adopted low-NOx burners as the heat source for the ovens and boiler equipment used in the car painting process and promote the switch from heavy oil and kerosene to fuels with low SOx emissions to reduce the emission and concentration of NOx and SOx.

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Air Quality: Achievements

Compliance with Emissions Regulations (Passenger Cars Only)

Nissan not only works to develop and promote zero emission electric vehicles (EVs) but continues to promote cleaner exhaust emissions from all of our engines. For example, the Qashqai released in Europe in October 2018 has a new fuel-efficient 1.3-liter turbo gasoline engine fitted with a particulate filter that meets the Euro 6d-Temp* emissions standard. In Japan, our e-POWER electrification technology has resulted in a significant lowering of fuel consumption while achieving 75% reductions in exhaust emissions from 2005 standards. As part of these efforts, our compliance with emissions regulations goes far beyond current legal requirements to meet more stringent specifications. Due to differences in regulations, there is no direct way to compare by region or country, but the table below shows the percentage of Nissan vehicles in each location produced to the strictest local standards.

* Euro 6d-Temp: All Euro 6 standards and the initial Real-Driving Emissions (RDE) limit for new car models.

Compliance with Emissions Regulations (By Region) (FY)

		unit	2019
Japan	75% lower than 2005 standard and 50% lower than 2018 standard	%	92.1
Europe	Euro 6b/c	%	(TBD)*
U.S.	U-LEV/SULEV/ZEV	%	99.8
China	National 5	%	100

* Passenger cars and light commercial vehicles only.
To be updated in WEB site after EUR result is available.

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Plant Emission Management

We thoroughly implement systems and control standards at our production plants to reduce the amount of air pollutants emitted during operation. Our air pollution control targets are more stringent than those mandated by the countries in which we operate.

In Japan, we have adopted strict measures for emissions of NO_x and SO_x pollutants from our factories, reducing the amount of these emissions to one quarter of the levels emitted in the 1970s. We have lowered NO_x and SO_x emissions by introducing low-NO_x burners in the ovens and boilers that provide heat for painting lines, and by switching the fuel used by those burners from heavy oil and kerosene to alternatives with low SO_x emissions.

Lower VOC Emissions

Volatile organic compounds (VOCs), which readily evaporate to become gaseous in the atmosphere, account for approximately 90% of the chemicals released as the result of our vehicle production processes. Lowering VOC emissions is a challenge that we are working to address. We strive to increase our recovery of cleaning solvents and other chemicals in order to limit the amounts of these substances emitted from our plants ahead of implementation of new regulations in each country where we operate, while also advancing planned measures to increase the recycling rate for waste solvents. We are also introducing water-based paint lines that limit VOC emissions to less than 20 grams per square meter of painted surface. We have adopted these lines in Nissan Motor Kyushu as well as at two plants in Aguascalientes in Mexico, the Resende Plant in Brazil, the Smyrna Plant in the United States, the Huadu Plant in China and the Sunderland Plant in the United Kingdom. We achieved a reduction of 27.2% in fiscal 2019 in VOC emissions per painted surface area compared with fiscal 2010 levels.

* For more information on Air Quality.

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