Long-Term Goal and Strategy of Japan's Automotive Industry for Tackling Global Climate Change

Current Status

- Technological innovation surrounding automobiles such as "CASE" creates possibility of more efficient, safer, and freer mobility.
- While the number of automobiles is expected to increase along with expansion of economic development and urbanization of emerging countries, technological innovation of "electrification" could contribute to tackling global climate change.
- Japan has been one of the leaders of "electrification" in terms of diffusion of electrified vehicle (xEV)※ (approximately 30% of sales), technology and human resources.

※electrified vehicle (xEV)＝BEV・PHEV・HEV・FCEV

【2030 Target】

Diffusion Rate of Next-Generation Automobiles: 50-70% of All Domestic Passenger Vehicles

HEV	30～40%
BEV・PHEV	20～30%
FCEV	～ 3%
Clean Diesel	5～10%

※ HEV : Hybrid Electric Vehicle
BEV : Battery Electric Vehicle
PHEV : Plug in Hybrid Electric Vehicle
FCEV : Fuel Cell Electric Vehicle

Long-Term Goal (By the End of 2050)

<Vehicles produced by Japanese automakers>
80% reduction of GHG emissions per vehicle
(Passenger Vehicles: 90% reduction, 100% xEV)

Japan set out its goal to realize **"Well-to-Wheel Zero Emission"** in collaboration with global efforts to achieve zero emissions from energy supply and with innovation in how vehicles are used.

80% reduction of GHG emission per vehicle※
Passenger Vehicle※: **90% reduction**, **100% xEV**
※Vehicles produced by Japanese automakers

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Innovation of How Vehicles are Used
- MaaS
- Connected
- Autonomous Drive and So Forth

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World's efforts for realizing zero emission of Energy Supply
(Power Source, Hydrogen Source, and Fuel to be All Zero-Emission)

Realize **"Well-to-Wheel Zero Emission"**

3 Principles and Key Actions in next 5 years

- For achieving long term goal, Japan seeks to create **positive cycle where efforts for enhancing contributions to global environmental issues leads to growth of Japanese automobile industry**.

◆promote **"OPEN"** innovation ◆cooperate internationally to overcome **"GLOBAL"** issues ◆establish **"SYSTEM"**

Promote Open Innovation

Promote Open Innovation in Next Generation Electrification Technology
Early realization of the next generation of key technologies pertaining to electrification such as batteries, fuel cells, power semiconductors, motors, inverters, and light-weight materials through industry-academia-public, cross-enterprise cooperation.

Promote Open Innovation toward De-carbonization of Internal Combustion Engines
Maximizing efficiency of internal combustion engines and promoting commercialization of biofuels and alternative fuels with high GHG reducing effects.

Promote Model-based Development, Foster Human Resources, and Enhance Technology Level of Small and Medium Suppliers
Promoting model-based development and utilizing AI for enhancing development efficiency. Fostering human resources and enhancing technology level of small and medium suppliers by promoting them through industry-academic, cross-enterprise cooperation.

Cooperate Internationally to Overcome Global Issues

"Well-to-Wheel Zero Emission"
Internationally publicizing and sharing the Well-to-Wheel based zero-emission policy toward substantive solutions to global environmental issues.

Cooperate in International Electrification Policy
Actively promoting dialogues among various countries in order to harmonize related automobile policies from around the world; and sharing Japan's experience in order to contribute to global electrification of vehicles.

Support Transformation of Global Supply Chains Toward Electrification
To support transformation of Japanese automakers' global supply chain toward electrification, facilitating an environment that will enhance the technology level of local materials/supplies and human resources.

Establish System

Build up a Battery System
Building up sustainable system for batteries and electric vehicles by stabilizing battery resource procurement, establishing guidelines for evaluating state of health of lithium ion batteries used for electric vehicles, creating battery reuse/recycle markets.

Develop System for Utilizing Next-generation Vehicles for Commercial Vehicle Segment
Developing operation and management system for electrified vehicles and other next-generation vehicles such as commercial LNG trucks by exploring both advantages and disadvantages compared to passenger vehicles.

Accelerate Integration with Distributed Energy Systems
Accelerating integration between infrastructure of electrified vehicles and distributed energy system and taking advantage of value created by diffusion of electrified vehicles.

Strategy Meeting for the New Era of Automobiles: Listed Actions in the Interim Report

Promote Open Innovation

Promote Open Innovation in the Next Generation Electrification Technology

All Solid-State Battery (Lithium-Ion Battery)

Target: Cost of Cell Pack
Currently 30,000 Yen/kWh
⇒10,000 Yen/kWh (In Mass Production)

Innovative Type Battery

Target: Near 2030 - High density standard cell
(Current 150Wh/kg⇒500Wh/kg)

Fuel Cell: Development of Next Generation Technology

Target: Near 2025 – FCV cell stack price ⇒ 1/4

Other Electrification-Related Technologies

- By the End of FY2018
  – Preparing a roadmap for the next generation technology development

Promote Open Innovation toward De-carbonization of Internal Combustion Engines

Maximizing Efficiency of Highly-Efficient Internal Combustion Engines

- Near 2030 – thermal efficiency of 60%

Promoting Development and Use of Biofuels and Alternative Fuels

- After FY2020
  – Practical use of next-generation bioethanol etc.

Promote Model-based Development, Foster Human Resources, and Enhance Technology Level of Small and Medium Suppliers

Model-based Development

- By the End of FY 2020
  – Building up a common base for model-based development

Utilization of AI to enhance development efficiency

- Building up a industry-academia cooperation consortium to advance development process utilizing AI

Creation of Supply-Chain Strengthening Scheme

Cooperate Internationally to Overcome Global

"Well to Wheel Zero Emission"

Fuel Economy Standard after 2020

- By the end of FY2018 – Formulating the fuel economy standard after 2020 for promoting Corporate average fuel economy (CAFÉ) whose standard is consistent with the diffusion target for the next-generation vehicles of 2030

Hosting First International Policy RoundTable on Electrification at EVS31, Kobe

Organizing Base Data for Policy Making regarding electrification policy

- Organizing and sharing with other countries base data for policy making regarding electrification policy (in cooperation with institutions such as IEA and ERIA)

Cooperate on International Electrification Policy

- Implementation of automobile policy dialogue with India and ASEAN countries (topics include support for facilitating charging infrastructures, feasibility study on mobility service using electrified vehicles)
- Promotion of international harmonization of the next charging standard

Support Transformation of Global Supply Chains Toward Electrification

- To support the transformation of Japanese automakers' global supply chains toward electrification, facilitating an environment that will enhance the technology level of local materials/supplies and human resources
- Starting in Fiscal Year 2019
  – Starting a scheme for fostering local human resources in areas related to electric components

Establish System

Build up a Battery System

Risk Reduction by Stabilizing Battery Resource Procurement

- FY2018 - Formulating policy on joint procurement and stockpiling of resources such as cobalt

Establish guidelines for evaluating the health of lithium ion batteries used for electric vehicles, creating battery reuse/recycle markets

- FY2018 - Formulating guidelines for evaluating state of health of lithium ion batteries used for electric vehicles
- FY2018 - Building up a joint scheme to collect used batteries toward creation of the reusable battery market
- FY2018 - Setting up an opportunity to discuss the necessary battery specifications aiming at creation of a reusable battery market with the potential user companies (Feasibility study will be implemented in Fiscal Year 2019)

Develop Systemfor Utilizing Next-generation Vehicles for Commercial Vehicle Segment

- FY 2018
  – Roadmap for diffusion and expansion of next-generation vehicles

Accelerate Integration with Distributed Energy Systems

Diffusion of Next-Generation Automobiles and Acceleration of Infrastructure Development

- FY2018
  – Starting national R&D projects of wireless charging of automobile batteries while driving

Development of Technology Pertaining to the Next Generation Infrastructure and Propelling V2G

- FY2018 – Starting FS projects on V2G (V2G; Vehicle to Grid)