

9. Importance of reality-based climate targets and adaptation

—Advanced Technologies Scenario as a pathway for reaching the 2°C climate target—

The 2015 Paris Agreement sets a target to limit global warming to well below 2°C above pre-industrial levels and encourages ‘efforts’ to stay below 1.5°C. In other words, the target of the Paris Agreement is 2°C and 1.5°C can be seen as an additional, non-binding target. However, following the issuance of the Special Report on Global Warming of 1.5°C by the Intergovernmental Panel on Climate Change (IPCC) (2018) and the declaration of net-zero emissions targets by a number of key nations around 2020, the 26th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26) held in 2021 passed a ‘resolution’ that contains special language highlighting the significance of efforts to stay below 1.5°C on its own, rather than in tandem with the 2°C target. At present, the Group of Seven (G7) countries including Japan are explicitly committed to the 1.5°C target (except the US Trump administration). In July 2025, the International Court of Justice issued an advisory opinion stating that the Nationally Determined Contributions (NDCs) of the parties to the Paris Agreement must be aligned with the 1.5°C temperature target of the Agreement.

However, in reality, the world’s greenhouse gas emissions continue to rise, and the prospects for achieving the 1.5°C target are becoming increasingly challenging. This chapter analyses the current status of major nations and others regarding the 1.5°C target, and it demonstrates that the 1.5°C target is no longer achievable based on the remaining carbon budget and that the Advanced Technologies Scenario of the IEEJ Outlook 2026 provides a pathway for reaching the alternative 2°C target. The increasing significance of adaptation in efforts to achieve the 2°C target is also discussed.

9.1 Recent developments regarding the 1.5°C target

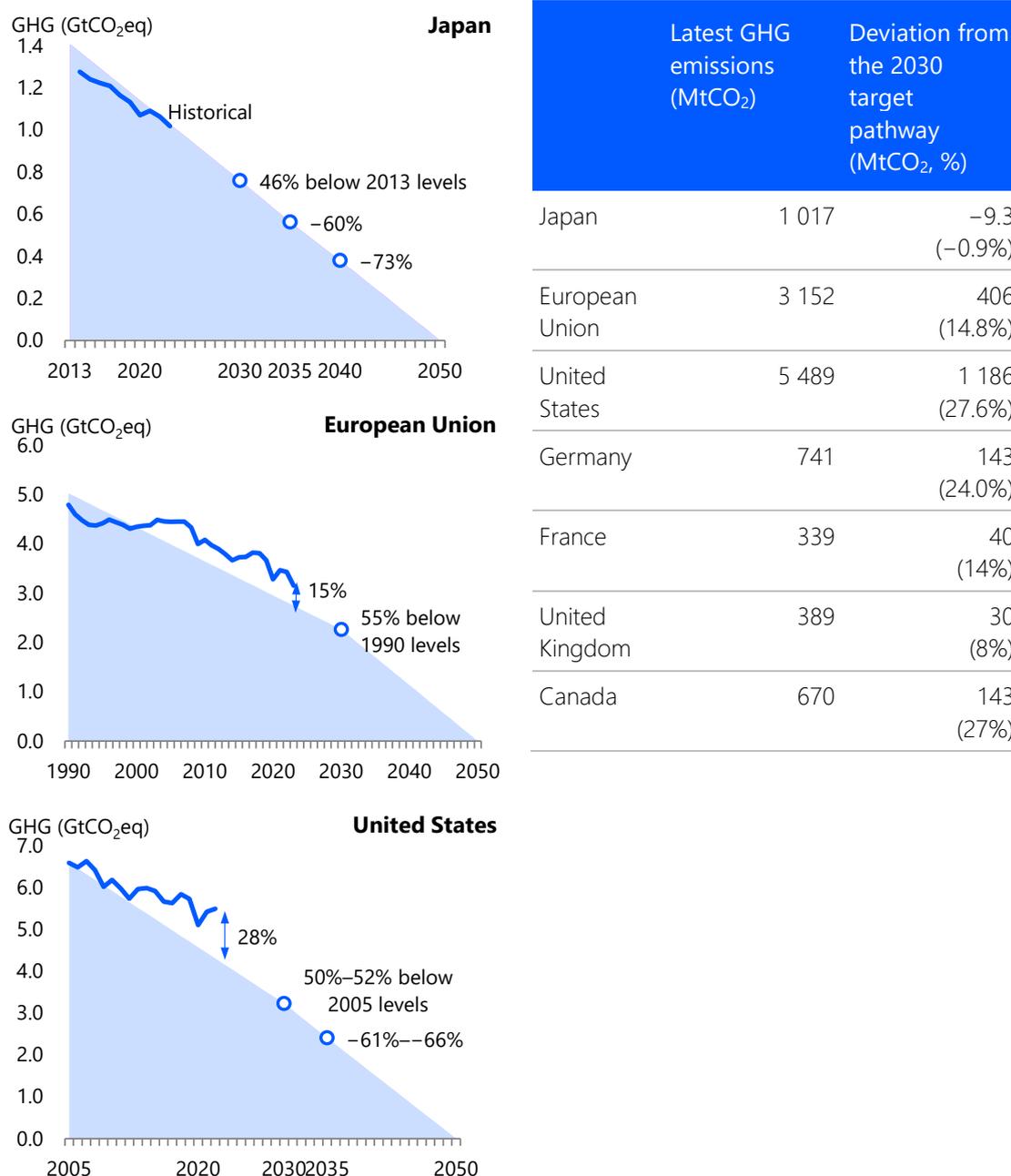
Moves in advanced economies

As mentioned earlier, advanced economies, particularly the G7 countries (excluding the United States; see Section 5.1 for the situation in the United States) are committed to the 1.5°C target. However, the GHG emissions of no country other than Japan are on track to meet the 2030 targets, and emissions remain above the required levels (Figure 9-1)³⁸.

While all countries need to reinforce their emissions reduction measures to reach net-zero in 2050, unlike around 2020, when climate action was a top policy priority, energy security and the need to ensure affordable energy supply have gained much greater weight in recent years. As a result, the G7 countries have faced considerably more difficulty in managing their policies.

³⁸ As Italy has not set its own reduction targets, a strict comparison is not possible; however, when compared to the European Union-wide targets, it is still not on track.

Figure 9-1 | Emission reduction pathways of G7 nations and their progress



The Parties to the Paris Agreement were required to submit their 2035 NDCs by February 2025. However, only 52 countries, including nine advanced economies, have done so as of the end of September 2025. To meet the 1.5°C target, countries were encouraged to set a reduction target of 60% from 2019 levels for their 2035 NDCs based on the global stocktake at COP28 (2023). However, the only advanced economy governments that have met this target are a small number of non-EU European countries such as the United Kingdom, as well as Australia (Table 9-1). Most advanced economies remain committed to the 1.5°C target but are assumed to be taking more realistic actions regarding the 2035 target.

Table 9-1 | 2035 targets in the new NDCs of advanced economies

	2030	2035
Japan	46% reduction from 2013 levels	60% reduction from 2013 levels (54% reduction from 2019 levels)
European Union	55% reduction from 1990 levels	66.25%–72.5% reduction from 1990 levels* ¹ (54%–62% reduction from 2019 levels)
United Kingdom	68% reduction from 1998 levels	81% reduction from 1990 levels (66% reduction from 2019 levels)
Switzerland	50% reduction from 1990 levels	65% reduction from 1990 levels (60% reduction from 2019 levels)
United States (under the Biden administration)	50%–52% reduction from 2005 levels	61%–66% reduction from 2005 levels (55%–61% reduction from 2019 levels)
Canada	40%–45% reduction from 2005 levels	45%–50% reduction from 2005 levels (44%–49% reduction from 2019 levels)
New Zealand	50% reduction from 2005 levels	51%–55% reduction from 2005 levels (50%–54% reduction from 2019 levels)
Norway	55% reduction from 1990 levels	70%–75% reduction from 1990 levels (70%–75% reduction from 2019 levels)
Australia	43% reduction from 2005 levels	62%–70% reduction from 2005 levels (53%–63% reduction from 2019 levels)
Iceland	41% reduction from 2005 levels	50%–55% reduction from 2005 levels (48%–53% reduction from 2019 levels)
Russia	30% reduction from 1990 levels	33%–35% reduction from 1990 levels (39%–44% reduction from 2019 levels)

*1: The next NDC is yet to be released as the IEEJ Outlook 2026 is being written. The information is based on the State of Intent released on 18 September 2025.

Under such circumstances, the leader of the UK Conservative Party, Kemi Badenoch, made a noteworthy comment in March 2025 that ‘Net zero by 2050 is impossible. I don’t say that with pleasure. I want a better future, a better environment for our children. But we have to get real’. The Tories were the ruling party when the United Kingdom hosted COP26. It was the current leader of that same party who stated that net zero is impossible, not for the world, but for the United Kingdom.

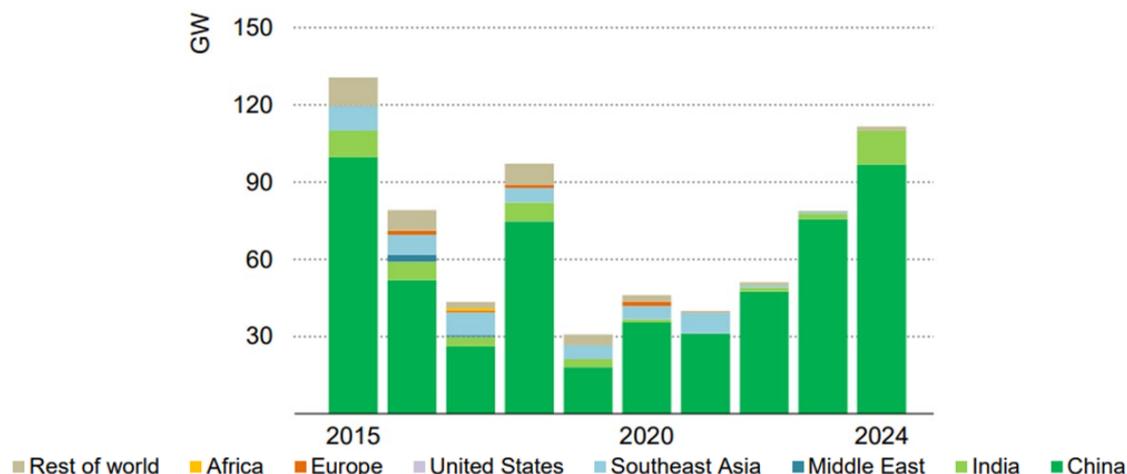
There are moves to revise the 1.5°C target in the private sector as well. The Net-Zero Banking Alliance (NZBA) was launched at COP26 to align the GHG emissions financed by financial institutions with the 1.5°C target. However, with the withdrawal of six key US banks at the end of 2024, and subsequent withdrawals by Japanese banks, the NZBA revised its policy in April 2025 to also recognise the 2°C target.

Moves in emerging economies

One of the reasons for the continued increase in the world's energy-related carbon dioxide (CO₂) emissions is the ongoing growth in coal consumption in China and India. As of 2024, China and India account for 56% and 15%, respectively, of global coal consumption, ranking as the world's first and second largest consumers.

According to the International Energy Agency (IEA), in China, final investment decisions (FIDs) for building 100 GW of coal-fired power plants were made in 2024 alone (Figure 9-2). FIDs for new coal-fired power plants in China decreased to about 30 GW in 2019 but subsequently increased, reaching 100 GW in 2024, the highest level in the last decade.

Figure 9-2 | Final investment decisions for new coal-fired power plants



Source: IEA "World Energy Investment 2025"

It goes without saying that existing coal-fired power plants are being retired as new ones are built. However, only 4.7 GW/year of plant capacity has been scrapped in the last five years, resulting in a significant net increase in coal-fired power generation capacity in China. The installed capacity of renewables has also grown significantly, with 341 GW of solar photovoltaic power generation capacity and 80 GW of wind power generation capacity newly constructed in 2024. However, based on the capacity factor of these renewable power sources in China, the output from new coal-fired capacity would match that of new solar photovoltaic and wind capacity even if the capacity factor of the coal capacities is around 50%. Therefore, building 100 GW of new coal-fired power plants per year would have an immeasurable impact on China's CO₂ emissions.

At the Climate Summit held on the margins of the United Nations General Assembly in New York on 24 September 2025, Chinese leader Xi Jinping announced China's next NDC to 'reduce GHG emissions by 7% to 10% from peak levels by 2035'. European think-tanks estimate that China is actually capable of reducing its CO₂ emissions by at least 30% from 2023 levels by 2035 and staying on track to meet the 1.5°C target, and the view that China's next NDC is insufficient is becoming increasingly widespread.

According to the IEA, in India, FIDs for building 15 GW of coal-fired power plants were made in 2024, again the largest in the last decade. The world's largest coal company, Coal India Limited, which supplies three-fourths of India's coal demand, announced in June 2025 that it would reopen 32 of its defunct coal mines and develop five new ones, citing the inability of renewables to meet the growing demand. The share of coal-fired power generation, which is currently over 70% of the total electricity generated, will still be 50% in 2031–2032, according to the Indian government, indicating that coal will remain in use in the future.

9.2 Comparison of the Advanced Technologies Scenario and the 2°C target

The viability of the climate target was quantitatively evaluated based on the carbon budget³⁹. As mentioned in previous IEEJ Outlook⁴⁰, the remaining carbon budget needed to keep the increase in global temperature below 1.5°C with a 50% probability is quickly decreasing from the level reported at the time of the Sixth Assessment Report (AR6) Synthesis Report (SYR) of the Intergovernmental Panel on Climate Change (IPCC) due to annual emissions. Specifically, IPCC AR6 SYR estimated the remaining carbon budget to be 500 GtCO₂ from 2020 onwards. However, the latest estimate from the Indicators of Global Climate Change (IGCC)⁴¹ (IGCC 2024)⁴² shows a significant decline to 130 GtCO₂ from 2025 onwards. This value is barely four years' worth of emissions at current levels, and, based on a simple calculation using a linear decrease in emissions, the world will need to go net-zero in 2032 (Figure 9-3). According to the IGCC 2024, the difference from the level of 500 GtCO₂ as of IPCC AR6 SYR consists of a decrease of 200 GtCO₂ due to emissions in 2020–2024, a decrease of a little over 100 GtCO₂ due to an upward revision of warming associated with a reduction of cooling aerosols, and a decline of about 40 GtCO₂ due to the rise in estimated warming based on the high temperatures observed in recent years. Given this estimated value, the 1.5°C target is already effectively unattainable. Therefore, the realistic option would be to pursue 2°C as the target aligned with the Paris Agreement. This is not necessarily a step back, but rather represents a return to the original target of the Paris Agreement.

³⁹ The carbon budget is the maximum value of cumulative net CO₂ emissions artificially achieved to keep temperature rise below a certain threshold with a given probability. The residual carbon budget is the amount remaining after subtracting the quantity already emitted in the past.

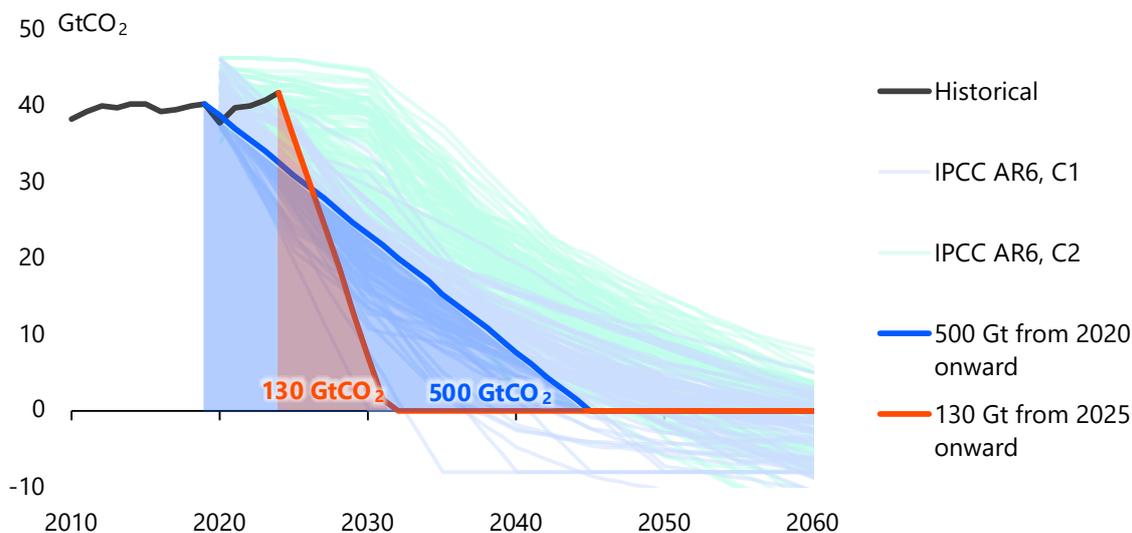
⁴⁰ IEEJ Outlook 2024 and IEEJ Outlook 2025

⁴¹ IGCC is an international research project that publishes the residual carbon budget annually. A similar initiative is the Global Carbon Budget (GCB).

⁴² Forster et al., "Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence", *ESSD*, 17, 2641–2680, 2025.

<https://essd.copernicus.org/articles/17/2641/2025/>

Figure 9-3 | Carbon dioxide emission pathway consistent with the 1.5°C target



Notes: 'Historical' was obtained from Global Carbon Budget 2024⁴³. Including emissions from cement production processes, flaring, land use, land use change and forestry sector. 'IPCC AR6, C1' includes 97 scenarios that fall under 'C1: limiting warming to 1.5°C (>50%) with no or limited overshoot', while 'IPCC AR6 C2' includes 131 scenarios that fall under 'C2: returning to 1.5°C (>50%) after a high overshoot'⁴⁴.

We used the carbon budget concept again to see whether the carbon dioxide (CO₂) emission pathway of the Advanced Technologies Scenario of the IEEJ Outlook 2026 is consistent with the 2°C target. To do so, it is necessary to extend the energy-related CO₂⁴⁵ emission pathway of the Advanced Technologies Scenario, which ends in 2050, into a pathway that continues until anthropogenic CO₂ emissions, including non-energy-related emissions, reach net-zero. For this purpose, we roughly estimated energy-related CO₂ emissions for 2051 onwards, assuming that the pace of reduction in 2050 (−0.61 GtCO₂/year) will continue thereafter. We assumed that emissions would be flat after reaching net-zero. Next, we set the amounts of non-energy-related CO₂ emissions (land-use change, cement process, cement absorption, flaring, etc.) by referring to the Illustrative Mitigation Pathways (IMPs) in the IPCC AR6 Working Group 3 (WG3) report. Among the IMPs with various mitigation levels, for non-energy-related CO₂ emissions, we referred to the Moderate Action (ModAct) aligned with the climate policies based on the Nationally Determined Contributions (NDCs) submitted in 2020, to adopt a slightly conservative assumption. Lastly, non-energy-related CO₂ emissions and energy-related CO₂ emissions were aggregated to obtain an estimated CO₂ pathway.

The estimated CO₂ pathway reaches net-zero in 2073, as shown in Figure 9-4. As the IPCC AR6 WG3 report assumes that the 2°C CO₂ emission pathway reaches net-zero around 2070–2080 (with a 67% probability)⁴⁶, the estimated pathway appears broadly consistent with the 2°C target.

⁴³ Global Carbon Budget, "GCB 2024". <https://globalcarbonbudget.org/gcb-2024/>.

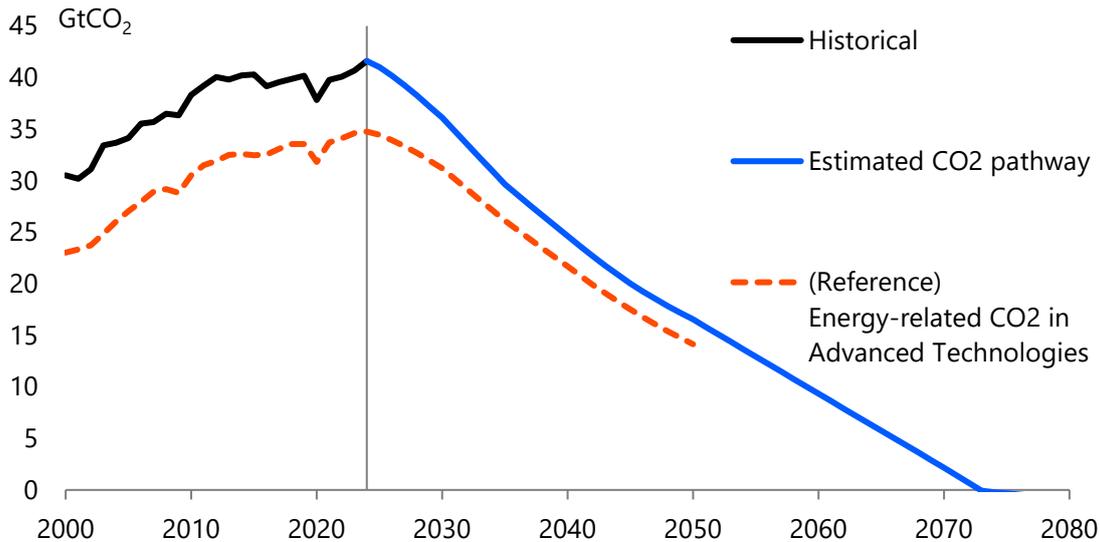
⁴⁴ Byers et al., "AR6 Scenarios Database hosted by IIASA", International Institute for Applied Systems Analysis, 2022. <https://data.ene.iiasa.ac.at/ar6/#/login?redirect=%2Fworkspaces>.

⁴⁵ The amount removed via Direct Air Capture and Storage (DACCS) has been taken into account.

⁴⁶ IPCC, "Summary for Policymakers. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change", 2022, Figure SPM.5. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

However, our estimate must be compared with the latest remaining carbon budget for accuracy. The total CO₂ emissions along the pathway from 2025 until net-zero is reached are 906 GtCO₂, which is a level capable of limiting the global temperature increase to within 2°C (50% probability) based on the latest remaining carbon budget (Table 9-2). However, total emissions slightly exceed the remaining carbon budget of IGCC 2024 for the 2°C target (67% probability).

Figure 9-4 | Estimated anthropogenic CO₂ emission pathway until reaching net-zero, created by extending the energy-related CO₂ emission pathway of the Advanced Technologies Scenario to 2050



Notes: 'Historical' was obtained from Global Carbon Budget 2024⁴⁷. '(Reference) Advanced Technologies Scenario' is the energy-related CO₂ emission pathway of the Advanced Technologies Scenario. 'Estimated pathway' is the estimated anthropogenic CO₂ emission pathway until reaching net-zero, created by extending the energy-related CO₂ emission pathway of the Advanced Technologies Scenario to 2050.

⁴⁷ Global Carbon Budget, "GCB 2024". <https://globalcarbonbudget.org/gcb-2024/>.

Table 9-2 | Comparison of cumulative CO₂ emissions from the estimated pathway and the remaining carbon budget

Scenario	Cumulative CO ₂ from 2025 onwards (GtCO ₂)	
Estimated pathway (cumulative total till net-zero is reached)	906	
2°C (50% probability)	IPCC AR6 SYR (start year adjusted)	1 150
	GCB 2024	1 110
	IGCC 2024	1 050
2°C (67% probability)	IPCC AR6 SYR (start year adjusted)	950
	GCB 2024	Not specified
	IGCC 2024	870
2°C (50% probability)	IGCC 2024	490

Note: As the remaining carbon budget in IPCC AR6 SYR is for the period starting from 2020, the emissions for the five years from 2020 to 2024 (200 GtCO₂) have been removed to obtain the values in the table.

Given the uncertainty of the estimated energy-related CO₂ pathway and remaining carbon budget in this analysis, and to maximise the probability of achieving the 2°C target, it is important to continue exploring possibilities for deeper emissions reductions beyond those in the Advanced Technologies Scenario.

9.3 Adaptation

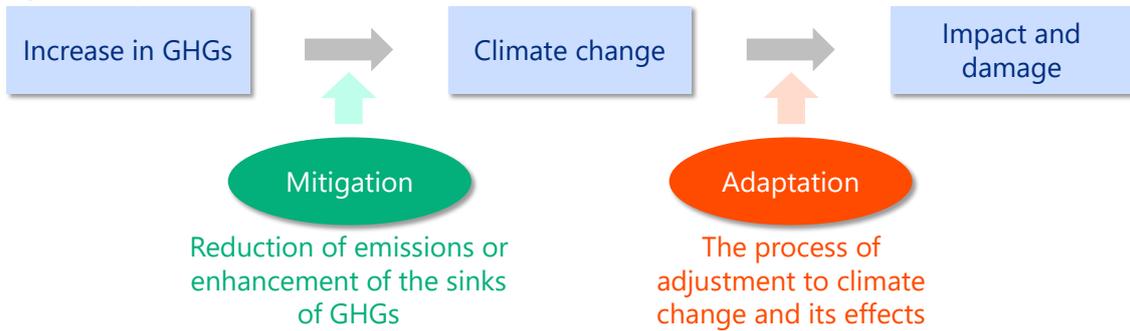
What is adaptation?

Mitigation (reduction) actions have not reached the scale or degree necessary to limit the increase in average global temperature in line with the long-term target of the Paris Agreement, and the temperatures are rapidly approaching and, in some cases, surpassing 1.5°C above pre-industrial levels. The unprecedented frequency and intensity of recent climate impacts underscore their scale and the challenge of adapting to them. Effective and appropriate adaptation actions are needed more urgently than ever.

Measures to address climate change can be divided into 'mitigation' and 'adaptation'. 'Mitigation' means reducing greenhouse gases (GHGs) and expanding sinks to prevent climate change from worsening. On the other hand, 'adaptation' is the process of adjusting to and responding to climate change and its impacts to reduce the damage (Figure 9-5).

It is important to first alleviate the impacts of climate change through mitigation, and, where this proves insufficient, implement adaptation measures as well. With the 1.5°C target becoming effectively unachievable, adaptation will increase in importance going forward.

Figure 9-5 | What is adaptation?



How large is the adaptation finance gap?

On the demand for adaptation financing, the Adaptation Gap Report 2023⁴⁸ of the United Nations Environment Programme (UNEP) describes the method for estimating adaptation financing needs and modelled adaptation costs, as well as their results. Adaptation financing needs were estimated by evaluating and analysing those presented in the National Adaptation Plans (NAPs) and the Nationally Determined Contributions (NDCs), by extrapolating the results to all countries including those that have not submitted their NAPs or NDCs. Modelled adaptation costs estimate the economic impacts of climate change and evaluate the costs required to reduce those impacts. It should be noted that the modelled costs and financing needs do not include private sector adaptation needs such as those for private infrastructure, increased air-conditioning demand, and impacts on labour productivity due to rising temperatures.

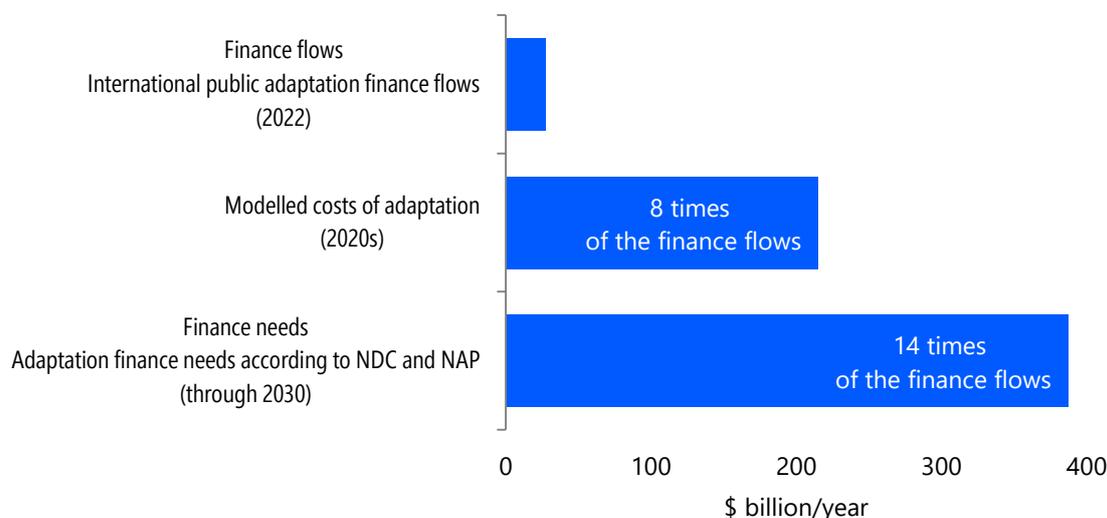
UNEP's Adaptation Gap Report 2024⁴⁹ presents updated estimates. For adaptation needs, the modelled costs of adaptation amounted to 215 billion dollars per year and the financing needs to \$387 billion per year, while merely \$28 billion were provided to developing countries via international public adaptation finance flows in 2022 (Figure 9-6). We can see there still lies an extremely large gap if we compare the adaptation needs and the international public finance flows in 2022. There is still an extremely large gap between the adaptation needs and the international public finance flows in 2022. The finance needed for adaptation is 8 to 14 times the amount currently available. The priority is to bridge this significant gap in adaptation finance.

For adaptation finance and mitigation finance, Article 9.4 of the Paris Agreement stipulates that 'the provision of scaled-up financial resources should aim to achieve a balance between adaptation and mitigation'. This is understood to mean that the ratio of adaptation to mitigation finance should be brought to 1:1.

⁴⁸ <https://www.unep.org/resources/adaptation-gap-report-2023>

⁴⁹ <https://www.unep.org/resources/adaptation-gap-report-2024>

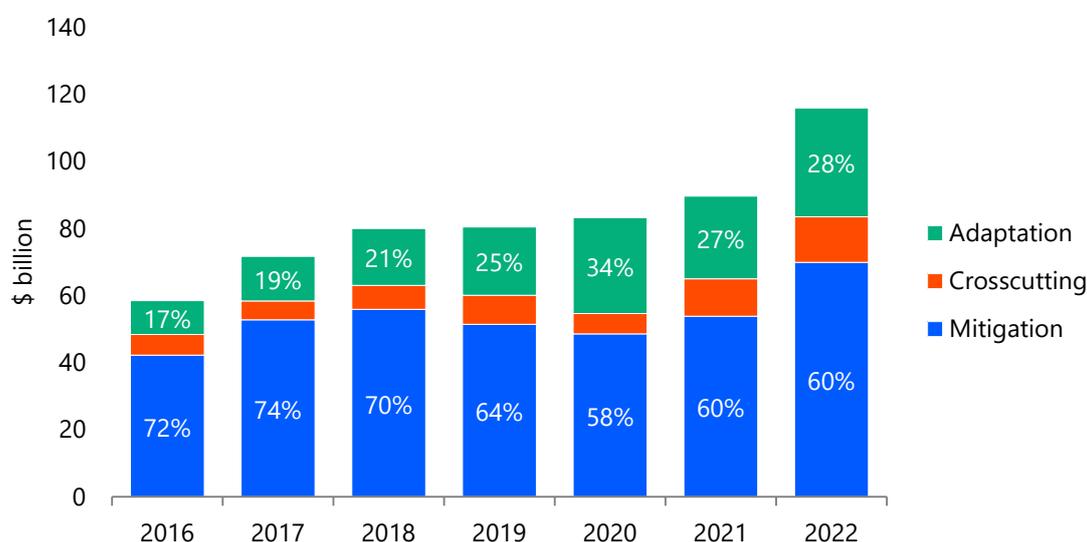
Figure 9-6 | Adaptation finance gap



Source: Created based on UNEP (2024) Adaptation Gap Report 2024.

If we compare the amounts of adaptation and mitigation finance within the climate finance provided and mobilised by advanced economies, mitigation finance accounted for 72% and 60% in 2016 and 2022, respectively (Figure 9-7). On the other hand, adaptation finance accounted for 17% and 28% in those same years, remaining far short of the amount of mitigation finance. It is necessary to take measures to ensure a balance between adaptation and mitigation finance.

Figure 9-7 | Climate finance provided and mobilised by area (including private sector finance)



Source: Created based on Organisation for Economic Co-operation and Development (OECD) (2024), Climate Finance Provided and Mobilised by Developed Countries in 2013–2022.

Various areas of adaptation

UNEP’s Adaptation Gap Report gives the following as the key areas and sectors for adaptation: ‘infrastructure, energy and settlement’, ‘water and floods’, ‘agriculture and fisheries’, ‘coastal and

marine resources', 'forests and ecosystems', 'extreme weather and disaster risk' and 'human health'. These areas and sectors are described in detail in Table 9-3.

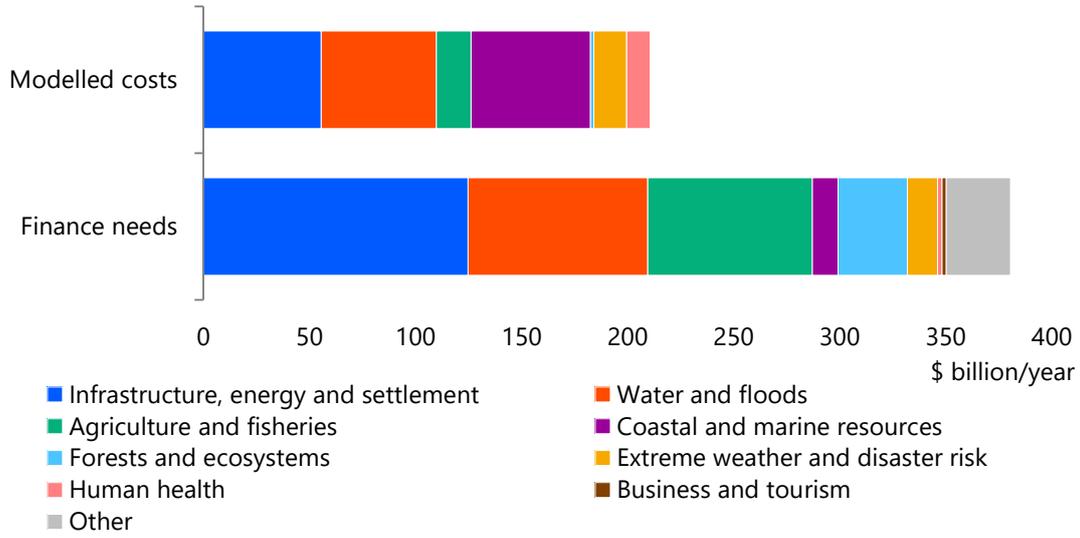
Table 9-3 | Key areas with adaptation needs

Area/sector	Description
Infrastructure, energy and settlement	Making infrastructure resilient in the energy and transportation subsectors
Water and floods	River flood protection (structures)
Agriculture and fisheries	Agricultural research and development, water management and infrastructure to address the impact of climate change on chronic hunger Addressing changes in fish catch potential, improving marine and coastal ecosystems (expanding marine protected areas) and safety at sea (responding to hazards from tropical windstorms, etc.)
Coastal and marine resources	Coastal protection (to address flood risks using dikes, etc.) and beach nourishment (to reduce erosion)
Forests and ecosystems	Expanding protected areas
Extreme weather and disaster risk	Weather and climate services (early warning systems, etc.) and social protection (funding for shock (climate extremes) response programs)
Human health	Disease control to address increase in malaria, dengue and diarrhoeal diseases, heat-alert schemes and supporting health sector responses to address increased heat-related mortality, disease surveillance, and making future water, sanitation and hygiene (WASH) investment resilient

Source: Created based on UNEP (2023) Adaptation Gap Report 2023.

The key adaptation areas with high financing needs are 'agriculture and fisheries', 'water and floods' and 'infrastructure, energy and settlement', while those with high modelled costs are 'water and floods', 'infrastructure, energy and settlement' and 'coastal and marine resources' (Figure 9-8). Other areas that make up a large portion are 'forests and ecosystems' in terms of high financing needs and 'human health' with high modelled costs. It is necessary to consider which areas to prioritise for adaptation based on actual and future needs.

Figure 9-8 | Finance needs and modelled costs



Source: Created based on UNEP (2023/2024) Adaptation Gap Report 2023 and 2024.