Diversity in Carbon Neutrality
-Accelerating Decarbonization with Sustainable Fuels -

Takao Aiba
Japan Automobile Manufacturers Association (JAMA)
Chair, the International Climate Change Policy Expert Group

Who We Are?

- JAMA (**J**apan **A**utomobile **M**anufacturers **A**ssociation, Inc.) is a non-profit industry **association comprising Japan's 14 manufacturers** of passenger cars, trucks, buses and motorcycles.

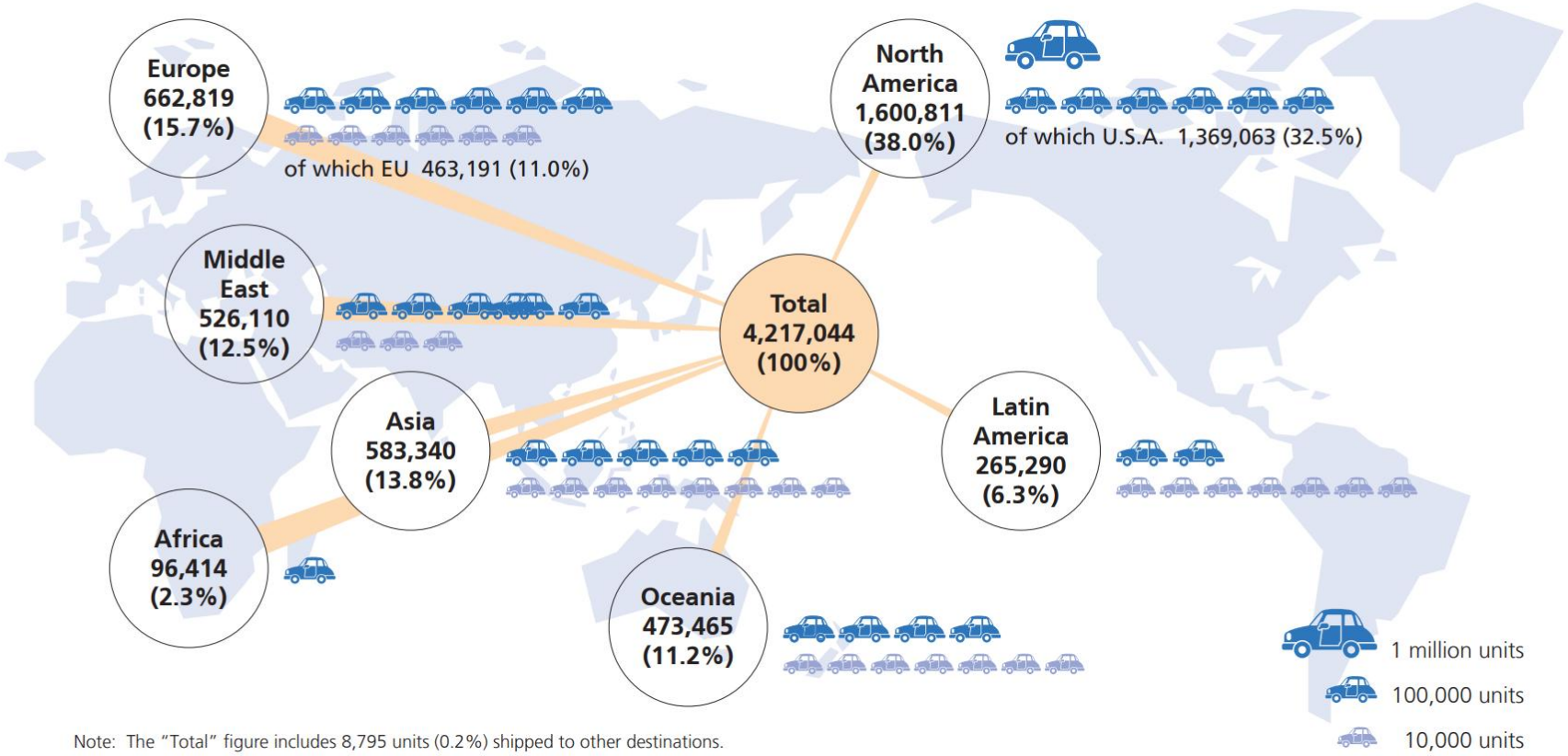
Established	April 3, 1967
Our Objective	• To promote the sound development of the automobile industry and contribute to social and economic welfare.
Our Activities	• Conducts studies and surveys related to automobile production, distribution, trade and use. • Assists in the rationalization of automobile production, and helps establish policy for the development, improvement and promotion of production technology. • Establishes and promotes policies related to automobile trade and international exchange. • Carries out other activities involved in meeting its organizational objectives.
Member Companies	DAIHATSU, HINO, HONDA, ISUZU, Kawasaki Let the Good Times Roll, mazda, MITSUBISHI MOTORS, FUSO, NISSAN MOTOR CORPORATION, SUBARU, SUZUKI, TOYOTA, UD TRUCKS, YAMAHA

Who We Are?

■ Member companies **produce and export motor vehicles worldwide.**

Motor Vehicle Exports By Destination In 2024

In vehicle units



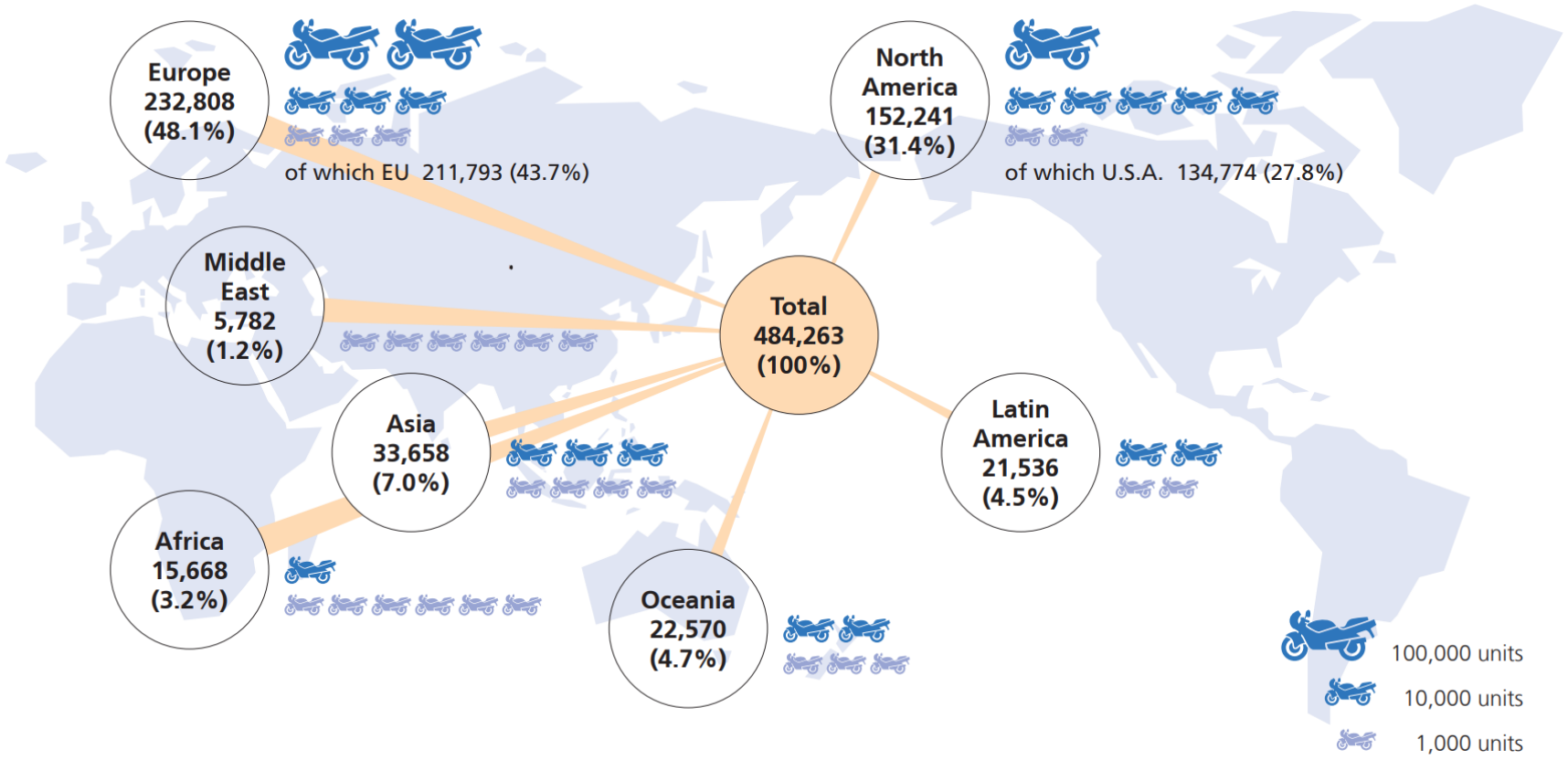
Note: The "Total" figure includes 8,795 units (0.2%) shipped to other destinations.

Who We Are?

■ Member companies **produce and export motorcycles worldwide.**

Motorcycle Exports By Destination In 2024

In vehicle units

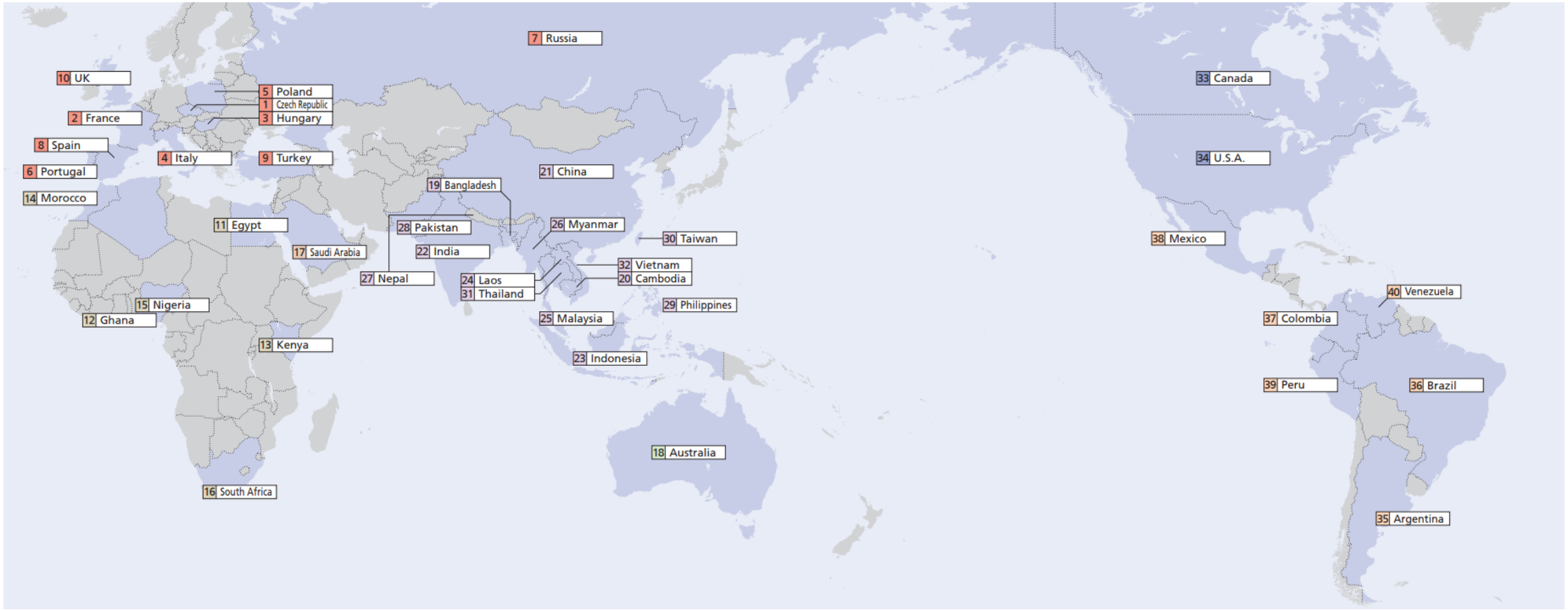


Who We Are?

■ Member companies **produce and export vehicles worldwide.**

Geographical Distribution of JAMA Members' Overseas Production Bases

As of March 31, 2025



Overview

Items	Contents
Title of the seminar	**Diversity in Carbon Neutrality** - Accelerating Decarbonization with Sustainable Fuels -
What we discuss	With the growing urgency of the climate crisis, sustainable fuels are gaining global attention. Sustainable fuels, including advanced biofuels, offer several advantages: ・ **much higher energy density** than the latest battery technologies, ・ **easier to transport and store**, ・**compatible with existing vehicle fleets**. When properly utilized, they also deliver **broader socio-economic and strategic benefits** —such as ・**affordable CO2 reduction,** ・**job creation and local economic revitalization,** ・**enhanced energy security,** ・**disaster resilience,** ・**reduced dependence on critical minerals,** ・**improved global competitiveness**. Key stakeholders from Japan, Brazil, Europe, and the United States to discuss the critical role of sustainable fuels and their potential to decarbonize road transport —advancing the goals of the Paris Agreement.

Moderator and Speakers

Prof. Jun Arima (Moderator)
Project Professor, Graduate School of Public Policy (The University of Tokyo)

Mr. Henry Joseph Junior
Advisor to the President, ANFAVEA

Ms. Liana Gouta
Director General, FuelsEurope

Mr. Takao Aiba
Chairperson of the International Climate Change Policy Sub-committee, JAMA

Prof. Keith L Kline
Distinguished Scientist, Oak Ridge National Laboratory

Mr. Petr Dolejsi
Mobility & Sustainable Transport Director, ACEA

Dr. Paolo Frankl
Head of the Renewable Energy Division, IEA

Transitioning to Carbon Neutrality by 2050 (A Scenario-Based Analysis)

1. Purpose of using scenarios

- To understand based on quantitative assessments, **possible pathways towards carbon neutrality** in automotive transport by 2050, JAMA commissioned the **Institute of Energy Economics, Japan** to analyze **three scenarios** (CNF, BEV75, and NZE scenario) which took into account different circumstances between **developed and emerging economies.**

2. Scenario parameters

*FC: Fuel consumption

2050 Scenario Designation & Definition		BEV/FCEV Share of New Passenger Vehicle Sales			2050 Projected CNF Share in Automotive Fuel Mix [2020 FC*-Based]
		Worldwide	Japan, North America, Europe etc.	Emerging economies	
0	**BAU**[1]	BAU	←	←	←
1	**CNF (Wide use of CNF)**	40%	50%	25%	30% approx.
2	**BEV75 (Wide EV adoption)**	75%	100%	50%	20% approx.
3	**NZE (100% BEVs/FCEVs)** from IEA[2] NZE[3] scenario	100%	100%	100%	7% (biofuel only)

[1] BAU: Business as usual [2] IEA : International Energy Agency [3] NZE : Net Zero Emissions by 2050

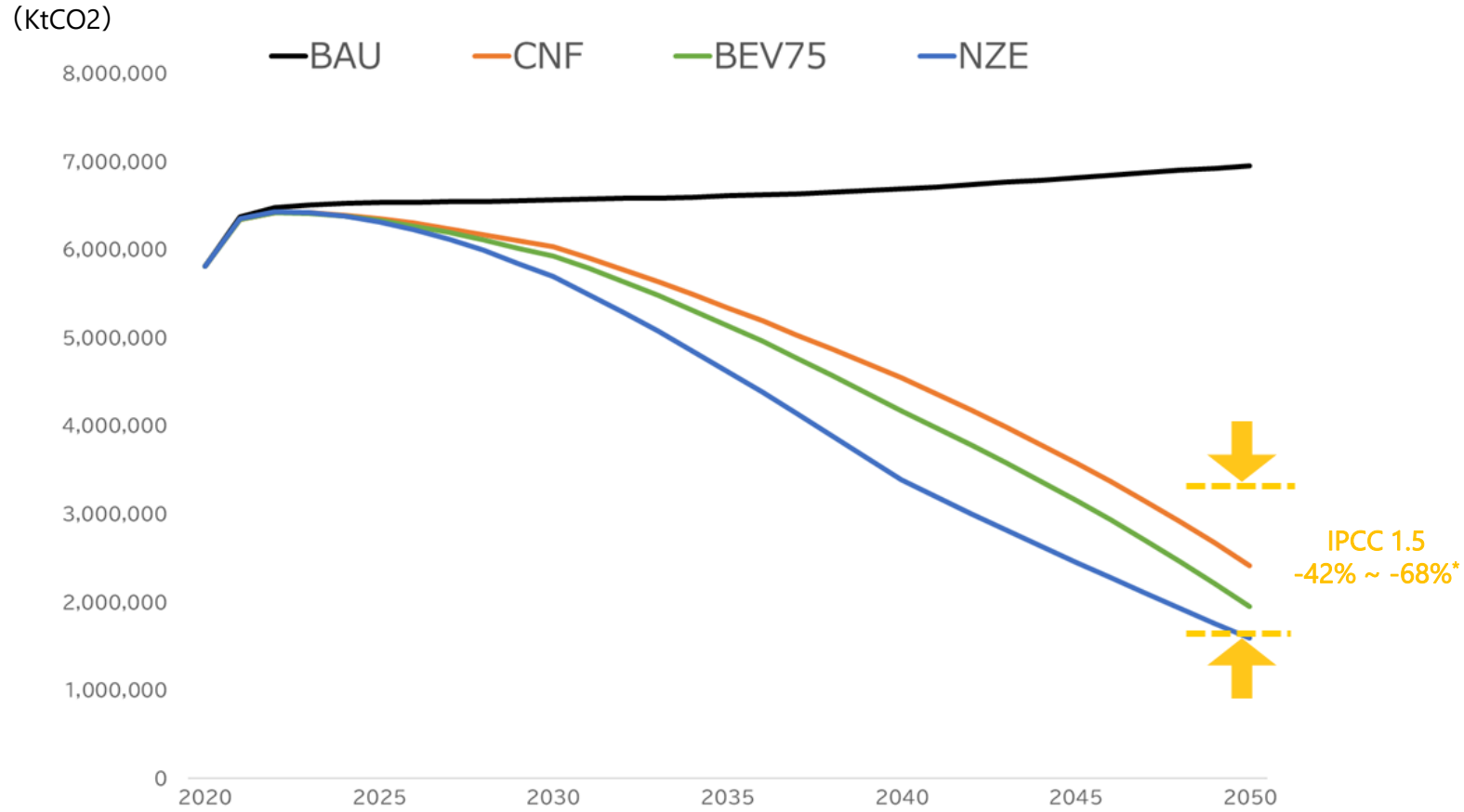
Transitioning to Carbon Neutrality by 2050 (A Scenario-Based Analysis)

3. Outcome of the analysis

- Global CO2 emissions reductions in automotive transport can be **in line with the IPCC 1.5℃ scenarios** for 2050 with not only a **rapid BEV conversion scenario**, but also a scenario premised on the **wide use of HEVs, PHEVs, and carbon-neutral fuels.**
- In advanced economies, reductions to close to carbon neutrality by 2050 are **possible under the three non-BAU scenarios.** In emerging economies, where significant increases in new passenger car sales and in in-use vehicle fleets are anticipated, **reductions in line with IPCC 1.5℃/2.0℃ scenarios are possible** when **CNF supply** is increased within the extent of reasonable estimate.

CO2 Emissions Worldwide 2020-2050, by Scenario

- In all three scenarios, CO2 emissions worldwide are in line with the IPCC's 2050 1.5℃ climate scenarios.

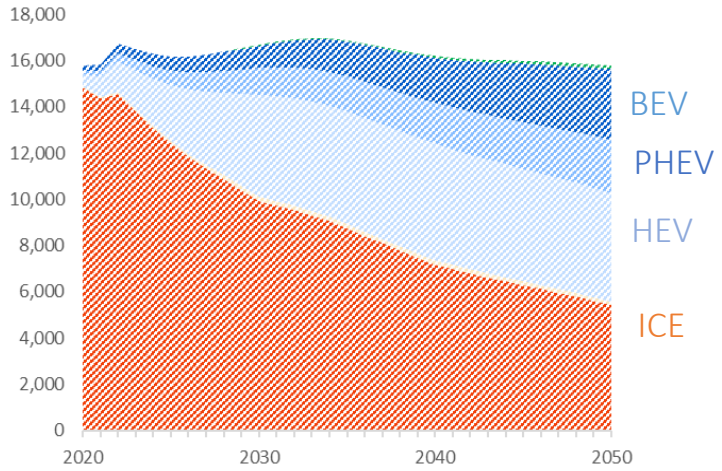


*The range of -42% to -68% shown in this describes the upper and lower limits of a number of 1.5℃ scenarios based on the scientific findings used by the IPCCAR6.

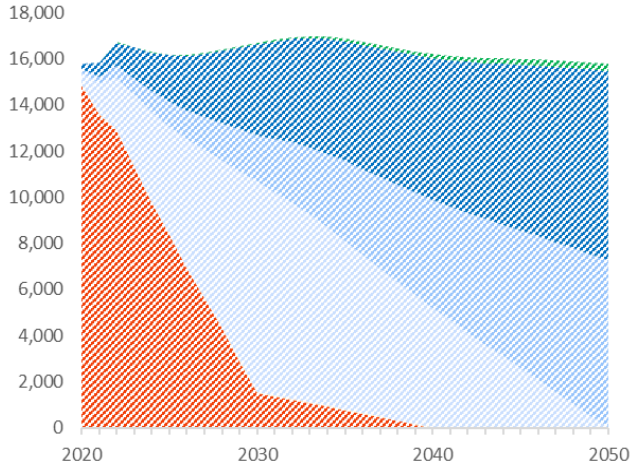
New Passenger Car Sales (Advanced Economies Europe)

(x 1,000 units)

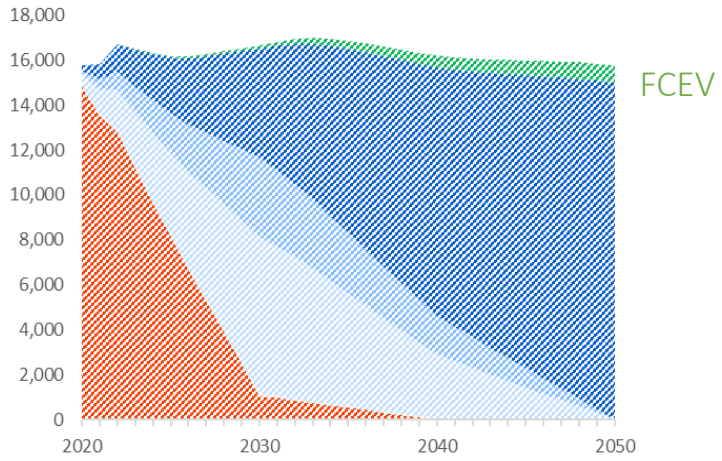
BAU



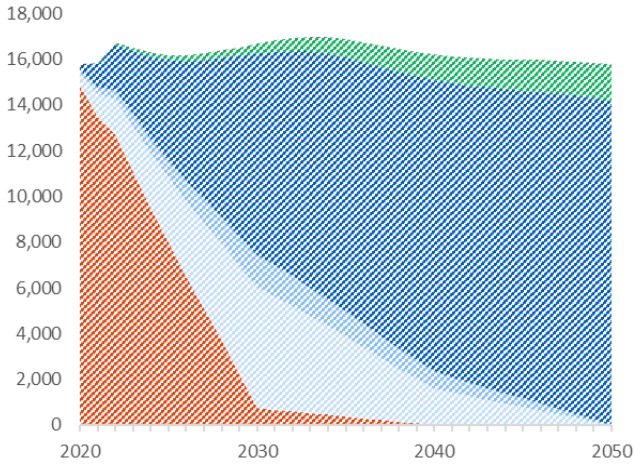
CNF



BEV75

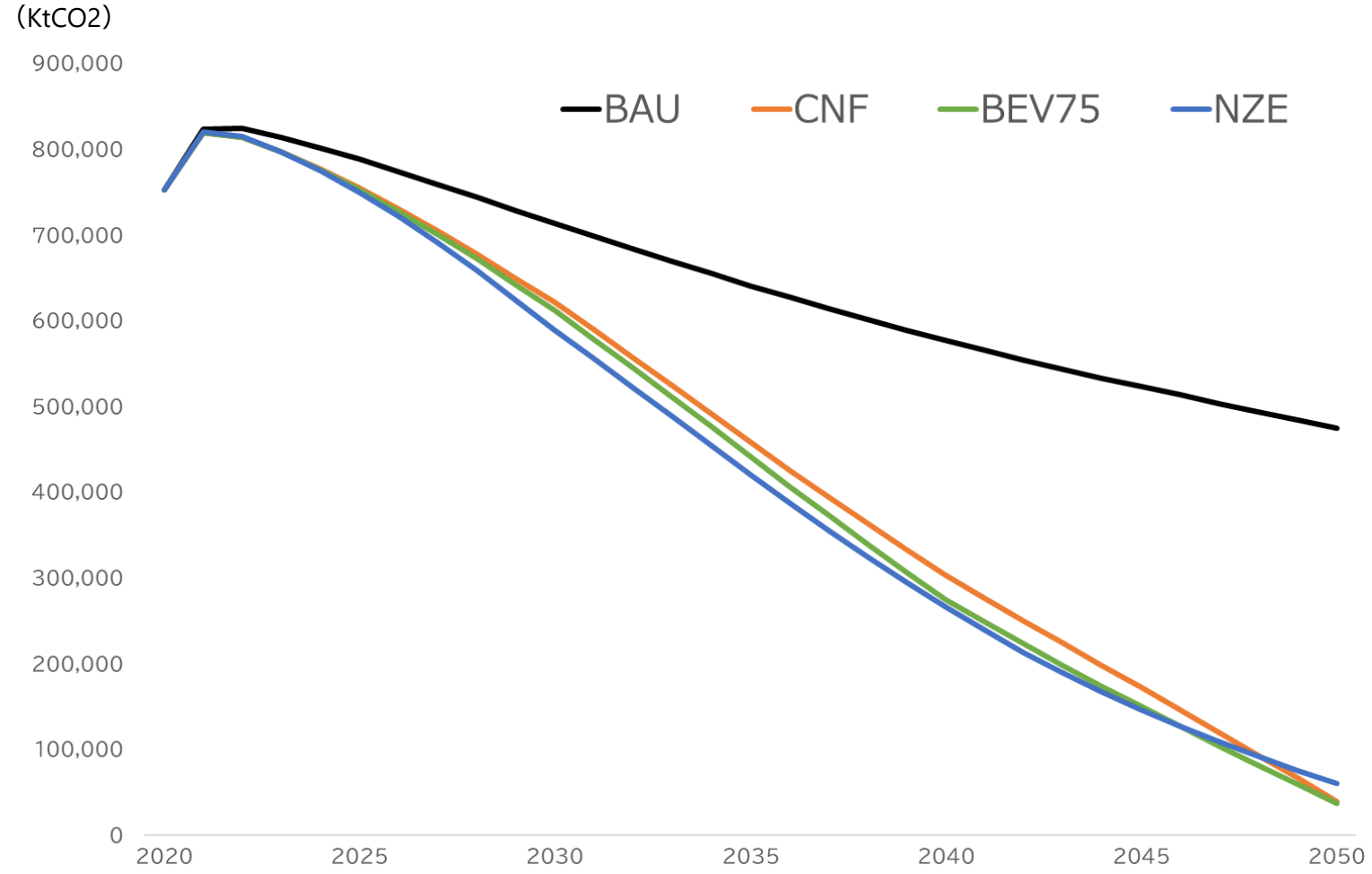


NZE



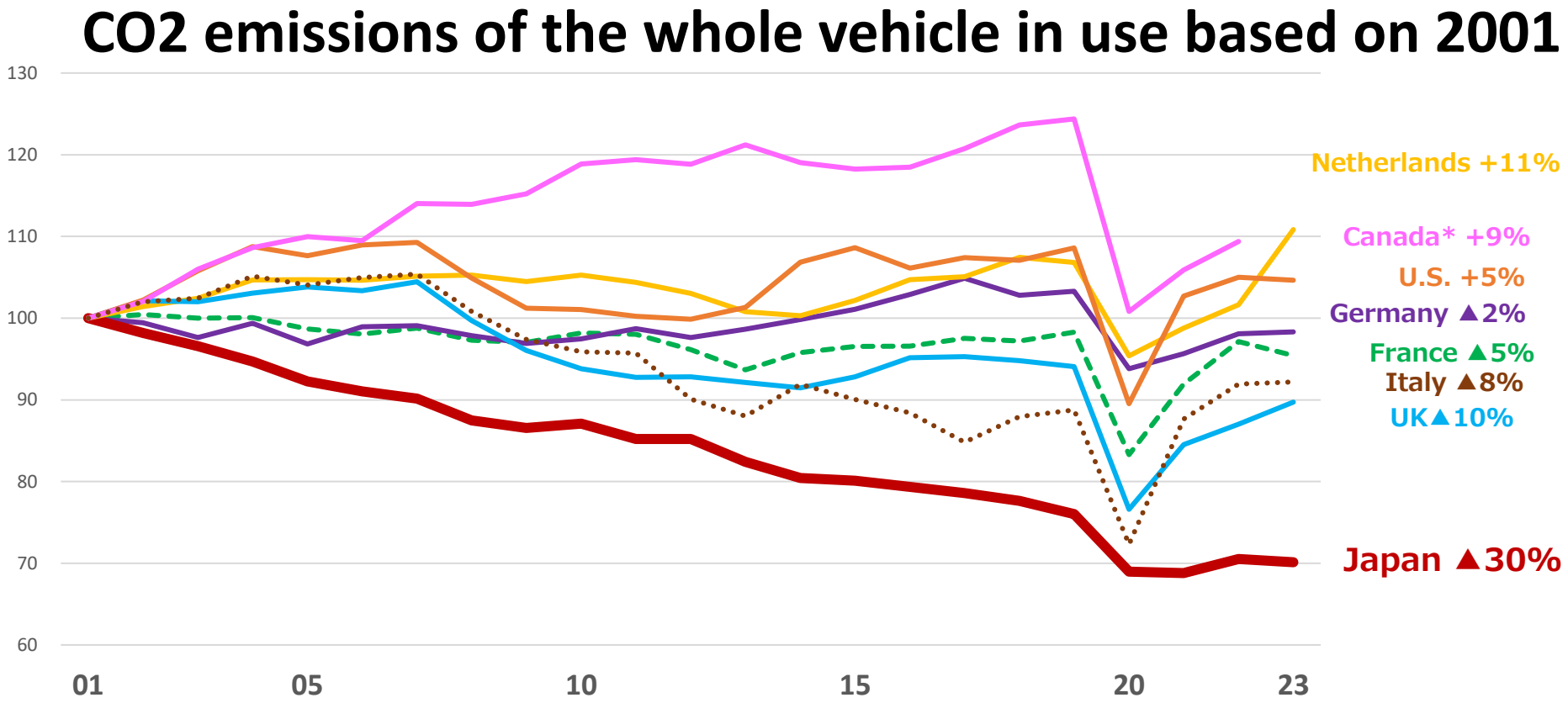
CO2 Emissions (Advanced Economies Europe)

- In all the scenarios, CO2 emission levels are close to carbon neutrality.



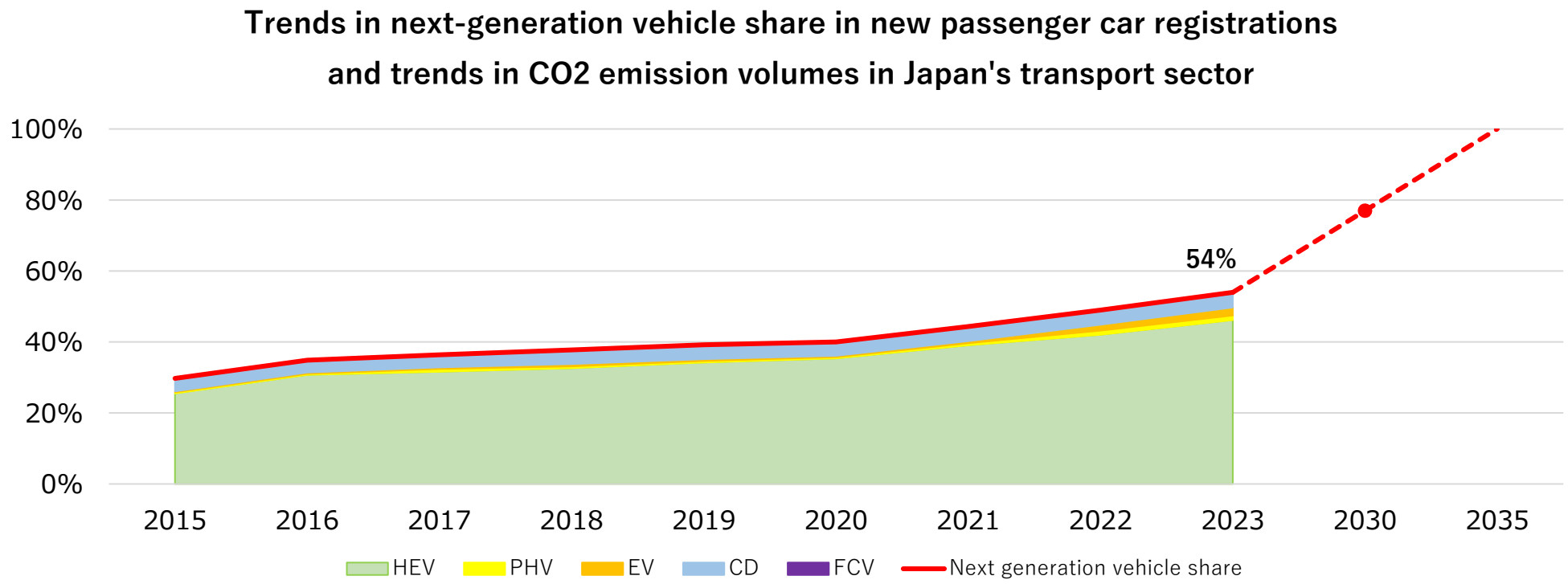
CO_2 emissions from road transport sector in Japan

- CO2 emissions in Japan's road transport sector have declined significantly (-30%) since the early 2000s.
- Limited rebound after the COVID-19 pandemic.



Road map for next generation vehicle

- The Japanese government has set the goal of achieving a ratio of **next-generation vehicles** (HEV, PHV, EV, Clean Diesel, and FCV) among new vehicle sales to **50-70% by 2030**.
- The current share of next generation vehicle is **54%.**



Analysis for motivations and conditions for ZEV targets

- In 2024, JAMA analyzed the **motivations and conditions for countries and cities** that are signatories to the **ZEV Declaration and the M-HDV Global MOU** to adopt ZEV targets.

ZEV Declaration

- Announced at COP26, hosted by Glasgow in 2021
- The Declaration states that ”Together, we will work towards all sales of new cars and vans being zero-emission globally by 2040, and by no later than 2035 in leading markets.”

Signatories: 24 Nations (2021) → 31 Nations (2025)

Austria	Cyprus	Israel	Poland
Azerbaijan	Denmark	Liechtenstein	Slovenia
Belgium	El Salvador	Lithuania	Spain
Canada	Finland	Luxembourg	Sweden
Cape Verde	France	Malta	The Holy See
Chile	Greece	Netherlands	United Kingdom
Colombia	Iceland	New Zealand	Uruguay
Croatia	Ireland	Norway	

Source: https://acceleratingtozero.org/the-declaration/

M-HDV Global MOU

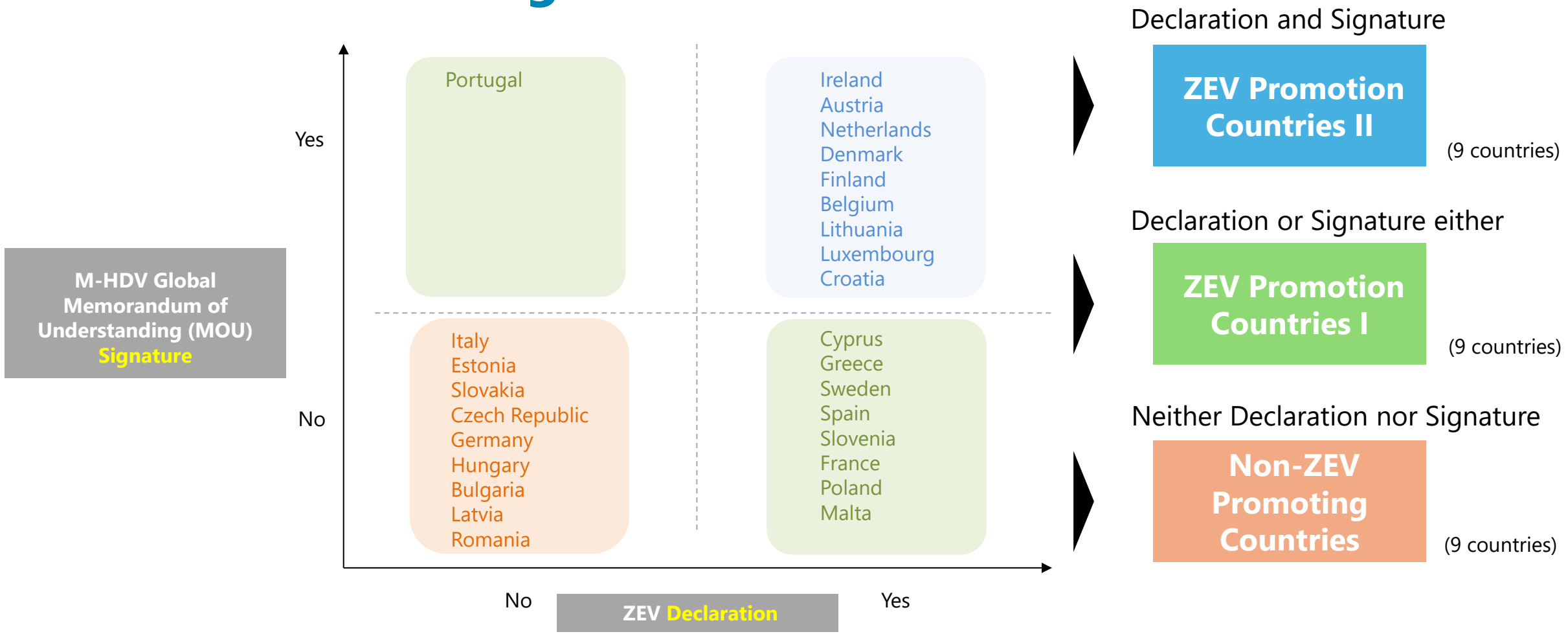
- 30% zero-emission vehicle sales by 2030
- 100% zero-emission sales of new trucks and buses by 2040
- Achieve net-zero carbon emissions by 2050
- Voluntary Target/ No mandatory mechanisms

National Endorsements: 32 Nations (2025)

Source: https://globaldrivetozero.org/mou-nations/

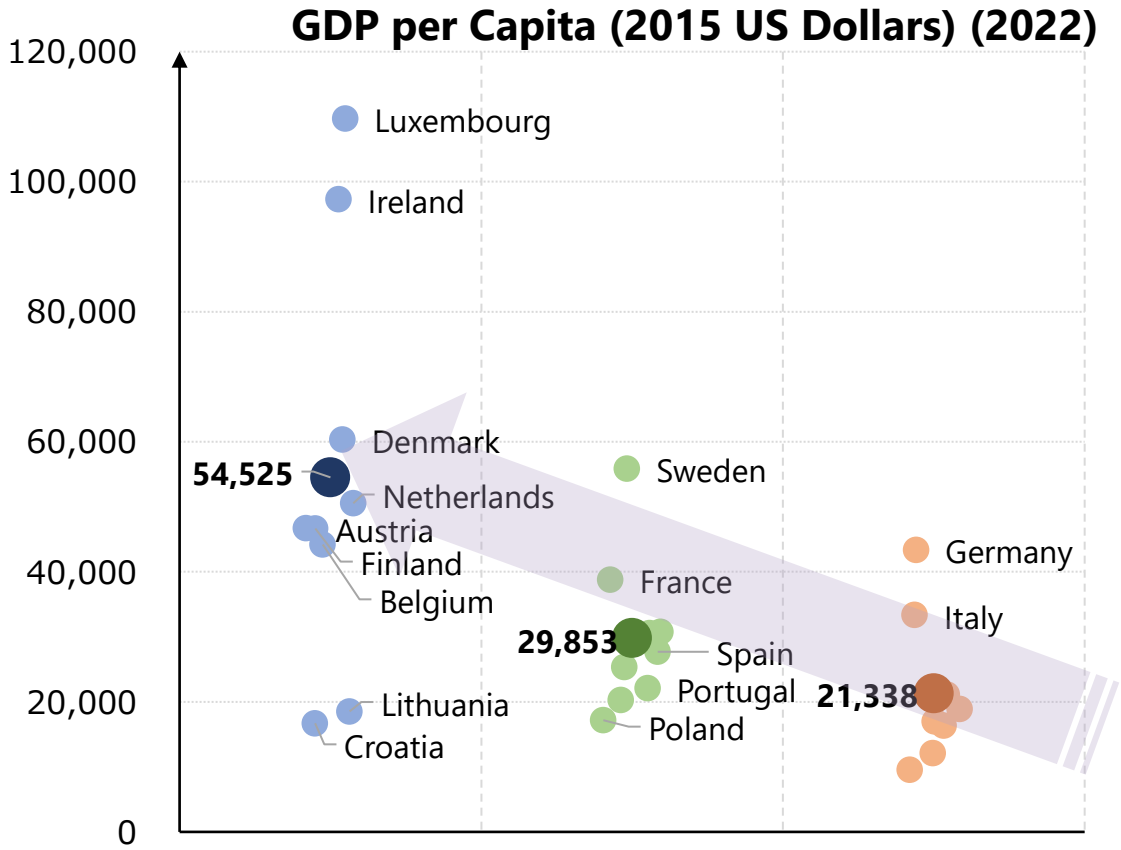
Categorization into three groups: EU-27 countries

- Categorize EU-27 countries into **three groups** according to **their declaration or signature status.**



Results: Relationship between per capita GDP and Declaration/Signature status

- Countries with **higher GDP per capita** tend to be **more proactive in EV adoption**.



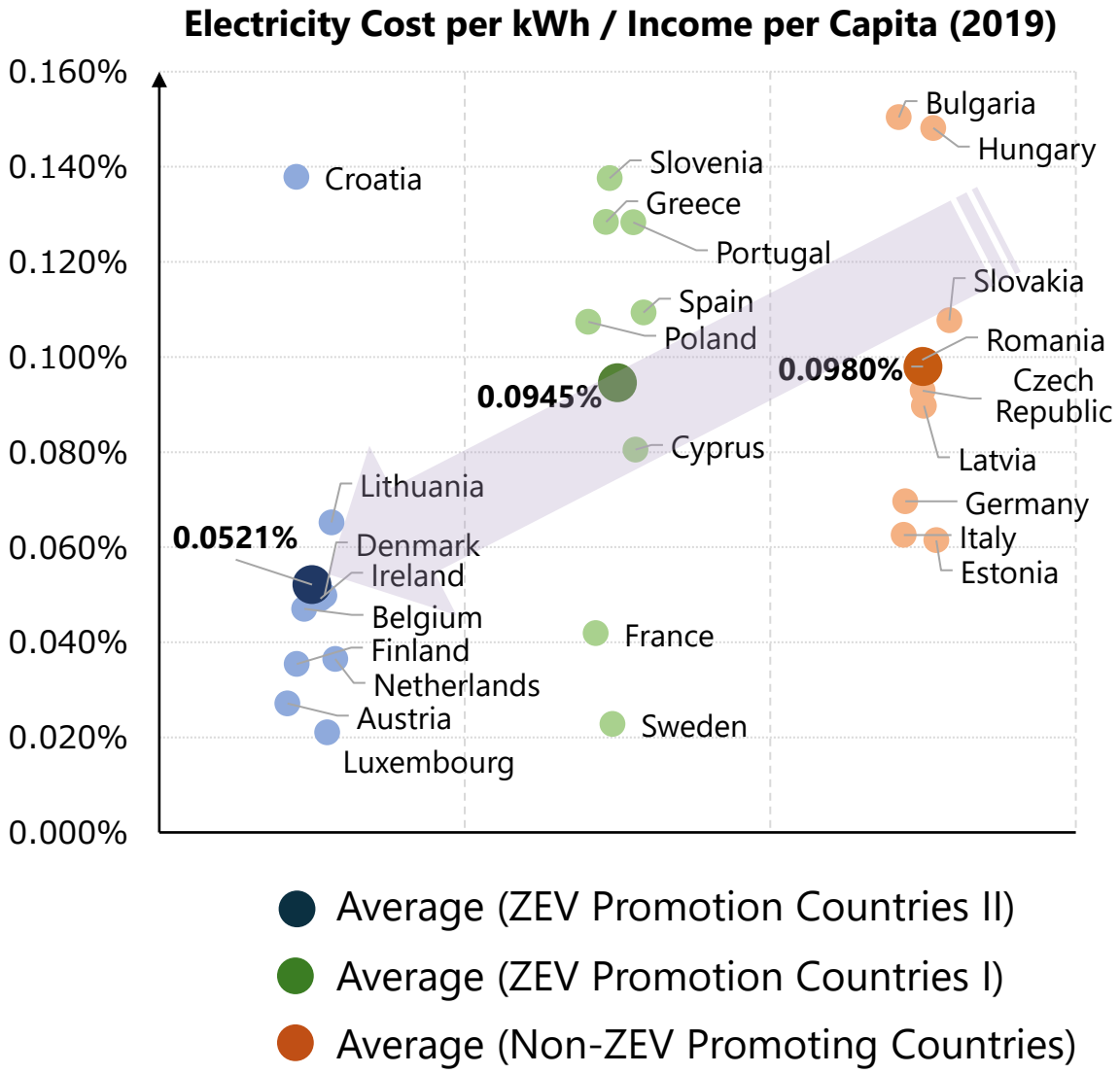
ZEV Promotion Countries II | ZEV Promotion Countries I | Non-ZEV Promoting Countries

- Average (ZEV Promotion Countries II)
- Average (ZEV Promotion Countries I)
- Average (Non-ZEV Promoting Countries)

Source: Japan Energy Economics Institute, compiled from World Bank (https://www.worldbank.org/ext/en/home)

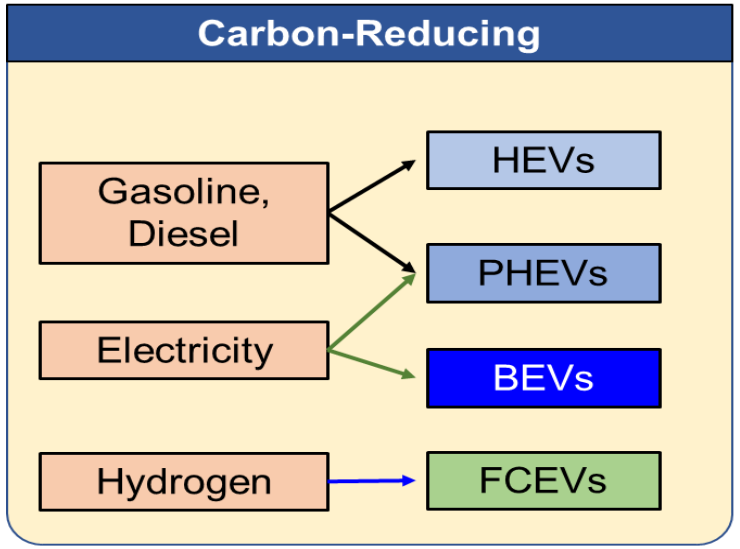
Results: Relationship between electricity cost and income

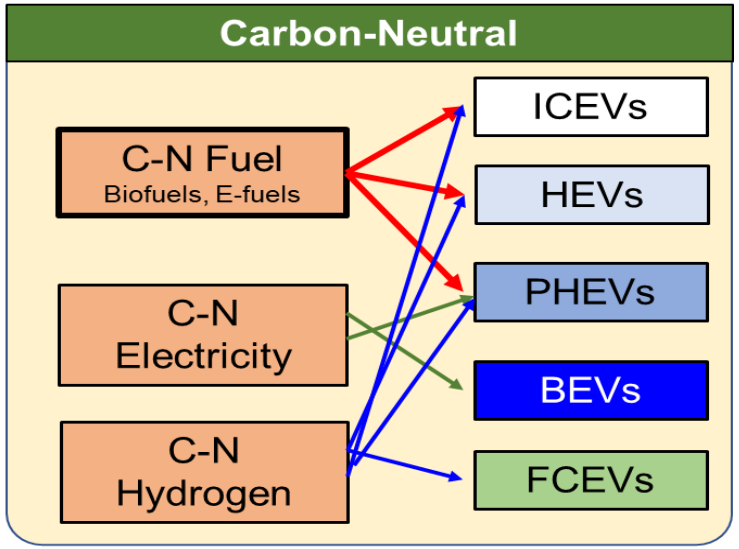
- **Advancing Countries II** generally have a **low ratio of electricity cost to income**, which favors **EV adoption** (Croatia is an exception).
- There are **significant differences** when **comparing Advancing Countries II and Non-Advancing Countries.**



Importance of carbon neutral energy

- It is **important to use carbon-neutral energy**, not only type of vehicle.
- **Sustainable Fuel** is one of the **promising options** for achieving carbon-neutral society.
- The rapid adoption and use of carbon-neutral fuels is desired to **prevent the decline of valuable existing fuel infrastructure and ICE development**, and to **reduce CO2 from the existing vehicle stock.**

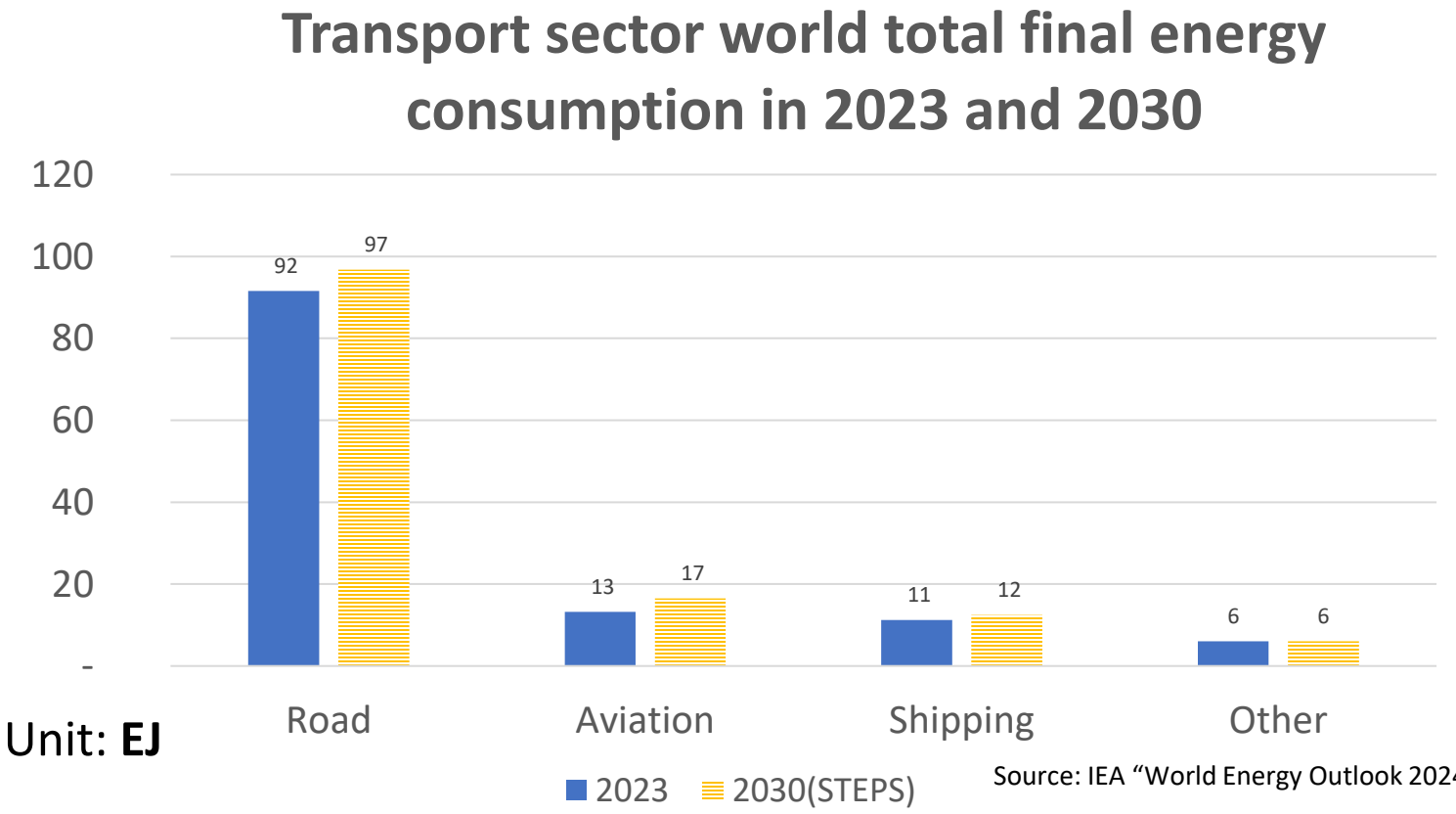




ICE: internal combustion engine

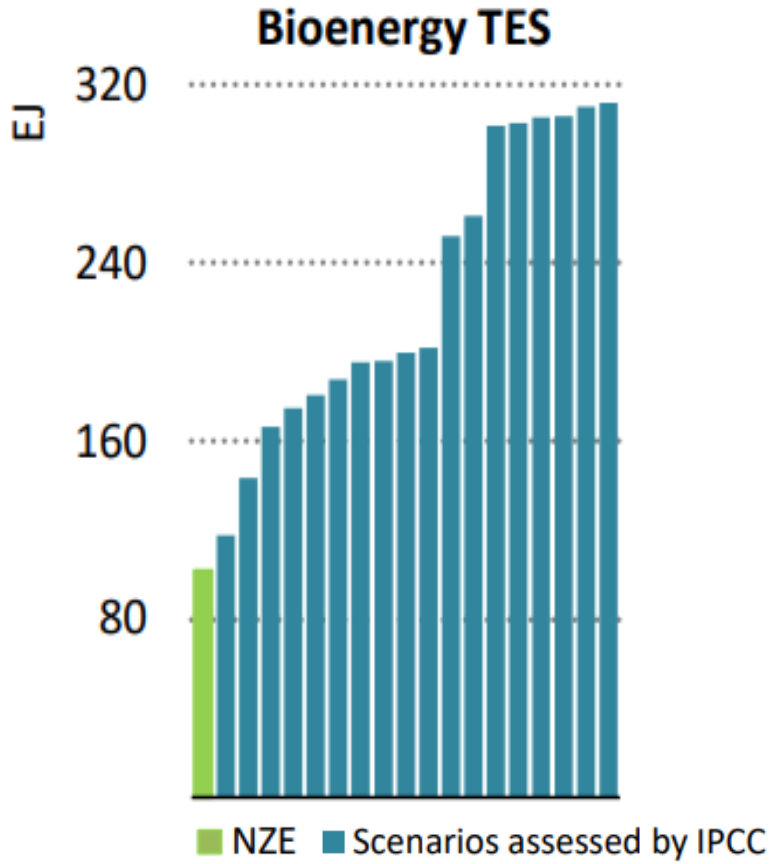
Bioenergy global supply potential

- Bioenergy supply potential would surpass aviation and shipping demand
- Majority of the IPCC AR6 scenarios estimates above 160EJ Bioenergy total supply



Unit: **EJ**

Source: IEA "World Energy Outlook 2024"



Source: IEA "Net Zero by 2050 – A road map for the global energy sector"
Figure 2.11 P63

International Timeline on Expanding Sustainable Fuels

May 2023 — G7 Hiroshima

April 2024 — Turin Joint statement on Sustainable Bio fuels

May 2024 — Agreement of ISFM

March 2025 — MoC on ISFM

August 2025 — CEM-16

September 2025 — Ministerial Meeting on Sustainable Fuels

- There is growing **international momentum for the utilization and expansion of sustainable fuels**, which are **effective** for even vehicles in use, **affordable**, and expected to deliver **significant CO2 reduction benefits**.

Memorandum of Cooperation on ISFM

- On March 2025, at the Japan-Brazil Summit Meeting, Japan and Brazil signed a **Memorandum of Cooperation (MoC) on the Initiative for Sustainable Fuels and Mobility (ISFM).**
- Under the MoC, Japan and Brazil will **lead a global decarbonization effort in the automotive sector**, while harnessing the strengths of both countries.

MEMORANDUM OF COOPERATION

BETWEEN

THE MINISTRY OF DEVELOPMENT, INDUSTRY, TRADE AND SERVICES OF THE FEDERATIVE REPUBLIC OF BRAZIL

THE MINISTRY OF MINES AND ENERGY OF THE FEDERATIVE REPUBLIC OF BRAZIL

THE MINISTRY OF FOREIGN AFFAIRS OF THE FEDERATIVE REPUBLIC OF BRAZIL

THE MINISTRY OF PORTS AND AIRPORTS OF THE FEDERATIVE REPUBLIC OF BRAZIL

AND

THE MINISTRY OF ECONOMY, TRADE AND INDUSTRY OF JAPAN

ON THE INITIATIVE FOR SUSTAINABLE FUELS AND MOBILITY (ISFM)

16th Clean Energy Ministerial Meeting (CEM-16)

- On August 2025, the **16th Clean Energy Ministerial Meeting (CEM-16)** took place in Busan, focusing on **accelerating clean energy transitions and strengthening international cooperation.**
- At the **high-level dialogue on Future Fuels** during CEM-16, JAMA emphasized the importance of **the technology open approach** and the **critical role of sustainable fuels** in the road transport sector.

Ministerial Meeting on Sustainable Fuels

- On 15 September 2025, hosted the **Ministerial Meeting on Sustainable Fuels**, to discuss the **importance of expanding the production and utilization of sustainable fuels**, such as biofuels, biogases, e-fuels and e-methane, in various sectors including aviation, maritime, **road transport** and industry.
- JAMA has issued a **joint statement with ANFAVEA**, which highlights that sustainable fuels can accelerate the shift toward cleaner mobility.
- We also presented this statement during the Ministerial Meeting.

September 12, 2025

Pragmatic and successful decarbonization of road transport

The Strategic Role of Sustainable Fuels including Biofuels and Technological Diversity

(Scan and view the statement)

Summary of our presentation

- JAMA and its member companies will **make maximum efforts towards carbon neutrality by 2050.** Diverse options tailored to customers are important.
- While promoting BEVs/FCEVs, **Carbon Neutral (CN) Fuels** are a promising, fast-acting option due to their **high energy density**, **ease of storage/transport**, and **effectiveness on vehicles in use**.
- Japan is starting to expand Biofuel usage. **Brazil** offers a global model, **achieving cost-effective emissions reduction** through **affordable, large-scale biofuel supply** (benefiting environment and economy).
- In the **Global South**, sustainable biofuel expansion linked to agricultural policy is an **affordable CO2 reduction option** that also **boosts local employment**, **economy**, and **energy security**.
- To encourage the energy sector to **scale up CN fuel supply** for society (including aviation/maritime), **utilizing it heavily as road transport fuel is critical**.
- We will **continue to maximize efforts** to offer optimal choices for **diverse global customers**. We are **committed to expanding sustainable fuels** and will work with the global auto industry, **energy sector**, and **governments** to properly **address the climate crisis**.