APERC Annual Conference

# Energy Transition Challenges

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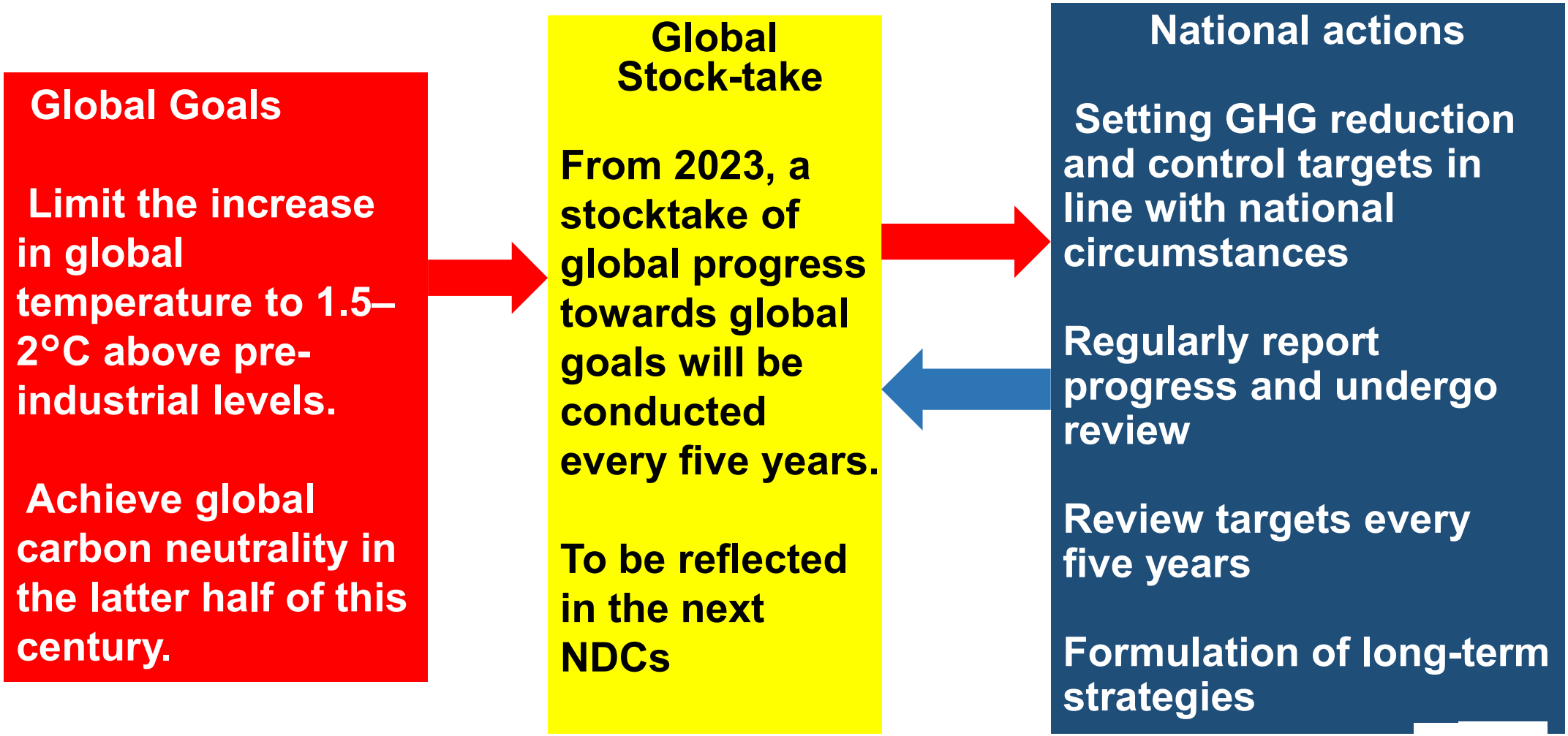
Visiting Professor, GraSPP, The University of Tokyo
Senior Councilor JOGMEC
Jun Arima

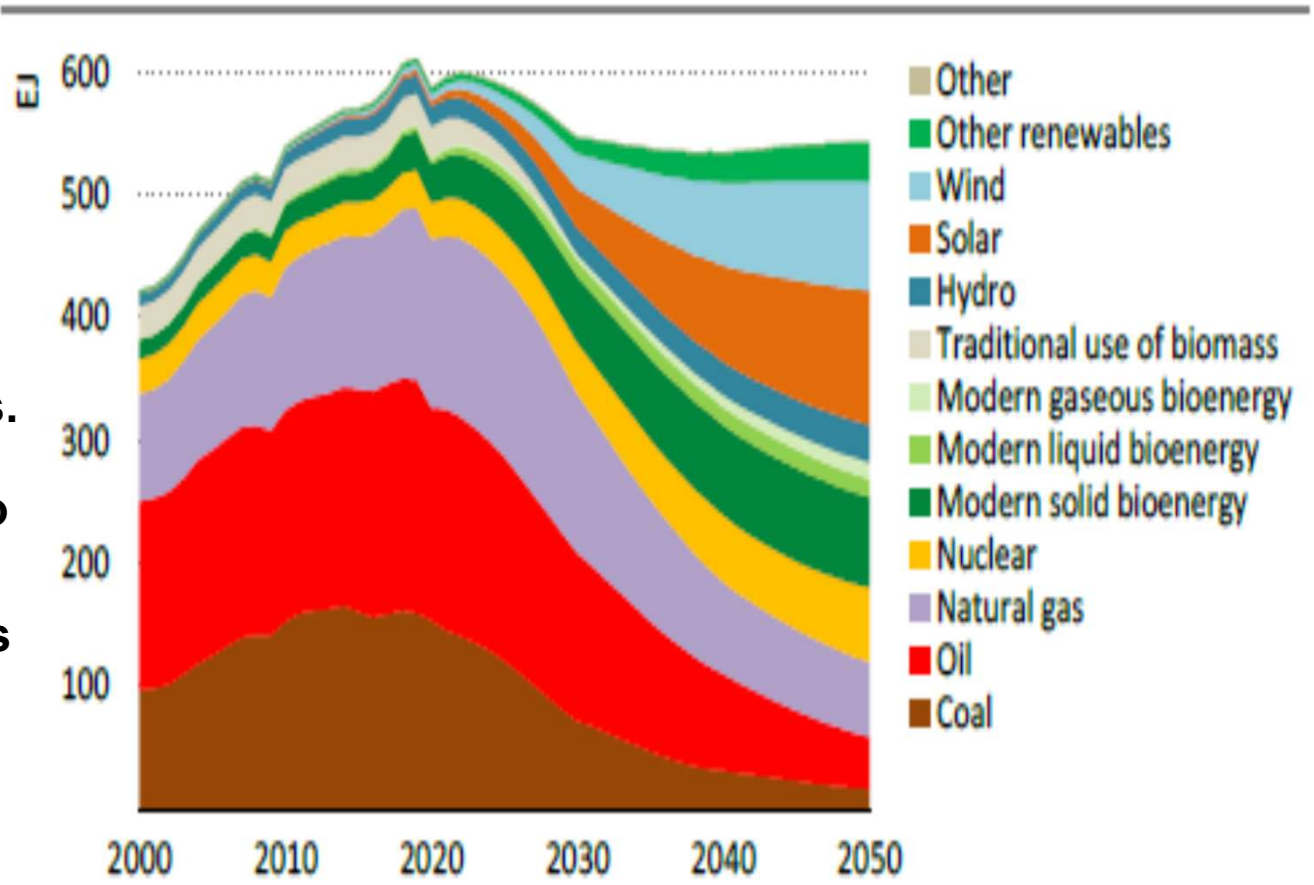
# The Paris Agreement framework



# IEA Net Zero by 2050 Scenario (May 2021)

- Produced by the IEA under a UK voluntary contribution ahead of COP26.
- Originally positioned as a 'scenario' for achieving carbon neutrality by 2050, it has become the de facto standard in international climate discussions. The IEA itself has been effectively recommending NZE to the world.
- It subsequently served as a basis for arguments against new oil and gas investment, coal phase-out, and fossil fuel phase-out.

**Primary Energy Mix under NZE 2050**

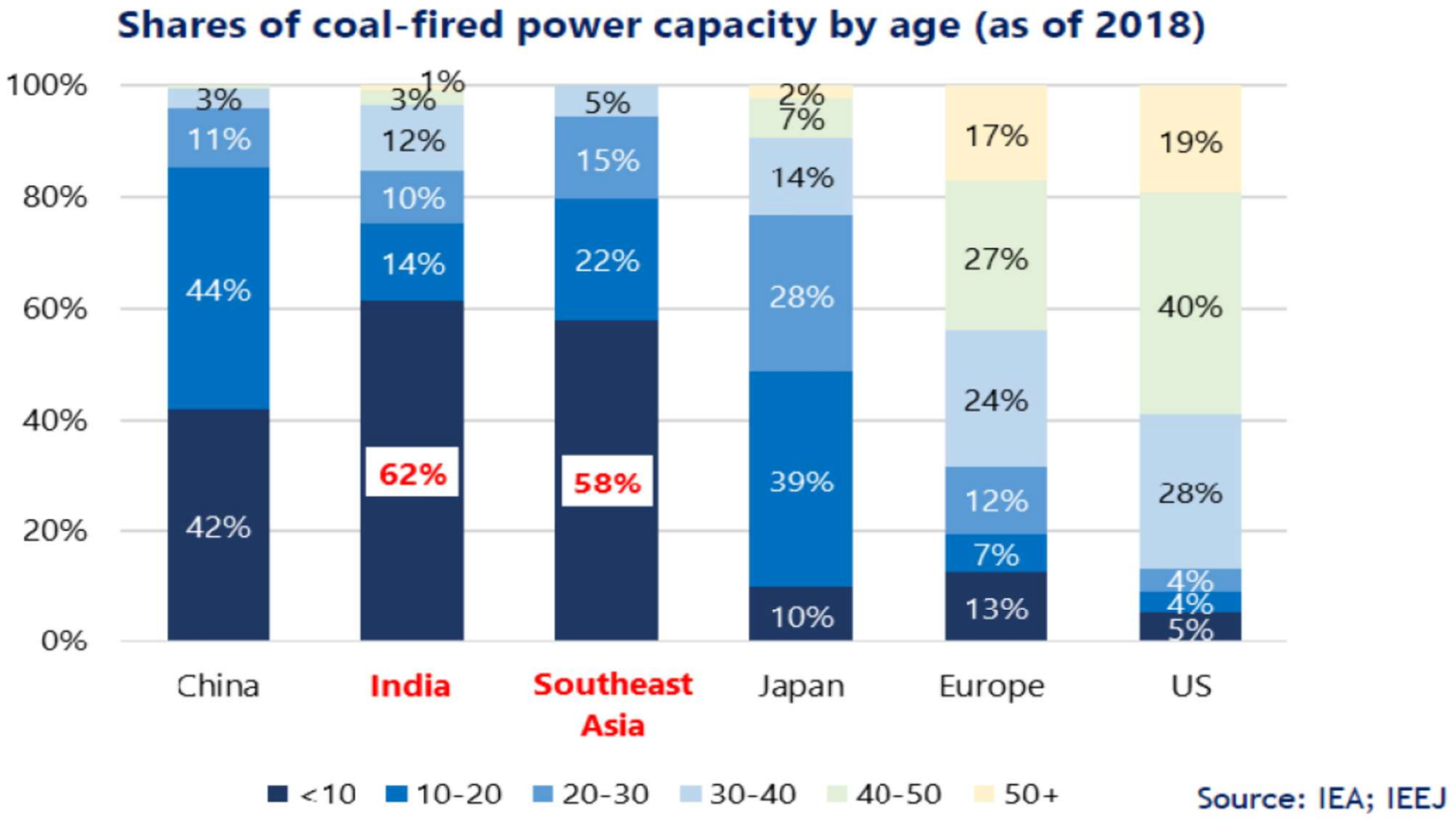



Source: IEA Net Zero by 2050 A Roadmap for the Global Energy Sector (May 2021)

# Glasgow Climate Pact

- Strive to limit the temperature increase since the Industrial Revolution to 1.5°C
- Reduce global CO2 emissions by 45% by 2030 compared to 2010 levels, achieving net-zero around mid-century.
- Accelerate action during the critical decade of the 2020s
- Current national targets would result in a 13.7% increase by 2030 compared to 2010 levels → Launch a work plan to enhance mitigation ambition and scale up implementation during the critical decade, to be adopted at COP27 in 2022
- Countries should review and strengthen their targets by the end of 2022, as necessary, in line with the Paris Agreement's temperature goals.
- Accelerate the phase down of unabated coal-fired power plants and the phase-out of inefficient fossil fuel subsidies (← Due to strong resistance from India, the original proposal of “phase out” was changed to “phase down”

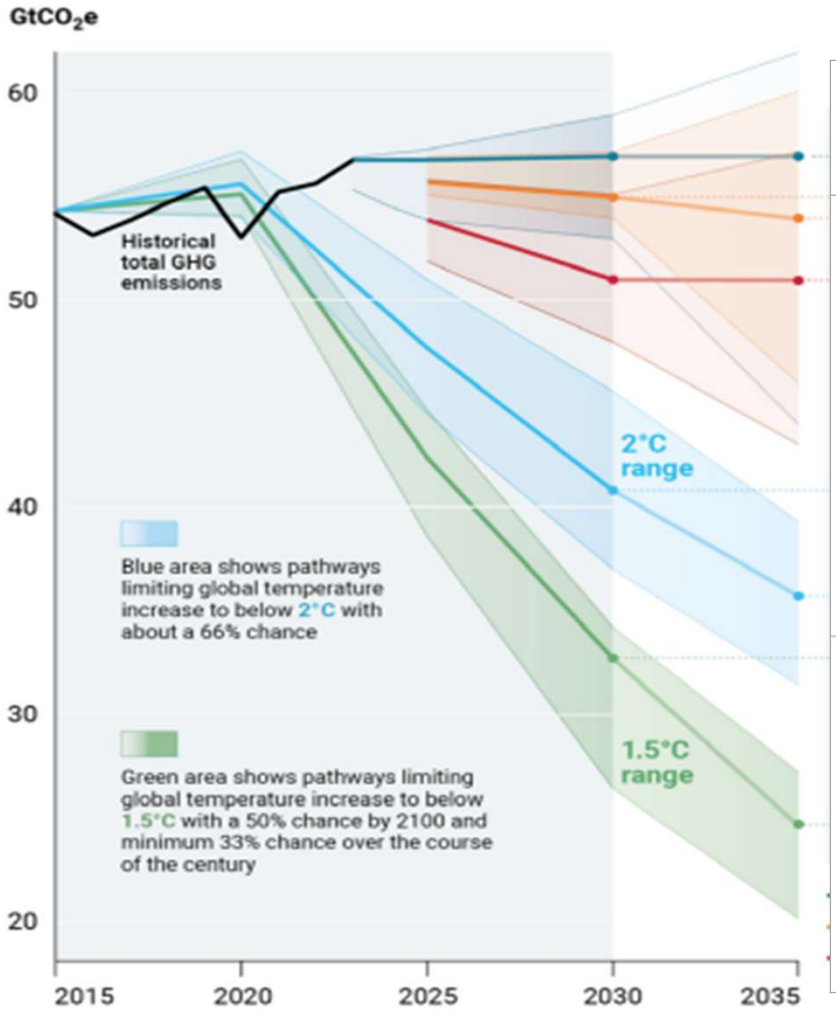
# Young Coal Power Plants in Asia




Source: "Cofiring with Ammonia for Decarbonization in Asia" Tatsuya Terazawa, IEEJ

# Emission Pathways Consistent with the 1.5°C Goal (IPCC AR6)

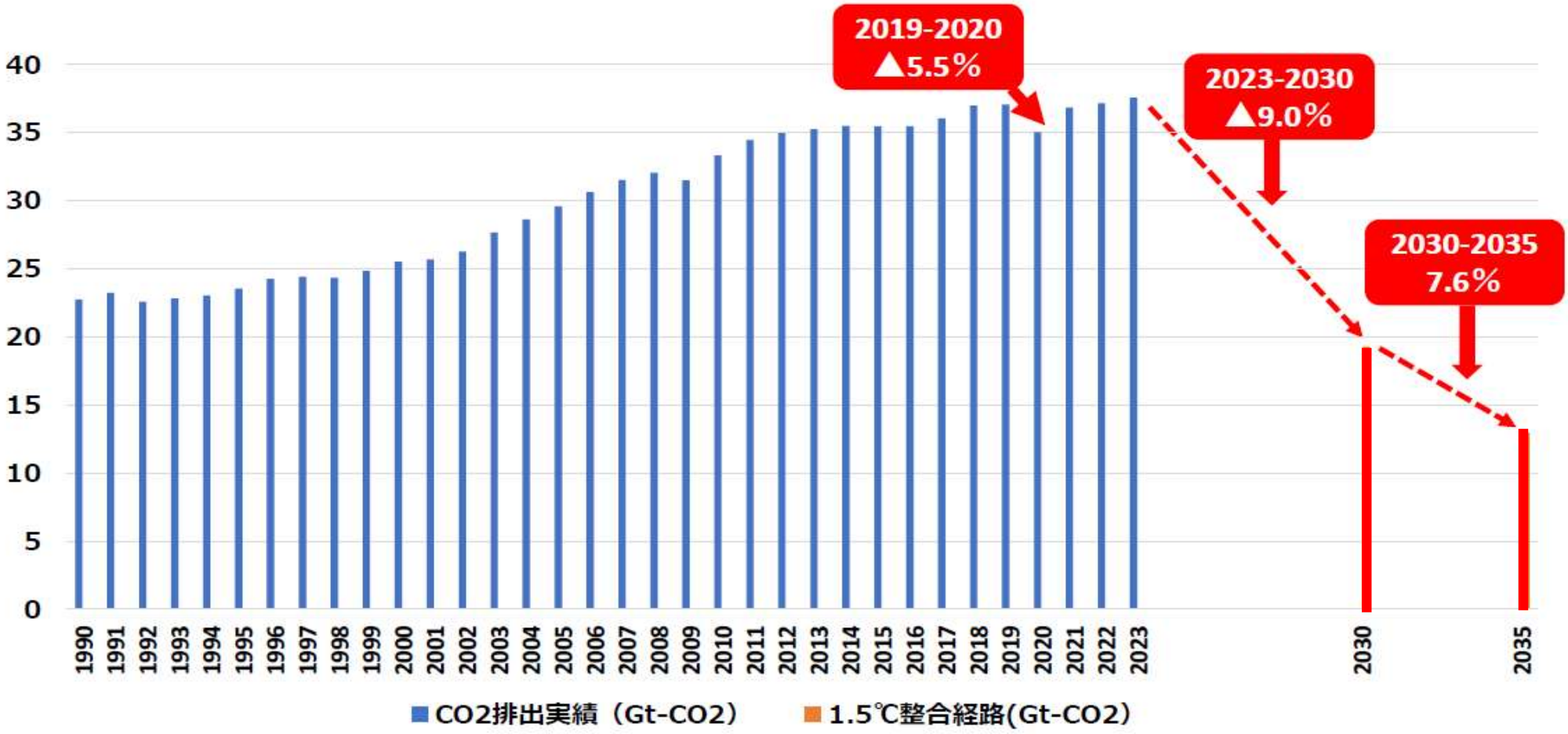
Figure ES.3 Global GHG emissions under different scenarios and the emissions gap in 2030 and 2035




| | | Percentage reduction from 2019 levels (%) | | | |
|---|---|---|---|---|---|
| | | | | | |
| Limit global warming to 1.5°C with no overshoot or only limited overshoot (50%+ probability) | GHG | 43 [34–60] | 60 [49-77] | 69 [58-90] | 84 [73-98] |
| | $CO_2$ | 48 [36-69] | 65 [50-96] | 80 [61-109] | 99 [79-119] |
| Limiting global warming to 2°C (67%+ probability) | GHG | 21 [1-42] | 35 [22-55] | 46 [34-63] | 64 [53-77] |
| | $CO_2$ | 22 [1-44] | 37 [21-59] | 51 [36-70] | 73 [55-90] |

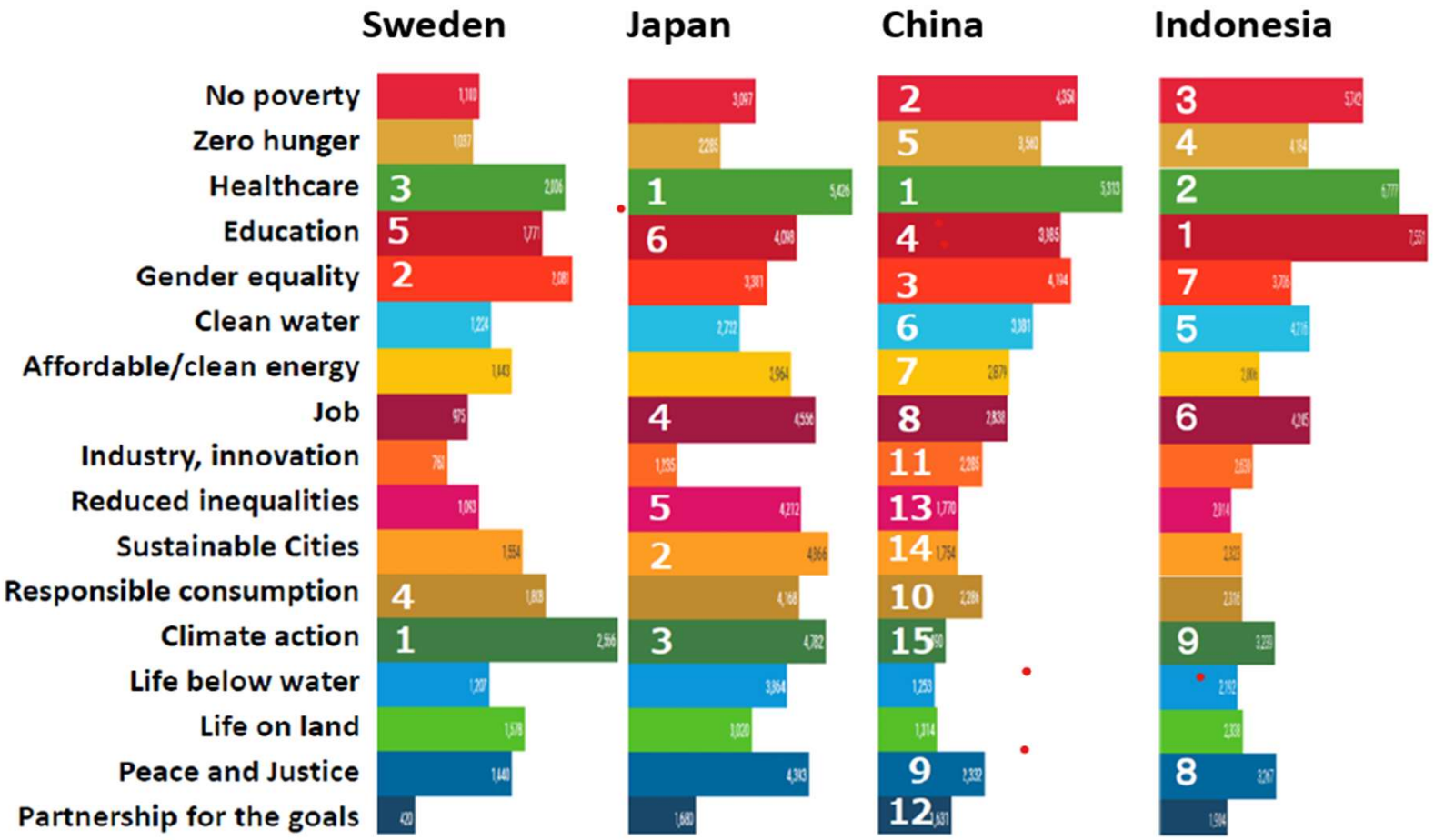
# Will 1.5°C emissions pathway be feasible?

To achieve a 45% reduction by 2030 and a 63% reduction by 2035 compared to 2019 levels, annual reductions exceeding the 5.5% drop from 2019 to 2020 must be sustained: -9.0% (2023–30) and -7.6% (2030–35).



# Priority of Climate Change Mitigation in the SDGs

- The priorities for the 17 SDGs differ entirely by country. While climate change ranks first in Sweden, it is ninth in Indonesia and fifteenth in China.




Source: United Nations My World 2030 (January 2020)

# COP28 Global Stocktake (GST) Decision (13 December 2023)

**1. Energy Transition**

- Taking into account each country's national circumstances, pathways, and approaches, contribute to the following (eight) global efforts through nationally determined contributions:
  - Tripling the global renewable energy capacity by 2030 and doubling the global average rate of improvement in energy efficiency
  - Phasing down unabated coal power
  - Accelerate action during this critical decade to transition away from fossil fuels in energy systems
  - Accelerate zero- and low-emission technologies such as renewable energy, nuclear power, CCUS, and low-carbon hydrogen.
- The role of transition fuels in promoting energy security and energy transition

**3. Financial Needs**

- Support needs mobilised for developing countries' NDC implementation amount to $5.8 trillion to $5.9 trillion for the period up to 2030
- Developing countries' adaptation funding needs amount to $215–387 billion annually until 2030. Achieving net-zero by 2050 requires annual clean energy investments of approximately $4.3 trillion (until 2030) and $5 trillion (2030–50).
- **Ambitious mitigation action (e.g. transition away from dossil fuels) and ambitious funding needs. The former will never be realized without the latter. ➔ Discussions on the New Climate Finance Goal (NCQG) at COP29.**

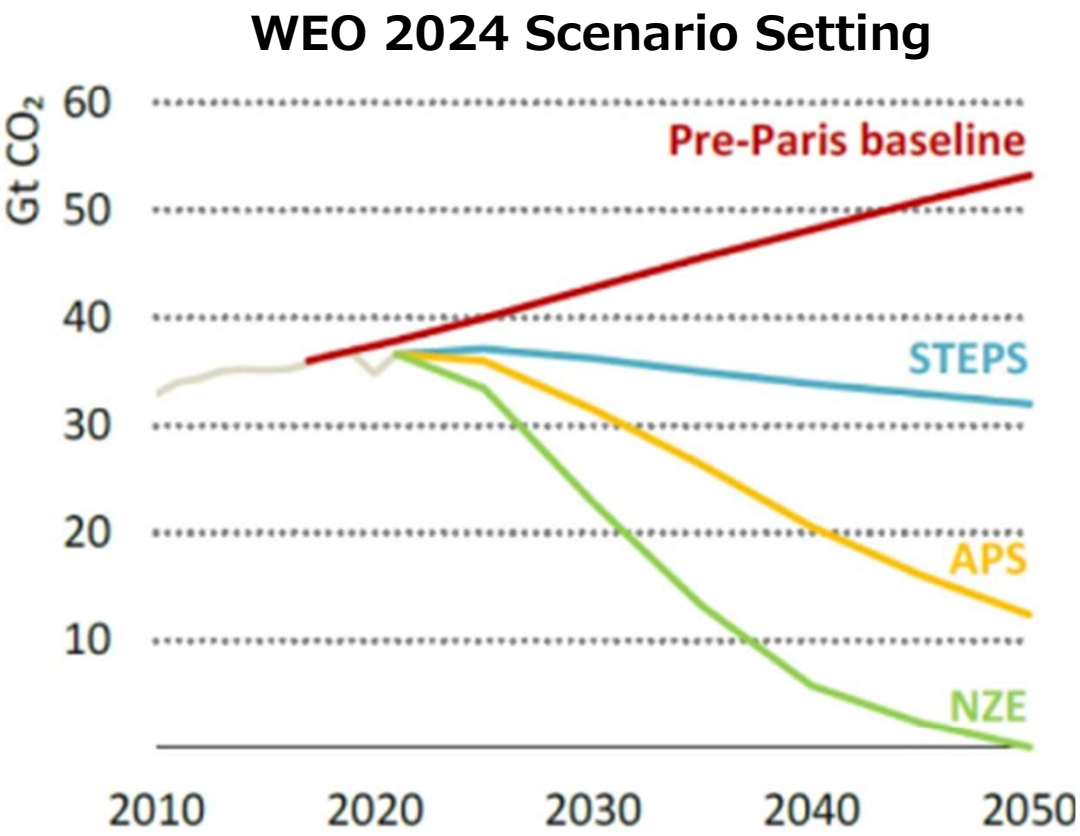
# New funding targets at COP29

**【NCQG】】(COP29 is the 'Finance COP')**

- All stakeholders are urged to cooperate to scale up climate finance for developing countries to at least USD 1.3 trillion annually from all sources, public and private, by 2035.
- In this regard, reaffirming Article 9 of the Paris Agreement and expanding upon the objective referred to in paragraph 53 of Decision 1/CP.21 (USD 100 billion per annum), decide that developed countries shall take the lead in setting a climate action target of at least USD 300 billion per annum for developing countries by 2035.
- Encourages developing countries to contribute voluntarily, including through South-South cooperation
- None of the above provisions shall affect the status of developing countries.

➔ **Developing countries expressed strong dissatisfaction with this outcome. Furthermore, no progress was made on enhancing ambition levels based on the Greenhouse Gas Tax (GST), which developed countries had strongly advocated, nor on energy transitions including the phase-down (out) of coal-fired power and the transition away from fossil fuels.**

# Changes in the IEA's World Energy Outlook (WEO) scenario setting




**The IEA excluded the CPS from its scenarios after 2020. It presented three scenarios: STEPS, APS, and NZE.**

**Stated Policy Scenario (STEPS)**

WEO's reference scenario. The pathway indicated by current policy settings. It reviews sector-specific policies in detail, reflecting energy policies already implemented or with concrete prospects for implementation. Japan's NDC (▲46% by 2030) is reflected here.

**Announced Pledges Scenario (APS)**

A scenario assuming all ambitious targets declared by countries, including long-term net-zero and energy access commitments, are achieved fully and on schedule.

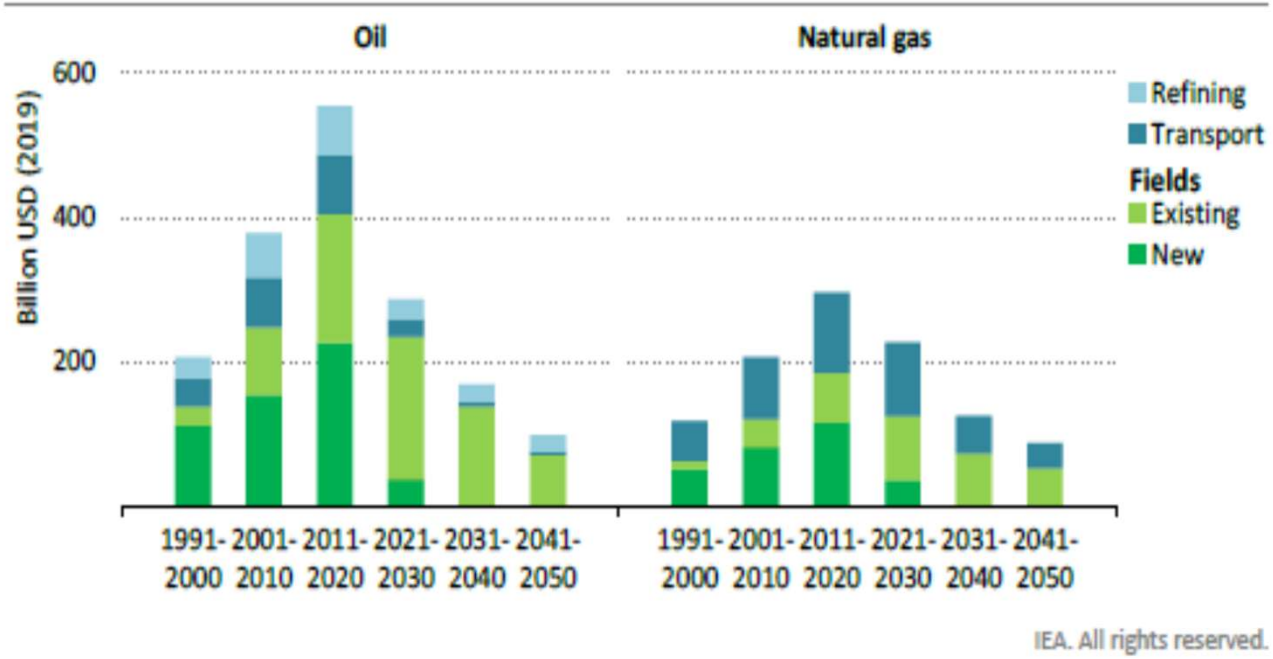
**Net Zero Emissions (NZE)**

A pathway to limit global average temperature rise to 1.5°C while ensuring universal access to modern energy by 2030. STEPS and APS are simulation analyses based on specific policies, whereas NZE is a backcasting analysis working backwards from the 2050 net-zero target.

# New Oil and Gas Investment under NZE2050

**Oil and gas investment under NZE Scenario**

**Figure 3.4** ▷ Investment in oil and natural gas supply in the NZE



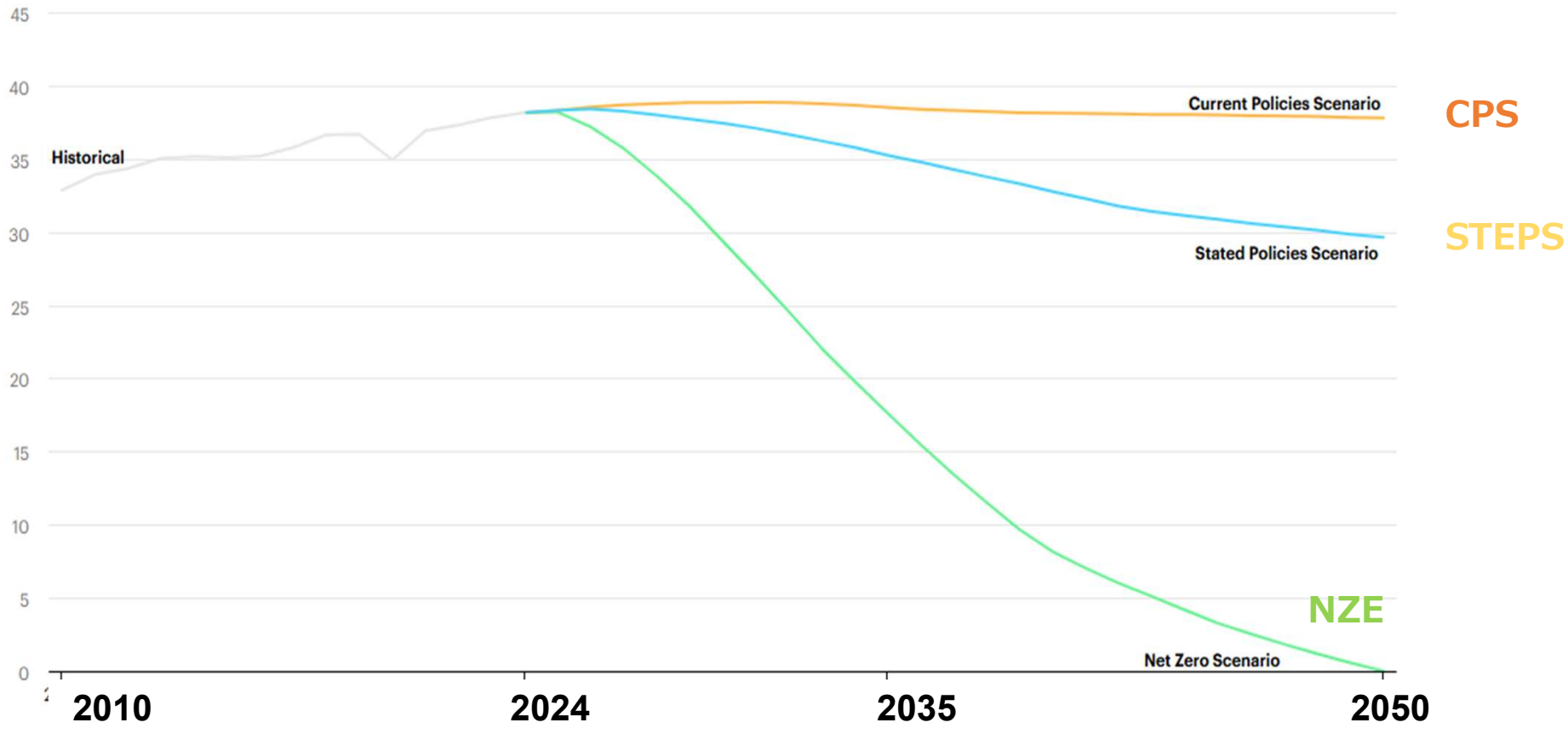



*Once fields under development start production, all upstream oil and gas investment is spent on maintaining production at existing fields*

- In its 2021 NZE2050 analysis, the IEA stated that "no new oil and gas field investments would be needed to achieve carbon neutrality by 2050"
- This contrasts sharply with the IEA's previous warnings that "insufficient upstream oil and gas investment will lead to future supply shortages".
- This provides theoretical grounds for the argument that fossil fuel investment should be excluded to achieve global carbon neutrality by 2050.
- Not included in WEO 2025

Source: World Energy Outlook 2025

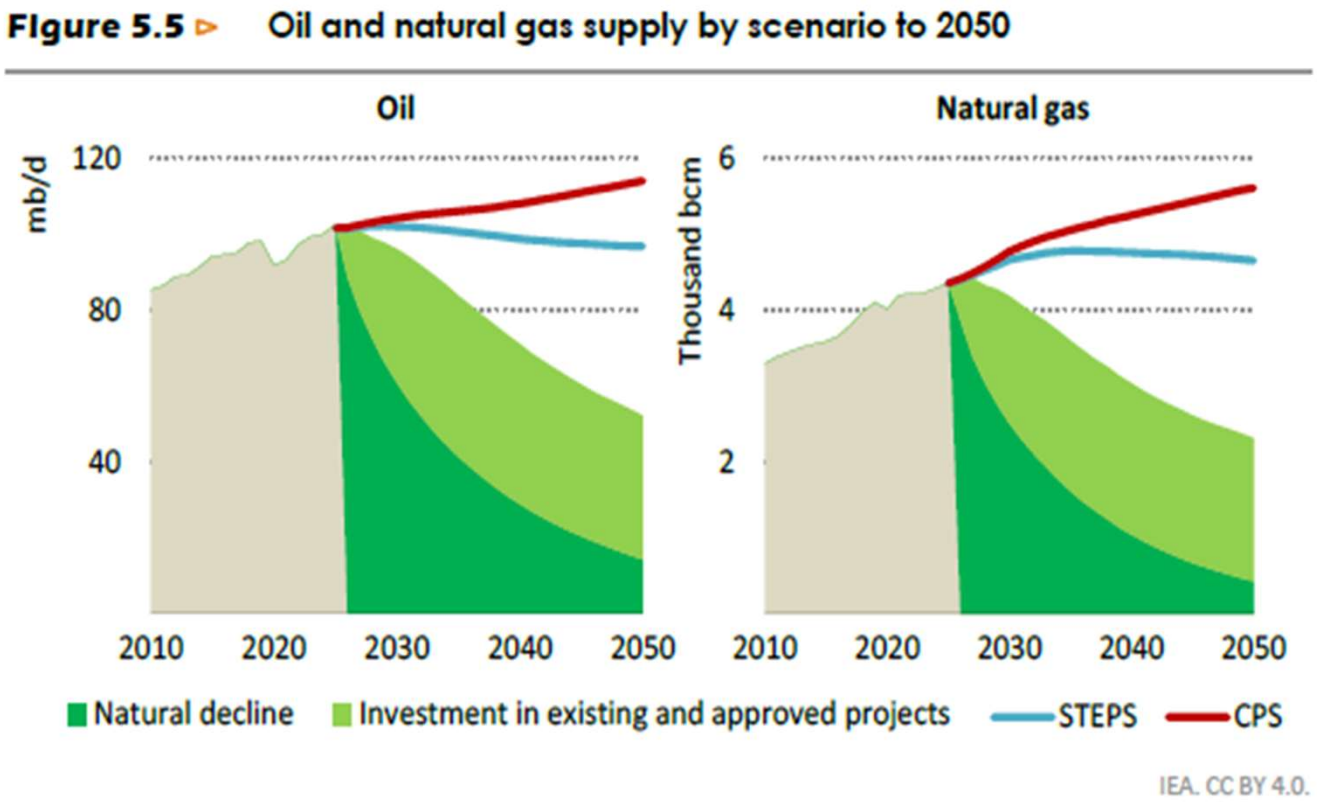
# Emission pathways for each scenario




Source: World Energy Outlook 2025

# The Need of Upstream Oil and Gas Investment

- Under CPS and STEPS, upstream oil and gas investment is insufficient to meet projected demand.
- It refers not only to existing sites but also to the necessity of new upstream development.
- This represents a significant shift from the previous stance that "new upstream oil and gas investment is unnecessary under NZE2050".




*Most investment in both scenarios offsets decline in existing fields, though the CPS requires investment in higher cost supply to meet rising demand*

Source: World Energy Outlook 2025

# Daniel Yergin's Realistic View of the Energy Transition

- **Past energy transitions were driven by technological and economic advantages, whereas today's transition is driven primarily by public policy.** Previous transitions unfolded over more than a century and did not completely replace existing technologies. In contrast, the current transition aims to fully replace existing systems within less than half a century.
- **There are four major challenges in the energy transition:**
  - **Energy security has once again become the top priority following the Ukraine war.**
  - **The USD 100 trillion global economy still relies on hydrocarbons for more than 80% of its energy supply.** Essential materials for modern civilization — such as cement, steel, plastics, and ammonia (fertilizers) — remain heavily dependent on the existing energy system.
  - **While climate change is the most critical issue in the Global North, developing countries in the Global South face other urgent priorities, including economic growth, poverty reduction, and health improvements.** For many developing countries, "energy transition" means shifting from firewood and waste to LNG. EU proposals to ban fossil fuel financing have been criticized as "neo-colonialism."
  - **The transition will sharply increase demand for critical minerals such as copper, lithium, and cobalt.** Developing new mines requires 16–25 years, permitting processes are increasingly complex, and some resource-rich countries oppose new mining projects.
- **Although the direction of the energy transition is clear, its embedded challenges must be recognized.**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# Thank you very much