United Nations FCCC/IDR.8/DEU–FCCC/TRR.5/DEU

Framework Convention on Climate Change

Distr.: General
4 January 2024

English only

Report on the technical review of the eighth national communication and the technical review of the fifth biennial report of Germany

Parties included in Annex I to the Convention were requested by decision 6/CP.25 to submit their eighth national communication to the secretariat by no later than 31 December 2022. According to decision 15/CMP.1, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol are required to include in their national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. This report presents the results of the technical review of the eighth national communication and relevant supplementary information under the Kyoto Protocol of Germany, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

Developed country Parties were requested by decision 6/CP.25 to submit their fifth biennial report to the secretariat by no later than 31 December 2022. This report presents the results of the technical review of the fifth biennial report of Germany, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention".

The review of these submissions took place in Dessau, Germany, from 11 to 15 September 2023.

Contents

Abbreviations and acronyms

AEA	annual emission allocation
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
ERT	expert review team
ESD	European Union effort-sharing decision
ESR	European Union effort-sharing regulation
EU	European Union
EU ETS	European Union Emissions Trading System
GCOS	Global Climate Observing System
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
N_2O	nitrous oxide
NA	not applicable
NAMA	nationally appropriate mitigation action
NC	national communication
NDC	nationally determined contribution
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
OECD	Organisation for Economic Co-operation and Development
PaMs	policies and measures
PFC	perfluorocarbon
reporting guidelines for supplementary information	“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol. Part II: Reporting of supplementary information under Article 7, paragraph 2”
SF_6	sulfur hexafluoride
UNFCCC reporting guidelines on BRs	“UNFCCC biennial reporting guidelines for developed country Parties”
UNFCCC reporting guidelines on CTF tables	“Common tabular format for ‘UNFCCC biennial reporting guidelines for developed country Parties’”
UNFCCC reporting guidelines on NCs	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”
WAM	‘with additional measures’
WEM	‘with measures’
WOM	‘without measures’

I. Introduction and summary

A. Introduction

1. This is a report on the in-country technical review of the NC8 and BR5 of Germany. The review was organized by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part IV: UNFCCC guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention" and "Part V: UNFCCC guidelines for the technical review of national communications from Parties included in Annex I to the Convention" (annex to decision 13/CP.20), and the "Guidelines for review under Article 8 of the Kyoto Protocol" (annex to decision 22/CMP.1 and annex I to decision 4/CMP.1).

2. In accordance with decision 13/CP.20, a draft version of this report was transmitted to the Government of Germany, which provided comments that were considered and incorporated into this final version of the report.

3. The review was conducted from 11 to 15 September 2023 in Dessau, Germany, by the following team of nominated experts from the UNFCCC roster of experts: Vidhee Avashia (India), Angela Fiore (Italy), Alejandra Maria Guevara (Honduras), Baasansuren Jamsranjav (Mongolia), Sandra Boitumelo Motshwanedi (South Africa) and Manfred Ritter (Austria). Baasansuren Jamsranjav and Manfred Ritter were the lead reviewers. The review was coordinated by Luca Birigazzi and Davor Vesligaj (secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC8 of Germany in accordance with the UNFCCC reporting guidelines on NCs,[1] the reporting guidelines for supplementary information, in particular the supplementary information required under Article 7, paragraph 2, and on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol[2] and of the information reported in the BR5 of Germany in accordance with the UNFCCC reporting guidelines on BRs.[3]

1. Timeliness

5. The NC8 was submitted on 3 February 2023, after the deadline of 31 December 2022 mandated by decision 6/CP.25. The corrigendum to the NC8 was submitted on 29 September 2023 to address issues raised during the review. The submitted corrigendum included changes and additions to the supplementary information related to the Kyoto Protocol. Detailed information on improvements related to the submitted corrigendum is provided in paragraph 13 below. Unless otherwise specified, the information and values from the latest submission are used in this report.

6. Germany did not inform the secretariat about its difficulties with making a timely NC8 submission. In accordance with decision 13/CP.20, a Party should inform the secretariat thereof by the due date of the submission in order to facilitate the arrangement of the review process. The ERT noted with great concern the delay in the submission and recommended that Germany make its next submission on time.

7. The BR5 was submitted on 3 February 2023, after the deadline of 31 December 2022 mandated by decision 6/CP.25. The CTF tables were submitted on 23 December 2022. The CTF tables were resubmitted on 11 and 28 September 2023 to address issues raised during the review. The resubmission included changes and additions to CTF tables 3, 4 and 6. Detailed information on improvements related to the resubmission is provided in paragraph

[1] Decision 6/CP.25, annex.
[2] Decision 15/CMP.1, annex, and decision 3/CMP.11, annex III.
[3] Decision 2/CP.17, annex.

13 below. Unless otherwise specified, the information and values from the latest submission are used in this report.

8. Germany did not inform the secretariat about its difficulties with making a timely BR5 submission. In accordance with decision 13/CP.20, a Party should inform the secretariat thereof by the due date of the submission in order to facilitate the arrangement of the review process. The ERT noted with great concern the delay in the submission of the textual part of the BR5.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

9. Issues and gaps identified by the ERT related to the information reported by Germany in its NC8 are presented in tables 1–2. The information reported, including the supplementary information under the Kyoto Protocol, mostly adheres to the UNFCCC reporting guidelines on NCs. The ERT concludes that the issues of a mandatory nature related to supplementary information under the Kyoto Protocol do not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.

10. Germany made improvements to the reporting in its NC8 compared with that in its NC7, including by addressing recommendations and encouragements from the previous review report. The ERT noted that the Party has improved:

(a) The transparency of the information reported on PaMs by providing information in accordance with the UNFCCC reporting guidelines on NCs, including by presenting the information by gas, summarizing it in a table, using the required subject headings, and including information on how its PaMs are modifying longer-term GHG emission trends;

(b) The transparency of the information reported on projections and the total effects of PaMs by providing an explanation for not reporting WOM scenario projections; a description of the timeline and processes involved in preparing the projections and an explanation for not using the latest inventory data available as a starting point for the projections; a summary of the sensitivity of the projections in relation to underlying assumptions; and a description of changes to the models or methodologies used for the projections;

(c) The transparency of the information reported on financial, technological and capacity-building support by including information on private climate finance mobilized through public sector funding;

(d) The transparency of the information reported on vulnerability assessment, climate change impacts and adaptation measures by cross-referencing relevant information on the issues related to vulnerability and adaptation assessments;

(e) The transparency of the information reported on research and systematic observation by highlighting the efforts made with regard to the use of general circulation models;

(f) The completeness of the supplementary information related to the Kyoto Protocol by providing information on elements required by paragraph 30(c)–(g) of the annex to decision 15/CMP.1 in conjunction with decision 3/CMP.11 and cross-references to the relevant sections of its 2023 NIR where the national system is described in detail; and information on the domestic and regional legislative arrangements and enforcement and administrative procedures established pursuant to the implementation of the Kyoto Protocol;

(g) The completeness of the supplementary information related to the Kyoto Protocol by providing updated information on its national system; a cross reference to its most recent annual submission where an up-to-date description of the national registry is provided; additional information on how the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects; and information on how the Party ensures the adequacy and predictability of financial resources provided.

Table 1
Assessment of completeness and transparency of mandatory information reported by Germany in its eighth national communication

Section of NC	*Completeness*	*Transparency*	*Reference to description of recommendation*
Executive summary	Complete	Transparent	–
National circumstances relevant to GHG emissions and removals	Complete	Transparent	–
GHG inventory	Complete	Transparent	–
PaMs	Complete	Transparent	–
Projections and the total effect of PaMs	Mostly complete	Mostly transparent	Issues 2–3 and 6 in table I.2
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	–
Financial resources and transfer of technology	Mostly complete	Mostly transparent	Issues 1–5 in table I.3
Research and systematic observation	Complete	Transparent	–
Education, training and public awareness	Complete	Transparent	–

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in annex I. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

Table 2
Assessment of completeness and transparency of mandatory supplementary information under the Kyoto Protocol reported by Germany in its eighth national communication

Supplementary information under the Kyoto Protocol	*Completeness*	*Transparency*	*Reference to description of recommendation*
National system	Complete	Transparent	–
National registry	Complete	Transparent	–
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	–
PaMs in accordance with Article 2	Complete	Transparent	–
Domestic and regional programmes and/or arrangements and procedures	Complete	Transparent	–
Information under Article 10[a]	Complete	Transparent	–
Financial resources	Complete	Transparent	–
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	–

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in annex I. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] The assessment refers to information provided by the Party on the provisions contained in Article 4, paras. 3, 5 and 7, of the Convention, as reported under Article 10 of the Kyoto Protocol, which is relevant to Parties included in Annex II to the Convention only. An assessment of the information on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example research and systematic observation.

11. Issues and gaps identified by the ERT related to the reported information by Germany in its BR5 are presented in table 3. The information reported mostly adheres to the UNFCCC reporting guidelines on BRs.

12. Germany made improvements to the reporting in its BR5 compared with that in its BR4, including by addressing recommendations and encouragements from the previous review report. The ERT noted that the Party has improved:

(a) The transparency of the information reported on GHG emissions and trends by reporting information on changes to its national inventory arrangements;

(b) The transparency of the information reported on progress in achievement of quantified economy-wide emission reduction targets and relevant information by ensuring that ESD allocations reported in the BR are consistent with those reported in the EU transaction log, improving the consistency of the information on targets reported in the BR and CTF tables, providing information clarifying the use of international market-based mechanisms by EU ETS operators in Germany, and providing additional information on the establishment of national rules for taking local action against domestic non-compliance with emission reduction targets;

(c) The transparency of the information reported on projections and the total effects of PaMs by providing an explanation for not reporting WOM scenario projections, a summary of the sensitivity of the projections in relation to underlying assumptions and a description of changes to the models or methodologies used for the projections;

(d) The transparency of the information reported on the provision of financial, technological and capacity-building support by including information on private climate finance mobilized through public sector funding and providing additional information in CTF table 7 on project evaluation using the OECD Rio markers.

Table 3
Summary of completeness and transparency of mandatory information reported by Germany in its fifth biennial report

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendation*
GHG emissions and removals	Complete	Transparent	–
Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies	Complete	Transparent	–
Progress in achievement of targets	Complete	Mostly transparent	Issues 1 and 3 in table II.1 Issues 2 and 5 in table II.2
Provision of support to developing country Parties	Mostly complete	Mostly transparent	Issues 1–3 and 5 in table II.3

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in annex II. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

13. The submission of the corrigendum to the NC8 and resubmission of the CTF tables made during the review improved:

(a) The GHG inventory information reported by providing updated information on national inventory arrangements;

(b) The information reported on progress in achievement of quantified economy-wide emission reduction targets and relevant information by filling in CTF table 4;

(c) The supplementary information related to the Kyoto Protocol by providing missing and updated information on the national system; missing information on domestic and regional legislative arrangements and enforcement and administrative procedures established pursuant to the implementation of the Kyoto Protocol; additional information its national registry; how the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects; and information on how the Party ensures the adequacy and predictability of financial resources provided to developing country Parties.

II. Technical review of the information reported in the eighth national communication and fifth biennial report

A. National circumstances relevant to greenhouse gas emissions and removals

1. Technical assessment of the reported information

14. The NC8 contains key data on legislation, population trends, geography and land use, climate and climate change, economic developments, energy, transport, the buildings sector, industry, trade, the services sector, agriculture, forestry, resource efficiency and wastewater.

15. Germany is a federation of 16 federal states (Länder). The Constitution of Germany establishes the division of responsibilities between the Federal Government and the federal states.

16. Between 1990 and 2020 the population and GDP of Germany increased by 4.7 and 47.9 per cent respectively, while GHG emissions per capita decreased by 43.7 per cent. Overall, Germany's total GHG emissions have been decreasing since 1990 owing mainly to economic factors and the implementation of climate change PaMs. The emission reductions in the early 1990s stemmed primarily from the reunification of Germany and the subsequent restructuring of the economy, including switching to cleaner fuels and decommissioning obsolete facilities. Energy-related emissions represent the largest contribution to the country's GHG emissions. Primary energy consumption decreased by 16.7 per cent in 2021 compared with the 1990 level, reaching its lowest level in 2020 owing to the impact of the coronavirus disease 2019 pandemic. The share of renewable energy sources in primary energy consumption increased considerably from 1.3 per cent in 1990 to 15.7 per cent in 2021. Furthermore, the emergency package of energy-focused measures adopted in 2022 stipulates that 80 per cent of Germany's gross electricity consumption is to be provided by renewable energy sources by 2030.

17. The federal Climate Change Act provides the legal framework for ensuring fulfilment of Germany's climate goals and compliance with relevant EU targets. Germany amended its Climate Change Act in 2021 and set more ambitious emission reduction targets (see para. 52 below).

2. Assessment of adherence to the reporting guidelines

18. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

B. Greenhouse gas inventory information[4]

1. Technical assessment of the reported information

19. Germany reported information in its BR5 and NC8 on its historical GHG emissions and inventory arrangements. Total GHG emissions[5] excluding emissions and removals from LULUCF decreased by 41.6 per cent between 1990 and 2020, while total GHG emissions including net emissions or removals from LULUCF decreased by 42.9 per cent over the same period. Emissions peaked in 1990 and decreased thereafter. Emissions excluding emissions and removals from LULUCF in 2021 increased by 4.0 per cent compared with 2020. Energy-related emissions remain predominant but have continued to decrease over time, especially in recent years, with annual variations influenced by winter temperatures which determine

[4] GHG emission data in this section are based on Germany's 2023 annual submission, version 1.0, which has not yet been subject to review. All emission data in subsequent chapters are based on Germany's BR5 CTF tables unless otherwise noted.

[5] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

heating patterns. The decrease in total emissions was driven mainly by factors such as the use of natural gas as a substitute for solid and liquid fuels, the increased use of renewable energy sources, the implementation of emission reduction measures in industry, reductions in livestock populations, the reduced use of fertilizer and a decrease in landfilling of solid waste. The greatest reductions occurred in the chemical industry sector, in particular in adipic acid production and in solvents and other product use through a decrease in the use of N_2O in anaesthesia, and in the waste sector through increased recycling, including composting, and a reduction in the amount of waste landfilled.

20. Table 4 illustrates the emission trends by sector and by gas for Germany. The emissions reported in the 2023 annual submission are higher than the data reported in CTF table 1 for 2020, with total GHG emissions excluding LULUCF 0.3 per cent higher and total GHG emissions including LULUCF 2.5 per cent higher. These differences are due to recalculations made in the 2023 annual submission, mainly for the energy sector because of the use of the final version of the energy balance instead of the draft version used for the 2022 annual submission, and for the LULUCF sector owing to the inclusion of wetlands in the calculations.

Table 4
Greenhouse gas emissions by sector and by gas for Germany for 1990–2021

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2020*	*2021*	*1990–2020*	*2020–2021*	*1990*	*2021*
Sector									
1. Energy	1 044 156.41	872 551.55	800 319.92	613 329.46	642 350.64	–41.3	4.7	83.5	84.5
A1. Energy industries	430 973.02	359 650.45	355 787.03	213 169.21	240 460.61	–50.5	12.8	34.4	31.6
A2. Manufacturing industries and construction	185 672.58	128 227.34	124 357.93	120 557.78	126 071.77	–35.1	4.6	14.8	16.6
A3. Transport	164 377.48	181 935.79	153 867.65	146 177.36	147 633.45	–11.1	1.0	13.1	19.4
A4. and A5. Other	220 609.55	173 204.43	154 469.73	129 443.90	124 359.52	–41.3	–3.9	17.6	16.4
B. Fugitive emissions from fuels	42 523.79	29 533.53	11 837.58	3 981.22	3 825.30	–90.6	–3.9	3.4	0.5
C. CO_2 transport and storage	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	–	–	–	–
2. IPPU	93 227.45	76 658.24	61 850.34	55 140.32	57 180.43	–40.9	3.7	7.5	7.5
3. Agriculture	72 632.03	62 732.48	59 355.48	57 551.88	56 332.89	–20.8	–2.1	5.8	7.4
4. LULUCF	35 975.62	–151.18	–2 655.84	4 196.84	3 998.40	–88.3	–4.7	NA	NA
5. Waste	41 208.89	28 249.56	10 853.39	4 901.03	4 494.05	–88.1	–8.3	3.3	0.6
6. Other[a]	NO	NO	NO	NO	NO	–	–	–	–
Gas[b]									
CO_2	1 054 740.64	898 938.04	831 129.58	647 252.33	678 798.87	–38.6	4.9	84.3	89.3
CH_4	132 605.60	96 046.39	60 100.11	47 051.41	45 687.75	–64.5	–2.9	10.6	6.0
N_2O	51 554.35	32 472.20	27 448.54	24 922.35	24 767.16	–51.7	–0.6	4.1	3.3
HFCs	42.16	5 655.84	9 753.45	8 256.32	8 069.18	19 483.3	–2.3	0.0	1.1
PFCs	2 752.00	877.68	317.50	188.23	190.95	–93.2	1.4	0.2	0.0
SF_6	4 563.95	4 197.53	3 094.66	3 100.38	2 663.74	–32.1	–14.1	0.4	0.4
NF_3	6.44	8.35	57.50	10.11	13.72	57.0	35.7	0.0	0.0
Total GHG emissions excluding LULUCF	**1 251 224.78**	**1 040 191.83**	**932 379.13**	**730 922.69**	**760 358.01**	**–41.6**	**4.0**	**100.0**	**100.0**
Total GHG emissions including LULUCF	**1 287 200.40**	**1 040 040.66**	**929 723.30**	**735 119.52**	**764 356.41**	**–42.9**	**4.0**	**NA**	**NA**

Source: GHG emission data: Germany's 2023 annual submission, version 1.0.
[a] Emissions and removals reported under the sector other (sector 6) are not included in total GHG emissions.
[b] Emissions by gas without LULUCF. The Party did not report indirect CO_2 emissions.

21. In brief, Germany's national inventory arrangements were established in accordance with the state secretaries' agreement on the national system adopted in 2007. There have been minor changes to these arrangements since the BR4 following the restructuring of ministerial responsibilities within the Federal Government in 2022, whereby management of the national system changed from the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection to the Federal Ministry for Economic Affairs and Climate Action, which in turn changed the coordination and flow of information between the first and second levels of the national system.

2. Assessment of adherence to the reporting guidelines

22. The ERT assessed the information reported in the NC8 and BR5 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and BRs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

3. National system for the estimation of anthropogenic emissions by sources and removals by sinks

(a) Technical assessment of the reported information

23. Germany provided in the NC8 a description of how its national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol is performing the general and specific functions defined in the annex to decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11. The description includes all the elements mandated by paragraph 30 of the annex to decision 15/CMP.1. The NC8 also contains a reference to the description of the national system provided in the NIR of the 2022 annual submission.

(b) Assessment of adherence to the reporting guidelines

24. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

4. National registry

(a) Technical assessment of the reported information

25. In its NC8 Germany provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 in conjunction with decision 3/CMP.11 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems.

(b) Assessment of adherence to the reporting guidelines

26. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

C. Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies

1. Technical assessment of the reported information

27. Germany reported information on its economy-wide emission reduction target in its BR5. For Germany the Convention entered into force on 21 March 1994. Under the Convention Germany committed to contributing to the achievement of the joint EU economy-wide emission reduction target of 20 per cent below the 1990 level by 2020.

28. The target for the EU and its member States is formalized in the EU 2020 climate and energy package. The legislative package regulates emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 using GWP values from the AR4 to aggregate the GHG emissions of the EU until 2020. Emissions and removals from the LULUCF sector are not included in the quantified economy-wide emission reduction target under the Convention.

29. The EU-wide targets are primarily implemented through the EU ETS and ESD. The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. An EU-wide emission cap was put in place for 2013–2020 for the EU ETS with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. For 2030, a reduction target of 62 per cent below the 2005 level has been set for emissions covered by the EU ETS. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding aviation and international maritime transport), residential and commercial buildings, agriculture, small industry and waste. The ESD is regulated through targets for each member State that add up to a reduction at the EU level of 10 per cent below the 2005 level by 2020. The ESR, the successor to the ESD, was adopted in 2018 and amended in 2023 with the target of reducing emissions covered under the ESR by 40 per cent below the 2005 level by 2030.

30. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Operators and airline operators can use such units to fulfil their requirements under the EU ETS, and member States can use such units for their national ESD targets, within specific limitations.

31. The European Commission set out its vision for a climate-neutral EU in November 2018, and in December 2019 presented the European Green Deal as a road map with actions for making the EU economy sustainable. The European Council endorsed in December 2019 the objective of making the EU climate-neutral by 2050. As part of the European Green Deal, the 2050 climate-neutrality target was made binding in the first European Climate Law, adopted in 2021. It also increased the ambition of the 2030 emission reduction target to at least 55 per cent below the 1990 level. Member States will set out any increased ambition in the update of their national energy and climate plans.

32. Germany has a national target of reducing its emissions to 14 per cent below the 2005 level by 2020 for ESD sectors. This target has been translated into binding quantified AEAs for 2013–2020. Germany's AEAs change following a linear path from 472,527.65 kt CO_2 eq in 2013 to 410,908.76 kt CO_2 eq in 2020.[6] Under the ESR, Germany has a national target of reducing emissions from covered sectors to 50 per cent below the 2005 level by 2030.

33. In addition to its ESD target, Germany committed to achieving a domestic target of a 40 per cent reduction in emissions below the 1990 level by 2020. Germany also reported on its longer-term targets. Through its Climate Change Act amended in 2021, Germany committed to achieving climate neutrality by 2045 and negative emissions from 2050 onward. The Climate Change Act also sets out the target of a reduction in emissions of at least 65 per cent by 2030 and at least 88 per cent by 2040 compared with the 1990 level.

2. Assessment of adherence to the reporting guidelines

34. The ERT assessed the information reported in the BR5 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

[6] According to the EU transaction log.

D. Information on policies and measures

1. Technical assessment of the reported information

35. Germany provided in its NC8 and BR5 information on its PaMs[7] implemented, adopted and planned to fulfil its commitments under the Convention. Germany's set of PaMs is similar to that previously reported, but has been updated to include those adopted up until August 2020. In addition, the NC8 provides information on PaMs that have entered into force since August 2020 but were not included in NC8 table 8. No major PaMs have been discontinued since Germany's BR4 submission.

36. Germany reported on its policy context and legal and institutional arrangements in place for implementing its commitments and monitoring and evaluating the effectiveness of its PaMs. Germany also provided information on changes to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target.

37. The NC8 briefly describes changes to the institutional arrangements following the adoption of the amended Climate Change Act in 2021. The Climate Change Act defines Germany's binding sectoral climate action goals and provides the legal framework to ensure their fulfilment. Germany's long-term strategy is set out in the Climate Action Plan 2050 adopted in 2016.

38. The German Environment Agency reviews sectoral compliance with the permissible emissions annually. If it determines that a given sector has exceeded its permissible emissions, the federal ministry responsible for the relevant sector is required to propose a programme for immediate action.

39. Germany's Council of Experts on Climate Change supports the Government in reviewing the assumptions and the proposed measures and reports its findings to the Federal Government, which deliberates and adopts measures for implementation through the programme for immediate action. During the review, Germany further explained that sectoral targets have been used only to a limited extent in the policymaking process and that future changes are expected in order to provide more flexibility at the sectoral level and a greater focus on achieving the overall national target.

40. Germany reported on its assessment of the economic and social consequences of its response measures. The Party referred to its 2016 NIR, in which individual measures aimed at minimizing adverse impacts are described, including the promotion of biofuels, the removal of coal subsidies, the EU ETS and the provision of support to enable developing countries to diversify their energy supplies. Most of these measures are not expected to have direct negative consequences for developing countries, while others are expected to have positive effects.

41. During the review, Germany presented assessments of the economic and social consequences of its response measures conducted for previous NCs, in particular the effects on employment at the national level. PaMs that are expected to have some negative consequences are those targeting the coal industry and combustion-related automobile industry. However, Germany stated that the negative employment effects in some sectors will be more than compensated for by the positive employment projections in other sectors. During the review, Germany further explained that since these assessments were conducted, an even smaller negative effect on employment has been observed in recent years.

42. In its reporting on PaMs, Germany provided the estimated emission reduction impacts for most of its PaMs. Estimates were not provided for overarching measures, such as the Energy and Climate Fund and the Energy Efficiency Fund. These were described as measures in the NC8 but not reported in CTF table 3. The Party explained during the review that the estimated impacts for these measures were allocated to other measures and sectors.

[7] The UNFCCC reporting guidelines on BRs use the term "mitigation actions", whereas the UNFCCC reporting guidelines on NCs use the term "policies and measures". The terms are used interchangeably in this report to refer to the relevant information in either the NC or BR.

43. The NC8 groups PaMs in terms of those adopted up until August 2020 and those adopted thereafter. During the review, Germany further clarified that the selection criteria were related to the availability of information and data between August 2020 and the deadline for finalizing the NC8.

44. Most of the PaMs are numbered in the NC8 (e.g. G.1: CO_2 pricing for heating and transport). However, this numbering is not applied in CTF table 3, making the comparison difficult, especially as some of the wording used is not consistent between the NC8 and CTF table 3.

45. Germany described the different methodologies used for estimating the impacts of its individual or groups of PaMs in its projections report 2021, which is referred to in the NC8. However, the description of the methodologies in the projections report is currently available in the German language only.

46. The key overarching related cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO_2 emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package. The 2021 European Climate Law, which forms part of the European Green Deal, made climate neutrality by 2050 legally binding and raised the EU-wide 2030 emissions reduction target to at least 55 per cent compared with the 1990 level. In 2023, the EU adopted several pieces of legislation that were part of the "Fit for 55" package intended to help achieve the new 2030 target. These new laws strengthened both the ESR and EU ETS 2030 targets, extended the EU ETS to include maritime shipping in 2024 and established the Social Climate Fund to address equitability of mitigation impacts. They also created the EU ETS 2 to cover at the point of distribution most fuel used in sectors not covered by the EU ETS, beginning in 2027.

47. The 2021–2030 EU-wide policies are operationalized through the national energy and climate plans of EU member States, which should set out national objectives for each of the five dimensions of the Energy Union, namely energy security; the internal energy market; energy efficiency; decarbonization; and research, innovation and competitiveness. The national energy and climate plans are periodically updated to reflect changes to EU policy, such as the implementation of the European Green Deal. Germany's national energy and climate plan is in the process of being revised to follow the new and stricter goals of its amended Climate Change Act. The key actions and commitments listed in the national energy and climate plan are consistent with the information reported in the NC7 and include, in particular, PaMs on boosting renewable energy (e.g. the Renewable Energy Sources Act) and on improving energy efficiency (e.g. the Buildings Energy Law).

48. Germany introduced national-level policies to achieve its targets under the ESD, the ESR and domestic emission reduction targets. The key policies are reported in NC8 table 8, including phasing out coal power plants, which has the most significant mitigation impact in the long term. Other national policies that have delivered significant emission reductions are programmes providing financial support for implementing energy standards for buildings and renovations and the measure on CO_2 pricing for heat and transport under Germany's Fuel Emissions Trading Act.

49. The ERT identified the latest amendment to the Building Energy Law, adopted shortly before the review following intensive discussions with stakeholders, as a measure of particular interest. As of 2024, every newly installed heating system will have to draw 65 per cent of its energy from renewable energy sources. The installation of oil-only heating systems will no longer be permitted from 2026 onward. This amendment highlights Germany's recognition of the urgency needed to communicate changes that affect household decisions and could provide a useful example for other Parties.

50. The national emissions trading system for the heat and transport sectors, established by the Fuel Emissions Trading Act, takes account of most emissions from fuel combustion outside the EU ETS sectors. This measure demonstrates Germany's recognition of the sensitivity of national carbon pricing to external effects such as an energy supply crisis caused

by a shortage in the gas supply. In Germany, the automatic increase in national carbon pricing was stopped in order to ensure affordable energy prices for households.

51. Germany highlighted the domestic mitigation actions that are under development, such as those being revised to align with the more ambitious 2030 target of the EU to reduce domestic emissions by at least 55 per cent compared with the 1990 level. Germany committed to reducing emissions by at least 65 per cent by 2030.

52. During the review, Germany provided an overview of additional measures planned to achieve the more ambitions national targets set out in the recently amended Climate Change Act, through which Germany committed to achieving climate neutrality by 2045 and negative emissions from 2050 onward. The Act also defines the target of a reduction in emissions of at least 65 per cent by 2030 and at least 88 per cent by 2040 compared with the 1990 level (see para. 33 above).

53. Among the mitigation actions that provide a foundation for significant additional action is the package of measures for immediate action in the energy sector designed to accelerate the expansion of renewable energies. It defines the principle that the use of renewable energies is primarily in the public interest by supporting the security of energy supply. Another implemented mitigation action with a significant impact is the National Decarbonization Programme for Industry, which establishes funding opportunities for industrial processes and 'carbon contracts' to help industry mitigate against the higher operational costs involved in low-emission processes.

54. Another planned measure highlighted by Germany during the review is ensuring a socially equitable transformation through a 'social compensation mechanism' that offsets future CO_2 price-related increases, at least in part. For example, the aim of the law on cost relief for heating is to provide additional financial support to meet the costs of heating for people receiving housing benefits. Table 5 provides a summary of the reported information on the PaMs of Germany.

Table 5
Summary of information on policies and measures reported by Germany

Sector	*Key PaMs*[a]	*Estimated mitigation impact in 2020 (kt CO_2 eq)*	*Estimated mitigation impact in 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	CO_2 pricing for heat and transport	0	2 391.00
Energy			
Energy efficiency	KfW development bank/Federal Office for Economic Affairs and Export Control programmes to provide financial support for implementing ambitious energy standards for new buildings and renovations	1 160.00	12 400.00
	Building Energy Law	380.00	4 860.00
	Tax incentives for refurbishment measures in buildings	270.00	2 890.00
Energy supply and renewable energy	Renewable Energy Sources Act	NE	23 000.00
Transport	Reducing the Renewable Energy Sources Act surcharge from 2021 onward	NA	1 820.00
IPPU	EU ETS in the industry sector	1 036.00	5 165.00
	National Decarbonization Programme	0	5 083.00
Agriculture	Implementing the national ordinance on fertilization	1 000.00	2 515.00
LULUCF	Reducing land use for urban development and transport	NE	2 001.00
Waste	Funding for landfill aeration	NE	890.00

Note: The estimated mitigation impacts are estimates of emissions of CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

[a] Names of PaMs reproduced as reported in Germany's BR5.

55. Germany's dynamic climate policy is reflected in the amount of additional information received by the ERT during the review on PaMs that have been recently adopted or are planned for adoption and were therefore not reported in the NC8.

56. Germany completed a new assessment of its PaMs in March 2023 (the projections report 2023), which brings the projected emissions much closer to the national targets set out in the Climate Change Act. Additional PaMs will, however, be needed to ensure full compliance with the national targets by 2030 and 2050.

2. Assessment of adherence to the reporting guidelines

57. The ERT assessed the information reported in the NC8 and BR5 of Germany and identified issues relating to transparency, and thus adherence to the UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The findings are described in tables I.1 and II.1.

3. Domestic and regional programmes and legislative arrangements and procedures related to the Kyoto Protocol

(a) Technical assessment of the reported information

58. The overall responsibility for climate change policymaking in Germany lies with the Federal Ministry for Economic Affairs and Climate Action. This includes responsibility for the Climate Change Act and overall coordination of government cooperation in this area. Responsibility for legislation and policies in specific sectors lies with the ministries responsible for those sectors. Implementation of climate policy is the shared responsibility of the ministries responsible for relevant sectors and of organizations at the regional and municipal level, depending on the policy. In addition, Germany has established a number of working groups and authorities that contribute to the implementation of PaMs, such as an interministerial working group on CO_2 reduction, a working group on emissions trading, the German emissions trading authority and the joint implementation coordination office.

59. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Germany committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-year level (see paras. 27–33 above).

60. Germany has national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources.

61. The Party reported that climate mitigation, the conservation of biodiversity, sustainable use of natural resources and use of co-benefits are integrated into existing strategies and measures in Germany. Examples provided in the NC8 include measures aimed at reducing nitrogen emissions, including ammonia and N_2O emissions, and protecting peatland soils. Germany also reported that nitrogen-related sustainability indicators and targets are part of the national Sustainable Development Strategy (2021). In November 2022, Germany adopted its National Peatland Protection Strategy, which provides the political framework for all aspects of peatland protection in Germany and is designed to help Germany achieve climate neutrality by 2045.

(b) Assessment of adherence to the reporting guidelines

62. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

4. Policies and measures in accordance with Article 2 and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

(a) Technical assessment of the reported information

63. In the NC8 Germany reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties. Most of Germany's PaMs are expected to have direct effects on developing countries. Almost all of the possible indirect effects are also considered to be positive. The PaMs cover, for example, promoting the use of biofuels, reducing subsidies for hard coal, PaMs at the EU level, especially the EU ETS, and support for developing countries in energy supply diversification. Germany also reported that it provides financial assistance and support through technology cooperation to other countries, including developing countries, in tackling climate change and adapting to its impacts.

64. The NC8 includes information on how Germany promotes and implements the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels. Germany is contributing to the development of short-term measures for implementing the IMO strategy on reducing GHG emissions from international maritime transport, approved in 2018. In cooperation with Denmark and France, Germany has developed a proposal for short-term energy efficiency measures to improve the technical and operational efficiency of ships. The Party also reported that it provides support through technical cooperation in the working groups of the ICAO Committee on Aviation Environmental Protection and supports measures that are environmentally effective, neutral with respect to competition in the aviation sector, sustainable and robust.

65. Further information on how Germany strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties was reported in Germany's 2022 annual submission, which refers to the Party's 2016 annual submission for detailed information. The Party reported that the possible impacts on other countries are mostly indirect and almost all are considered to be positive. In its 2016 annual submission, Germany provided an assessment of potential positive and negative impacts (both direct and indirect) on developing country Parties. The Party also reported in its 2016 annual submission on what it prioritized in implementing its commitments under Article 3, paragraph 14, including activities aimed at reducing hard coal subsidies and avoiding negative effects of non-sustainably produced biofuels. Germany also reported on its support for developing countries in energy sector diversification, for example through cooperation in the area of renewable energies and by providing funding to the regional Global Energy Efficiency and Renewable Energy Fund aimed at accelerating the transfer of environmentally friendly technologies in developing countries.

(b) Assessment of adherence to the reporting guidelines

66. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

E. Estimates of emission reductions and removals and the use of units from market-based mechanisms and land use, land-use change and forestry and progress in achieving the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

67. Germany reported in its BR5 that it did not use units from market-based mechanisms under the Kyoto Protocol and other market-based mechanisms under the Convention to meet its commitment under the ESD. It reported in CTF table 4 and 4(b) that it did not use any

units from market-based mechanisms in 2019 or 2020. Given that the contribution of LULUCF activities is not included in the joint EU target under the Convention, reporting thereon is not applicable to Germany. Table 6 illustrates Germany's ESD emissions and use of units from market-based mechanisms for achieving its ESD target.

Table 6
Summary of information on emissions covered by the European Union effort-sharing decision annual emission allocation and use of units from market-based mechanisms by Germany
(kt CO_2 eq)

Year	*ESD emissions*	*AEA*	*Use of units from market-based mechanisms*	*AEAs transferred to (–) or from (+) other Parties*[a]	*Annual AEA surplus/deficit*	*Cumulative AEA surplus/deficit*
2013	460 204.91	472 527.65	0	0	12 322.74	12 322.74
2014	436 790.19	465 830.46	0	0	29 040.28	41 363.02
2015	444 080.62	459 133.27	0	0	15 052.66	56 415.68
2016	454 157.41	452 436.08	0	0	–1 721.33	54 694.35
2017	466 857.28	432 348.86	0	0	–34 508.42	20 185.92
2018	434 047.77	425 202.16	0	0	–8 845.61	11 340.31
2019	444 262.72	418 055.46	0	0	–26 207.26	–14 866.96
2020	407 410.81	410 908.76	0	11 369.00	14 866.95	0.00

Sources: Germany's BR5 and BR5 CTF table 4(b), information provided by the Party during the review and EU transaction log (AEAs).

Note: For a given year, a positive number (surplus) indicates that annual or cumulative ESD emissions were lower than the corresponding AEA or cumulative AEAs, while a negative number (deficit) indicates that annual or cumulative ESD emissions were higher than the corresponding AEA or cumulative AEAs.

[a] The transfer of AEAs from other EU member States occurred in 2022 but is applicable to the 2020 accounting year.

2. Assessment of adherence to the reporting guidelines

68. The ERT assessed the information reported in the NC8 and BR5 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and BRs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

3. Assessment of achievement of the quantified economy-wide emission reduction target

69. In assessing the Party's contribution towards achievement of the 2020 joint EU target on the basis of the information reported in its BR5, the ERT noted that, under the EU 2020 climate and energy package, Germany committed to reducing its emissions under the ESD to 14 per cent below the 2005 level by 2020 (see para. 32 above). This target has been translated into binding quantified AEAs for 2013–2020. In 2020 Germany's ESD emissions were 0.9 per cent (3,497.95 kt CO_2 eq) below the AEA. Germany has a cumulative surplus of 0.00 kt CO_2 eq with respect to its AEAs between 2013 and 2020.

70. The ERT noted that the Party reported that the total GHG emissions excluding LULUCF of the EU and including the use of units from market-based mechanisms do not exceed the emission level corresponding to the target in 2020, and thus that the EU has achieved its joint target. See the report on the review of the BR5 of the EU for further details. Therefore, the ERT concluded that, on the basis of the information reported in the BR5 and provided during the review, Germany has met its 2020 commitment under the Convention through its contribution to achieving the joint EU target.

71. The ERT noted that the Party's ESD emissions in 2020 do not exceed its AEA for 2020; however, Germany's cumulative deficit of AEAs was 11,369,000. The ERT noted that, to achieve its target under the ESD (i.e. to cover its AEA deficit), Germany purchased 11,369,000 surplus AEAs in 2022 from EU member States that had overachieved their target under the flexibility allowed under the ESD.

F. Projections

1. Projections overview, methodology and results

(a) Technical assessment of the reported information

72. Germany reported in its BR5 and NC8 updated projections for 2025, 2030, 2035 and 2040 relative to actual inventory data for 2018 under the WEM scenario. The WEM scenario reported by Germany includes PaMs implemented and adopted until 31 August 2020.

73. Germany did not provide a WAM or WOM scenario. In the NC8 and during the review, the Party explained that a WOM scenario was not calculated owing to the methodological complexity and limited use of such a scenario. A WAM scenario was not provided because all PaMs, including those that are planned and are sufficiently detailed and certain to be implemented, were considered for the WEM scenario.

74. The projections are presented on a sectoral basis, using the national sectoral categories as defined in the Climate Change Act, and allocated to the common reporting format categories in the corresponding CTF tables. The projections are presented on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6, as well as NF_3 for 2030–2040, both in textual format and in CTF table 6. The projections are also provided in an aggregated format for each sector and for a Party total using GWP values from the AR4.

75. Germany reported on underlying factors and activities affecting the projections for each sector in the projections report 2021 but not in the textual part of the NC8.

(b) Methodology, assumptions and changes since the previous submission

76. The methodology used for the preparation of the projections is slightly different from that used for the preparation of the emission projections for the NC7. Germany provided information on changes since the submission of its NC7. The reported projections are now broken down by fuel and energy subsector with respect to the EU ETS and the ESR and, within the ESR, to the national emissions trading scheme.

77. To prepare its projections, Germany relied on key underlying assumptions relating to population, energy prices, economic development indicators, the price for EU ETS certificates, and CO_2 prices for heat and transport pursuant to Germany's Fuel Emissions Trading Act. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections.

78. For the WEM scenario, the Party used national statistics on population trends and annual GDP growth rate provided by the Federal Statistical Office, in line with European Commission guidelines. The annual GDP growth rate was based on the Federal Government's projections calculated in the last quarter of 2020 up until 2025, while for 2030 onward, the Party used data from the European Commission calculated in the first quarter of 2020. For energy prices (crude oil, natural gas and hard coal) the projections were based on data contained in the International Energy Agency's *World Energy Outlook 2020*. To take proper account of the unique situation in 2020 caused by the pandemic, energy prices for 2025 were calculated as an average of the basic values for 2019 and 2030. The inflation-adjusted cost of lignite production is assumed to remain constant in the future (at EUR 6.4/MWh) as a result of the legally mandated phasing out of lignite-based electricity generation by 2038 at the latest.

79. The projections analysis was based on the following models: (1) the Öko-Institut's ELIAS/PowerFlex model for electricity generation from fossil fuels, renewable energy and combined heat and power systems; (2) the Öko-Institut's EnUSEM integration model for primary energy consumption, energy used in other energy conversion sectors, and process-related emissions in the energy sector and other sectors; (3) the Öko-Institut's TEMPS model for the transport sector; (4) the ISI-Fraunhofer Institute's INVERT/EELab model for the buildings sector (residential and non-residential buildings); (5) the ISI-Fraunhofer Institute's FORECAST model for electricity and fuel demand for the industry, commerce and services sectors, and process-related emissions for the mineral industry and chemical industry; (6) the Öko-Institut's LaWiEnMod model for energy consumption in agriculture; and (7) the Öko-

Institut's IPCC Waste Model for the waste sector. GHG emissions from the agriculture and LULUCF sectors were calculated by the Thünen Institute.

80. Sensitivity analyses were conducted for a number of assumptions, such as population trends, economic growth and CO_2 prices under the EU ETS and Germany's Fuel Emissions Trading Act. Five sensitivity scenarios were assessed: a higher population increase owing to a significant increase in immigration based on data from the Federal Statistical Office; economic growth based on the European Commission's economic forecast, which accounts for the impacts of the pandemic (i.e. a sharp economic downturn, followed by a rapid recovery); two sensitivity analyses for CO_2 prices, with moderately and considerably higher price pathways for EU allowances, based on the assumptions of the Öko-Institut; and higher CO_2 prices under the Fuel Emissions Trading Act, based on Germany's national energy and climate plan. The results of the analyses show that the modified basic assumptions have only a slight impact on the projected emission reductions in 2030 under the WEM scenario.

(c) Results of projections

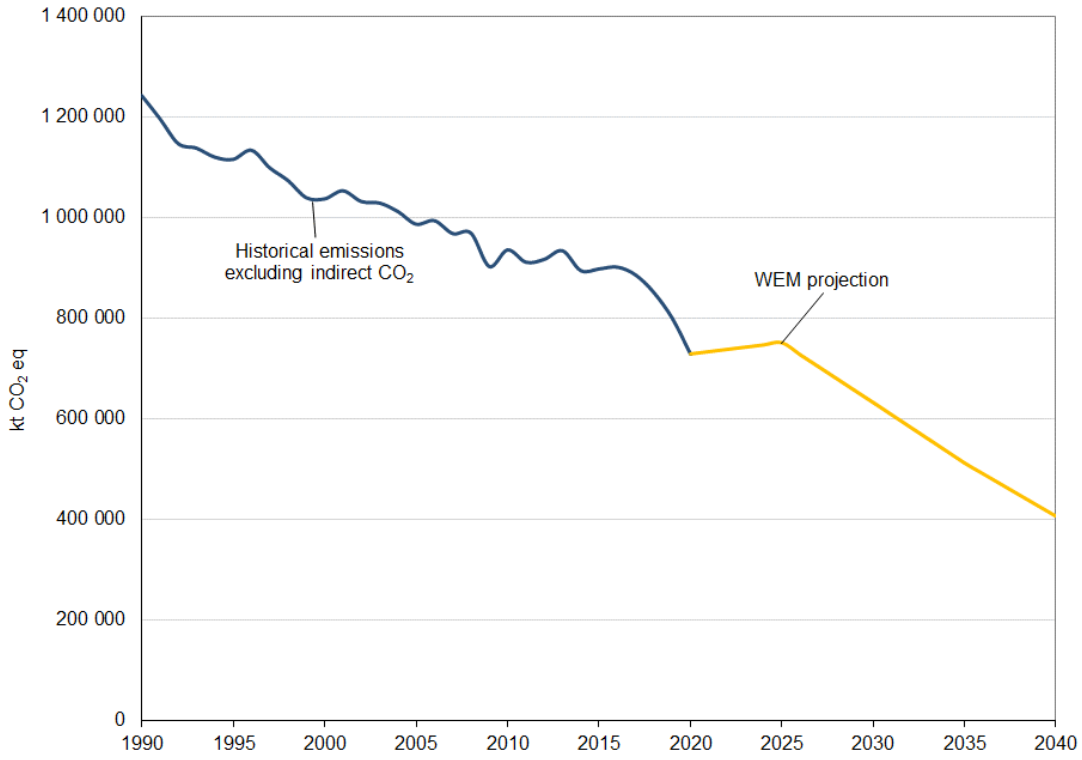
81. The projected emission levels under different scenarios are presented in table 7 and figure 1.

Table 7
Summary of greenhouse gas emission projections for Germany

	GHG emissions (kt CO_2 eq/year)	*Change in relation to 1990 level (%)*	*Change in relation to 2020 level (%)*
Inventory data 1990	1 241 919.23	NA	NA
Inventory data 2020	728 737.65	–41.3	NA
WEM projections for 2030	632 894.36	–49.0	–13.2
WEM projections for 2040	408 700.00	–67.1	–43.9

Sources: Germany's BR5, NC8 and BR5 CTF table 6.
Note: The projections are of GHG emissions excluding LULUCF and excluding indirect CO_2.

Figure 1
Greenhouse gas emission projections reported by Germany

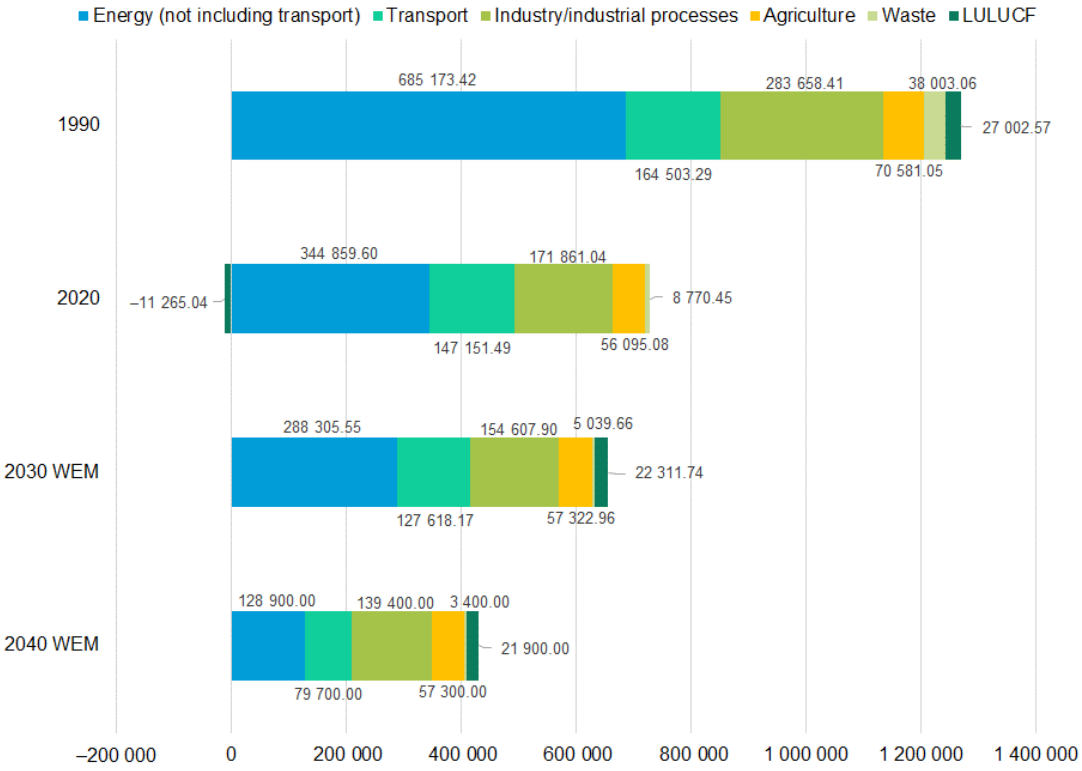


Sources: Germany's NC8, BR5 and BR5 CTF tables 1 and 6 (total GHG emissions excluding LULUCF).

82. Germany's total GHG emissions excluding LULUCF are projected under the WEM scenario to decrease by 49.0 and 67.1 per cent below the 1990 level in 2030 and 2040 respectively. When including LULUCF, total GHG emissions are projected under the WEM scenario to decrease by 48.4 and 66.1 per cent below the 1990 level in 2030 and 2040 respectively.

83. Germany presented the WEM scenario by sector for 2030 and 2040, as summarized in figure 2 and table 8.

Figure 2
Greenhouse gas emission projections for Germany presented by sector
(kt CO_2 eq)



Sources: Germany's NC8 and BR5 CTF table 6.

Table 8
Summary of greenhouse gas emission projections for Germany presented by sector

	GHG emissions and removals (kt CO_2 eq)			*Change (%)*	
Sector	*1990*	*2030 WEM*	*2040 WEM*	*1990–2030 WEM*	*1990–2040 WEM*
Energy (not including transport)	685 173.42	288 305.55	128 900.00	–57.9	–81.2
Transport	164 503.29	127 618.17	79 700.00	–22.4	–51.6
Industry/industrial processes	283 658.41	154 607.90	139 400.00	–45.5	–50.9
Agriculture	70 581.05	57 322.96	57 300.00	–18.8	–18.8
LULUCF	27 002.57	22 311.74	21 900.00	–17.4	–18.9
Waste	38 003.06	5 039.66	3 400.00	–86.7	–91.1
Other	NA	NA	NA	NA	NA
Total GHG emissions excluding LULUCF	**1 241 919.23**	**632 894.36**	**408 700.00**	**–49.0**	**–67.1**

Sources: Germany's NC8 and BR5 CTF table 6.

84. According to the projections reported for 2030 under the WEM scenario, the most significant absolute emission reductions are expected to occur in the energy sector, amounting to projected reductions of 57.9 per cent between 1990 and 2030 as a result of reductions in the following subsectors listed in descending order: energy industries,

residential, commercial and institutional, and fugitive emissions from fuels subsectors. The second and third most significant emission reductions in absolute terms are expected to occur in the industry (energy and processes) and transport sectors, with projected reductions of –45.5 and –22.4 per cent respectively between 1990 and 2030.

85. The pattern of projected emissions reported for 2040 under the same scenario changes slightly owing to higher emission reductions in the transport sector than in the industry sector (–51.6 and –50.9 per cent respectively) due to the expansion of electromobility, which is projected to shift some of the emissions from the transport sector to energy industries. In the energy sector, emission reductions of 81.2 per cent below the 1990 level are projected, decreasing from 34 to 17 per cent of total emissions by 2040.

86. Germany presented the WEM scenario by gas for 2030, as summarized in table 9.

Table 9
Summary of greenhouse gas emission projections for Germany presented by gas

	GHG emissions and removals (kt CO_2 eq)		*Change (%)*
Gas[a]	*1990*	*2030 WEM*	*1990–2030 WEM*
CO_2	1 051 979.10	554 680.95	–47.3
CH_4	118 555.32	42 438.99	–64.2
N_2O	57 989.38	31 063.57	–46.4
HFCs	50.32	3 524.24	6 903.7
PFCs	3 060.23	291.27	–90.5
SF_6	4 428.00	695.42	–84.3
NF_3	6.88	11.75	70.8
Total GHG emissions without LULUCF	**1 241 919.23**	**632 894.36**	**–49.0**

Source: Germany's BR5 CTF table 6. Updated projections were provided by Germany during the review.

[a] Germany did not include indirect CO_2 emissions in its projections.

87. During the review, Germany presented information on the most recent projections, as contained in its projections report 2023, which shows that the implementation of new PaMs would bring the projections closer to the national emission reduction targets, but that further action is still needed.

(d) Assessment of adherence to the reporting guidelines

88. The ERT assessed the information reported in the NC8 and BR5 of Germany and identified issues relating to completeness and transparency, and thus adherence to the UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The findings are described in tables I.2 and II.2.

2. Assessment of the total effect of policies and measures

(a) Technical assessment of the reported information

89. In its NC8 Germany did not present the estimated and expected total effect of implemented and adopted PaMs. Information was not presented by gas (on a CO_2 eq basis) in terms of GHG emissions avoided or sequestered, either in 2030 or 2040. Germany explained during the review that this information is not currently available. Factors and activities affecting the projected trends for each sector were not presented in the NC8; however, during the review Germany explained that this information is provided in the projections report 2021.

90. According to the information reported in CTF table 3, the total estimated effect of Germany's implemented, adopted and planned PaMs is 251,311 kt CO_2 eq in 2030, and PaMs implemented in the energy sector will deliver the largest emission reductions.

(b) Assessment of adherence to the reporting guidelines

91. The ERT assessed the information reported in the NC8 of Germany and identified issues relating to completeness and transparency, and thus adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table I.3.

3. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

(a) Technical assessment of the reported information

92. In the NC8 Germany reported that it does not take into account the use of emission reduction units under Articles 6, 12 and 17 of the Kyoto Protocol resulting from projects aimed at reducing anthropogenic emissions by sources or increasing anthropogenic removals by sinks of GHGs in other countries. The Party also explained that it did not use market-based mechanisms to meet its Kyoto Protocol target. The ERT notes that reporting on the supplementarity of such mechanisms is therefore not relevant for Germany.

(b) Assessment of adherence to the reporting guidelines

93. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

G. Provision of financial, technological and capacity-building support to developing country Parties

1. Technical assessment of the reported information

(a) Approach and methodologies used to track support provided to non-Annex I Parties

94. In its NC8 and BR5 Germany reported information on its provision of financial, technological and capacity-building support to non-Annex I Parties.

95. Germany has provided support that it considers to be “new and additional”. Its definition of “new and additional” includes all newly committed and disbursed funding in the reporting year. As a result, all climate finance funding reported in CTF tables 7, 7(a) and 7(b) is defined as “new and additional”.

96. Germany reported on the support that it has provided to non-Annex I Parties, distinguishing between support for mitigation and adaptation activities and identifying the capacity-building elements of such support. It explained how it tracks finance for adaptation and mitigation. Since 2011, Germany has used the OECD Rio markers, which distinguish between mitigation and adaptation measures. Regarding capacity-building, the Party reported that bilateral cooperation projects almost always include technology transfer and capacity-building components and often apply a cross-cutting approach.

97. Germany’s national approach to tracking the provision of financial support, including information on indicators, delivery mechanisms used and allocation channels tracked, is based on the OECD Rio markers system to differentiate between climate change mitigation and adaptation measures; a score is then applied to define the percentage of the project budget allocated to climate change. Germany provides part of its climate finance through multilateral institutions in the form of contributions to international climate funds and multilateral organizations. These contributions are tracked in the form of disbursements. Mobilized public financing (i.e. provided through climate-related loans from the KfW development bank and its subsidiary, DEG), is also reported as committed finance. Germany reported information in CTF table 7(b) on bilateral climate finance by project, describing the individual projects in as much detail as possible, and indicating that further information is available on the websites of the responsible ministries. Changes to its approach since the previous report include the addition of the new climate finance subcategory “Private climate

finance mobilized through public-sector funding", which provides additional information on private financial flows.

98. Germany's methodology and underlying assumptions used for collecting and reporting information on financial support are based on three climate finance subcategories: (1) climate finance from budgetary sources; (2) mobilized public financing; and (3) private climate finance mobilized through public sector funding. For private finance, Germany explained that it only reported on finance instruments for which reporting methodologies have already been internationally agreed with OECD.

(b) Financial resources

99. Germany reported in its NC8 and BR5 information on its provision of financial support to non-Annex I Parties as required under the Convention, including on financial support committed and disbursed, allocation channels and annual contributions.

100. Germany described how it seeks to ensure that the resources it provides to non-Annex I Parties effectively address their adaptation and mitigation needs. The KfW development bank, the German Agency for International Cooperation and the German Institute for Development Evaluation regularly evaluate projects to precisely assess their effectiveness according to the OECD evaluation criteria and to draw lessons from this evaluation. Table 10 summarizes the information reported by Germany on its provision of financial support.

Table 10
Summary of information on provision of financial support by Germany in 2019–2020
(Millions of United States dollars)

Allocation channel of public financial support	*Disbursement in 2019–2020*
Official development assistance	66 679.39
Climate-specific contributions through multilateral channels, including:	1 865.27
Global Environment Facility	133.68
Least Developed Countries Fund	56.53
Adaptation Fund	90.67
Green Climate Fund	379.38
Other multinational climate change funds	42.54
Financial institutions, including regional development banks	1 051.18
United Nations bodies	111.29
Climate-specific contributions through bilateral, regional and other channels	14 377.58

Sources: Germany's BR5 CTF tables and Query Wizard for International Development Statistics, available at http://stats.oecd.org/qwids/.

101. Germany's climate-specific public financial support[8] totalled USD 16,242.85 million in 2019–2020, representing an increase of 9.5 per cent since the BR4 (2017–2018).[9] With regard to future financial pledges aimed at enhancing implementation of the Convention by developing countries, Germany has fulfilled its pledge announced in 2015 to double its climate financing from EUR 2 billion to EUR 4 billion per year by 2020. Germany reaffirmed this commitment in 2022 by pledging an increase in its publicly funded contribution to international climate finance to at least EUR 6 billion per year by 2025.

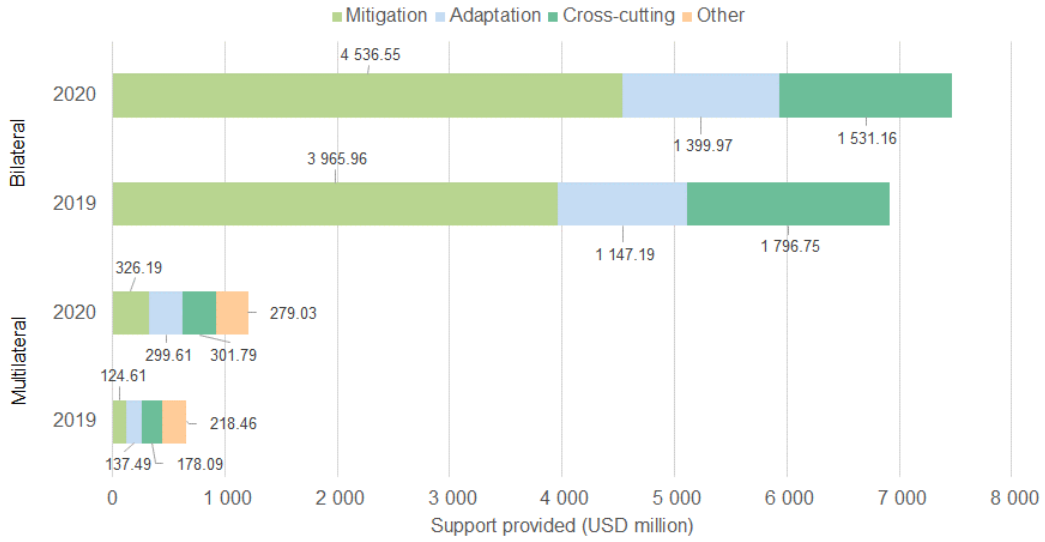
102. Germany contributed through multilateral channels USD 1,865.27 million in 2019–2020. The contributions were made to specialized multilateral climate change funds, such as the Global Environment Facility, the Least Developed Countries Fund, the Adaptation Fund, the Green Climate Fund, multilateral development banks and specialized United Nations bodies. The total support provided through multilateral channels in 2019–2020 increased by 236.9 per cent compared with 2017–2018 (reported in the BR4). Information on financial

[8] For the remainder of this chapter, the term "financial support" means climate-specific financial support, unless otherwise noted.

[9] Comparisons with data from previous years have been calculated directly without adjusting for inflation.

support from the public sector provided through multilateral and bilateral channels and the allocation of that support by target area is presented in figure 3 and table 11.

Figure 3
Provision of support by Germany in 2019–2020



Sources: Germany's BR5 CTF tables 7, 7(a) and 7(b).

Table 11
Summary of information on channels of financial support reported by Germany
(Millions of United States dollars)

Allocation channel of public financial support	*Amount disbursed in 2019–2020*	*Amount disbursed in 2017–2018*	*Change (%)*[a]	*Share of total (2019–2020) (%)*
Detailed information by type of channel				
Multilateral channels				
Mitigation	450.80	165.19	172.9	24.2
Adaptation	437.09	292.20	49.6	23.4
Cross-cutting	479.88	330.19	45.3	25.7
Other	497.49	–	NA	26.7
Total multilateral	**1 865.27**	**787.58**	**136.8**	**100.0**
Bilateral channels				
Mitigation	8 502.51	8 731.72	–2.6	59.1
Adaptation	2 547.16	2 623.97	–2.9	17.7
Cross-cutting	3 327.91	2 696.18	23.4	23.1
Other	–	–	NA	–
Total bilateral	**14 377.58**	**14 051.87**	**2.3**	**100.0**
Total multilateral and bilateral	**16 242.85**	**14 839.45**	**9.5**	**100.0**

Source: Germany's BR5 CTF tables 7, 7(a) and 7(b), and the report on the technical review of the BR4 of Germany for 2017–2018 data.

[a] Note that variances in contribution amounts from year to year can occur that are not reflective of trends, owing to factors such as the biennial or triennial contribution cycles of some multilateral funds, the timing of approvals for individual bilateral projects or changes in exchange rates.

103. The Party reported detailed information on the total financial support provided though bilateral (USD 14,377.58 million) channels in 2019–2020. During the reporting period, Germany placed a particular focus on the Middle East and South-Eastern Europe regions, to which it allocated USD 2.77 billion; the Africa region, to which it allocated USD 2.51 billion; and the Asia, and Latin America and Caribbean regions, to which it allocated USD 0.99 billion.

104. The NC8 and BR5 provide information on the types, sectors and instruments of support provided. The information reported shows that in 2019–2020 the average shares of

bilateral financial support allocated to mitigation, adaptation and cross-cutting projects were 59.1, 17.7 and 23.1 per cent respectively. In 2019–2020, the majority of financial contributions through bilateral channels were allocated to the energy, cross-cutting, water and sanitation, and transport sectors. The ERT noted that the grants and concessional loans provided in 2019–2020 accounted for most of the bilateral financial support.

105. Germany explained that private climate finance in 2019–2020 mobilized through public sector funding consisted mainly of revolving lines of credit granted to local development banks, investments in structured funds and public–private partnerships. Germany mobilized private climate finance for the areas and financing instruments for which internationally agreed OECD reporting methodologies are available. Private finance investments mobilized for mitigation and adaptation are targeted towards two areas: (1) capacity-building for implementation of Article 2, paragraph 1, of the Paris Agreement (i.e. making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development), whereby the Federal Government supports advisory services for policymakers in implementing reform processes within the context of sustainable finance and in creating policy and regulatory frameworks that promote private climate-related investments; and (2) private sector mobilization and innovative financing instruments, whereby the KfW development bank and its subsidiary, DEG, leverage private funding in connection with their climate-related activities in developing countries and emerging economies.

106. An example of Germany's support is related to the implementation of NDCs through the NDC Partnership, which is aimed at supporting developing countries in bringing together their national climate contributions and advancing progress towards the Sustainable Development Goals, and in deploying bilateral and multilateral donor programmes in a more coordinated way for implementation. In cooperation with other donor countries, Germany is financing the secretariat of the NDC Partnership. As at the end of 2020, Germany had provided financing totalling EUR 12 million.

107. The Party also reported on the InsuResilience Global Partnership aimed at providing finance and insurance solutions to guard against climate and disaster risks, focusing on poor and vulnerable countries and populations. It comprises more than 120 members, operates 24 programmes in more than 100 countries, and has the ambitious goal of providing financial protection against climate and disaster risk for 500 million people annually by 2025.

(c) Technology development and transfer

108. Germany reported on its measures and activities related to technology transfer, access and deployment benefiting developing countries, including activities undertaken by the public and private sector. Examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties include the German Climate Technology Initiative, which provides financing for climate-friendly and -adapted measures, and the CLIENT II – International Partnerships for Sustainable Innovations initiative, which promotes demand-oriented research collaboration. The Party recognizes the importance of the private sector as a technology supplier and source of finance, which is why many German development cooperation projects are aimed at creating an improved technical and policy framework in partner countries in order to facilitate the support that can be provided by the private sector.

109. The ERT took note of the information provided in CTF table 8, which lists examples of activities undertaken by Germany to advance technology transfer in recipient countries, including support related to mitigation in the waste management, energy, transport and industrial sectors in Asia, Latin America, Africa and Europe. All measures reported in CTF table 8 are funded through public channels.

110. The ERT noted that Germany reported on additional measures implemented since its last NC and BR. The Party did not report on success and failure stories in relation to technology transfer using table 9 of the UNFCCC reporting guidelines on NCs. During the review, Germany explained that evaluation of development cooperation activities is carried out by the German Institute for Development Evaluation, which publishes the evaluation reports on its website for public access. Examples of lighthouse projects or initiatives include

the InsuResilience Global Partnership, the International Climate Initiative, the Transformative Urban Mobility Initiative and the Global Energy Transformation Programme.

111. Germany provided information on the work carried out with non-governmental actors such as the German Partnership for Sustainable Mobility, which is a professional network involving industry, science and civil society that promotes dialogue on sustainable transport with actors from developing countries and emerging economies.

(d) Capacity-building

112. Germany reported on its capacity-building support for mitigation, adaptation and technology that responds to the existing and emerging needs identified by non-Annex I Parties. It described examples of individual measures and activities related to capacity-building support in textual and tabular format. The Party reported that capacity-building is a core element of the Federal Government's bilateral cooperation projects and is not reported separately as a distinct financial stream. Germany engages in capacity-building through bilateral and multilateral cooperation, collaborating with the private sector, scientific organizations and civil society.

113. Germany has supported climate-related capacity development activities relating to adaptation, mitigation, technology development and transfer, and access to climate finance, as well as other specific sectors and cross-cutting aspects such as reporting. Germany reported that its support is designed to be context-specific and results-oriented. Examples of such measures and activities include providing support to selected partner countries in developing their intended nationally determined contributions, promoting a renewable energy and energy efficiency programme in the west Africa region, and implementing ecosystem-based adaptation measures in the coastal ecosystems of Caribbean countries and in mountainous regions in Asia, Africa and Latin America.

2. Assessment of adherence to the reporting guidelines

114. The ERT assessed the information reported in the NC8 and BR5 of Germany and identified issues relating to transparency and completeness, and thus adherence to the UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The findings are described in tables I.3 and II.3.

3. Reporting on finance, capacity-building and technology transfer information related to the Kyoto Protocol

(a) Technical assessment of the reported information

115. In its NC8 Germany reported its activities, actions and programmes undertaken in fulfilment of its commitments under Article 10 of the Kyoto Protocol. Germany provided information on steps taken to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity in order to facilitate implementation of Article 10 of the Kyoto Protocol. The Party reported that technology transfer and capacity-building are components of all the Federal Government's public climate finance. Through the German Climate Technology Initiative, the Federal Ministry for Economic Cooperation and Development finances modern, climate-friendly and -adapted measures in developing countries and emerging economies. The measures, which often involve developing infrastructure, promote reductions of GHG emissions and adaptation to climate change.

116. Germany provided information on its implementation of Article 11 of the Kyoto Protocol, including information about how the Party has taken into account the need for adequacy and predictability. During the review, Germany reported that it reports its envisaged climate finance in the context of its national chapter in the EU submission under Article 9, paragraph 5, of the Paris Agreement and by doing so Germany ensures the predictability of its climate finance. The Party described how its contributions are "new and additional" (see para. 95 above).

117. Germany reported on its financial contributions to the Adaptation Fund, which consisted of public financial support of USD 33,594,624.86 disbursed in 2019 and USD 57,077,625.57 disbursed in 2020, as reported in CTF table 7(a).

(b) Assessment of adherence to the reporting guidelines

118. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

H. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

119. In its NC8 Germany provided information on the expected impacts of climate change in the country; the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations; and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. Germany provided a description of climate change vulnerability and impacts on 12 action areas (land, biodiversity, agriculture, forests and forestry, water, coastal and marine, fisheries, transport and transport infrastructure, buildings, industries, waste and human health) and highlighted the adaptation response actions taken and planned at different levels of government.

120. In its NC8 Germany identified 31 risks and impacts as being "very urgent" to address 11 of the 12 action areas (see para. 119 above). On the basis of the results of the national climate impact and risk assessment under the framework of Germany's Strategy for Adaptation to Climate Change, the NC8 indicates an urgent need for adaptation to address climate hazards and risks, in particular heat-related risks to human health, especially in urban areas, as well as risks related to drought and low-water level in rural areas, especially in eastern and west-central Germany, heavy rainfall and flash floods on infrastructure and buildings, and a gradual temperature increase and sea level rise on natural and nature-using systems, especially in coastal, rural and mountainous areas. The information reported in the NC8 is based on the second progress report on Germany's Strategy for Adaptation to Climate Change, and around 30 new action items have been included compared with the previous list of 150 action items reported in the NC7. An impact, risk and adaptive capacity assessment was conducted for the progress report instead of the previously applied vulnerability assessment.

121. Germany has addressed adaptation measures through the Adaptation Action Plan III adopted in 2020, which provided further direction to government and government agencies on enhancing preparedness for climate change. The Adaptation Action Plan III includes measures related to implementation of initiatives such as the National Flood Protection Programme and Federal Biological Protection Programme, as well as measures related to climate-adapted building construction and the provision of information to public and health practitioners. Further, under each vulnerable area, strategies and measures are being implemented and planned. During the review, Germany highlighted that a legal framework in the form of a Climate Adaptation Act is in the process of being developed and should be implemented in 2023 or 2024. Germany also informed the ERT that it is working on creating a measurable strategy on climate adaptation goals that would be implemented as part of the planned revised Adaptation Strategy. Table 12 summarizes the information on vulnerability and adaptation to climate change presented in the NC8 of Germany.

Table 12
Summary of information on vulnerability and adaptation to climate change reported by Germany

Vulnerable area	*Examples/comments/adaptation measures reported*
Water	Vulnerability: Danger of flash floods, damage to river flood protection infrastructure, reduced surface water quality, reduced groundwater levels and quality, risks related to

Vulnerable area	*Examples/comments/adaptation measures reported*
	invasive species and the growth, reduced reproduction and increased mortality of fish stocks.
	Adaptation: The Federal Government's Blue Belt programme is aimed at renaturing Germany's waterways and floodplains and is being carried out along with other measures and actions such as flood hazard mapping, enhanced implementation of natural water retention measures, decentralized rainwater management measures for residential and commercial areas and updating of the National Flood Protection Programme to ensure resilient infrastructure and provide sustainable ecological conditions in Germany's waterways to allow the migration of fish during harsh climatic conditions.
Infrastructure	Vulnerability: Damage to buildings caused by river flooding and flash flooding, deterioration of urban climate quality and vegetation, reduction of water transport capacities, flooding and deterioration of roads and rail infrastructure.
	Adaptation: Integrating aspects of climate-resilient construction in both new and existing buildings by promoting energy-efficient construction and renovation, conducting a study on the feasibility of green roofs and façades, climate-proofing transport infrastructure on Germany's waterways, adapting the rail infrastructure using state-of-the-art technology, and promoting increased investment via the 2030 Federal Transport Infrastructure Plan.
Land	Vulnerability: Reduced soil moisture levels, less percolation of water in soils, spread of invasive species, increased abiotic stress for agriculture and forests, reduced agriculture and forest yields, and increased danger caused by forest fires.
	Adaptation: Systematic consideration of the climate protection functions of soils in federal projects, implementation of the Federal Biological Diversity Programme, habitat protection for climate-sensitive and/or endangered species in order to make them more resilient, operational monitoring and use of a forecasting portal for erosion risks and critical soil moisture conditions to support sustainable farming practices, and the creation and permanent safeguarding of site-appropriate, near-natural, structurally rich, climate-stable and ecologically high-quality forest ecosystems consisting predominantly of native tree species.
Health	Vulnerability: Heat exposure, allergic reactions and damage to health linked with increasing exposure to ultraviolet light.
	Adaptation: Evaluation of existing and newly developed health-care and treatment strategies for periods of intense heat, analyses of the effectiveness of health adaptation measures in the context of heat action plans, trend analyses of imported vector-borne infectious diseases, and development and provision of information and training on preventive and health-promoting measures in relation to climate change adaptation.
Economy	Vulnerability: Impacts on water-based goods transport.
	Adaptation: Rhine low-water action plan that includes eight actions to respond to the climate-related challenges facing industrial facilities along the Rhine River and its tributaries.

122. Germany provided a detailed description of international adaptation activities, including support provided to the National Adaptation Plan Global Network, the Global Initiative on Disaster Risk Management and IPCC Assessment Report and Special Reports under the AR6 cycle. In its NC8 the Party referred to the second progress report on the Strategy for Adaptation to Climate Change for a detailed description of Germany's international adaptation activities, which include several multi-country initiatives such as the West African Science Service Centre on Climate Change and Adapted Land Use initiative involving 11 countries in West Africa, the global project Mainstreaming Ecosystem-based Adaptation across 11 non-Annex I Parties, and the Enhancing Climate Services for Infrastructure Investments initiative for capacity-building across 13 developing countries. Germany also provided information on bilateral cooperation with developing countries on adaptation, as contained in the second progress report, such as a capacity-building programme for improved flood protection in coastal towns of Viet Nam, support for water resource management in Peru and support for forest landscape restoration in Afghanistan.

2. Assessment of adherence to the reporting guidelines

123. The ERT assessed the information reported in the NC8 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

I. Research and systematic observation

1. Technical assessment of the reported information

124. In its NC8 Germany provided information on its general policy and funding relating to research and systematic observation and both domestic and international activities, including contributions to the World Climate Programme, the International Geosphere–Biosphere Programme, GCOS and the IPCC.

125. Germany has implemented and planned international and domestic policies and programmes on climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time. The Federal Ministry of Education and Research and the German Research Foundation fund research projects under the Framework Programme "Research for Sustainable Development" (known as FONA) for implementation of the National Sustainable Development Strategy and the planned Future Strategy on Research and Innovation. (e.g. in 2021, the Integrated Greenhouse Gas Monitoring System for Germany was introduced to progressively measure emission reductions). Germany has encouraged research in climate systems relating to the atmosphere, marine and polar environments, hydrological cycles, land surfaces and land use.

126. The support provided by the Federal Ministry of Education and Research has enabled the German Climate Computing Centre to undertake modelling and forecasting-related climate simulations under the sixth phase of the World Climate Research Programme's Coupled Model Intercomparison Project. The Economics of Climate Change programme is funding 29 projects on the topic. As part of adaptation research, projects are being carried out in the priority areas of agriculture, forestry, ecosystems and biodiversity, and coastal regions. In addition, research is being undertaken in Germany on mitigation technologies, for example on renewable energies and energy efficiency in the buildings sector under the 7th Energy Research Programme and the National Hydrogen Strategy framework; on CO_2 use and plastic recycling technologies under the Resource Efficiency and Circular Economy programme; on electromobility funding under the New Vehicle and System Technologies programme; and on CO_2 capture and storage and CO_2 removal methods. Since the NC7, Germany has launched the 7th Energy Research Programme, which has increased its field of research to include the National Hydrogen Strategy and research on options for CO_2 removal technologies.

127. In terms of activities related to systematic observation, Germany reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. Germany undertakes systematic observations in relation to the atmosphere, oceans, land surfaces and the cryosphere, and using multi-source remote sensing. Germany has established a coordination mechanism for these observations with a GCOS Coordinator hosted at the Deutscher Wetterdienst, the national meteorological service of Germany. Germany also regularly makes additional voluntary financial contributions towards the activities of the GCOS secretariat. With regard to data management, Germany has established several information systems, such as the Spatial Data Infrastructure Germany initiative on geodata and geoservices, the Marine Data Infrastructure Germany initiative on coastal engineering, marine environment protection and nature conservation, and the National Climate Data Centre to house observation data from monitoring stations. The ERT noted that information on the identification of barriers to free data-sharing was not included in the NC8. During the review, Germany explained that the Spatial Data Access Act of 2009 regulates the provision and sharing of data and, as such, there are legal barriers or constraints to free and open data exchange.

128. The NC8 reflects actions taken to support capacity-building and the establishment and maintenance of observation systems and related data and monitoring systems in developing countries. Germany provides funding for scientists from developing countries working on global climate change research. Assistance is provided to emerging economies and developing countries for establishing and operating observation systems, related data management and climate monitoring. The Training and Education Centre of the Global Atmosphere Watch programme has been providing support for training since 2001. Germany is also supporting selected countries to improve the use of climate services through the Enhancing Climate Services for Infrastructure Investments project.

2. Assessment of adherence to the reporting guidelines

129. The ERT assessed the information reported in the NC8 and BR5 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and BRs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

J. Education, training and public awareness

1. Technical assessment of the reported information

130. In its NC8 Germany provided information on its actions relating to education, training and public awareness at the domestic and international level. The Party provided information on the general policy on education, training and public awareness; primary, secondary and higher education; public information campaigns; training programmes; education materials; resource or information centres; the involvement of the public and non-governmental organizations; and its participation in international activities. The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection applies a framework on education for sustainable development that facilitates the provision of diverse action-oriented and participatory civic education. Germany has been implementing the United Nations Educational, Scientific and Cultural Organization programme, Education for Sustainable Development for 2030, in all education sectors under the leadership of the Federal Ministry of Education and Research since 2015. It also publishes a monthly newsletter to provide information on its projects and activities. Through the National Climate Initiative, the Federal Ministry for Economic Affairs and Climate Action funds education projects to help raise awareness of climate action among students and teachers.

131. In addition, Germany is running an information campaign entitled “Climate Action 2050” to raise awareness of the Climate Action Programme 2030, as well as other campaigns on climate action and *Energiewende* (Germany’s programme on energy systems transformation). In the area of training, Germany has put in place the Vocational Training for Sustainable Development funding programme to integrate education for sustainable development in vocational training, with a focus on four projects: construction as climate action; cross-cutting training on energy-related modernization of buildings; the “Smart Builder” training programme for communication and cooperation at building sites; and the GREENCRAFTS initiative on promoting green trades in Thuringia. The Federal Government has also been providing information and advisory services (e.g. international communication in relation to *Energiewende* and the SME Initiative on Energy Transition and Climate Protection).

2. Assessment of adherence to the reporting guidelines

132. The ERT assessed the information reported in the NC8 and BR5 of Germany and recognized that the reporting is complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and BRs. There were no issues raised during the review relating to the topics discussed in this chapter of the review report.

III. Conclusions and recommendations

133. The ERT conducted a technical review of the information reported in the NC8 of Germany in accordance with the UNFCCC reporting guidelines on NCs. The ERT concluded that the reported information mostly adheres to the UNFCCC reporting guidelines on NCs and that the NC8 provides an overview of the national climate policy of Germany.

134. The information provided in the NC8 includes all elements of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. Germany reported on the national system, the national registry, supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, PaMs in accordance with Article 2 of the Kyoto Protocol, domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures, information under Article 10 of the Kyoto Protocol, and financial resources provided to developing country Parties. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was provided by Germany in its 2022 annual submission.

135. The ERT conducted a technical review of the information reported in the BR5 and BR5 CTF tables of Germany in accordance with the UNFCCC reporting guidelines on BRs. The ERT concluded that the reported information mostly adheres to the UNFCCC reporting guidelines on BRs and that the BR5 and its CTF tables provide an overview of emissions and removals related to the Party's quantified economy-wide emission reduction target; assumptions, conditions and methodologies related to the attainment of the target; the progress of Germany towards achieving its target and the Party's provision of support to developing country Parties.

136. In its NC8 Germany reported on its key national circumstances related to GHG emissions and removals, including the government structure, population size, geographical and climate profile, economic indicators and information on each sector of the economy. In 2021 Germany amended its Climate Change Act and set more ambitious goals for reducing GHG emissions.

137. Germany's total GHG emissions excluding LULUCF were estimated to be 41.6 per cent below its 1990 level in 2020. Emissions peaked in 1990 and decreased thereafter. The greatest reductions occurred in the chemical industry and waste sectors, while energy-related emissions remained predominant but have continued to decrease over time, especially in recent years, owing to the use of natural gas as a substitute for solid and liquid fuels and the increased use of renewable energy sources.

138. As reported in the BR5, under the Convention Germany committed to contributing to the achievement of the joint EU quantified economy-wide target of a 20 per cent reduction in emissions below the 1990 level by 2020. The target covers all sectors and CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, expressed using GWP values from the AR4. Emissions and removals from the LULUCF sector are not included. Under the ESD Germany has a target of reducing its emissions by 14 per cent below the 2005 level by 2020.

139. In addition to its ESD target, Germany committed to achieving a domestic target of a 40 per cent reduction in emissions below the 1990 level by 2020. The EU has a joint 2030 emission reduction target of at least 55 per cent below the 1990 level. This will be primarily implemented through the EU ETS and ESR, which have targets to reduce emissions by 2030 by 62 and 40 per cent respectively compared with the 2005 level. Germany has longer-term targets of achieving net GHG neutrality by 2045 and a negative emissions balance from 2050 onward.

140. The ERT noted that the total GHG emissions of the EU excluding LULUCF do not exceed the emission level corresponding to the target in 2020, and thus that the EU has achieved its joint target. The ERT therefore concluded that Germany has met its 2020 commitment under the Convention through its contribution to achieving the joint target of the EU. See the report on the review of the BR5 of the EU for further details. The ERT noted that the Party met its 2020 ESD target by using the flexibility allowed under the ESD (i.e. to

cover its AEA deficit) by purchasing 11,369,000 surplus AEAs from EU member States that had overachieved their target.

141. The GHG emission projections provided by Germany in its NC8 and BR5 correspond to the WEM scenario. Under the WEM scenario, emissions in 2030 are projected to be 49.0 per cent below the 1990 level and 13.2 per cent below the 2020 level. In 2040, emissions are projected to be 67.1 per cent below the 1990 level and 43.9 per cent below the 2020 level.

142. Germany's main policy framework relating to energy and climate change is the Climate Change Act, originally adopted in 2019 and amended in 2021. Within the Climate Change Act, Germany has committed to achieving net GHG neutrality by 2045. The Climate Change Act defines a range of maximum permissible quantities of annual emissions for different sectors including energy, transport and buildings until 2030. As part of the Climate Change Act, Germany has developed a set of PaMs that it is planning to implement in order to achieve its national climate protection goals across all related sectors. Some of these PaMs include the Fuel Emissions Trading Act, the package of measures for immediate action in the energy sector, the Building Energy Law, the promotion of electromobility and the National Decarbonization Programme for Industry. Germany also introduced national-level policies to achieve its targets under the ESD and ESR and domestic emission reduction targets. The mitigation effect of phasing out coal power plants is the most significant in the long term. Other national policies that have delivered significant emission reductions are programmes providing financial support for implementing energy standards for buildings and renovations and the measure on CO_2 pricing for heat and transport under Germany's Fuel Emissions Trading Act.

143. Germany continued to provide climate financing to developing countries in line with its climate finance programmes such as the NDC Partnership, the InsuResilience Global Partnership, the International Climate Initiative, the NAMA Facility, the Global Energy Transformation Programme, the Africa Renewable Energy Initiative and the African Forest Landscape Restoration Initiative. It has increased its contributions by 9.5 per cent since the BR4; its public financial support in 2019–2020 totalled USD 16,242.85 million. For those years, Germany provided more support for mitigation. The biggest share of support went to projects and programmes in the energy, cross-cutting, water and sanitation, and transport sectors. An example of this support is related to the implementation of NDCs through the NDC Partnership, which is aimed at supporting developing countries in bringing together their national climate contributions and advancing progress towards the Sustainable Development Goals, and in deploying bilateral and multilateral donor programmes in a more coordinated way for implementation.

144. Germany continued to provide support for technology development and transfer and capacity-building. The Party reported that technology transfer and capacity-building are core components of almost all the Federal Government's climate-related bilateral cooperation. Priority for technological support was given to projects and programmes in mitigation in several countries in Asia, Africa and Latin America. Priority for capacity-building support was given to projects and programmes in mitigation and adaptation in Asia, Africa and Latin America.

145. In its NC8 Germany provided information on the expected impacts of climate change in the country; the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations; and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. Germany continued to update the Adaptation Action Plan III which replaced the previous Adaptation Action Plan II under its Strategy for Adaptation to Climate Change (2008). Germany reported that it has in place a well-established system for climate change modelling and scenario assessments and has implemented several adaptation actions that are graded on the basis of their level of urgency. There has been considerable improvement in the country's monitoring and evaluation system. The planned work to further improve the effectiveness of adaptation actions appears promising.

146. In its NC8 Germany provided information on its activities relating to research and systematic observation. Germany has undertaken several domestic and international research and observation activities, including participation in and funding of EU programmes, as well

as multilateral and bilateral initiatives on climate change modelling, and mitigation and technology assessments related to new and renewable energies.

147. In its NC8 Germany provided information on its actions relating to education, training and public awareness. It reported on vocational training programmes, educational activities in schools for students and teachers, and public information campaigns related to energy systems transformation and climate action. Germany also reported on international communication efforts undertaken in the area of energy systems transformation.

148. In the course of the review, the ERT formulated the following recommendations for Germany to improve its adherence to the UNFCCC reporting guidelines on NCs in its next NC:

(a) To improve the completeness of its reporting by:

(i) Including the total effect of PaMs by gas for the most recent inventory year and for subsequent years that end in either a zero or a five, extending at least 15 years from the most recent inventory year (not cumulative savings) (see issue 3 in table I.2);

(ii) Providing information on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format, or providing a reference to the relevant report containing this information, including the exact chapter and page number (see issue 6 in table I.2);

(iii) Providing information on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation (see issue 2 in table I.3);

(iv) Including information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties (see issue 3 in table I.3);

(v) Providing relevant examples, where feasible, on success and failure stories using table 9 of the UNFCCC reporting guidelines on NCs (see issue 4 in table I.3).

(b) To improve the transparency of its reporting by:

(i) Including clear and consistent information on the cut-off date for the scenarios reported and allocating its PaMs to those adopted, implemented and planned accordingly (see issue 2 in table I.2);

(ii) Providing a description of the indicators relevant to the tracking of technological and capacity-building support (see issue 1 in table I.3);

(iii) Providing information on how the capacity-building support provided responds to the existing and emerging capacity-building needs identified by non-Annex I Parties (see issue 5 in table I.3);

(c) To improve the timeliness of its reporting by submitting its next NC on time (see para. 5 above).

149. In the course of the review of Germany's BR5, the ERT formulated the following recommendations relating to adherence to the UNFCCC reporting guidelines on BRs:

(a) To improve the completeness of its reporting by:

(i) Providing information on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format, or providing a reference to the relevant report containing this information, including the exact chapter and page number (see issue 5 in table II.2);

(ii) Providing information on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation (see issue 2 in table II.3);

(iii) Including information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties (see issue 3 in table II.3);

(b) To improve the transparency of its reporting by:

(i) Including the additional information provided during the review on how it monitors progress in relation to PaMs (see issue 1 in table II.1);

(ii) Describing what it considers as PaMs for the reporting in the NC and thus for inclusion in CTF table 3, and what it considers as measures that are described in the NC8 in order to provide additional information only, and explaining the use of the notation keys reported in CTF table 3 (see issue 3 in table II.1);

(iii) Including clear and consistent information on the cut-off date for the scenarios reported and allocating its PaMs to those adopted, implemented and planned accordingly (see issue 2 in table II.2);

(iv) Providing a description of the indicators relevant to the tracking of technological and capacity-building support (see issue 1 in table II.3);

(v) Providing information on how the capacity-building support provided responds to the existing and emerging capacity-building needs identified by non-Annex I Parties (see issue 5 in table II.3);

(c) To improve the timeliness of its reporting (see para. 7 above).

Annex I

Assessment of adherence to the reporting guidelines for the eighth national communication of Germany

Tables I.1–I.5 summarize the ERT assessment of adherence to the UNFCCC reporting guidelines on NCs for Germany's NC8.

Table I.1
Findings on policies and measures from the review of the eighth national communication of Germany

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 10 Issue type: transparency Assessment: encouragement	The ERT noted that Germany did not transparently describe in its NC8 how it prioritized PaMs that have the most significant impact on GHG emissions and removals. The reporting in the NC8 groups PaMs by those adopted up until August 2020 and those adopted thereafter. During the review, Germany clarified that it prioritized PaMs for inclusion in the NC8 on the basis of the availability of information and data between August 2020 and the deadline for finalizing the NC8. However, these selection criteria and how they were used to prioritize the PaMs that have the most significant impact on GHG emissions and removals were not explained in the NC8. The ERT encourages Germany to provide further details in its next NC on how it prioritized the PaMs presented and described in the NC by explaining that priority is given to PaMs with the most significant impact on GHG emissions and removals.
2	Reporting requirement specified in paragraph 13 Issue type: transparency Assessment: encouragement	The ERT noted that in the NC8, Germany did not report in detail on the assessment of the economic and social consequences of response measures. During the review, however, Germany gave a detailed presentation on the analysis of economic and social consequences of response measures that was prepared for the Climate Action Programme 2020 and Climate Action Plan 2050. The ERT encourages Germany to report in its next NC on the assessment of the economic and social consequences of response measures in line with the information provided during the review and to the extent possible.
3	Reporting requirement specified in paragraph 18 Issue type: transparency Assessment: encouragement	The ERT noted that Germany did not transparently describe the way in which progress in relation to PaMs to mitigate GHG emissions is monitored and evaluated over time. During the review, Germany clarified that it is making efforts to systematically estimate and monitor the impact of PaMs ex ante and ex post their adoption and implementation. In preparation for each climate action programme, relevant federal government departments are required to propose additional PaMs or updates of existing PaMs, which are underpinned by quantified estimates of their emission reduction impact using a standardized approach to describe the proposed PaMs. These estimates are compiled and assessed by the federal ministry in charge of climate policy with regard to their overall impact, possible interdependencies and the extent to which sectoral objectives can be met on the basis of the proposed action. Before a climate action programme is adopted by the Federal Government in accordance with the Climate Change Act, a public consultation procedure is carried out and an independent advisory body, the Council of Experts on Climate Change, provides an assessment of the proposed actions, with a focus on the assumptions underpinning the expected impact on emissions. From 2024 onward, projections of the expected impacts of PaMs (and overall climate action programmes) will be proposed by mid-March every year in order to inform the government policymaking process with regard to whether the PaMs adopted to date will be sufficient to achieve the national climate policy targets. If this is not the case (according to two subsequent projections), the Federal Government is required to elaborate a set of additional PaMs to fill the gap. The ERT encourages Germany to include in its next NC the additional information provided during the review on how it monitors progress in relation to PaMs.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.2
Findings on projections including aggregate effects of policies and measures reported in the eighth national communication of Germany

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 25 Issue type: completeness Assessment: encouragement	The ERT noted that Germany did not provide WAM scenario projections in its NC8 or provide an explanation as to why it did not prepare this scenario. During the review, the Party explained that planned PaMs were modelled in the WEM scenario, as were all measures set out in the Climate Action Programme 2030 that were sufficiently detailed and certain to be implemented. The ERT reiterates the encouragement made in the previous review report for Germany to report in its next NC a WAM scenario or an adequate explanation as to why it is not possible to do so. If a WAM scenario is provided, PaMs should be consistently allocated between the WEM scenario, which should contain only implemented and adopted PaMs, and the WAM scenario, which should also encompass planned PaMs.
2	Reporting requirement specified in paragraph 26 Issue type: transparency Assessment: recommendation	In its NC8, Germany reported that the WEM scenario includes all PaMs that had been adopted and implemented as at 31 August 2020. However, in CTF table 3, the Party reported 16 PaMs as "implemented" whose start date of implementation is after the reported cut-off date of 31 August 2020. During the review, the Party explained that some PaMs were also categorized as "implemented" when the start date of implementation is after the cut-off date. The ERT recommends that Germany include clear and consistent information in its next NC on the cut-off date for the scenarios reported and allocate its PaMs to those adopted, implemented and planned accordingly.
3	Reporting requirement specified in paragraph 37 Issue type: completeness Assessment: recommendation	In its NC8 Germany did not provide any estimates of the total effect of PaMs included in the WEM scenario in terms of GHG emissions avoided or sequestered, by gas (on a CO_2 eq basis) in 2025, 2030 and 2035. During the review, the Party explained that a differentiation of the total effect of PaMs by gas could, in principle, be possible in the future by undertaking further work on modelling. CH_4 and N_2O emissions are not calculated separately, except for cases where they represent the main emissions in a sector (e.g. agriculture). Therefore, the Party cannot currently provide information on the total effect of PaMs per gas. The ERT recommends that Germany include in its next NC information on the total effect of PaMs by gas for the most recent inventory year and for subsequent years that end in either a zero or a five, extending at least 15 years from the most recent inventory year (not cumulative savings).
4	Reporting requirement specified in paragraph 40 Issue type: transparency Assessment: encouragement	Germany reported in its NC8 which models were used for the projections for each sector and gas, but did not always specify the type of model used (e.g. top-down, bottom-up, accounting model or expert judgment) and its strengths and weaknesses. Moreover, the ERT noted that an explanation of how overlaps or synergies between different PaMs were accounted for was not provided in the NC8. During the review, Germany referred to relevant sections and/or pages of the NC8 where information on the models used can be found: for example, information on the management of overlaps and synergies between PaMs in the projections of emissions in the agriculture and waste sectors, and the correction of overlaps by estimating the percentage effect of each measure on the overall mitigation effect. Overlaps or synergies that may exist between different sectors were not systematically analysed in the projections. The ERT reiterates the encouragement made in the previous review report for Germany to provide information in its next NC on how the modelling approach used for the projections accounts or does not account for any overlaps or synergies that may exist between different PaMs and specifically between different sectors. This information should enable the reader to gain a basic understanding of the models and/or approaches used, including through a brief description of the models.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
5	Reporting requirement specified in paragraph 41 Issue type: transparency Assessment: encouragement	In its NC8, Germany referred to the projections report 2021 for further details on the models and methodological approach used. However, the report is in German; only a one-page technical note and four flow charts are provided in English; and specific references to the relevant sections and/or pages were not provided. During the review, Germany confirmed that an English version of the report is not available. The ERT reiterates the encouragement made in the previous review report for Germany to enhance the transparency of its reporting by including in its next NC specific references to the relevant sections and/or pages of the background documents that contain additional information on the models and methodological approach used for the projections.
6	Reporting requirement specified in paragraph 45 Issue type: completeness Assessment: recommendation	The ERT noted that Germany did not provide information in its NC8 on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format. Emission trends and projections were described for each sector in the NC8, but information on underlying assumptions and activities for each sector was not provided either in textual or tabular format. During the review, the Party explained that information on underlying assumptions regarding the modelling for each sector is included in the projections report 2021. However, no English version of the report is available. In the recently published projections report 2023, these key indicators are available in an Excel spreadsheet in German. The ERT recommends that Germany provide in its next NC information on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format, or provide a reference to the relevant report containing this information, including the exact chapter and page number.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.3
Findings on financial, technological and capacity-building support from the review of the eighth national communication of Germany

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 49 Issue type: transparency Assessment: recommendation	The ERT noted that Germany did not report in its NC8 which indicators were used in its national approach to tracking the provision of technological and capacity-building support provided to non-Annex I Parties. During the review, Germany explained that technology transfer and capacity-building are components of all the Federal Government's public climate finance. Owing to the large scale of climate finance provided, Germany did not report all of the technology transfer and capacity-building measures in the NC8. Furthermore, the Party considers that applying specific criteria would not do justice to the uniqueness of each project. The ERT recommends that Germany provide a description of the indicators relevant to the tracking of technological and capacity-building support in its next NC.
2	Reporting requirement specified in paragraph 51 Issue type: completeness Assessment: recommendation	Germany did not report in its NC8 information on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation. During the review, Germany explained that it regularly evaluates projects in order to precisely assess their effectiveness and learn from them. Germany also provided links for the respective evaluation reports. The ERT recommends that Germany include information in its next NC, to the extent possible, including the information provided during the review, on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
3	Reporting requirement specified in paragraph 57 Issue type: completeness Assessment: recommendation	The Party did not report in its NC8 information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties. During the review, Germany explained that support for the development and enhancement of endogenous capacities and technologies through financial cooperation projects is mainly implemented by the project executing agency via accompanying measures. The ERT recommends that Germany include in its next NC information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties.
4	Reporting requirement specified in paragraph 57 Issue type: completeness Assessment: recommendation	The ERT noted that although Germany reported activities related to technology transfer in its NC8, it did not provide a description of selected projects or programmes that promote practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies using table 9 of the UNFCCC reporting guidelines on NCs. During the review, Germany provided links to information from government cooperation organizations on best practice examples of and lessons learned from climate-related projects. In addition, the Party provided information on the German Institute for Development Evaluation, whose main task is to analyse and evaluate German development cooperation activities. The ERT recommends that Germany report in its next NC, where feasible, relevant examples of success and failure stories using table 9 of the UNFCCC reporting guidelines on NCs.
5	Reporting requirement specified in paragraph 59 Issue type: transparency Assessment: recommendation	The ERT noted that Germany did not report in its NC8 information on how the activities supported respond to the existing and emerging capacity-building needs of non-Annex I Parties in the areas of mitigation, adaptation, and technology development and transfer. During the review, Germany explained that the capacity-building support measures are designed to be context-specific, results-based and consistent with respective national priorities. The ERT recommends that Germany provide information in its next NC describing how the capacity-building support provided responds to the existing and emerging capacity-building needs identified by non-Annex I Parties.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.4
Findings on research and systematic observation from the review of the eighth national communication of Germany

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 65 Issue type: completeness Assessment: encouragement	The Party did not report in its NC8 on opportunities and barriers to free and open international exchange of data and information and action taken to overcome such barriers, or on challenges related to maintaining a consistent and comprehensive observation system. During the review, Germany acknowledged the concerns of the ERT relating to the completeness of its reporting and explained that there are legal constraints to free and open data exchange since the provision of data is regulated by the Spatial Data Access Act of 2009. The ERT encourages Germany to include in its next NC information on the identification of opportunities for and barriers to free and open international exchange of data and information and on action taken to overcome such barriers.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.5
Findings on education, training and public awareness from the review of the eighth national communication of Germany

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 68 Issue type: completeness Assessment: encouragement	In its NC8 Germany did not report on the extent of public participation in the preparation or domestic review of the NC. During the review, the Party informed the ERT that education, training and public awareness are cross-cutting actions and, hence, no specific ministry or department is responsible for such actions and that public participation in the preparation or domestic review of the NC is therefore conducted across institutions. The ERT encourages the Party to include in its next NC information on public participation in the preparation and review of the NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Annex II

Assessment of adherence to the reporting guidelines for the fifth biennial report of Germany

The BR5 of Germany is the final BR under the measurement, reporting and verification system established under the Convention.[1] Nevertheless, ERTs continue to provide recommendations and encouragements to the Parties on completeness, transparency and adherence to the UNFCCC reporting guidelines on BRs. Parties may find these recommendations and encouragements relevant, as appropriate, when preparing their initial biennial transparency report under the enhanced transparency framework of the Paris Agreement. Tables II.1–II.3 summarize the ERT assessment of adherence to the UNFCCC reporting guidelines on BRs for Germany's BR5.

Table II.1
Findings on mitigation actions and their effects from the review of the fifth biennial report of Germany

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 7 Issue type: transparency Assessment: recommendation	The ERT noted that Germany did not transparently describe in detail the way in which changes in its domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements, are used for domestic compliance and monitoring. During the review, Germany clarified that it is making efforts to systematically estimate and monitor the impact of PaMs ex ante and ex post their adoption and implementation. In preparation for each climate action programme, relevant federal government departments are required to propose additional PaMs (or updates of existing measures), which are underpinned by quantified estimates of their emission reduction impact (using a standardized template to describe the proposed PaMs). These estimates are compiled and assessed by the federal ministry in charge of climate policy with regard to their overall impact, possible interdependencies and the extent to which sectoral objectives can be met on the basis of the proposed action. Before a climate action programme is adopted by the Federal Government in accordance with the Climate Change Act, a public consultation procedure is carried out and an independent advisory body, the Council of Experts on Climate Change, provides an assessment of the proposed actions, with a focus on the assumptions underpinning the expected impact on emissions. From 2024 onward, projections of the expected impacts of PaMs (and overall climate action programmes) will be proposed by mid-March every year in order to inform the government policymaking process with regard to whether the PaMs adopted to date will be sufficient to achieve the national climate policy targets. If this is not the case (according to two subsequent projections), the Federal Government is required to elaborate a set of additional PaMs to fill the gap. The ERT recommends that Germany include the additional information provided during the review on how it monitors progress in relation to PaMs.
2	Reporting requirement specified in paragraph 8 Issue type: transparency Assessment: encouragement	The ERT noted that in the BR5, Germany did not report in detail on the assessment of the economic and social consequences of response measures. During the review, however, Germany gave a detailed presentation on the analysis of economic and social consequences of response measures that was prepared for the Climate Action Programme 2020 and Climate Action Plan 2050.

[1] The COP, by decision 1/CP.24, decided that the final biennial reports shall be those submitted to the secretariat no later than 31 December 2022 and reaffirmed that, for Parties to the Paris Agreement, following the submission of the final biennial report, the modalities, procedures and guidelines contained in the annex to decision 18/CMA.1 will supersede the measurement, reporting and verification system established under decision 1/CP.16, paragraphs 40–47 and 60–64, and decision 2/CP.17, paragraphs 12–62.

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
		The ERT encourages Germany to report on the assessment of the economic and social consequences of response measures in line with the information provided during the review and to the extent possible.
3	Reporting requirement specified in CTF table 3	The ERT noted that Germany did not provide fully transparent information on why CTF table 3 does not include all of the PaMs described in the NC8 and why some of them are reported as "NE".
	Issue type: transparency	During the review, Germany explained that some of the PaMs described in the NC8 were not reported in CTF table 3 as they were considered as overarching measures (such as the PaMs for the Energy and Climate Fund and the Energy Efficiency Fund). Germany further explained that these estimated impacts were allocated to other measures and sectors and that "NE" was reported for 2020, 2021 and 2025 as the impacts of PaMs were only fully estimated for 2030.
	Assessment: recommendation	The ERT recommends that Germany further describe what it considers as PaMs for the reporting in the NC and thus for inclusion in CTF table 3, and what it considers as measures that are described in the NC8 in order to provide additional information only; and to transparently explain the use of the notation keys reported in CTF table 3.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs or to the CTF table number from the UNFCCC reporting guidelines on CTF tables. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Table II.2
Findings on projections reported in the fifth biennial report of Germany

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 25	The ERT noted that Germany did not provide WAM scenario projections in its BR5 or provide an explanation as to why it did not prepare this scenario.
	Issue type: completeness	During the review, the Party explained that planned PaMs were modelled in the WEM scenario, as were all measures set out in the Climate Action Programme 2030 that were sufficiently detailed and certain to be implemented.
	Assessment: encouragement	The ERT encourages Germany to report a WAM scenario or an adequate explanation as to why it is not possible to do so. If a WAM scenario is provided, PaMs should be consistently allocated between the WEM scenario, which should contain only implemented and adopted PaMs, and the WAM scenario, which should also encompass planned PaMs.
2	Reporting requirement[a] specified in paragraph 26	In its BR5, Germany reported that the WEM scenario includes all PaMs that had been adopted and implemented as at 31 August 2020. However, in CTF table 3, the Party reported 16 PaMs as "implemented" whose start date of implementation is after the reported cut-off date of 31 August 2020.
	Issue type: transparency	During the review, the Party explained that some PaMs were also categorized as "implemented" when the start date of implementation is after the cut-off date.
	Assessment: recommendation	The ERT recommends that Germany include clear and consistent information on the cut-off date for the scenarios reported and allocate its PaMs to those adopted, implemented and planned accordingly.
3	Reporting requirement[a] specified in paragraph 40	Germany reported in its BR5 which models were used for the projections for each sector and gas, but did not always specify the type of model used (e.g. top-down, bottom-up, accounting model or expert judgment) and its strengths and weaknesses. Moreover, the ERT noted that an explanation of how overlaps or synergies between different PaMs were accounted for was not provided in the BR5.
	Issue type: transparency	During the review, Germany referred to relevant sections and/or pages of the NC8 where information on the models used can be found: for example, information on the management of overlaps and synergies between PaMs in the projections of emissions in the agriculture and waste sectors, and the correction of overlaps by estimating the percentage effect of each measure on the overall mitigation effect. Overlaps or synergies that may exist between different sectors were not systematically analysed in the projections.
	Assessment: encouragement	

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
		The ERT reiterates the encouragement made in the previous review report for Germany to provide information on how the modelling approach used for the projections accounts or does not account for any overlaps or synergies that may exist between different PaMs and specifically between different sectors. This information should enable the reader to gain a basic understanding of the models and/or approaches used, including through a brief description of the models.
4	Reporting requirement[a] specified in paragraph 41 Issue type: transparency Assessment: encouragement	In its BR5, Germany referred to the projections report 2021 for further details on the models and methodological approach used. However, the report is in German; only a one-page technical note and four flow charts are provided in English; and specific references to the relevant sections and/or pages were not provided. During the review, Germany confirmed that an English version of the report is not available. The ERT reiterates the encouragement made in the previous review report for Germany to enhance the transparency of its reporting by including specific references to the relevant sections and/or pages of the background documents that contain additional information on the models and methodological approach used for the projections.
5	Reporting requirement[a] specified in paragraph 45 Issue type: completeness Assessment: recommendation	The ERT noted that Germany did not provide information in its BR5 on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format. Emission trends and projections were described for each sector in the NC8, but information on underlying assumptions and activities for each sector was not provided either in textual or tabular format. During the review, the Party explained that information on underlying assumptions regarding the modelling for each sector is included in the projections report 2021. However, no English version of the report is available. In the recently published projections report 2023, these key indicators are available in an Excel spreadsheet in German. The ERT recommends that Germany provide information on the key factors and activities impacting the trend for each sector (e.g. projected animal population and fertilizer use for agriculture), along with relevant data in tabular format, or provide a reference to the relevant report containing this information, including the exact chapter and page number.

Note: The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and on BRs.

[a] Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs, as per para. 11 of the UNFCCC reporting guidelines on BRs.

Table II.3

Findings on provision of financial, technological and capacity-building support to developing country Parties from the review of the fifth biennial report of Germany

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 14 Issue type: transparency Assessment: recommendation	The ERT noted that Germany did not report in its BR5 which indicators were used in its national approach to tracking the provision of technological and capacity-building support provided to non-Annex I Parties. During the review, Germany explained that technology transfer and capacity-building are components of all the Federal Government's public climate finance. Owing to the large scale of climate finance provided, Germany did not report all of the technology transfer and capacity-building measures in the NC8. Furthermore, the Party considers that applying specific criteria would not do justice to the uniqueness of each project. The ERT recommends that Germany provide a description of the indicators relevant to the tracking of technological and capacity-building support.

No.	*Reporting requirement and issue type*	*Description of the finding with recommendation or encouragement*
2	Reporting requirement specified in paragraph 16	Germany did not report in its BR5 information on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation.
	Issue type: completeness	During the review, Germany explained that it regularly evaluates projects in order to precisely assess their effectiveness and learn from them. Germany also provided links for the respective evaluation reports.
	Assessment: recommendation	The ERT recommends that Germany include information, to the extent possible, including the information provided during the review, on how it seeks to ensure that the resources it provides effectively address the needs of non-Annex I Parties with regard to climate change adaptation and mitigation.
3	Reporting requirement specified in paragraph 21	The Party did not report in its BR5 information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties.
	Issue type: completeness	During the review, Germany explained that support for the development and enhancement of endogenous capacities and technologies through financial cooperation projects is mainly implemented by the project executing agency via accompanying measures.
	Assessment: recommendation	The ERT recommends that Germany include information on the support provided for the development and enhancement of the endogenous capacities and technologies of non-Annex I Parties.
4	Reporting requirement specified in paragraph 21	The ERT noted that although Germany reported activities related to technology transfer in its BR5, it did not provide information on success and failure stories.
	Issue type: completeness	During the review, Germany provided links to information from government cooperation organizations on best practice examples of and lessons learned from climate-related projects. In addition, the Party provided information on the German Institute for Development Evaluation, whose main task is to analyse and evaluate German development cooperation activities.
	Assessment: encouragement	The ERT encourages Germany to report relevant examples on success and failure stories.
5	Reporting requirement specified in paragraph 23	The ERT noted that Germany did not report in its BR5 information on how the activities supported respond to the existing and emerging capacity-building needs of non-Annex I Parties in the areas of mitigation, adaptation, and technology development and transfer.
	Issue type: transparency	During the review, Germany explained that the capacity-building support measures are designed to be context-specific, results-based and consistent with respective national priorities.
	Assessment: recommendation	The ERT recommends that Germany provide information describing how the capacity-building support provided responds to the existing and emerging capacity-building needs identified by non-Annex I Parties.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Annex III

Documents and information used during the review

A. Reference documents

2022 GHG inventory submission of Germany. Available at https://unfccc.int/ghg-inventories-annex-i-parties/2022.

2023 GHG inventory submission of Germany. Available at https://unfccc.int/ghg-inventories-annex-i-parties/2023.

BR4 of Germany. Available at https://unfccc.int/BR4.

BR5 CTF tables of Germany. Available at https://unfccc.int/BR5.

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B. Additional information provided by the Party

Responses to questions during the review were received from Dirk Günther and Tobias Vosen (German Environment Agency), including additional material.