Yamaha Motor

Environmental Technology Briefing Session

7/19/2021
Agenda

- President, CEO and Representative Director - Yoshihiro Hidaka

1: Long-Term Vision
2: Environmental Plan

- Director, Senior Executive Officer, General Manager of Technical Research & Development Center, Heiji Maruyama

3: Carbon-neutral strategy in line with the unique style of Yamaha Motor
4: Specific Initiatives

Q&A session
HIDAKA, Yoshihiro
President, CEO and Representative Director
Challenges: Paris Agreement - GHG Emission Reduction Targets

There is no waiting for "greenhouse gas reduction measures". As for companies, the challenge is for the survival.

Reference to the "1.5°C" in the Paris Agreement

- Keeping the global average temperature rise below +2°C in comparison with pre-industrialization levels (1850-1900)
- Initiatives to limit the global average temperature rise to +1.5°C to pre-industrialization levels (1850-1900)
- Effective in 2016, implemented from 2020

Source: Intergovernmental Panel on Climate Change (IPCC), a summary of the "Special Report on Global Warming of 1.5 °C": Prepared by Ministry of the Environment

Greenhouse gas reduction targets in major countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2030 Targets</th>
<th>Base year</th>
<th>2050 Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>-46%</td>
<td>Compared to 2013</td>
<td>Carbon neutral</td>
</tr>
<tr>
<td>US</td>
<td>-50-52%</td>
<td>Compared to 2005</td>
<td>Carbon neutral</td>
</tr>
<tr>
<td>EU</td>
<td>-55%</td>
<td>Compared to 1990</td>
<td>Carbon neutral</td>
</tr>
<tr>
<td>UK</td>
<td>-68%</td>
<td>Compared to 1990</td>
<td>At least -100% (compared to 1990 levels)</td>
</tr>
<tr>
<td>China</td>
<td>CO2 emissions per GDP over -65%</td>
<td>Compared to 2005</td>
<td>2060 Carbon neutral</td>
</tr>
</tbody>
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Yamaha Motor Long-Term Vision
ART for Human Possibilities

人はもっと幸せになれる
Yamaha Motor's Growth Strategy and Realized Outcomes

Important Societal Issues
- Environment and resources
- Transportation, education and industry
- Innovation
- Human capital management

Corporate Mission
Kando Creating Company

Business Operations
- Land Mobility
- Marine Products
- Robotics
- Financial Services
- Other

Base for competitiveness

Outcomes realized
- Environmental value
- Societal value
- Economic value

Long-Term Vision
ART for Human Possibilities
Let's Strive for Greater Happiness

Growth Strategy Directions
- Advancing Robotics
- Rethinking Solution
- Transforming Mobility

Confidence
Excitement
Innovation
Ties
Emotion
While leveraging our strengths, we promote initiatives from identifying important social issues to be dealt with.

**Issues directly involved with the sustainability of business models**

- Environmental and Resource
- Transportation, Education, and Industry Issues

**Important issues related to strengthening the foundation**

- Innovation
- Promotion of Human Resources Utilization
Support for TCFD proposals, external evaluations

May 2019
Task Force on Climate-related Financial Information Disclosure (TCFD) - Support for the proposal

June 2019
Yamaha Motor Chosen for “SNAM Sustainability Index” for Second Straight Year

June 2019
Selected as a constituent of the “S&P Japan 500 ESG”

June 2019
Selected as a constituent of the “FTSE4 Good Index Series” and “FTSE Blossom Japan Index”

November 2020
Selected as a constituent of the DJSI “Asia Pacific Index”

December 2020
Obtained an "A-" in the field of the CDP2020 Climate Change Report, an international non-profit organization
Yamaha Motor Environmental Plan
■ CO2 emissions from the entire Yamaha Motor life cycle

Scope 3. Category 11. "During Product Use" account for 82.7% in Yamaha Motor life cycle CO2 emissions. By product, "Motorcycles": 65%, "Marine Engines": 19%
Yamaha Motor Initiatives for Climate Change

"Emissions other than Scope 1.2. (Scope 3./ Mainly for total emissions from product groups)"
2030 ▲24% (compared to 2010). 2050 Carbon neutral

Company emissions in corporate activities (Scope 1./2.) Targets

Emissions other than Scope 1.2. (Scope 3.) Targets

Reduction target mainly for total emissions from product groups (motorcycles, outboard motors, industrial robots, etc.)

Offsetting using internationally recognized methods
In order to accelerate the development of environmental technology that Yamaha Motor should work on, the company will establish its own fund specializing in the environmental resources field.

**Environmental Resources Field - Overview of Yamaha Motor Fund**

- **Fund Name**: Yamaha Motor Climate Scrum Fund (Draft)
- **Business Operations**: Search activities and investment of venture companies specializing in the environmental resources field
  - Total operation amount 100M dollars, Operation period 15 years
- **Establishment**: 2022 (Scheduled)
- **Business Location**: US / Silicon Valley
- **Administrator**: Yamaha Motor Ventures & Laboratory Silicon Valley Inc.
- **Purpose and Expectations**:
  - Supporting new businesses that contribute to the maintenance / improvement of the global environment
  - Focus on areas where we should work on solving environmental resource issues
  - Consider investing in growth potential businesses without specifying the region
  - Aiming to build new businesses that will lead to the acquisition of negative carbon in the environmental resources field
MARUYAMA, Heiji

Senior Executive Officer,
Chief General Manager of
Technical Research & Development Center
In the unique style of Yamaha Motor

Compact Mobility
"Compact Mobility", one of the earth-friendly means of transportation compared to four-wheeled passenger cars
"Environmentally friendly" compact mobility that Yamaha Motor continues to provide

1993 Continues to develop "compact mobility" that in-line with Yamaha Motor and low environmental load such as the world's first electrically power assisted bicycle

1993 onwards
- World's first electrically power assisted bicycle "YAMAHA PAS"

2002 onwards
- First in Japan Mass-produced electric motorcycle "Passol"

2005 onwards
- Development of fuel cell vehicle Monitor use "FC-me"

2019 onwards
- Replaceable battery EV EC-05

Current
- Various Electric Products

In the unique style of Yamaha Motor
Developed small eco-friendly mobility
The compact mobility "electrically assisted bicycle" created by Yamaha Motor has become a larger global market.
Future movements drawn by Yamaha Motor

Solving social issues through the development of “compact mobility” that has a low environmental impact and is fun.
Carbon-neutral strategy in line with the unique style of Yamaha Motor

Basic Policies: Aim to further reduce CO2 emissions per person due to movement

Utilization of Compact Mobility

Challenge for new areas

Motorcycles

Automobile

Marine

Promoting efficiency and CO2 reductions using optimum methods

Vehicle size

CO2 Emissions Generated by Movement/Person

Motorcycles

Automobile

Marine

PAS

Challenge for new areas

BEV

FCV

BEV

HEV

Vehicle size

CO2 Emissions Generated by Movement/Person
~ Toward the future ~
Balancing carbon neutrality and improving customer value
- Improved thermal and drive efficiency
- Compliant with environmental regulations
- Compliant with CN Fuel
- In pursuit of human-machine sensuality, Fun creation

<Thermal Efficiency>
- High Compression Ratio
- VVA (Variable Valve Actuation)
- Strengthening In-cylinder Flow

<Drive Efficiency>
- Electronic Controlled Shift
- Electronic Controlled Throttle
- Electronic Controlled AT

~ Present (2021) ~
High Value Added Powertrain Creation
- Brings out high-quality torque characteristics "Crossplane engine"
- Combines acceleration and environmental performance
  "BLUE CORE Engine"

Founded (1950s)
The beginning of the Yamaha internal combustion engine

On to higher heights

Yamaha Motorcycles Average Consumption

<table>
<thead>
<tr>
<th>Year</th>
<th>EU2</th>
<th>EU3</th>
<th>EU4</th>
<th>EU5</th>
<th>Post EU5</th>
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</thead>
<tbody>
<tr>
<td>2010</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>2020</td>
<td>45</td>
<td>35</td>
<td>25</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>2030</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>5</td>
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Emissions Response

- Improved Combustion Efficiency
- Loss Reduction
- Improved Cooling

km/L

2010  2020  2030
Powertrain composition ratio for motorcycles and outboard motors in order to realize a carbon-neutral society

As a prerequisite, it is assumed with reference to future forecast scenarios such as IEA when aiming for carbon neutrality in 2050. In the future, reviews will be carried out as appropriate according to power source composition policies and infrastructure conditions designed for each country and region.
Specific Initiatives
ART for Human Possibilities
Let’s Strive for Greater Happiness

In the unique style of Yamaha Motor
Eco-friendly Compact Mobility

Yamaha Motor Original
Carbon Neutral Strategy
Challenge for new areas
Tokyo Motor Show 2019 reference: Exhibited Model

MW-VISION
Challenge for new areas
Tokyo Motor Show 2019 reference: Exhibited Model

MW-VISION

Concept

Closer to people’s senses in order to be more in tune with the city and its people.
Human Size Mobility

Lean Control Technology

By combining scooter and EV technology, practicality in everyday use and a high-quality feel that surpasses conventional scooters is achieved.

An actuator is mounted on the Front Leaning Multi Wheel (LMW) mechanism, providing a unique lean control technology according to riding conditions.

Leaning Multi Wheel = A general term for vehicles with three or more wheels that lean and turn like a motorcycle.
Challenge for new areas
Tokyo Motor Show 2019 reference: Exhibited Model

TRITOWN
Challenge for new areas
Tokyo Motor Show 2019 reference: Exhibited Model

TRITOWN

Concept

Making the last mile fun and enjoyable!

We worked hard to make short-distance travel more enjoyable and comfortable.

Lean Mechanism

In the main, we adopted a leaning mechanism using a parallelogram link.

It becomes more independent by the rider balancing on the vehicle.

By placing your feet on both the steps that move up and down on the left and right, you can balance (stop) the movement and stand.
**Challenge for new areas**

**NeEMO**

Through customers’ daily use, the company will explore new possibilities of utilization such as means of transportation after the returning of licenses and the expansion of life such as improving physical and mental health by offering greater opportunities to get out.

**Slow Mobility**

Responding to social issues such as depopulation, aging, and labor shortages while also considering future autonomous driving options.

Providing mobility as a place where people can connect. Designed under the idea that interactions will increase inside a face-to-face in-vehicle environment.
Efficiency with the optimal methods
Tokyo Motor Show 2019 reference: Exhibited Model

Promoting efficiency and CO2 reductions using optimum methods

Vehicle size

CO2 Emissions Generated by Movement/Person

Marine
BEV
FCV

Automobile
BEV
BEV/FCV

Motorcycles
HEV

PAS
BEV

E01

E02
Concept
A new-generation high-mobility EV platform that leads the flow of urban transportation and realizes comfortable commuting to work and school.

High Rotation Type Motor
A high-speed air-cooled brushless DC motor developed exclusively for motorcycle characteristics. Achieves ease of handling in the low-speed range, a feeling of linear acceleration across the entire range, and high-quality high-speed driving from low-speed high torque and high rotation type motors.

High Rigidity Cradle Frame
A double cradle frame structure made of high-strength steel piping that achieves both a rational layout of the motor and battery along with a high-level running performance. By mounting a heavy battery in the center of the unit, higher capacity is secured and greater ride quality is realized by centralizing the mass.

High output, Large-capacity Lithium-ion Battery
High output fixed batteries that enable high-speed driving while satisfying a cruising range designed for everyday use. The miniaturization of the battery case makes it possible to mount it on a more compact vehicle body, and also supports quick charging that can be carried out to 90% in 60 minutes(*).
*Charging time from 0% / When battery temperature is 25°C
**Concept**

A platform for next-generation electric commuting ideal for city travel.

- **Lightweight, High-output Removable Batteries**
  A structure made for the installation of various 48V battery systems (including replaceable ones) expected for each global region. As a removable type that supports home charging, Yamaha Motor has developed a 48V battery that is both lightweight and portable and has high output. Convenience has been improved by devising a fixed structure to facilitate the work of replacing the battery.

- **Body Layout Ensuring Storability**
  Based on the frame of the existing engine models, a relaxed riding posture and sufficient storage space are secured even when the battery is installed. A platform that takes into consideration future product expandability.

- **Rear Arm Integrated Power Unit**
  A direct drive in-wheel motor is used to achieve a more quiet and smooth acceleration feeling. Achieving compactness by consolidating power unit parts on the rear arm.