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

	2030 Targets	Base year	2050 Targets
Japan	-46%	Compared to 2013	Carbon neutral
US	-50-52%	Compared to 2005	Carbon neutral
EU	-55%	Compared to 1990	Carbon neutral
UK	-68%	Compared to 1990	At least -100% (compared to 1990 levels)
China	CO2 emissions per GDP over -65%	Compared to 2005	2060 Carbon neutral

Source: Created from the Ministry of Economy, Trade and Industry “Enegy White Paper” https://www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/2021/042/042_004.pdf

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

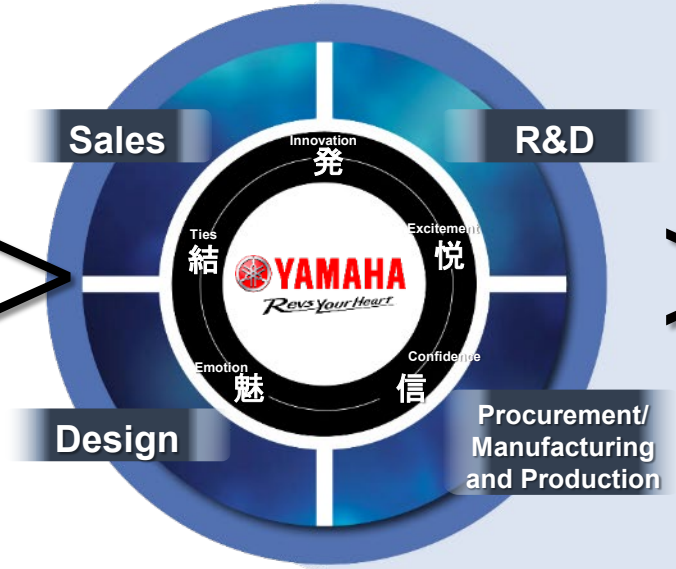
Transportation, education and industry

Innovation

Human capital management

Corporate Mission

Kando Creating Company



Base for competitiveness

Business Operations

Land Mobility

Marine Products

Robotics

Financial Services

Other

Growth Strategy Directions

Long –Term Vision

ART for Human Possibilities

Let's Strive for Greater Happiness

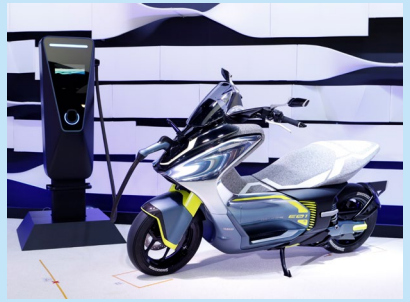
Advancing Robotics

Rethinking Solution

Transforming Mobility

Outcomes realized

Environmental value



Societal value

Economic value

■ Important Social Issues (Materiality)

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

Task Force on Climate-related Financial Information Disclosure (TCFD) - Support for the proposal / Receipt of external evaluation

June 2018

Selected as a constituent of the "SNAM Sustainability Index"

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

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Member of Dow Jones Sustainability Indices Powered by the S&P Global CSA

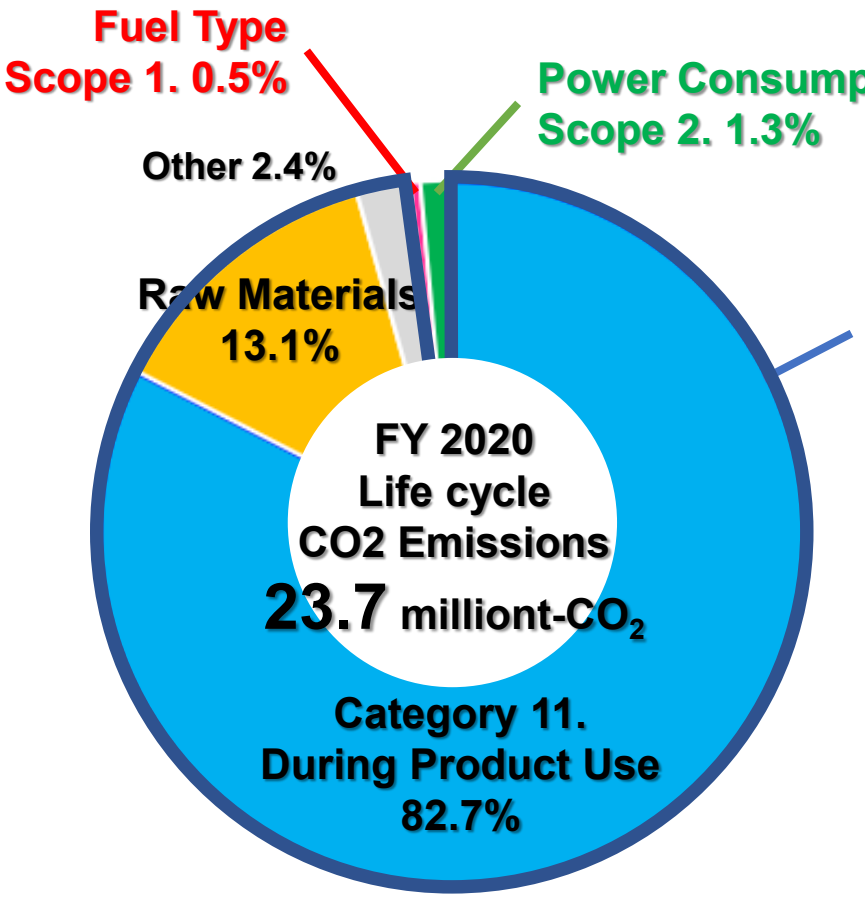
Member of SNAM Sustainability Index 2019

Yamaha Motor Environmental Plan

■ CO2 emissions from the entire Yamaha Motor life cycle

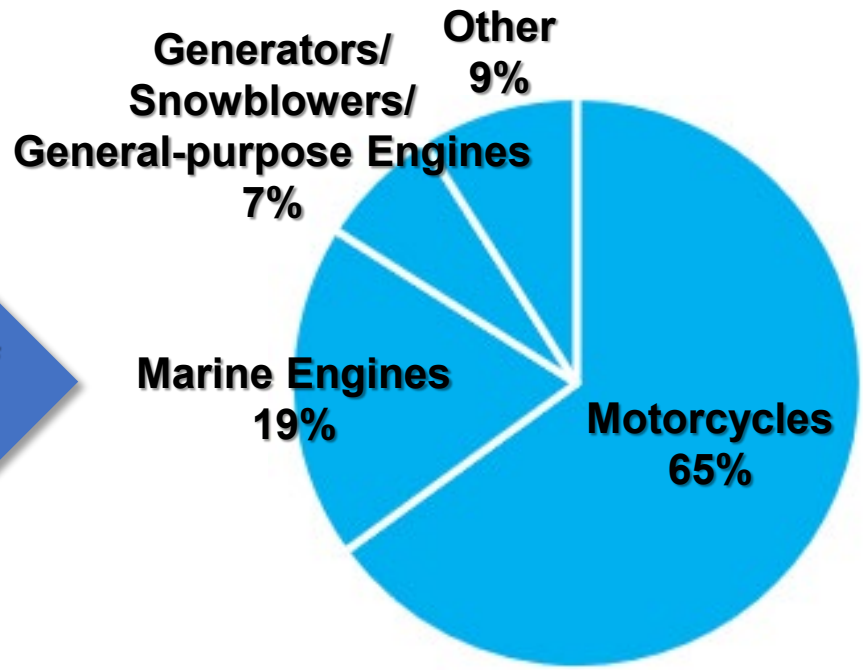
Scope 3. Category 11. "During Product Use" account for 82.7% in Yamaha Motor life cycle CO2 emissions.
By product, "Motorcycles": 65%, "Marine Engines": 19%

Life Cycle Break-down of CO2 Emissions



Breakdown of 82.7%

Scope 3. Category 11. CO2 Emissions Break-down "During Product Use"

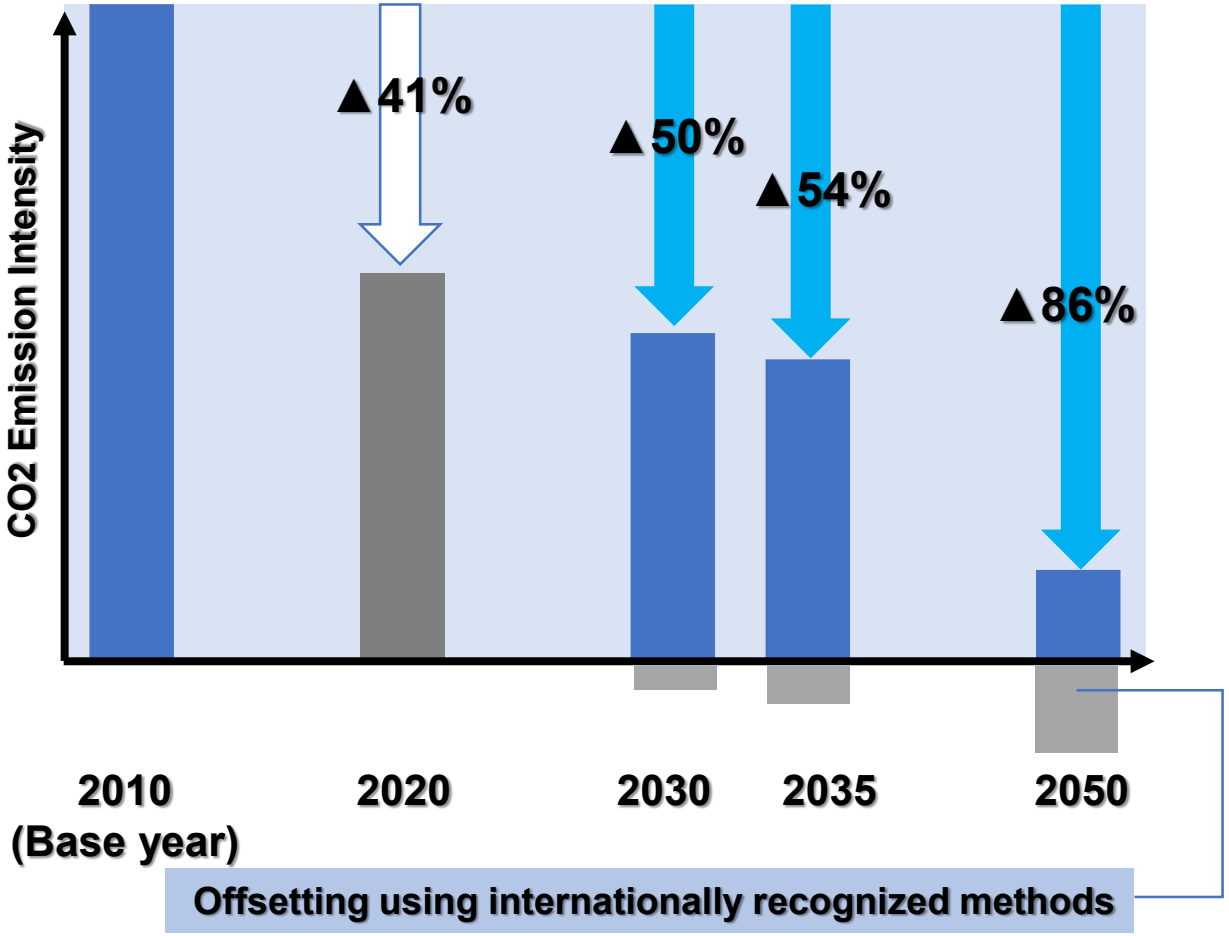


*Calculated using the "Emissions Intensity Database (ver3.1)" in accordance with the Ministry of the Environment "Basic Guidelines for Calculating Greenhouse Gas Emissions Through the Supply Chain Ver2.3_December 2017".
(Sourcehttps://www.env.go.jp/earth/ondanka/supply_chain/gvc/files/tools/unit_outline_V3-1.pdf

■ Yamaha Motor Initiatives for Climate Change

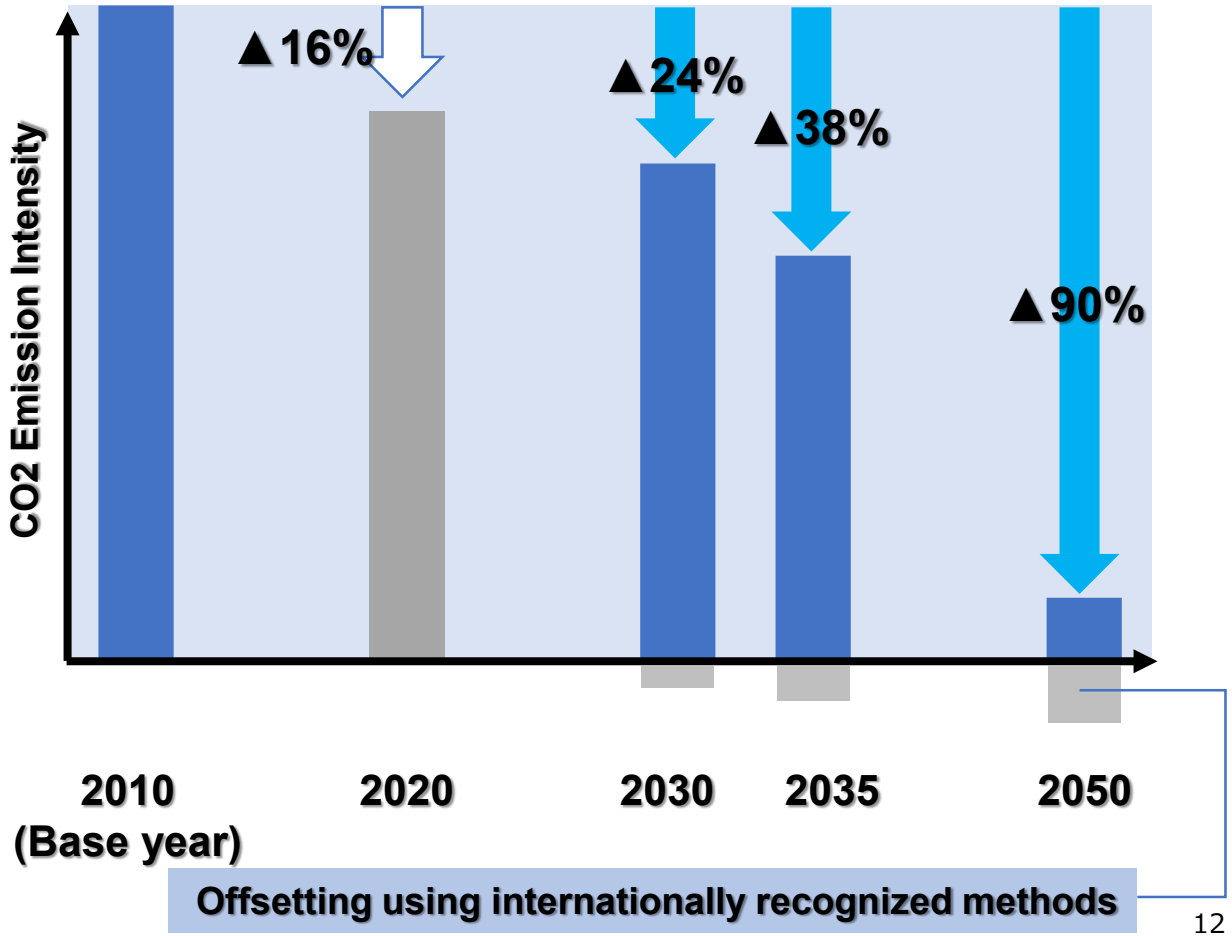
"Emissions other than Scope 1.2. (Scope 3./ Mainly for total emissions from product groups)"
2030 ▲24% (compared to 2010). 2050 Carbon neutral

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.)



■ Environmental Funds

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


YAMAHA

MARUYAMA, Heiji

Senior Executive Officer,
Chief General Manager of
Technical Research & Development Center

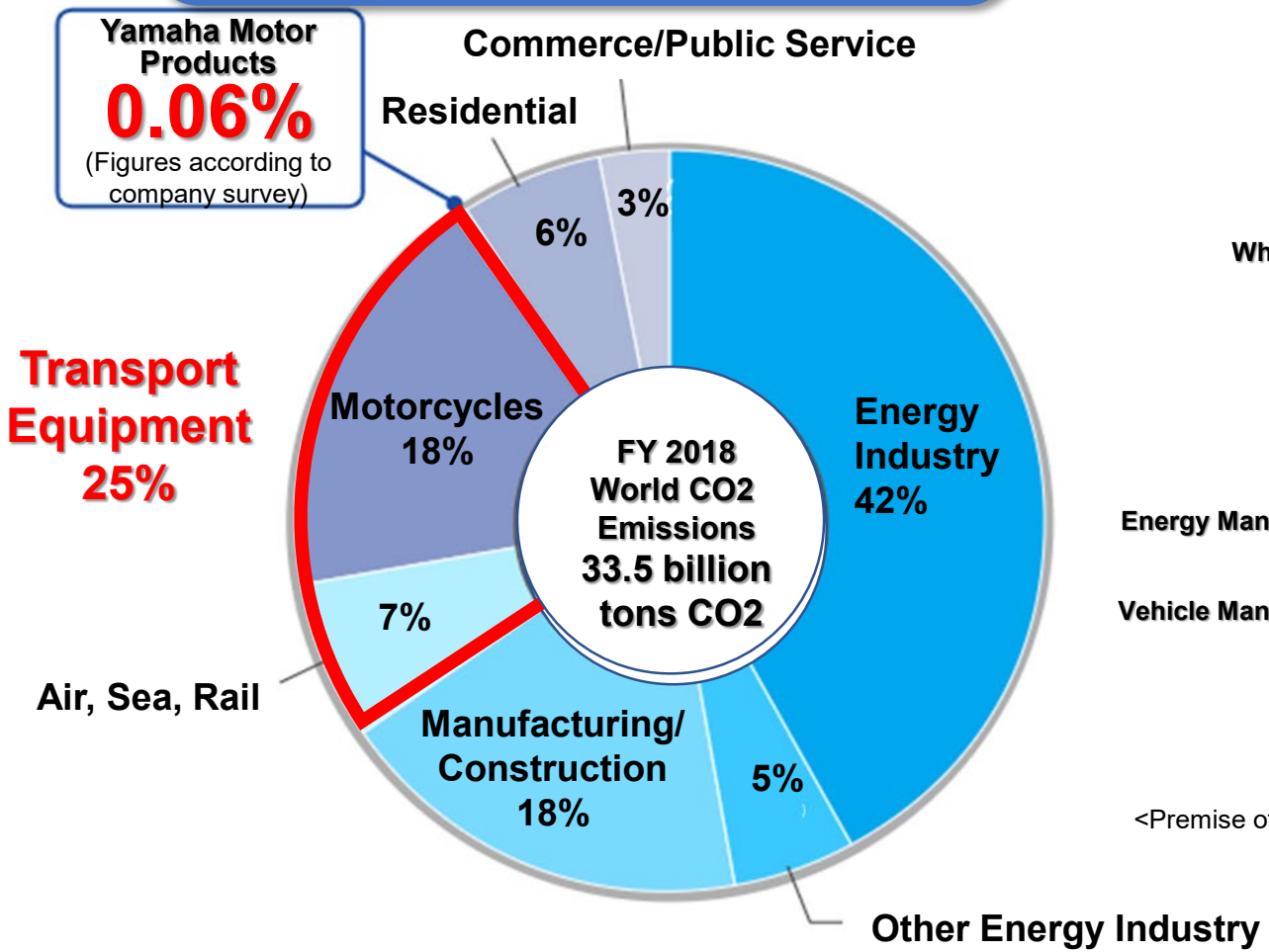
In the unique style of
Yamaha Motor

Compact Mobility

■ Motorcycles - CO2 Emissions Impact

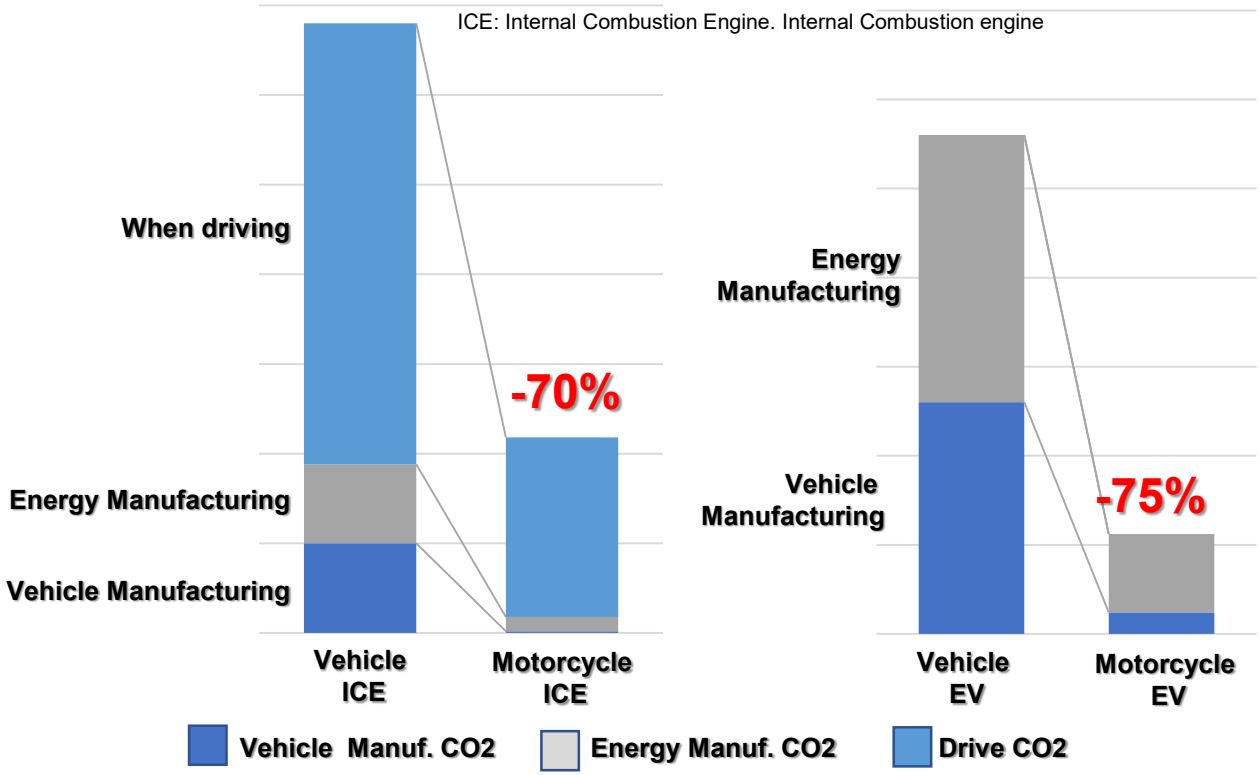
"Compact Mobility", one of the earth-friendly means of transportation compared to four-wheeled passenger cars

Global CO2 Emissions by Source



Source: Created from the IEA "CO2 Emissions from Fuel Combustion 2019 Highlights"

Product Life cycle CO2 Emission Comparison



<Premise of Trial Calculation>

Vehicle Manufacturing: Raw Materials, Battery Manufacturing, Assembly, Disposal
Energy Manufacturing: Fuel Manufacturing / Electricity Manufacturing
Four-wheeled Vehicles: IEA standard / Two-wheeled vehicles: Yamaha Motor 125 cm3, two-wheeled EV has the same output class as shown on the left
Annual driving 15,000km, usage period 10 years
Reference: IEA "Global EV Outlook 2020"

■ "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

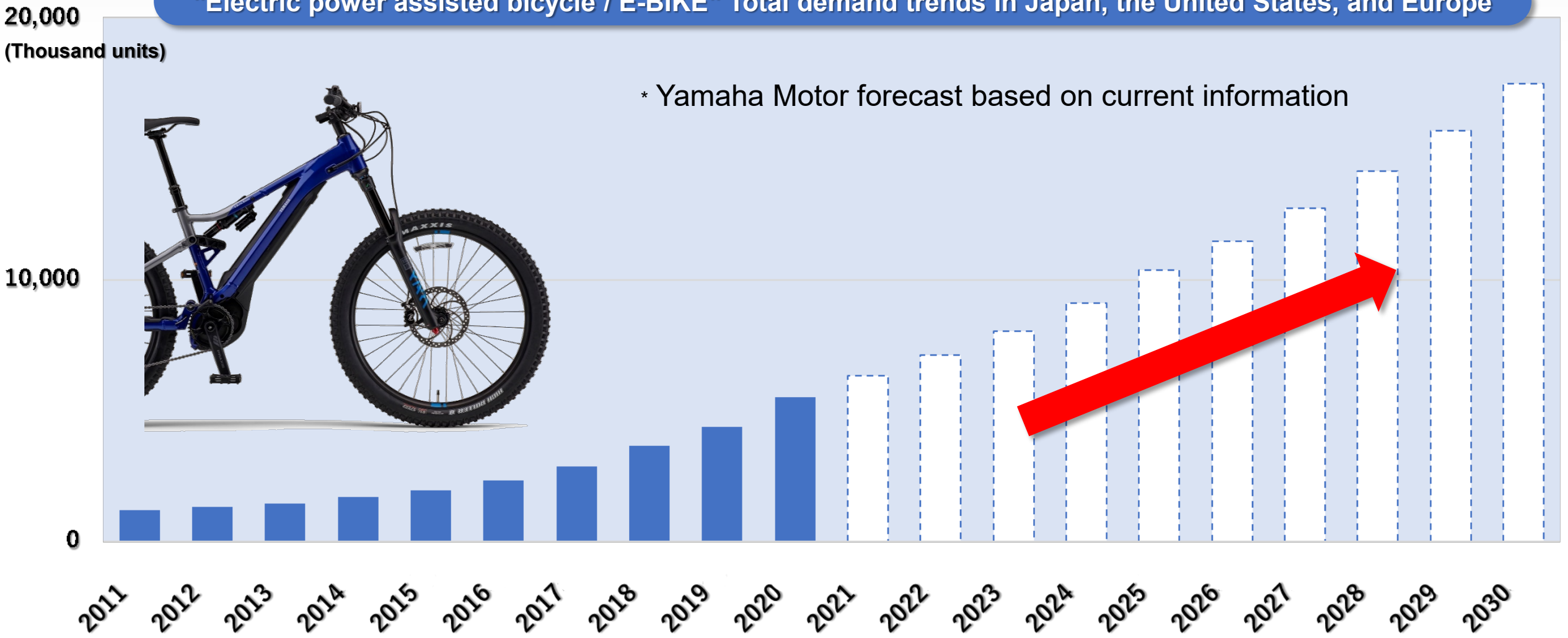
1993 onwards	2002 onwards	2005 onwards	2019 onwards	Current
World's first electrically power assisted bicycle "YAMAHA PAS"	First in Japan Mass-produced electric motorcycle "Passol"	Development of fuel cell vehicle Monitor use "FC-me"	Replaceable battery EV EC-05	Various Electric Products

In the unique style of Yamaha Motor Developed small eco-friendly mobility

■ Electric Assisted Bicycle Market

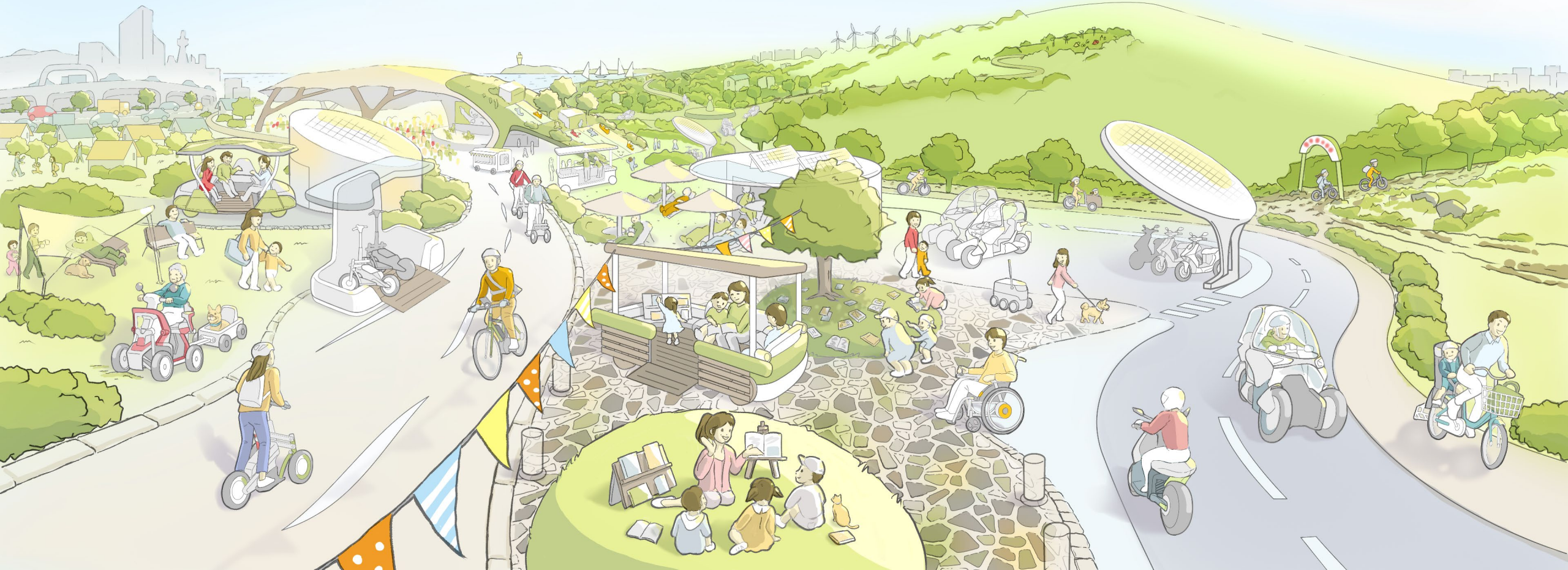
The compact mobility "electrically assisted bicycle" created by Yamaha Motor has become a larger global market.

"Electric power assisted bicycle / E-BIKE" Total demand trends in Japan, the United States, and Europe



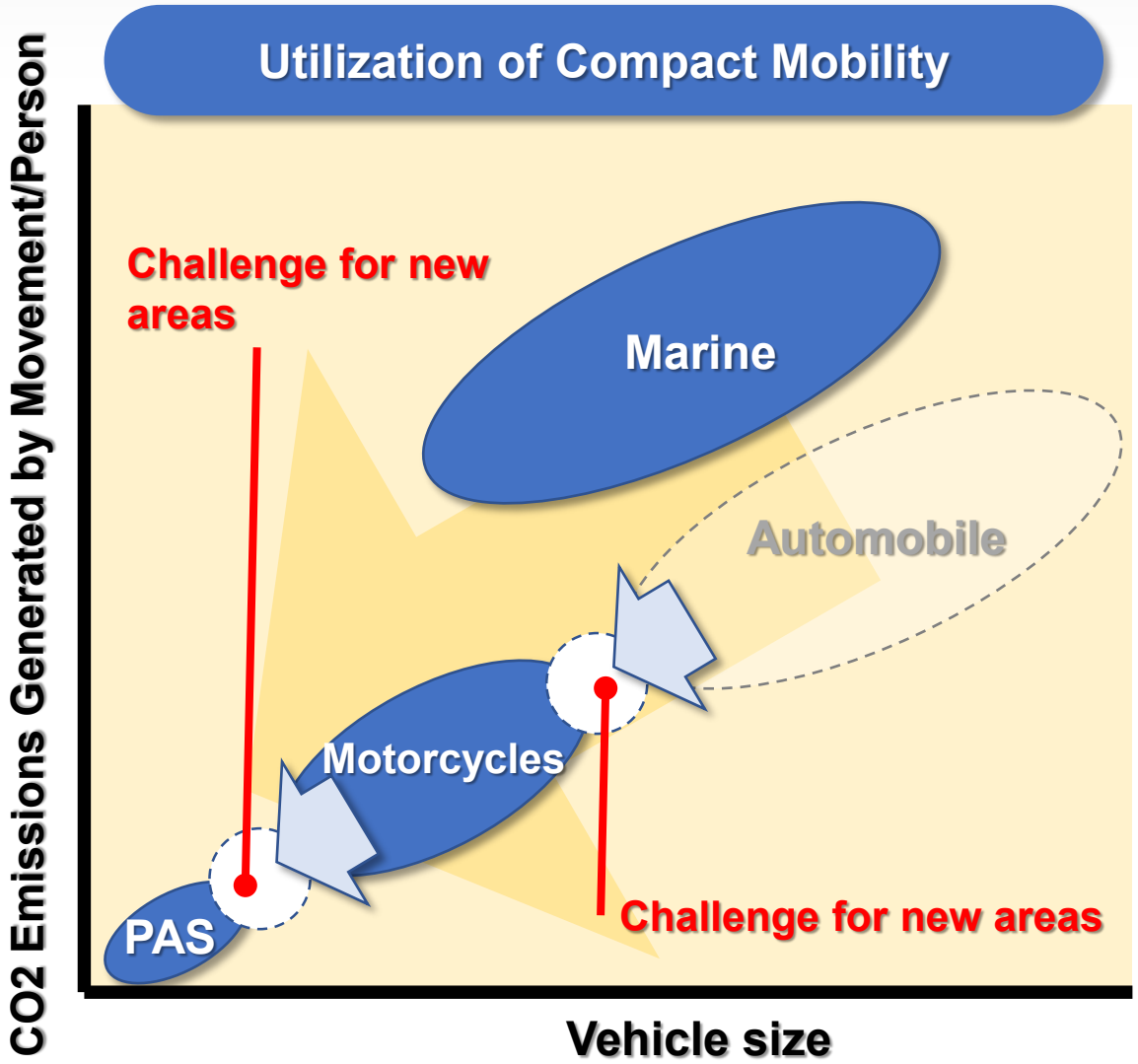
■ Future movements drawn by Yamaha Motor

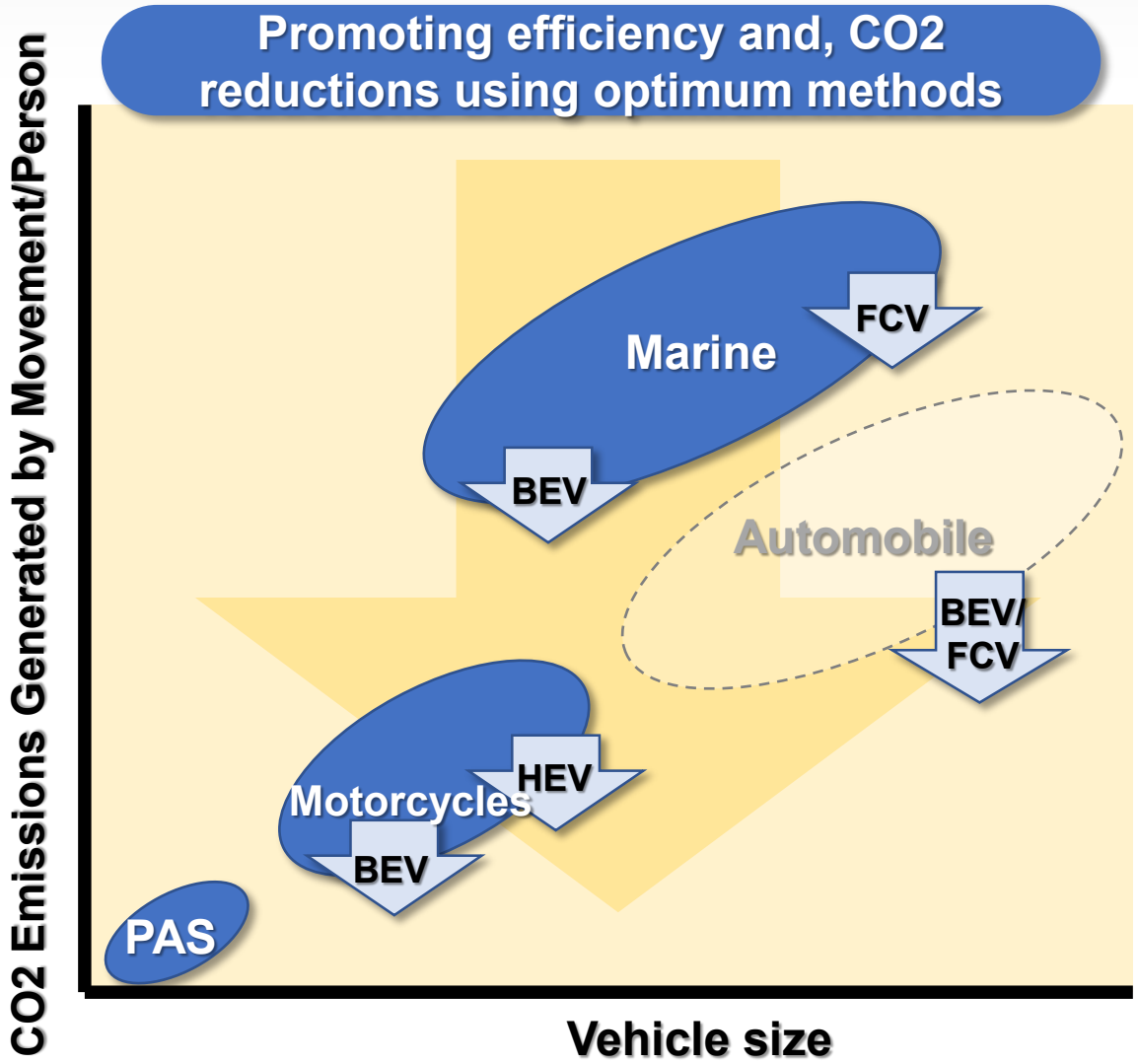
Solving social issues through the development of "compact mobility" that has a low environmental impact and is fun



■ 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





■ Internal Combustion Engine Development

~ 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

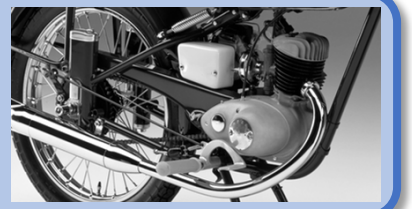
~ Present (2021)

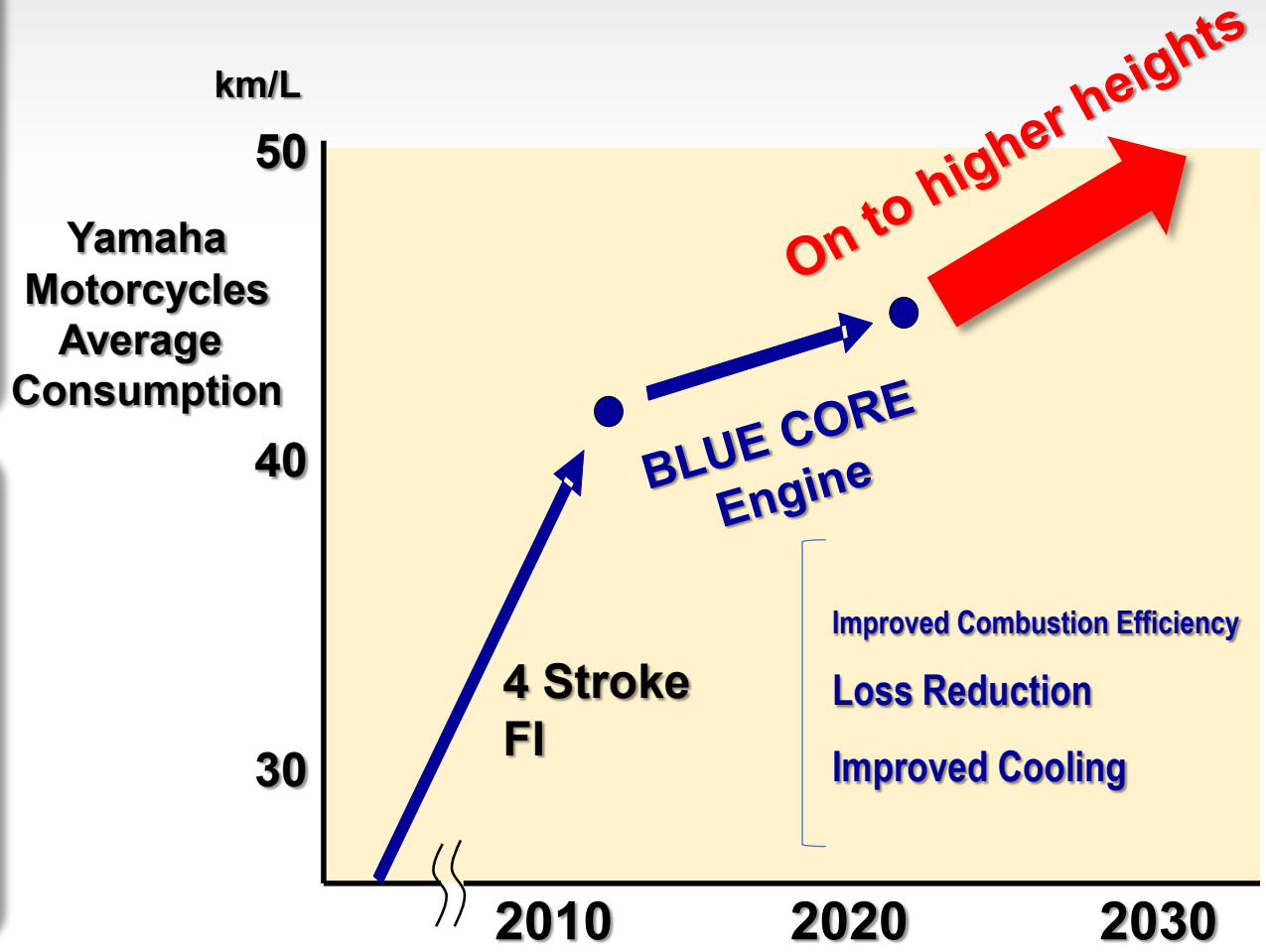
High Value Added Powertrain Creation

- 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

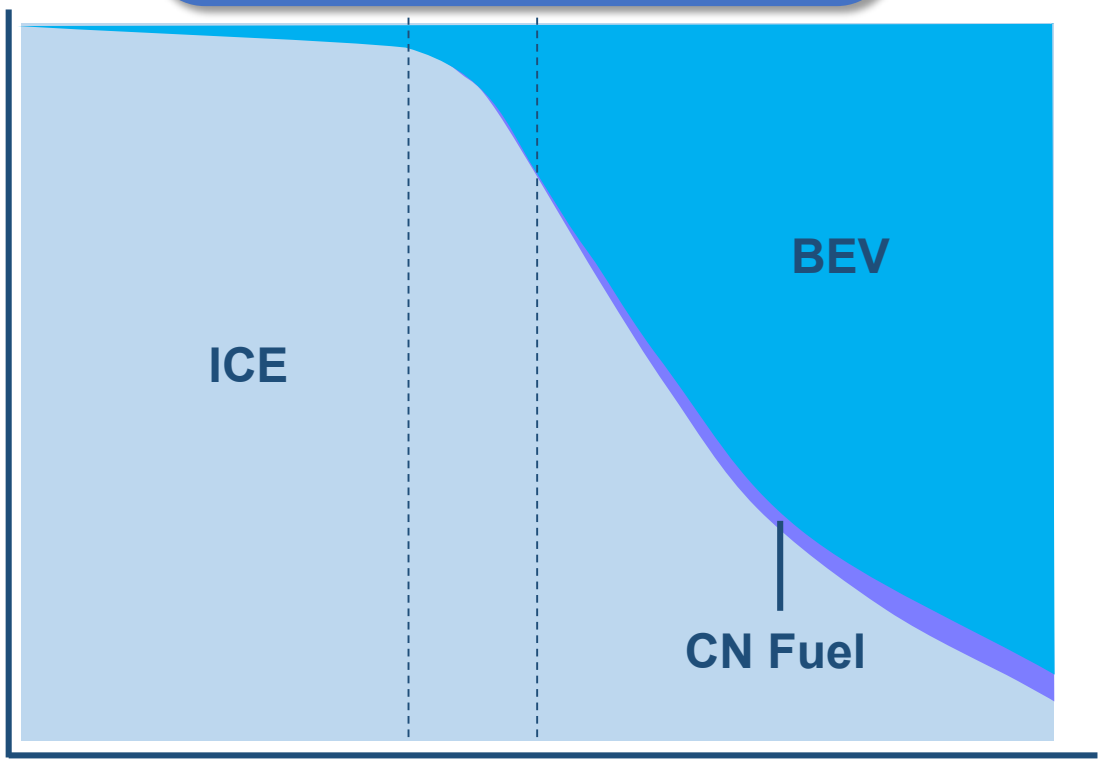




■ Specific Measures

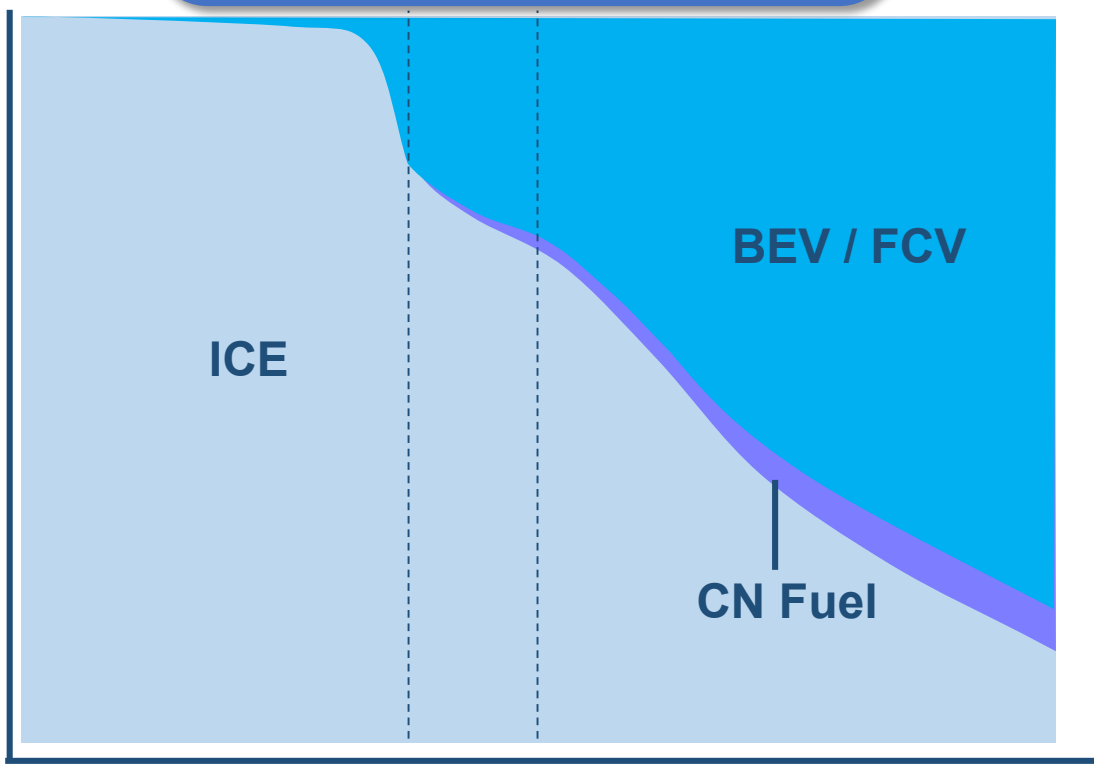
Powertrain composition ratio for motorcycles and outboard motors in order to realize a carbon-neutral society

Motorcycles



BEV Targets	2.6%	20.0%	90.0%

Outboard Motors



BEV / FCVTargets	21.0%	30.0%	81.0%

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.

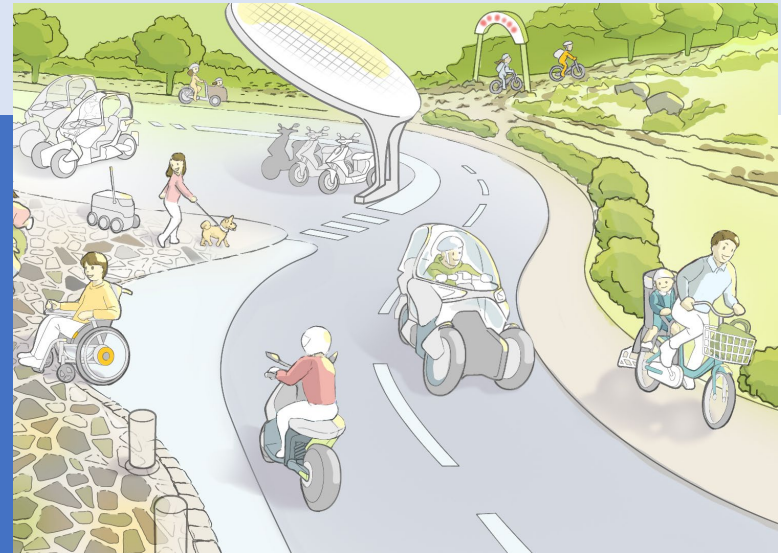
Specific Initiatives

ART for Human Possibilities

Let's Strive for Greater Happiness

In the unique style of Yamaha Motor

Eco-friendly Compact Mobility



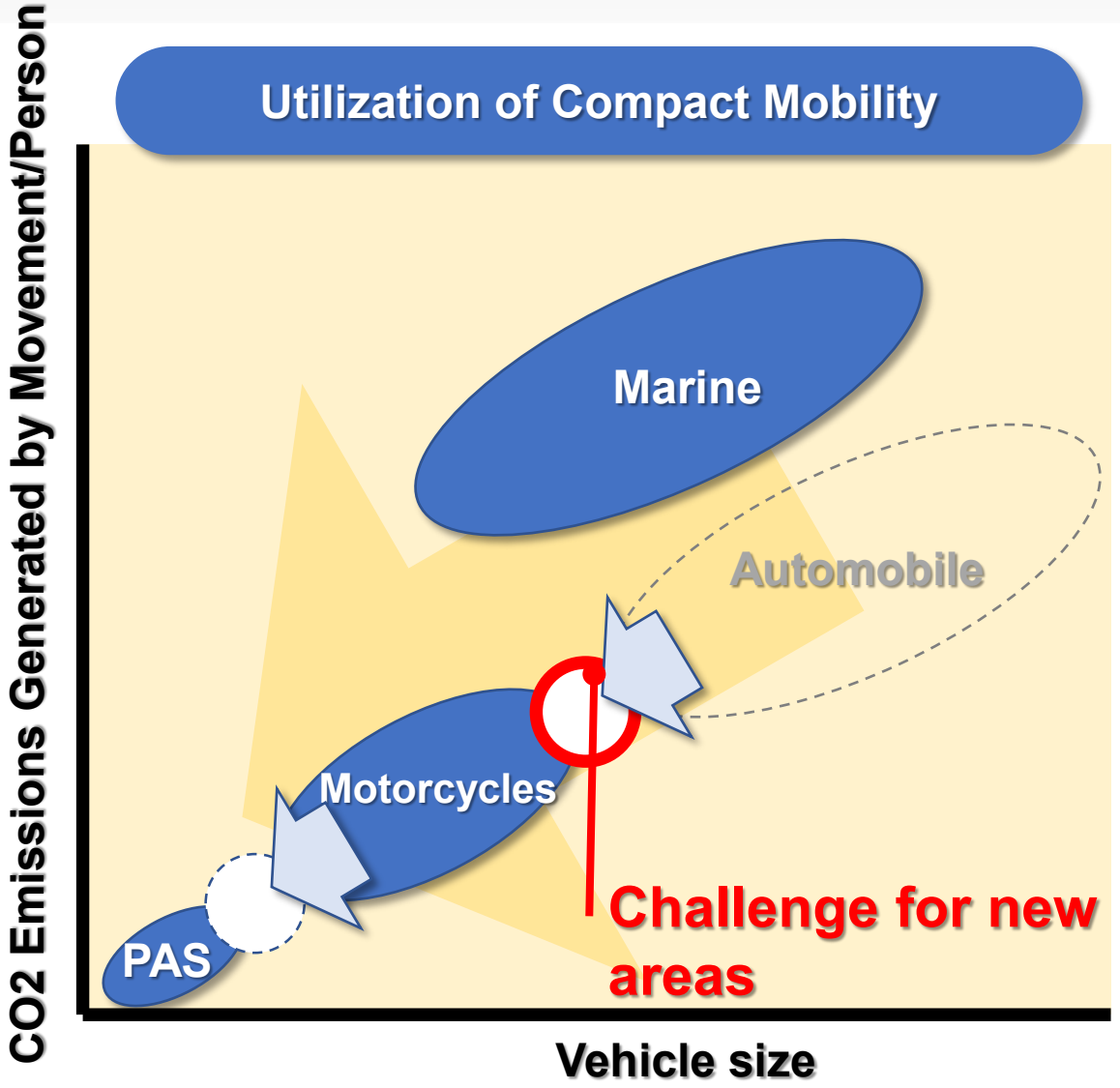
Yamaha Motor Original

Carbon Neutral Strategy

Challenge for new areas

Tokyo Motor Show 2019 reference: Exhibited Model

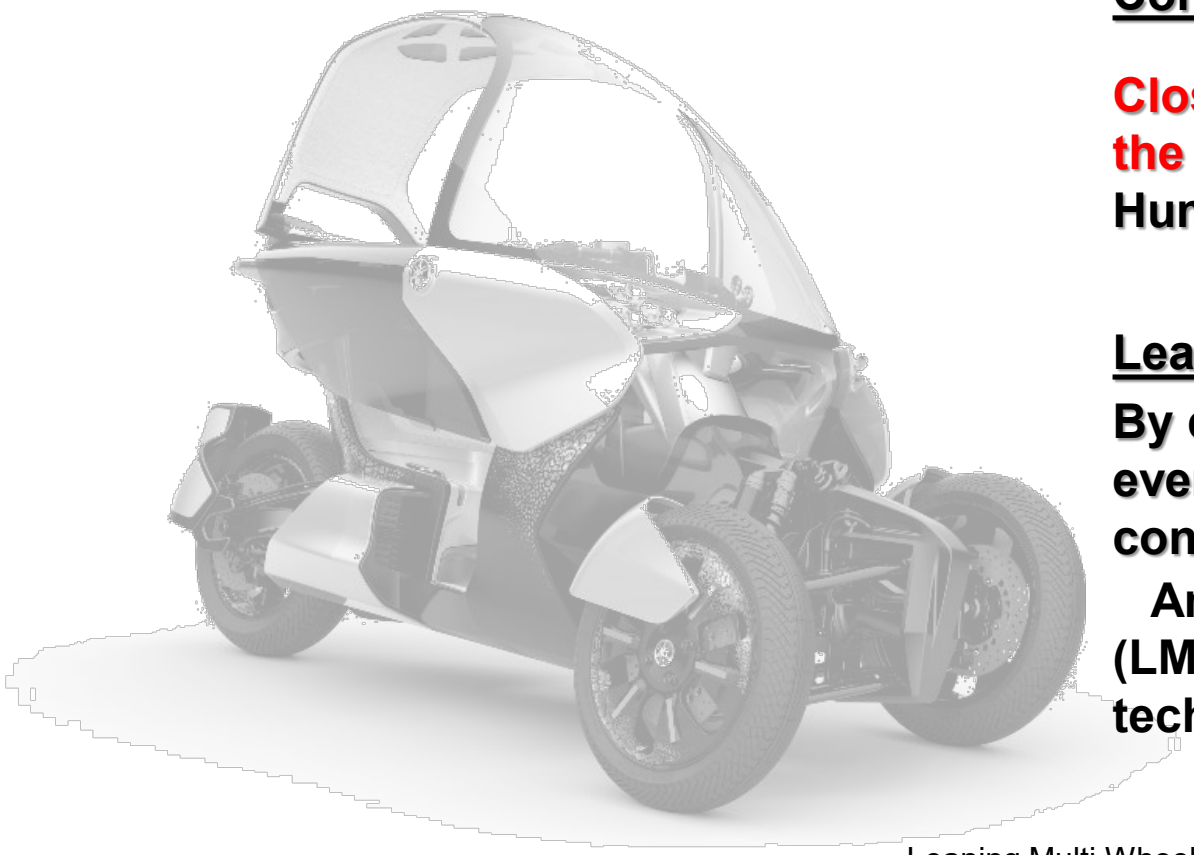
MW-VISION



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.

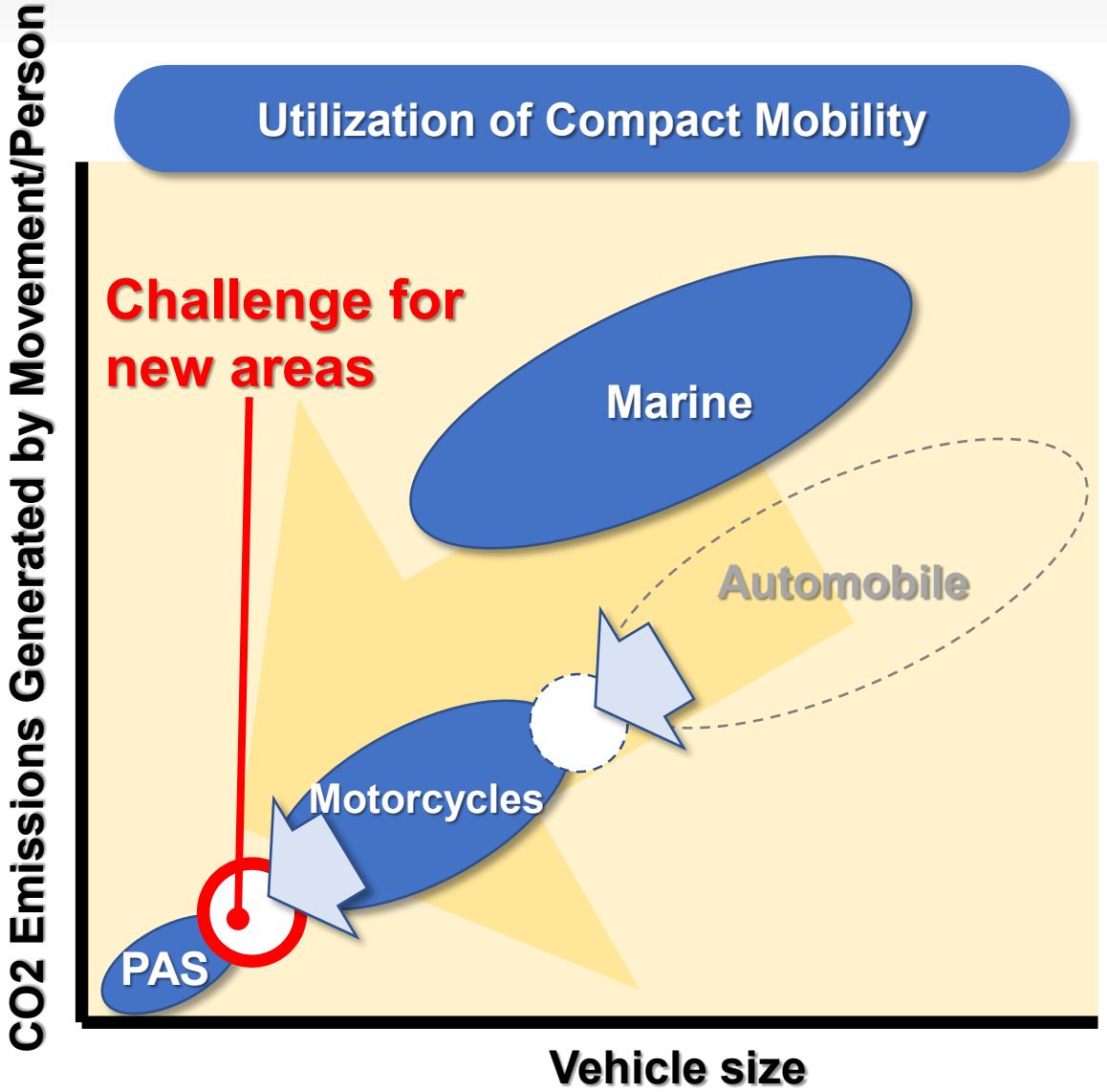
An actuator is mounted on the Front Leaning Multi Wheel (LMW) mechanism, providing a unique lean control technology according to riding conditions.

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

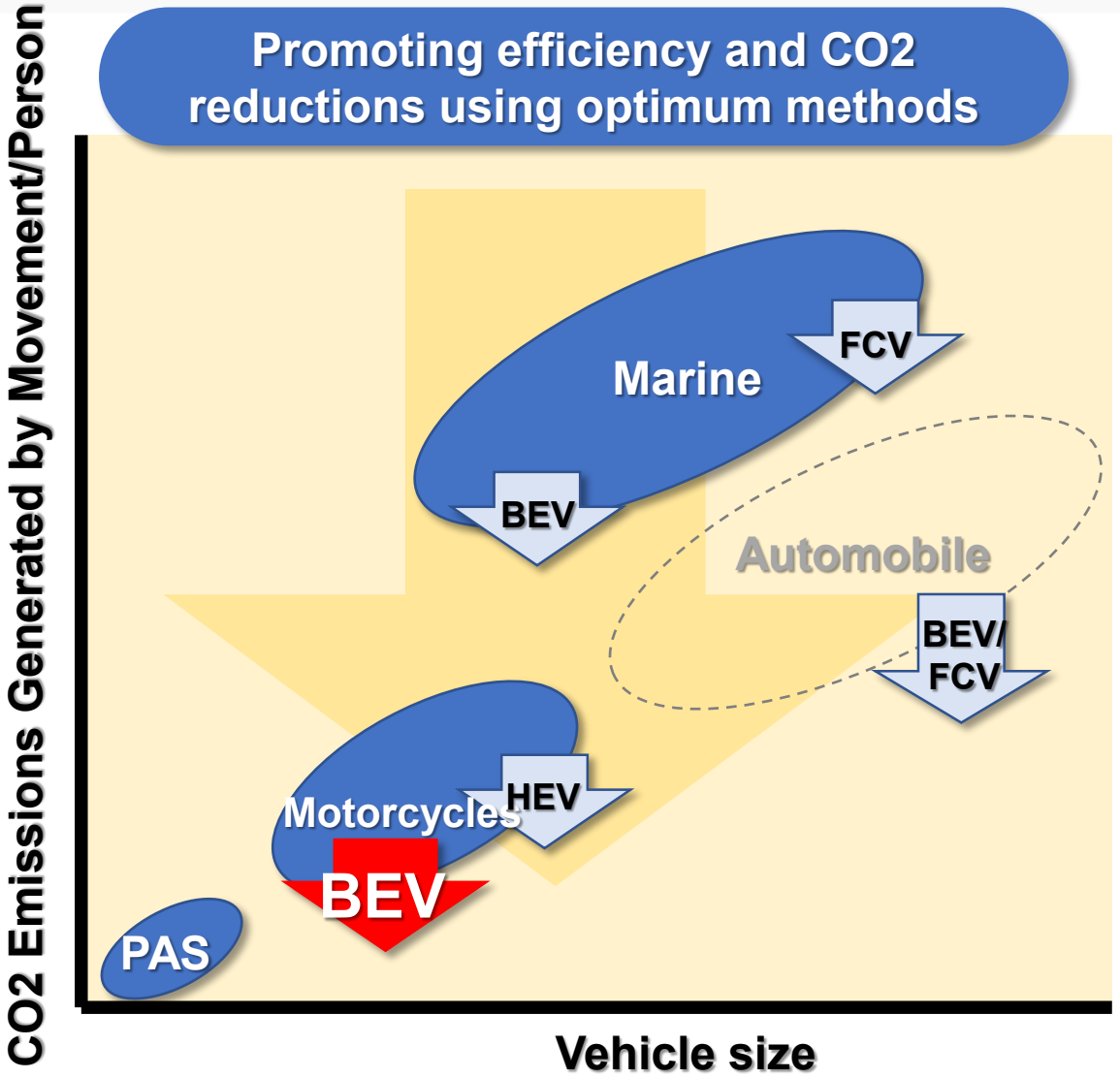
Responding to social issues such as depopulation, aging, and labor shortages while also considering future autonomous driving options.
Providing mobility as a place where people can connect
Designed under the idea that interactions will increase inside a face-to-face in-vehicle environment

Efficiency with the optimal methods

Tokyo Motor Show 2019 reference: Exhibited Model

E01

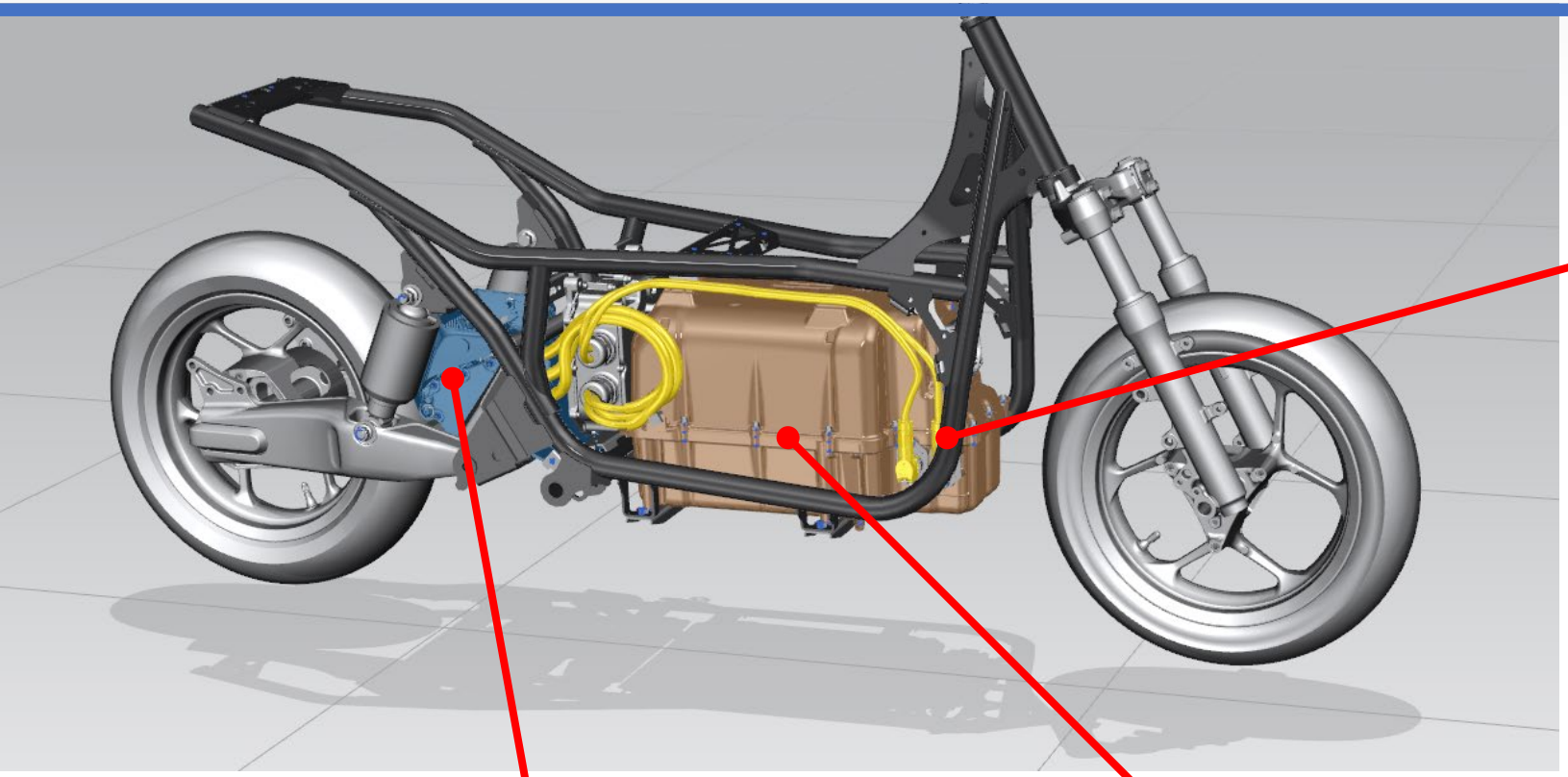
E02



Efficiency with the optimal methods E01 Tokyo Motor Show 2019 reference: Exhibited Model

Concept

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



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 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 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**

Efficiency with the optimal methods E02

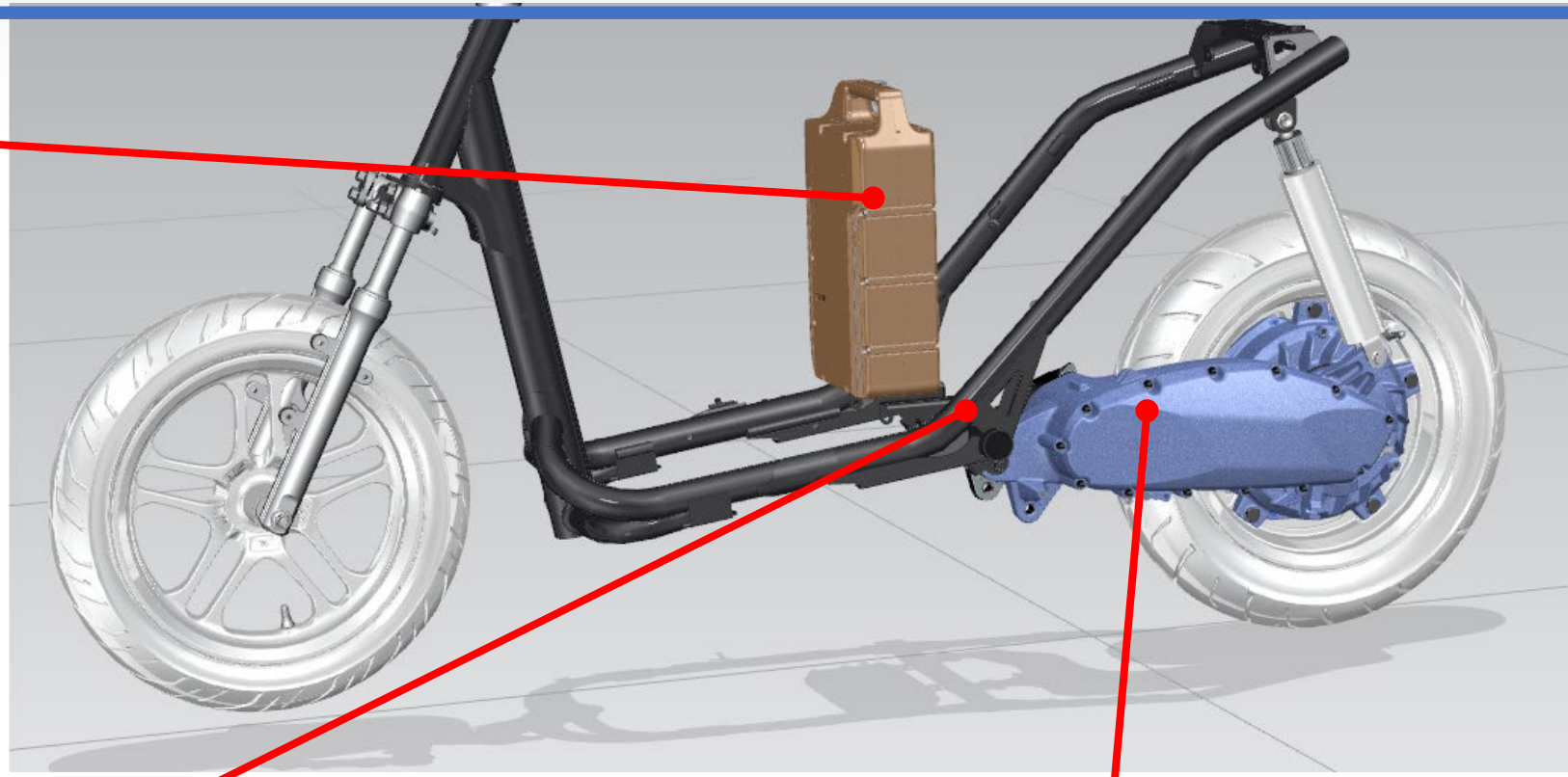
Tokyo Motor Show 2019 reference: Exhibited Model

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.


YAMAHA