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Item 14(a) of the provisional agenda
Matters relating to technology development and transfer
Joint annual report of the Technology Executive Committee and the Climate Technology Centre and Network

Joint annual report of the Technology Executive Committee and the Climate Technology Centre and Network for 2024*

Summary

This report covers the activities and performance of the Technology Executive Committee and the Climate Technology Centre and Network since the publication of their joint annual report for 2023, including in their second year of implementing the joint work programme of the Technology Mechanism for 2023–2027 and in implementing the technology framework under the Paris Agreement. It contains information on the bodies' meetings and joint activities, deliverables and engagement with stakeholders, as well as key messages and recommendations for the Conference of the Parties at its twenty-ninth session and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its sixth session.

* This document was submitted to the conference services for processing after the deadline in order to include reporting on the 29th meeting of the Technology Executive Committee, held from 17 to 20 September 2024, and the 24th meeting of the Climate Technology Centre and Network, held from 20 to 25 September 2024.

Contents

		Page
	Abbreviations and acronyms	3
I.	Introduction	4
	A. Mandate and background	4
	B. Scope	4
	C. Possible action by the subsidiary bodies	4
II.	Joint chapter of the Technology Executive Committee and the Climate Technology Centre and Network	4
III.	Activities and performance of the Technology Executive Committee	7
	A. Meetings and membership	7
	B. Implementation of the rolling workplan for 2023–2027	7
	C. Challenges and lessons learned	13
IV.	Activities and performance of the Climate Technology Centre and Network	14
	A. Advisory Board meetings and membership	14
	B. Activities of the Climate Technology Centre and Network	14
	C. Organizational structure of the Climate Technology Centre and Network	22
	D. Challenges and lessons learned	23
	E. Key messages for the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement	24
Annexes		
I.	Key messages and recommendations of the Technology Executive Committee for the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement	25
II.	Climate Technology Centre and Network technical assistance projects completed during the reporting period for each area of system transformation	32

Abbreviations and acronyms

AF	Adaptation Fund
AFCIA	Adaptation Fund Climate Innovation Accelerator
AI	artificial intelligence
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GCNMA	Glasgow Committee on Non-market Approaches
GEF	Global Environment Facility
GEO	Group on Earth Observations
GHG	greenhouse gas
LDC	least developed country
LT-LEDS	long-term low-emission development strategy(ies)
NAP	national adaptation plan
NDC	nationally determined contribution
NDE	national designated entity
NGO	non-governmental organization
NMA	non-market approach
RCC	regional collaboration centre
SB	sessions of the subsidiary bodies
SBI	Subsidiary Body for Implementation
SIDS	small island developing State(s)
TA	technical assistance
TAP	technology action plan
TEC	Technology Executive Committee
TNA	technology needs assessment
TT:CLEAR	technology information clearing house
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WIPO	World Intellectual Property Organization

I. Introduction

A. Mandate and background

1. COP 16 established the Technology Mechanism, comprising the TEC and the CTCN, to facilitate implementation of enhanced action on technology development and transfer to support action on mitigation and adaptation in order to achieve full implementation of the Convention.[1]

2. CMA 1 adopted the technology framework under Article 10, paragraph 4, of the Paris Agreement to provide overarching guidance to the work under the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer to support implementation of the Paris Agreement.[2]

3. In accordance with relevant COP[3] and CMA[4] decisions, the TEC and the CTCN prepare a joint annual report for consideration by the COP and the CMA through the subsidiary bodies.

4. During the reporting period, the TEC and the CTCN entered their second year of implementing the joint work programme of the Technology Mechanism for 2023–2027,[5] which is aimed at facilitating coherence and synergy and ensuring effective implementation of the work of both bodies. It comprises joint activities and common areas of work of the bodies, the rolling workplan of the TEC for 2023–2027[6] and the programme of work of the CTCN for 2023–2027.[7]

B. Scope

5. This report summarizes the key activities and outcomes of the work of the TEC and the CTCN since the publication of their joint annual report for 2023.[8] Chapter II below highlights and tracks progress in the bodies' collaborative and joint efforts. Chapters III and IV below describe the activities and results of the work of the TEC and the CTCN respectively during the reporting period, including information on common areas of work and challenges and lessons learned in implementing their mandates. Annex I presents key messages and recommendations of the TEC for consideration at COP 29 and CMA 6, and annex II provides an overview of CTCN TA projects completed during the reporting period.

C. Possible action by the subsidiary bodies

6. The subsidiary bodies may wish to consider this report and to recommend draft decisions for consideration and adoption at COP 29 and CMA 6.

II. Joint chapter of the Technology Executive Committee and the Climate Technology Centre and Network

7. The joint sessions[9] of the TEC and the CTCN Advisory Board, held in 2024 on 19 April and 20 September in conjunction with the bodies' meetings, continued to provide a valuable opportunity for systematically exchanging feedback on the work of each body and

[1] Decision 1/CP.16, para. 117.
[2] Decision 15/CMA.1, para. 1.
[3] Decisions 2/CP.17, paras. 142–143; 1/CP.21, para. 68; 12/CP.21, para. 2; 15/CP.22, para. 6; 15/CP.23, para. 4; and 14/CP.25, para. 8.
[4] Decisions 15/CMA.1, paras. 4–5; and 8/CMA.2, para. 4.
[5] Available at https://unfccc.int/ttclear/tec/documents.html.
[6] Available at https://unfccc.int/ttclear/tec/workplan.
[7] Available at https://pow.ctc-n.org/programme.html.
[8] FCCC/SB/2023/3.
[9] See https://unfccc.int/ttclear/tec/meetings.html.

taking stock of their joint work, including in implementing the joint work programme of the Technology Mechanism.

8. The TEC and the CTCN continued to collaborate on joint activities. During the reporting period, they:

(a) Held a high-level event at COP 28 on AI for climate action, in collaboration with the COP 28 Presidency. The aim of the event was to explore the potential of AI as a powerful technological tool for realizing transformative adaptation and mitigation solutions in developing countries, particularly in the LDCs and SIDS. The event provided a space for ministers to discuss policy and for leaders in the field to share knowledge and experience in order to raise awareness of the opportunities and challenges presented by AI-powered climate action. Information on the event, including a summary and the video recording, is available on TT:CLEAR;[10]

(b) Held a high-level event at COP 28, in collaboration with the COP 28 Presidency, on international cooperation on technology and innovation as a means of uniting for climate action.[11] The purpose of the event was to foster existing and unlock potential new partnerships in technology development and transfer aimed at uniting the public and private sectors and supporting developing countries in this regard;

(c) Finalized and began implementing the workplan for the Technology Mechanism initiative on AI for climate action (2024–2027),[12] including initiating work on an AI climate application hub in partnership with Enterprise Neurosystem and participating in the Climate Change AI Summer School 2024. The hub will serve as a repository of AI-powered open-source climate applications that can be freely accessed and will feature solutions shared under the AI Innovation Grand Challenge (see para. 25(a) below). A governance system and selection criteria are being developed to ensure that the required quality assurance and due diligence are applied when selecting the AI applications to feature on the hub;

(d) Developed draft concept notes on the use of distributed ledgers and green technology databases, and continued collaborating with WIPO on linking the WIPO GREEN database of innovative technologies and needs to the CTCN website with the aim of raising awareness of environmentally friendly technologies and connecting providers and seekers thereof;

(e) Operationalized the gender and climate technology expert roster,[13] an online database of international professionals, local experts and Indigenous Peoples with recognized expertise in the area of gender equality and climate technology. As at September 2024, 95 experts had joined the roster;

(f) Launched the third biennial Technology Mechanism NDE survey for evaluating the ex post impacts of the support provided by the TEC and the CTCN to facilitate technology development and transfer. For this iteration of the survey a more targeted dissemination approach was employed than for previous surveys in order to ensure greater participation.[14] The survey was sent to over 160 NDEs between May and August 2024 and responses were received from 74, an 18 per cent increase in response compared with the 2022 survey. The survey findings will help to guide the implementation of the joint work programme of the Technology Mechanism.

9. The TEC and the CTCN continued to collaborate closely in implementing the common areas of work outlined in the joint work programme of the Technology Mechanism. Regarding water–energy–food systems, the CTCN contributed information on a TA case study as input to a joint TEC and FAO knowledge product on climate technologies for agrifood system transformation. Regarding TNAs, information gathered by the TEC from the

[10] https://unfccc.int/ttclear/events/2023/2023_event10.

[11] See https://www.ctc-n.org/calendar/events/high-level-event-cop28-uniting-climate-action-calling-international-cooperation.

[12] Available at https://unfccc.int/ttclear/artificial_intelligence.

[13] Available at https://www.ctc-n.org/networking-and-collaboration/gender-and-climate-technology-expert-roster.

[14] In accordance with decision 18/CP.27, para. 11.

CTCN TA portfolio enriched the TEC analysis of success stories from implemented TAPs to identify key elements for successful implementation of prioritized technologies. Regarding business and industry, the CTCN contributed to a TEC policy brief prepared in collaboration with UNIDO on integrating consideration of hard-to-abate industries into the process of preparing and implementing NDCs.

10. The TEC and the CTCN continued to collaborate and exchange information, including by:

(a) Organizing an in-session workshop held at SBI 60, at which participants took stock of and explored ways to enhance the linkages between the Technology Mechanism and the Financial Mechanism;

(b) Participating in and contributing to each other's events and activities; for example, the TEC presented its knowledge products and the highlights from its work at the regional NDE forums held during the reporting period;

(c) Holding joint events at COP 28 and SB 60 on fostering innovation through collaborative climate technology research, development and demonstration and on promoting technologies that support risk-informed climate adaptation and early warning systems respectively;

(d) Conducting an analysis of the monitoring and evaluation indicators for their joint activities and existing reporting requirements, approving operational indicators, and initiating the elaboration of impact-related indicators;

(e) Launching, with the support of the UNFCCC secretariat, a joint call for partnerships aimed at accelerating technology development and transfer [15] in order to mobilize resources for implementing the joint work programme of the Technology Mechanism;

(f) Undertaking joint communication and outreach efforts, including through the CTCN newsletter and the UN Climate Change Technology group on LinkedIn, which reach more than 12,000 subscribers and 2,200 members respectively.

11. The TEC and the CTCN engaged with constituted bodies and in processes and initiatives under the UNFCCC, including by:

(a) The CTCN contributing to the TEC inputs to the Standing Committee on Finance's draft guidance for the operating entities of the Financial Mechanism;[16]

(b) Jointly contributing to the in-session workshop under the framework for NMAs referred to in Article 6, paragraph 8, of the Paris Agreement held in conjunction with GCNMA 5 during SB 60 by making a presentation on the work under the Technology Mechanism relevant to NMAs;

(c) Regularly jointly interacting with the GCF and the GEF to explore opportunities for closer collaboration, including by co-organizing with the GCF secretariat the session on strengthening linkages between the Technology Mechanism and the Financial Mechanism held at the 2024 GCF regional dialogue for the Middle East and North Africa;[17]

(d) Jointly exploring potential areas of collaboration between the Technology Mechanism and the UN Climate Change Global Innovation Hub, including through the co-organization of events and the facilitation of inputs through the Hub to work under the Technology Mechanism.

[15] See https://unfccc.int/about-us/partnerships/current-calls-for-partnerships/accelerating-technology-development-and-transfer-through-the-joint-work-programme-of-the-technology.

[16] See meeting documents of the 35th Standing Committee on Finance meeting, available at: https://unfccc.int/scf/scf-meetings-and-documents. https://unfccc.int/scf/scf-meetings-and-documents.

[17] See https://www.greenclimate.fund/event/gcf-regional-dialogue-middle-east-and-north-africa.

12. The TEC and the CTCN prepared[18] a document providing information on their individual and joint actions undertaken in response to mandates and guidance from the COP and the CMA.[19]

III. Activities and performance of the Technology Executive Committee

A. Meetings and membership

13. The TEC convened its 28th meeting from 16 to 19 April 2024 in Copenhagen and its 29th meeting from 17 to 20 September 2024 in Bonn.

14. At its 28th meeting, the TEC elected Thibyan Ibrahim (Maldives) as its Chair and Dietram Oppelt (Germany) as its Vice-Chair for 2024.[20]

15. The meetings of the TEC were webcast live and attended by observers, including representatives of Parties and admitted observer organizations who actively contributed to the discussions. All meeting documents, webcasts and reports are available on TT:CLEAR.[21]

B. Implementation of the rolling workplan for 2023–2027

16. In 2024, the TEC rolling workplan for 2023–2027[22] entered its second year of implementation. The workplan is structured around four workstreams, defined to assist the TEC in delivering on its mandate by promoting science-based and systemic approaches to innovation and technology development and transfer, bolstering transformative technology solutions with a focus on high-impact sectors and high-potential actions, and leveraging collaborative partnerships. The guidance from the technology framework under the Paris Agreement is embedded across the four workstreams.

17. The TEC periodically reviewed and revised its rolling workplan during the reporting period, prioritizing the activities therein by taking into account the resource requirements and financial implications of their implementation.

18. The TEC worked through 17 open-ended and ad hoc activity groups during the reporting period. These groups, which are co-led by TEC members and supported by the secretariat, implement the TEC rolling workplan in collaboration with partner organizations. Representatives of UNFCCC NGO constituencies (business and industry, children and youth, farmers and agricultural, and research and independent NGOs, and Indigenous Peoples organizations, and women and gender constituency) are members of the groups and actively contribute to their work.

19. A highlight of the work of the TEC in 2024 is the development, in collaboration with various partners, of seven knowledge products, some of which have been published and others are under development:[23]

(a) Policy brief on realizing Early Warnings for All: innovation and technology in support of risk-informed climate resilience policy and action;

(b) Technical paper on AI for climate action;

(c) Information note on AI for climate action;

[18] In response to decisions 18/CP.27, para. 9, and 19/CMA.4, para. 9.
[19] Available at https://unfccc.int/ttclear/tec/meetings.html under the reference documents for TEC 29.
[20] A list of the TEC members indicating their terms of office is available at https://unfccc.int/ttclear/tec/members.html.
[21] https://unfccc.int/ttclear/tec/meetings.html.
[22] As footnote 6 above.
[23] Upon publication, they will be available at https://unfccc.int/ttclear/tec/documents.html.

(d) Analysis of success stories from implemented TAPs and identification of key elements for success;

(e) Policy paper on climate technologies for agrifood system transformation;

(f) Policy brief on integrating hard-to-abate industries into the process of preparing and implementing NDCs;

(g) Policy brief on gender-responsive technology and infrastructure for sustainable urban mobility.

20. Building on its work, the TEC developed key messages and recommendations in five thematic areas for consideration at COP 29 and CMA 6 (see annex I):

(h) Realizing Early Warnings for All: innovation and technology in support of risk-informed climate resilience policy and action;

(i) Climate technologies for agrifood system transformation;

(j) Integrating hard-to-abate industries into the process of preparing and implementing NDCs;

(k) Gender-responsive technology and infrastructure for sustainable urban mobility;

(l) The Climate Technology Progress Reports for 2022 and 2023.

21. During the reporting period, the TEC co-led, with partner organizations, the organization of 12 events[24] and participated in 22 events organized by partners or as part of the UNFCCC process in various thematic areas of work.[25]

22. The TEC appreciates the supplementary financial contribution from the Government of Italy and the in-kind support provided by Enterprise Neurosystem, FAO, GEO, UNEP Copenhagen Climate Centre and UNIDO, which enabled implementation of its rolling workplan during the reporting period.

1. Workstream 1: national systems of innovation, collaborative research, development and demonstration, and general-purpose technologies

23. Under research, development and demonstration (activity A.2.1 of the rolling workplan), the TEC conducted an exercise to scope out opportunities for engagement, which included participating in the Future Cleantech Festival organized by Future Cleantech Architects, where it engaged in discussions on long-duration energy storage in the context of energy transition. The TEC agreed to develop in 2026 a knowledge product on energy storage.

24. In the area of emerging and transformational adaptation technologies (activity A.3.1 of the rolling workplan), noting the importance of early warning systems, which are mentioned in about 50 per cent of NDCs and 40 per cent of NAPs, the TEC prepared a policy brief[26] on innovation and technology in support of risk-informed climate resilience policy and action in collaboration with GEO under Early Warnings for All. The brief highlights policy insights into and technology options for developing climate information and advancing disaster risk knowledge to support the implementation and scale-up of multi-hazard early warning systems in response to the context-specific needs and priorities of the most vulnerable communities and bolster risk-informed adaptation and mitigation outcomes. In addition, recommendations for actors across the early warning system value chain are included.

25. In the area of digital technologies (activity A.4.1 of the rolling workplan), in line with the workplan for the Technology Mechanism initiative on AI for climate action (see para. 8(c) above), the TEC:

[24] For a calendar of TEC events and links to event pages, see https://unfccc.int/ttclear/events/index.html.
[25] For information on TEC participation in events, see https://unfccc.int/ttclear/events/participation.
[26] See footnote 23 above.

(a) Launched, in partnership with Enterprise Neurosystem, the AI Innovation Grand Challenge,[27] a global open-source AI competition aimed at identifying and supporting AI-powered climate solutions that demonstrate potential for increasing climate resilience or adaptation capacity, or reducing GHG emissions, are applicable in diverse country contexts, particularly the LDCs and SIDS, and support the goals outlined in the joint work programme of the Technology Mechanism. Positive consideration will be given to projects already being implemented in developing countries, particularly the LDCs and SIDS, and led by women, and the winner of the Challenge will be announced at COP 29;

(b) Prepared and disseminated prior to COP 28 a compilation of COP 28 events relevant to AI for climate action;[28]

(c) Initiated consideration of a technical paper exploring the role of AI as a technological tool for advancing and scaling up transformative mitigation and adaptation solutions in developing countries, with a focus on the LDCs and SIDS. The paper will address the challenges and risks posed by AI and offer recommendations to policymakers on how to overcome them;

(d) Prepared an information note on AI for climate action,[29] which provides definitions of AI, machine learning and climate action; an overview of the potential uses of AI for climate action and associated risks and challenges; and an introduction to the Technology Mechanism initiative on AI for climate action;

(e) Co-organized with the United Nations University an expert meeting on AI and climate, focused on AI governance and opportunities, risks and challenges related to using AI for climate action, including in the LDCs and SIDS.[30]

2. Workstream 2: technology needs assessment and technology planning tools to support implementation of nationally determined contributions

26. Continuing its work on TNAs (activity B.1.1 of the rolling workplan), which is a common area of work under the joint work programme of the Technology Mechanism, the TEC prepared an analysis[31] of six case studies of countries that have achieved successful results in implementing TAPs. The analysis highlights elements for success and approaches that may contribute to the effective implementation of prioritized technologies in developing countries, including in relation to the positioning of TNAs within the broader climate change planning process and the formulation of TAPs, and how they have been used to trigger climate action, the uptake of technologies and the scaling up of technology implementation.

27. The TEC contributed to the update of the *TNA Step by Step* guidebook led by UNEP Copenhagen Climate Centre, which informs the work under phase V of the global TNA project.[32] Also, the TEC secured the support of UNEP Copenhagen Climate Centre and UNIDO for developing a TNA guidebook focusing on the energy sector, including aspects of just transition, which will be published in 2025.

28. In the area of long-term technological transition pathways (activity B.2.1 of the rolling workplan), the TEC engaged in three regional workshops on LT-LEDS, two of which were organized by the African Group of Negotiators Experts Support in collaboration with RCC East and Southern Africa, RCC West and Central Africa and RCC MENA and South Asia, and the other jointly convened by the secretariat of the Asia Low Emission Development Strategies Partnership, the United Nations Economic and Social Commission for Asia and the Pacific, the NDC Partnership and RCC Asia and the Pacific. At each workshop, the TEC informed participants about the technology components of the LT-LEDS of countries from the respective region and explained how the work of the TEC can inform the development and implementation of LT-LEDS, including by considering country-specific circumstances

[27] See https://enter.innovationgrandchallenge.ai/2024.
[28] See https://unfccc.int/ttclear/artificial_intelligence.
[29] See footnote 23 above.
[30] See https://unu.edu/ehs/announcement/bonn-ai-climate-2024.
[31] See footnote 23 above.
[32] For information on the project, see https://tech-action.unepccc.org/.

and leveraging the linkages of LT-LEDS with NDCs, TAPs and national technology road maps.

3. Workstream 3: transformative and innovative solutions

29. In the area of water–energy–food systems (activity C.1.1 of the rolling workplan), a common area of work under the joint work programme of the Technology Mechanism, the TEC is collaborating with FAO to develop a policy paper on climate technologies for agrifood system transformation. The paper builds on the discussions at the joint TEC–FAO thematic dialogue held on the margins of SB 58 and the expertise of the TEC and FAO in climate technologies and agrifood systems respectively, and takes into account the finding in the synthesis report[33] for the technical assessment component of the first global stocktake that for adaptation the sectors most commonly prioritized by Parties for technology development and transfer are agriculture (87 per cent of Parties) and water resources (70 per cent). The paper highlights the role of technology in making agrifood systems more resilient and inclusive; explores capacity-building needs of developing country Parties, finance flows and climate technologies for both adaptation and mitigation in the context of agrifood systems; includes country-specific examples covering various regions and sectors; and identifies policy gaps and opportunities.[34] The TEC agreed to organize with FAO a high-level event on climate technologies and agrifood systems to be held at COP 29.

30. On buildings and infrastructure (activity C.2.1 of the rolling workplan), a common area of work under the joint work programme of the Technology Mechanism, the TEC engaged in the third global dialogue and investment-focused event under the Sharm el-Sheikh mitigation ambition and implementation work programme[35] in order to identify areas where the policy work of the TEC can add value while maximizing synergies and avoiding duplication of efforts. With the same purpose, the TEC also engaged in global initiatives outside the UNFCCC process, such as Buildings Breakthrough, which is coordinated by the Global Alliance for Buildings and Construction.[36] Furthermore, the TEC is collaborating with the Massachusetts Institute of Technology Climate Policy Center and the Global Alliance to deliver two knowledge products in 2025–2026. The first will focus on deploying established climate technologies and solutions for buildings and infrastructure and the second on leveraging data to accelerate financing for climate technologies in buildings and infrastructure.

31. With regard to transformative industry (activity C.3.1 of the rolling workplan), a common area of work under the joint work programme of the Technology Mechanism, the TEC:

(a) Published a knowledge product on the mapping conducted in the previous reporting period of initiatives that promote low- and near-zero emission production and products in hard-to-abate industries, in collaboration with UNIDO. The paper[37] identifies potential areas where the TEC can add value and outlines policies and technologies that can support the achievement of economy-wide emission reduction targets while fostering inclusive and sustainable industrial development;

(b) Prepared a policy brief[38], in collaboration with UNIDO, on integrating hard-to-abate industries into the process of preparing and implementing NDCs. The aim of the brief is to provide countries with information on policy and technology options for possible inclusion in their updated NDCs to drive further progress in industrial decarbonization;

[33] Available at https://unfccc.int/documents/461992.

[34] The paper will be available by COP 29 at https://unfccc.int/ttclear/tec/documents.html.

[35] See https://unfccc.int/event/third-global-dialogue-and-investment-focused-event-under-the-sharm-el-sheikh-mitigation-ambition-and.

[36] A press release on the initiative is available at https://www.unep.org/news-and-stories/press-release/buildings-breakthrough-global-push-near-zero-emission-and-resilient.

[37] TEC. 2023. *Transformative industry: Mapping of initiatives that promote low and near zero emission production and products in hard-to-abate sectors*. Bonn: UNFCCC. Available at https://unfccc.int/ttclear/tec/transformativeindustry.html.

[38] See footnote 23 above.

(c) Initiated the organization of Technology Day for COP 29 focusing on transformative industry with the aim of supporting countries in effectively integrating hard-to-abate industries into the process of preparing and implementing NDCs.

32. In the area of innovative ocean climate solutions (activity C.4.1 of the rolling workplan), the TEC participated in the ocean and climate change dialogue[39] at SB 60, sharing insights on emerging ocean-based energy technologies from its work on early warning systems and findings from its publications.

4. Workstream 4: collaboration with constituted bodies and engagement in processes under the UNFCCC and with other United Nations agencies

33. As per the corresponding activities outlined in its rolling workplan, the TEC:

(a) Provided inputs to the Standing Committee on Finance's draft guidance for the operating entities of the Financial Mechanism for consideration at COP 29 and CMA 6;

(b) Participated in the annual meeting of the GCF with the constituted bodies at COP 28;

(c) Co-organized with the Facilitative Working Group of the Local Communities and Indigenous Peoples Platform an event held at COP 28 on transformative technologies for climate action with a focus on Indigenous technologies and technologies of local communities;

(d) Invited representatives of the AF, the GCF and the GEF to attend its meetings and events with a view to enhancing information exchange and collaboration with those entities;

(e) Contributed to activities of the Adaptation Committee NAP task force and enhanced information exchange and collaboration with the Adaptation Committee;

(f) Contributed to activities of the informal coordination group for capacity-building under the Convention and the Paris Agreement, including the group's meetings held in conjunction with COP 28;

(g) Contributed to the UNEP Copenhagen Climate Centre series of Climate Technology Progress Reports. Several TEC members participated in their capacity as technology experts in the steering committee that guided the preparation of the Report for 2024.

34. The TEC presented insights from its work at the:

(a) In-session workshop under the framework for NMAs held in conjunction with GCNMA 5 during SB 60, which focused on financial, technology and capacity-building support available or provided for identifying and developing NMAs;

(b) AF event at COP 28 on achieving lasting impacts in vulnerable countries while reducing disaster risk.

5. Linkages between the Technology Mechanism and the Financial Mechanism

35. The TEC and the CTCN, in consultation with the SBI Chair, organized an in-session workshop held at SBI 60 on linkages between the Technology Mechanism and the Financial Mechanism.[40] Participants, who included members of the TEC and the CTCN Advisory Board and representatives of the operating entities of the Financial Mechanism, Parties, observer organizations, multilateral development banks and the private sector, took stock of the linkages and explored ways to maintain and enhance them.

36. The TEC, with the support of the secretariat and in consultation with the CTCN, prepared a summary report on the workshop for consideration at SBI 61.[41] The report summarizes the proceedings of the workshop, including discussions on how to strengthen the

[39] See https://unfccc.int/topics/ocean/ocean-and-climate-change-dialogue.
[40] In response to decision 10/CP.28, para. 12.
[41] As per decision 10/CP.28, para. 14; the report is contained in document FCCC/SBI/2024/16.

linkages at the national level, how to leverage the linkages to better support the implementation of priority climate technologies and how to foster the linkages by engaging stakeholders and providing opportunities for them to share experience.

6. Monitoring and evaluation of impacts

37. In 2024 the TEC revised the performance measurement framework of its monitoring and evaluation system, including operational indicators and targets, in order to ensure alignment, in terms of measuring impacts, with its rolling workplan. It established an open-ended activity group on monitoring and evaluation to discuss the impact of the work of the TEC. The TEC has used the Technology Mechanism NDE survey[42] to track the progress of implementation of its rolling workplan and the support provided to NDEs.

38. The TEC developed a tracking system to generate information for its monitoring and evaluation reports on the progress of implementation of its rolling workplan. It produced the first such report in 2024.[43]

7. Outreach

39. The TEC continued enhancing its communications and developing outreach activities in the implementation of its rolling workplan, in alignment with the TEC communications and outreach strategy adopted in 2020,[44] including by organizing and participating in global and regional events and using TT:CLEAR (which had received 22,451 page views as at September 2024) and UNFCCC communication channels. The TEC also made use of the UN Climate Change Technology group on LinkedIn (which as at September 2024 had more than 2,200 members) and partner platforms to enhance its visibility and reach.

8. Engagement with national designated entities

40. Responding to guidance from the COP and the CMA,[45] the TEC continued to strengthen its engagement with and outreach to NDEs by participating in the regional NDE forums organized by the CTCN for Africa, Asia, the Pacific, and Latin America and the Caribbean, which were held between October 2023 and October 2024. The forums presented an opportunity for the TEC to highlight its work, disseminate TEC knowledge products and introduce the Technology Mechanism AI for climate action initiative.

41. Its interaction with NDEs revealed the need for the TEC to enhance its outreach to them, including by seeking feedback from them on its work, strengthening its efforts to improve the visibility and user-friendliness of TEC knowledge products, and providing induction presentations on its work to new NDEs.

9. Gender mainstreaming

42. The TEC, with the support of its gender focal points and in collaboration with the UNFCCC gender team, continued mainstreaming gender in the implementation of its rolling workplan (under activity D.4).[46] It achieved gender balance among panellists at all its events during the reporting period.

43. The TEC published a policy brief on gender-responsive technology and infrastructure for sustainable urban mobility.[47] The brief offers insights into gender inequalities and gender-based differences in the context of urban mobility systems. It provides policy options and good practices for developing, implementing and scaling up mobility technologies, infrastructure and services that support decarbonization of the transport sector while

[42] See TEC document TEC/2024/29/23.
[43] See TEC document TEC/2024/29/20.
[44] Available at https://unfccc.int/ttclear/tec/documents.html (under strategies and guidelines).
[45] Decisions 18/CP.27, para. 6; 9/CP.28, para. 5; and 14/CMA.5, para. 4.
[46] For information on the appointment of gender focal points and gender mainstreaming efforts, see the reports on TEC 28 and 29 in TEC documents TEC/2024/28/19 and TEC/2024/29/25 respectively.
[47] TEC. 2024. *Gender-responsive technology and infrastructure for sustainable urban mobility*. Bonn: UNFCCC. Available at https://unfccc.int/ttclear/tec/transport.html#brief18/.

responding effectively to the needs of all members of society, as well as outlining related challenges and barriers.

C. Challenges and lessons learned

44. In the second year of implementation of the TEC rolling workplan, the open-ended and ad hoc activity groups and partner organizations supported the TEC in its work by integrating diverse views and the contributions of UNFCCC NGO constituencies and partners into its thematic work in a systematic, inclusive and cost-effective manner.

45. In doing so, the TEC noted the following challenges:

(a) Limited human resources for managing collaboration with existing and potential partners owing to the number and complexity of workplan activities;

(b) The increased volume of documents produced by the TEC, combined with limited capacity and time between meetings, which poses a challenge for TEC members, observers, the secretariat and others to adequately review the documents;

(c) Insufficient financial resources to implement all workplan activities, thus necessitating reprioritization;

(d) Limited awareness among NDEs from developing countries about the work of the TEC and its publications, thus necessitating more meaningful engagement with NDEs in future, including through direct communication, targeted messaging and translation of TEC products into other United Nations languages, taking into account resource availability.

46. The TEC also noted the following improvements in and lessons learned from its communications and stakeholder engagement since the previous reporting period:

(a) Enhanced interaction with NDEs at NDE regional forums, engagement with NDEs at TEC events and dissemination of TEC knowledge products to NDEs, which has enabled the TEC to enhance the visibility of its work and solicit views from NDEs and other technology stakeholders on key challenges, priorities and lessons learned across TEC workstreams;

(b) Expansion from organizing stand-alone TEC events under its workplan to participating in and collaborating on events organized under synergistic UNFCCC processes and global initiatives, which has contributed to reducing overlap in coverage of content and identifying areas where the TEC can have the greatest impact, as well as reducing the costs associated with implementing TEC activities;

(c) Increased number of new collaborations and partnerships with bodies and under processes and initiatives under and outside the UNFCCC, which has helped the TEC to mobilize in-kind resources and specific technical expertise, and disseminate its products;

(d) Strengthened coordination with the CTCN on implementing the joint work programme of the Technology Mechanism, including by conducting biweekly calls between the secretariats of the two bodies and exchanging systematic feedback at the joint sessions of the TEC and the CTCN Advisory Board, which has increased coherence and synergy in the work of the bodies.

47. The TEC will continue raising the awareness of Parties and other stakeholders of the potential contribution of its work to relevant UNFCCC processes, including ongoing work related to mitigation, adaptation and just transition.

48. The TEC will also continue looking into addressing the challenges in implementing its workplan activities.

IV. Activities and performance of the Climate Technology Centre and Network

A. Advisory Board meetings and membership

49. At its 23rd meeting, held in Copenhagen from 19 to 24 April 2024, the CTCN Advisory Board elected Fred Machulu Onduri (Uganda) as its Chair and Stephen Minas (Greece) as its Vice-Chair. The Board thanked the outgoing Chair, Erwin Rose (United States of America), for his service.

50. In addition, key results of CTCN activities in 2023 were presented and the 2023 financial statement of the CTCN was endorsed. The Board provided further guidance on the implementation of the third programme of work of the CTCN, for 2023–2027, as part of the joint work programme of the Technology Mechanism for 2023–2027.

51. At its 24th meeting, held in Bonn from 20 to 25 September 2024, the Advisory Board endorsed the appointment of and welcomed the new Director of the CTCN and Secretary to the Board, Ariesta Ningrum, who will assume her position in December 2024. In addition, the Board approved the CTCN chapter of the joint annual report of the TEC and the CTCN for 2024 and the CTCN annual operating plan and budget for 2025.

52. Two Advisory Board task forces were in effect in 2024, one on resource mobilization and the other on TA prioritization criteria.

53. All CTCN Advisory Board meeting documents, webcasts and reports are available on the CTCN web pages.[48]

B. Activities of the Climate Technology Centre and Network

54. In 2024 the CTCN celebrated its 10-year anniversary, a significant milestone that coincides with the second year of implementation of its five-year programme of work. The remainder of this chapter provides an overview of CTCN activities conducted between October 2023 and September 2024, structured around the five themes of the technology framework under the Paris Agreement.[49]

1. Innovation

55. Several CTCN TA projects completed during the reporting period focused on promoting or introducing innovative and emerging climate technologies; for example, a feasibility study on the use of green hydrogen for combined heat and power supply in Mongolia, the development of a national hydrogen plan in Thailand, and the deployment of a smart drinking water network in Tunisia.

56. Digitalization, one of two CTCN technology enablers, remains a significant focus area for TA projects, which include developing a groundwater monitoring system for aquifer management in Belize, a customized weather and climate information system for climate-resilient agriculture in Nepal, and a methodology for estimating carbon sinks in the forestry sector using Earth observation technology with AI components in Samoa.

57. The other CTCN technology enabler, national systems of innovation, is crucial for enhancing local capacity for innovation and technology research and development to promote low-carbon and climate-resilient development. Ongoing TA projects include providing support in the Democratic Republic of the Congo, Mozambique and Zambia for developing frameworks and road maps for national systems of innovation. Assessing these systems improves understanding of their governance and capabilities essential for addressing climate change and highlights local systems' insights into Indigenous technologies.

[48] https://www.ctc-n.org/about-ctcn/advisory-board.
[49] Decision 15/CMA.1, annex, para. 4.

58. The CTCN continued to implement several innovation-focused programmes and initiatives:

(a) AFCIA phase I: 25 TA projects on innovation in adaptation practices from 23 countries, including 10 from the LDCs and 3 from SIDS, were selected to receive AFCIA funding. Six of the projects were completed during the reporting period;

(b) AFCIA phase II: the CTCN has administered USD 10 million for phase II since July 2024, which will fund 60 TA projects over five years;

(c) Climate Technology for Communities at Risk of Climate-induced Conflicts: the programme, funded by the European Commission in the amount of USD 3.1 million, was launched in June 2023. During the reporting period, implementation commenced in 10 countries with the aim of promoting growth and competitiveness of community-based innovative low-carbon technologies in communities at risk of conflict due to climate change impacts;[50]

(d) The European Commission also awarded the CTCN a USD 2.1 million grant for the Innovative Climate Solutions programme,[51] the aim of which is to align seven innovative solutions with countries' needs for transformative and inclusive climate action.

59. Since opening in 2022 in Songdo, Republic of Korea, the CTCN Partnership and Liaison Office, which serves as a centre of excellence for climate technology research, development and demonstration, has supported activities including:

(a) Launching a global capacity-building programme under the AI for climate action initiative, as part of which the CTCN held capacity-building workshops for NDEs focusing on the potential and challenges of AI for climate action for Asia and the Pacific in July 2024 and Africa in August 2024;

(b) Supporting TA projects that pilot innovative technologies or support research, development and demonstration initiatives. For example, in Côte d'Ivoire the CTCN is providing assistance to improve the quality of locally produced biochar; and in Papua New Guinea the CTCN is conducting a pre-feasibility study on ocean energy technologies;

(c) Conducting capacity-building initiatives related to research, development and demonstration, such as the two webinars on collaborative research, development and demonstration in key system transformation areas held during the reporting period. Capacity-building for NDEs on green hydrogen technologies was conducted in Benin in October 2023 (jointly with the West African Development Bank) and in Chile in November 2023 (together with the National Renewable Energy Laboratory of the United States and the United Nations Economic Commission for Latin America and the Caribbean);

(d) Developing a digital readiness index and a handbook on emerging digitalization options for the energy sector in collaboration with the National Institute of Green Technology of the Republic of Korea and The George Washington University Environmental and Energy Management Institute. Both knowledge products, completed during the reporting period, will assist in assessing countries' digital maturity and potential to apply digital tools, initially focusing on energy infrastructure, as well as help the CTCN to better tailor TA projects to local needs.

2. Implementation

(a) Supporting development and transfer of climate technologies

60. As at August 2024, the CTCN had received, since its inception, 472 TA requests, including 16 multi-country requests, from 115 developing country Parties, of which 39 per cent had been completed. Of the 472 requests, the LDCs accounted for 24 per cent and SIDS for 10 per cent.

61. The received TA requests relate to mitigation (37 per cent), adaptation (22 per cent) or, increasingly, both (41 per cent). Most mitigation-related requests concern energy

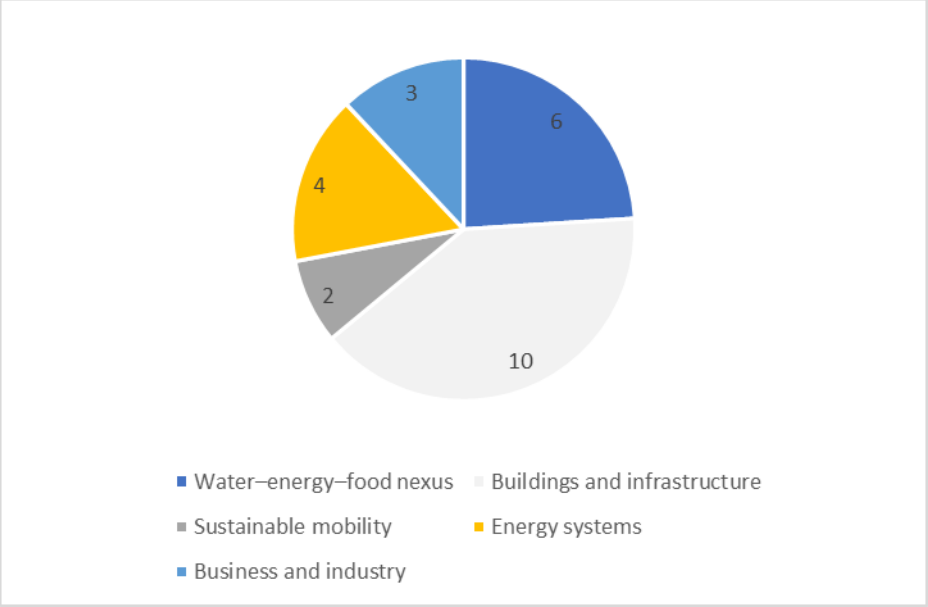
[50] See https://www.ctc-n.org/technical-assistance/climate-change-and-security.
[51] See https://www.ctc-n.org/technical-assistance/ics-innovative-climate-solutions-programme.

efficiency, renewable energy or agriculture, while adaptation-related requests concern mainly water, agriculture and forestry, or coastal zones.

62. In terms of type of assistance, requests for decision-making tools and/or information were received most frequently (accounting for 25 per cent of all requests), followed by requests for technology feasibility studies (21 per cent) and technology identification and prioritization (15 per cent).

63. The figure below illustrates the distribution of TA projects completed during the reporting period (see also annex II) according to the CTCN five areas of system transformation: 21 leveraged national systems of innovation as a key enabler for system transformation, while 7 used digitalization.

Number of Climate Technology Centre and Network technical assistance projects completed during the reporting period by area of system transformation



Note: The CTCN completed 28 TA projects during the reporting period, but 3, for TNAs, do not fall under a single area of system transformation and are not included in this figure.

64. The TA projects completed during the reporting period highlight a few trends: a growing interest in exploring national strategies in emerging areas like green hydrogen, such as in Mongolia and Thailand, or circular economy, such as in Costa Rica and Mexico; an emphasis on conducting economic feasibility studies and market assessments and developing financing mechanisms for scaling up climate technologies; the application of digital technologies in climate information systems, such as agrometeorological information systems and early warning systems; and the enhancement of urban infrastructure and e-mobility, particularly in the Asia-Pacific region.

65. The CTCN continued to respond to TA requests in a demand-driven manner while developing a pipeline of projects using a programmatic approach, and it commenced raising resources for programmatic windows: the water–energy–food nexus, including projects on agrivoltaics, hydroponics and aquaponics; national systems of innovation, including establishing such systems for climate action and conducting TNAs; energy systems, including initiatives for net metering, green hydrogen development and grid decarbonization by phasing out sulfur hexafluoride; and business and industry, with efforts targeting the cement industry.

66. At its 23rd meeting, the CTCN Advisory Board endorsed the revised prioritization criteria for the assessment of TA requests submitted by NDEs.[52] Internal guidance on applying the criteria has been developed and is being implemented.

[52] See CTCN Advisory Board document AB/2024/23/21.

(b) Conducting technology needs assessments and implementing their results

67. The CTCN supported the completion of three TNAs during the reporting period, two of which funded through the GCF Readiness and Preparatory Support Programme. Eight preliminary project concept notes were developed on the basis of project ideas identified in the TAPs prepared as part of the TNAs. The TNA projects were conducted in:

(a) Chile: as part of the project, the CTCN conducted three national workshops for government officials, academia, NGOs and the private sector to ensure national ownership and deployment of the four TAPs. Results from the TNA are being integrated into the 17 sectoral plans that make up Chile's Climate Change Law;

(b) Georgia: the CTCN supported the update of Georgia's second TNA from 2012, which now includes a finance mobilization strategy to secure investment for the technologies identified in the associated TAPs. Representatives of accredited entities and the private sector were involved in updating the TNA and one of Georgia's concept notes relates to accessing GCF funds;

(c) Kyrgyzstan: as part of the project, a Kyrgyz delegation visited several Danish water companies, and one Danish water technology provider made a reciprocal visit to Kyrgyzstan. The aim of this exchange was to explore the potential for a partnership bringing Danish expertise on leakage management solutions to Kyrgyzstan's water network.

68. Outcomes from countries' past TNAs continue to inform their TA requests. For example, the TNA conducted in Tunisia in 2017 led to a TA project completed in 2023 on a smart drinking water network. The success of the technologies piloted in the cities of Sousse and Monastir prompted the national designated authority for the GCF and Tunisia's National Water Distribution Utility to seek resources for scaling up the project. Similarly, the TA project completed in Belize during the reporting period arose from the TNA conducted in 2017, which identified the need for adaptation technologies for the water sector. The project resulted in the implementation of a drought monitoring system for northern Belize. Additionally, the TNA conducted in Uganda in 2021 resulted in a TA project for developing a GCF project proposal to secure funds for implementing the country's TAPs.

3. Enabling environments and capacity-building

(a) Creating enabling environments and favourable market conditions for climate technologies

69. Many TA projects completed during the reporting period were aimed at creating enabling environments for technology development and transfer through the provision of decision-making tools and information (25 per cent of completed TAs). Other significant means of creating enabling environments were technology identification and prioritization (18 per cent) and recommendations for laws, policies and regulations (18 per cent).

70. Examples of how CTCN support creates enabling environments are the 'pay as you irrigate' model in Mozambique, developed for smallholder farmers, with a focus on women, which enables beneficiaries to plan, procure and sustainably implement solar-powered irrigation systems, considering both their environmental and economic conditions; and the strategy developed for the use of green hydrogen technologies in Thailand, which includes guidance for creating associated policies, a regulatory framework and infrastructure.

(b) Promoting gender-responsive and endogenous technologies and harnessing Indigenous Peoples' knowledge

71. Following the endorsement of the new CTCN gender policy and action plan 2023–2027 in September 2023, annual gender workplans are being developed and monitored.[53] A CTCN gender assessment and action plan was introduced during the development of TA response plans to ensure that gender mainstreaming is integrated from the outset and carried throughout implementation of projects. Furthermore, the percentage of the budget for TA projects dedicated to gender mainstreaming has increased from 1 to 5 per cent under the new

[53] See CTCN Advisory Board document AB/2024/23/27 for the gender workplan for 2024.

policy. Gender funds support, inter alia, the hiring of gender experts and the development of gender policy briefs, as, for example, in the TA project completed in Georgia.

72. The CTCN actively promoted the Technology Mechanism gender and climate technology expert roster, including by referring to it in the TA request template and encouraging Network members and NDEs to engage experts from the roster.

73. Several TA projects completed during the reporting period promoted endogenous technologies by making use of local resources and knowledge. For example:

(a) Support was provided for nature-based solutions in Honduras aimed at boosting the resilience of rural and Indigenous communities in Celaque National Park against extreme weather;

(b) An integrated salinity intrusion data-sharing system was established for adaptation to climate impacts in the Mekong Delta for the agricultural communities living along the river basin in Viet Nam to improve transboundary water management;

(c) Solar irrigation technologies, integrating local expertise with innovative financing, supportive policy frameworks and tailored training, were scaled up in Ghana to enhance the climate adaptation of smallholder farmers.

(c) Building capacity

74. Several TA projects completed during the reporting period included South-South learning exchange visits. National experts from the Lao People's Democratic Republic conducted a South-South exchange of experience with representatives of transport institutions in the Republic of Korea on public transport administration and bus rapid transit implementation. Both TA projects in Bangladesh included South-South learning visits: under the project on coastal geomorphology adaptation, Bangladeshi policymakers attended a three-day knowledge exchange in Thailand; and, under the project on real-time transport information systems, representatives of the Dhaka Transport Coordination Authority visited the Republic of Korea.

(d) Enhancing public awareness of and information-sharing on climate technology development and transfer

75. TA projects were showcased at several regional, national and local events to raise awareness of climate technologies and disseminate project findings. For example, in Tunisia the TA project benefited from comprehensive media coverage, including television reporting on the project's outcomes; while in Chile a high-level TA closure meeting was held, attended by over 80 representatives of ministries and key stakeholders.

76. At the global level, the CTCN collaborated with:

(a) WIPO by contributing to its *Green Technology Book* – both the 2023 edition on climate change mitigation solutions and the 2024 edition on energy solutions;

(b) The United Nations Economic and Social Commission for Asia and the Pacific on the *Asia-Pacific Digital Transformation Report 2024*;

(c) UNEP Copenhagen Climate Centre on *The Climate Technology Progress Report 2023* on urban system transformation.

77. The CTCN was invited to share knowledge on climate technologies at over 10 global conferences and partner events. The Advisory Board Chair presented an overview of CTCN initiatives on AI at an event for members of the United States Council for International Business, while the Vice-Chair presented on CTCN activities at the UN Climate Change Global Innovation Hub's eighth systemic innovation workshop. Additionally, the representative of business and industry NGOs on the Advisory Board presented CTCN work during the United Nations General Assembly. The CTCN contributed to a workshop organized by the United Nations Economic and Social Commission for Asia and the Pacific and the Asian and Pacific Centre for Transfer of Technology, focusing on strategic approaches to assessing market potential for technology innovations. During COP 28 the CTCN participated in 14 climate technology related events.

78. The CTCN launched an awareness-raising campaign marking its first decade of operations and a report celebrating the 10-year anniversary was published.[54] Using the hashtag #CTCNInnovationDecade, 1,107 social media posts during the reporting period showcased TA results and disseminated knowledge and best practices. A total of 13 issues of the CTCN newsletter were sent to its more than 12,500 subscribers, and information about learning opportunities and events was disseminated to more than 14,308 social media followers on LinkedIn, Facebook and X.

4. Collaboration and stakeholder engagement

(a) Engaging with local communities, authorities, civil society organizations and the private sector

79. Many actors engage in TA projects. For example, in Honduras the CTCN collaborated closely with community resilience experts from the Government, the United Nations Educational, Scientific and Cultural Organization and two Danish universities to support the development of nature-based solutions. In Ghana the CTCN organized workshops to introduce solar irrigation technology options to government officers, investors, private sector representatives and smallholder farmers (as future users), facilitating their adoption.

80. At the global level, the CTCN formed strategic partnerships with actors including the German Agency for International Cooperation, with which it is collaborating on a global programme to phase out sulfur hexafluoride. As part of this programme, a high-level panel was held during COP 28. In addition, the CTCN partnered with the Global Cement and Concrete Association to support countries in implementing projects for developing deep decarbonization road maps for the cement industry. As part of its global capacity-building programme under the AI for climate action initiative, the CTCN engaged systematically with partners, including Data Science Africa, the Green Digital Innovation Hub and Microsoft's AI for Good research lab.

(b) Engaging with national designated entities

81. Beyond working with NDEs on ongoing TA projects, the CTCN actively engaged with over 50 NDEs to provide technical support and guidance for preparing new TA requests. All requests submitted to the CTCN receive approval and are submitted through the respective country's NDE.

82. NDEs received technical and logistical support from the CTCN to enable them to attend several events, such as:

(a) The regional NDE forums for Latin America and the Caribbean, held in Panama in October 2023 (24 NDEs); Asia and the Pacific, held in Malaysia in November 2023 (18 NDEs); Asia and the Pacific, held in the Republic of Korea in July 2024 (25 NDEs); and Africa, held in Kenya in August 2024 (50 NDEs);

(b) Two capacity-building sessions on green hydrogen technologies as referred to in paragraph 59(c) above;

(c) The GCF regional dialogue with Eastern Europe and Central Asia, held in North Macedonia in March 2024 (five NDEs); and the GCF regional dialogue with the Middle East and North Africa, held in Morocco in June 2024 (three NDEs).

83. During the reporting period, the CTCN secretariat introduced new processes to strengthen NDE ownership of TA projects: (1) two mandatory activities, namely forming a project steering committee (comprising the implementing team, NDE, project proponents and CTCN representatives) on project commencement and holding a workshop for local financing institutions and other stakeholders on project completion; (2) a post-implementation monitoring template designed to involve NDEs in project follow-up and provide a clear overview of project outcomes; and (3) a process to be fully operationalized has been defined for NDEs to request logistical support for specific needs, featuring a tailored template that was discussed during the regional NDE forums in 2024.

[54] See https://www.ctc-n.org/resources/10-years-technology-solutions-innovation-climate-action.

(c) Network members

84. The CTCN welcomed 64 new Network members, of which 36 are from developing countries, bringing the total number of Network members to 874 as at August 2024. Private sector organizations represent 59 per cent of the new members, followed by NGOs (11 per cent) and non-profit organizations (9 per cent). Parties not included in Annex I to the Convention represent 56 per cent of the new members and Parties included in Annex I to the Convention 44 per cent.

85. The CTCN facilitated two Network engagement events in June and September 2024 as part of its Voluntary Technology Talk programme. The June event, held in conjunction with the Exhibition on Environmental Technology & Green Energy in Seoul, Republic of Korea, featured a two-day in-person workshop where six NDEs met with Korean Network members. The September event focused on NDEs from SIDS and the LDCs and took place in Busan, Republic of Korea, alongside the World Climate Expo 2025.

(d) Collaborating with UNFCCC constituted bodies and constituencies

86. The CTCN engaged with the GCNMA to feature the CTCN on the newly developed NMA Platform, which facilitates matchmaking between service providers and support seekers by recording and exchanging information on NMAs.

87. In September 2024, the CTCN, in coordination with the UNFCCC children and youth constituency and partners Seedstars and the Swiss Association for Entrepreneurship in Emerging Markets, launched the second phase of the Youth Climate Innovation programme,[55] which helps young innovators in developing countries to create and scale up climate technology solutions.

88. As part of its ongoing collaboration with the UNFCCC women and gender constituency, the CTCN supported the 2023 Gender Just Climate Solutions Awards, disseminating information thereon via the Network and providing access to a year-long mentoring programme to the winners, and served on the jury to select the award winners for 2024.

5. Support

(a) Enhancing collaboration with the operating entities of the Financial Mechanism and the Adaptation Fund

89. The CTCN has supported the implementation of 31 GCF readiness projects to date (in the amount of USD 11 million), 2 of which were completed during the reporting period and 2 of which are under implementation.

90. The CTCN successfully facilitated access to GCF Project Preparation Facility funds by supporting the development of a concept note, in collaboration with the Kenya Commercial Bank, for a project on promoting the adoption of environmentally sound technologies by small and medium-sized enterprises in Kenya to enhance production efficiency and business value.

91. The CTCN and the GCF participated in several of each other's events, fostering collaboration and knowledge exchange:

(a) The CTCN and NDEs took part in two GCF regional dialogues;

(b) The GCF contributed to CTCN learning events and technical workshops, engaging experts on topics such as buildings and infrastructure and the water–energy–food nexus;

(c) The GCF hosted NDE delegations from Samoa and Zambia at its headquarters;

(d) The GCF participated in regional NDE forums.

92. The NDEs of Ghana, Jordan, Kazakhstan, Lebanon and Nigeria participated in the GEF national dialogues in their respective countries to facilitate further coordination with

[55] See https://www.ctc-n.org/youth-climate-innovation-programme.

GEF operational focal points and explore potential cooperation with them at the national level.

93. The CTCN is actively involved in supporting two ongoing AF programmes. It participated in the 2023 annual climate finance readiness seminar for accredited national implementing entities and co-organized with the AF side events for the Adaptation Futures 2023 conference.

(b) Facilitating access to finance through technical assistance

94. The CTCN includes specific deliverables in its TA to empower stakeholders to secure finance for implementing project outcomes. For example, for the TA project in Belize a cost analysis was conducted and a financing strategy prepared for developing the comprehensive groundwater monitoring system. Belize is one example where a project has culminated in a final deliverable that includes a concept note on funding projects arising from the TA for submission to financing institutions.

95. AFCIA phase I has generated promising technology ideas, leading to the scaling up of funding for three projects to date. Notably, a USD 5 million concept was submitted to the AF for Burundi, USD 7.5 million was leveraged from the Canadian Government for a project in Mongolia, and USD 100,000 was secured from the Caribbean Public Health Agency for a project in Saint Kitts and Nevis.

96. The results from the third biennial NDE survey relating to nine TA projects completed in 2023 highlight several key aspects regarding the facilitation of access to financing. Of those projects, five of the respective NDEs are actively implementing the recommendations of the CTCN, although they have reported challenges such as financial and human resource constraints, difficulties in influencing sectoral actors and the need for broader stakeholder involvement. The positive outcomes of these projects were attributed to capacity-building, financial support, strong stakeholder engagement and tailored measures. Notably, two of the projects have successfully secured or are in the process of securing funding, one through the GCF and the other through the AF.

(c) Enhancing mobilization of support

97. The Advisory Board's task force on resource mobilization is guiding and monitoring implementation of the CTCN resource mobilization and partnership strategy for 2023–2027[56] endorsed at the 22nd Advisory Board meeting and met regularly during the reporting period.

98. The CTCN maintained its relationship with existing donors and partners, including the Danish International Development Agency, to which it submitted a funding proposal for the CTCN third programme of work for USD 4.38 million, and the Governments of Germany, Japan, the Republic of Korea, Spain and Sweden, from which it received continued support.

99. The CTCN is enhancing and diversifying its engagement with development financing sources and international financial institutions, with a particular focus on multilateral development banks.

100. The CTCN will be implementing two new TA projects with pro bono support in 2025, one with support from Japan and the other with support from the Republic of Korea, representing approximately USD 350,000.

101. Several co-financing and in-kind contributions were made by Network members and UNEP for TA project implementation or capacity-building activities, including approximately USD 30,000 in co-financing from the UNEP Global Opportunities for Sustainable Development Goals accelerator for a circular economy project in Latin America and the Caribbean and USD 210,000 from UNEP for a green buildings project in Ghana. Furthermore, the German Agency for International Cooperation and SK Telecom provided in-kind contributions to organize site visits as part of the CTCN AI capacity-building programme.

[56] See CTCN Advisory Board document AB/2023/22/22.1.

(d) Monitoring and tracking

102. The UNEP-commissioned evaluation of the overall performance of the CTCN from 2013 to 2022 was completed in June 2024.[57] It resulted in six recommendations, for which the CTCN has developed an implementation plan. The UNEP evaluation office will track the implementation status of the planned actions.

C. Organizational structure of the Climate Technology Centre and Network

103. The CTCN secretariat is based in Copenhagen and its technical specialists work out of regional offices in Bangkok, Nairobi, Panama City and Songdo. The CTCN Partnership and Liaison Office is now fully operational.

104. The CTCN has completed the process of recruiting a new Director and a Regional Manager for the African region.

105. The CTCN includes an international Network of 874 organizations and institutions that can respond to requests from developing countries related to climate technology development and transfer, and 166 NDEs nominated by their countries.

Funding overview

106. The CTCN has secured USD 124.2 million in financial contributions since its establishment in 2013. As at August 2024, the CTCN had received funds for 2024 in the amount of USD 3,149,320 (see the table below).

Cash receipts for the Climate Technology Centre and Network in 2024

Donor	*Type of contribution*	*Amount (USD)*
Republic of Korea	Against 2021 pledge	2 005 281
AF	Against 2020 pledge	485 545
Japan	New	361 877
Sweden	New	188 763
Spain	New	107 854
Total		**3 149 320**

107. The CTCN carried over a fund balance of approximately USD 20.3 million into 2024. Its approved annual operating budget for 2024 is just over USD 10 million and its projected expenditure for the year is USD 10.2 million. The CTCN projected fund balance at the end of 2024 is approximately USD 22.4 million. This includes carry-over of USD 7.5 million and pending cash receipts of USD 1.6 million in 2024, USD 8.8 million in 2025, USD 2.5 million in 2026, USD 1.5 million in 2027 and USD 469,000 in 2028 against signed agreements.

108. The annual operational budget of the CTCN of USD 2.2 million covers salaries, fixed office expenses, and costs related to meetings of the Advisory Board and other meetings, such as the sessions of the COP and the subsidiary bodies. Of the current balance of USD 7.8 million in the multi-donor trust fund, USD 6.6 million must be reserved for operational costs, leaving only USD 1.2 million available for project activities other than TA during 2025–2027.

109. A funding gap of approximately USD 8 million is projected for the remaining period, 2025–2027, of the programme of work of the CTCN for 2023–2027. This estimate is based on the current unearmarked balance in the multi-donor trust fund, anticipated donor contributions in the coming years relative to pledges (which include both earmarked and unearmarked funds), and a required annual budget of at least USD 10 million for the CTCN.

[57] See https://wedocs.unep.org/handle/20.500.11822/41446.

D. Challenges and lessons learned

110. Both the scaling up of TA projects and transformation of national systems pose challenges arising from limited coordination between the national focal points for the Technology Mechanism and the Financial Mechanism. Increasing NDE participation in GCF regional dialogues and GEF national dialogues would offer an opportunity to strengthen the linkages between the Mechanisms and produce outcomes at the country level. Organizing regional NDE forums alongside GCF regional dialogues could enhance synergies between them and promote closer collaboration of NDEs with the GCF.

111. While government-generated ideas for CTCN TA projects ensure strong country ownership, there is a need to engage more non-governmental stakeholders in the TA process and, more broadly, to promote opportunities for local experts to drive transformational change.

112. Developing countries, particularly the LDCs and SIDS, continue to require CTCN support for identifying and evaluating digitalization technologies, as well as the components of national systems of innovation, owing to limited data availability and capacity for transition to advanced technologies.

113. TNAs effectively identify and prioritize required technologies in specific sectors, but further analysis – including accessing data, developing baselines and conducting feasibility studies – is often required to translate the outcomes of TNAs into fundable project concepts. This follow-up work could be addressed more frequently through CTCN TA. The TNAs conducted during the reporting period highlight that, while TNAs constitute a valuable tool for assessing technology needs and integrating technology into national strategies, successful implementation of TAPs and projects arising from TNA outcomes depends on strong public policy support and sufficient funding.

114. Building the capacity of countries to access TA through AFCIA is essential, as only 10 per cent of applications submitted in the first phase of the programme met all eligibility criteria. The focus of AFCIA on supporting individual technologies rather than the entire innovation ecosystem has highlighted the need for integrating pilot technologies into broader innovation systems.

115. The programmatic approach applied under AFCIA has proven effective in achieving concrete outcomes for TA projects, and allocating resources from the outset for scaling up a technology ensures that the most promising innovations can be taken forward without significant delays once a project is completed.

116. The CTCN Partnership and Liaison Office in Songdo has helped to enhance collaboration with the GCF, a success factor highlighted by the GCF during the in-session workshop at SBI 60 on linkages between the Technology Mechanism and the Financial Mechanism. Representatives of the Office and the GCF co-facilitated regional dialogues between NDEs and national designated authorities during the reporting period, highlighting the potential for establishing joint capacity-building programmes to enhance national coherence on climate technology and finance innovation.

117. The Office has facilitated collaboration with implementing partners globally and in the Republic of Korea, which has, in turn, led to successful applications for scaling up funding for TA projects after completion.

118. The CTCN faces significant challenges arising from limited funding, which restricts its ability to address the increasing number of TA requests. During the reporting period, the CTCN received 70 new TA requests but, owing to budget constraints, could only consider less than 50 per cent of them. Some requests were, therefore, included in the pipeline for 2025.

E. Key messages for the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement

119. As Parties prepare their first biennial transparency reports for submission by the end of 2024 and update their NDCs for submission in 2025, they are encouraged to identify their technology needs to ensure that they receive more targeted TA support and specify how the outcomes of TA can support the national priorities outlined in those documents.

120. It is crucial to strengthen collaboration between NDEs and national focal points for the Financial Mechanism to promote effective design of CTCN TA projects and development of fundable projects for climate technology transfer and deployment from their outcomes. Parties are encouraged to foster closer collaboration and coordination between NDEs and other focal points at the national level to ensure actions are aligned and mutually reinforcing.

121. In order to fully implement its mandate, the CTCN needs to mobilize additional resources from all sources, including the Financial Mechanism, bilateral, multilateral and private sector channels, philanthropic sources, and financial and in-kind contributions from UNEP as its host organization and participants in the Network, as called for in the agreed upon CTCN Resource Mobilization and Partnership Strategy.

Annex I

Key messages and recommendations of the Technology Executive Committee for the Conference of the Parties and the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement

[English only]

1. On the basis of the work carried out during the reporting period[1], the TEC wishes to deliver, for consideration at COP 29 and CMA 6, the key messages and recommendations set out in this annex, which are organized according to the implementation of activities in the four workstreams of its rolling workplan for 2023–2027.

I. Realizing Early Warnings for All: innovation and technology in support of risk-informed climate resilience policy and action

2. The TEC highlights the following key messages drawn from the findings in a policy brief on this issue prepared jointly with GEO:

(a) Scaling up early warning innovations and technologies is essential to enhancing risk-informed climate resilience policies and actions;

(b) Climate information and disaster risk knowledge provide the foundation for the multi-hazard early warning system value chain, which saves lives and protects property and the environment. Yet significant differences exist among countries in access to and availability of data and knowledge on disaster risk; in particular, the LDCs, SIDS and African countries experience poor access and availability. Challenges in relation to risk knowledge, including in its monitoring, status reporting, production, use and accessibility, persist globally, but in particular for these countries;

(c) A wide array of scalable technology measures, platforms and services have already demonstrated their effectiveness in boosting climate information and disaster risk knowledge for countries in need. These technologies are most effective when integrated: for example by combining hardware, software and 'orgware' measures; approaches based on Indigenous and traditional knowledge; and high- and low-technology open solutions that leverage low-cost sensors, mobile and digital technologies, AI and Earth observation satellites, for example;

(d) Parties have underscored the importance of early warning systems to realizing their climate agendas in their national action and planning documents: about 50 per cent of NDCs, about 40 per cent of NAPs and more than 90 per cent of adaptation communications submitted under the Convention and the Paris Agreement mention early warning systems. However, there is limited recognition of the role of technology applications in improving climate information and multi-hazard early warning systems in these policies and plans or in country programme documents and funding proposals submitted to climate funds: only about 25 per cent of NDCs, 30 per cent of adaptation communications, 12 per cent of the adaptation-related components of TNAs and 10 per cent of GCF funding proposals based on NAPs highlight technologies for this purpose;

(e) Long-term finance, both domestic and international, supported by a coordinated multisectoral approach is key to sustaining project outcomes and scaling up integrated technological solutions that address multiple hazards across multiple sectors, including the building of resilient infrastructure and the assessment of loss and damage;

(f) Technology can empower citizen scientists and other local stakeholders to produce and use local data on vulnerability and exposure to hazards, allowing countries to

[1] See https://unfccc.int/ttclear/tec/documents.html.

identify their most vulnerable populations, communities and groups. Such local data and knowledge enable evidence-based decision-making and enhance people-centred multi-hazard early warning systems with effective ‘last mile delivery’, which remains a key challenge.

3. To scale up innovation and fit-for-purpose technology solutions, the TEC recommends that the COP and the CMA encourage Parties, international organizations and stakeholders, as relevant, to:

(a) Consider technologies for multi-hazard early warning systems when preparing and updating NDCs, NAPs, TNAs and other national strategies and plans, where appropriate, integrating a combination of complementary technologies into both existing and proposed systems, plans and processes;

(b) Invest in multisectoral technology solutions by leveraging funding from relevant financial mechanisms and other sources, including the AF, the Climate Risk and Early Warning Systems initiative, the Fund for responding to Loss and Damage, the GCF, the GEF and the Systematic Observations Financing Facility, while building on the outcomes of funded projects to avoid fragmentation of efforts, promote long-term sustainability and maximize impact;

(c) Leverage international initiatives and public–private partnerships in order to strengthen the capacity of Governments to understand and mitigate context-specific disaster risks and to reduce the financial and other barriers associated with accessing international capital;

(d) Support the integration of technologies into projects to promote local stakeholder engagement such that both low- and high-technology solutions enable the creation and consumption of risk knowledge by Indigenous Peoples; youth; female-led and community-based groups and entities, including local universities, research institutions and start-ups;

(e) Build the technical capacity of stakeholders in developing countries for enhancing reporting on, production, use of and access to risk knowledge, including by implementing targeted actions that strengthen the inclusion and build the capacity of women in technology in order to address persisting gender disparity;

(f) Leverage the global community of scientific experts and innovators, including GEO, who promote open data, knowledge and solutions as public goods; and who can provide the technical support and knowledge transfer needed for engaging stakeholders and building their capacity; while helping to design fit-for-purpose combined technology measures, including frontier and emerging technologies.

II. Climate technologies for agrifood system transformation

4. The TEC highlights the following key messages drawn from the policy paper on this topic, being jointly prepared with FAO:

(a) The application of climate technologies in agrifood systems is an essential means of accelerating progress in adaptation to climate change while also building structural resilience into these systems and supporting emission reduction;

(b) Effective implementation of climate technologies in agrifood systems must be embedded within the broader objectives of agrifood system transformation, which include improving production, nutrition, natural resource management and livelihoods, and explicitly account for complementarities and trade-offs;

(c) Technology requirements and opportunities need to be captured for all stages of the agrifood value chain;

(d) Capacity-building and awareness-raising, particularly for stakeholders in the LDCs and SIDS, is needed to realize the benefits of deploying readily available climate technologies. Increased investment in research and development of new technologies for

agriculture has been found to have significant positive financial, social and environmental benefits for agrifood systems;

(e) Economic and financial constraints have consistently been identified as the main barriers to adopting climate technologies. In coordination with broader efforts, scaling up and effectively implementing climate technologies requires not only a large increase in available finance, but also the tailoring of financing to support investment requirements. There is also a need to create enabling conditions for financial institutions to provide guarantee and risk-sharing services, asset-collateralized loans programmes and other instruments that accelerate the adoption of technologies;

(f) Adopting a facilitative approach to the informal sector in agrifood systems is important given its relevance in agricultural value chains. This approach could include technical assistance, training and public support to provide needed incentives for climate technology adoption;

(g) Experience, in general, in conducting TNAs and preparing TAPs has provided insights into how to better integrate climate change and agrifood sector policies into NDC and NAP preparation and implementation and has revealed the need to increase the likelihood of countries obtaining finance from all sources, including public international finance, for implementing technologies identified in TNAs and TAPs.

5. The TEC recommends that the COP and the CMA encourage Parties, international organizations and stakeholders, as relevant, on this issue, to:

(a) Undertake accurate, robust and context-specific assessments of local agrifood systems that account for natural resource use, consider socioeconomic inclusion, are gender-responsive and consider the nexus with water, energy, biodiversity and food. The assessments are needed to help define and underpin the climate technology options to be taken up;

(b) Ensure capacity-building strategies and efforts are linked to technology needs, identify suitable and correct skills, especially for smallholders and vulnerable segments of the population, and, in particular, consider initiatives focused on equipping rural women with digital literacy and relevant skills;

(c) Increase and further target finance flows, from all sources, to appropriately address the technology needs in countries in coordination with broad efforts to facilitate access to and the deployment of climate technologies that take into consideration investment requirements and country capacities;

(d) Coordinate across sectors and at all levels of government the development of policies that target climate change and agriculture while considering linkages with broad development and environmental concerns.

III. Integrating hard-to-abate industries into the process of preparing and implementing nationally determined contributions

6. Drawing on the policy brief on integrating hard-to-abate industries, particularly steel, cement and chemical industries, into the process of preparing and implementing NDCs for deep industrial decarbonization, and the mapping conducted of initiatives for promoting zero- and low-emission production and products in the steel, cement and chemical industries, the TEC, while being mindful of the strategic value of energy and energy security and emphasizing the outcome of the first global stocktake,[2] highlights the following key messages drawn from the policy brief:

[2] See, in particular, para. 28 of decision 1/CMA.5.

(a) Industry accounted for 34 per cent of all GHG emissions in 2019.[3] Transforming key industrial sectors is thus crucial to substantially reducing GHG emissions and keeping the goal under the Paris Agreement of limiting global temperature rise to 1.5 °C within reach;

(b) Zero- and low-emission technologies and approaches, such as electrification, renewable energy, energy and material efficiency, circularity, hydrogen-based steelmaking, electric boilers, high-efficiency electric kilns, and carbon dioxide capture and storage, are vital for reducing industrial GHG emissions;

(c) Tracking of progress of emission reduction technologies through road maps and milestones ensures that targets are being met;

(d) Collaborative efforts between industries, research institutions, financial institutions and Governments can accelerate development and deployment of zero- and low-emission technologies;

(e) International cooperation and knowledge-sharing are catalysts for innovation, technology transfer, capacity-building and gender equality. Several industrial road maps and initiatives are currently in place;

(f) There are signs of women's leadership and participation slowly increasing within industry but they are still at a low level.

7. To enhance industrial decarbonization, particularly in hard-to-abate industries, while accelerating progress towards net zero emissions, the TEC recommends that the COP and the CMA encourage Parties to consider:

(a) Integrating hard-to-abate industries into the process of preparing and implementing NDCs and national reports to enhance their effectiveness, foster global cooperation, and strengthen support for implementation;

(b) Developing low- and near-zero emission road maps and milestones for key industries, clearly defining roles and responsibilities and considering:

(i) Zero- and low-emission technologies and approaches such as those referred to in paragraph 6 above;

(ii) Economic and regulatory incentive policies to promote industrial decarbonization;

(iii) Electrification, renewable energy installation and decarbonizing policies, taking into account environmental integrity;

(iv) Research, development and demonstration of both endogenous technologies and Indigenous technologies;

(v) Green public procurement policies;

(vi) Policies for definitions and standards, including building codes;

(vii) Capacity-building policies;

(viii) Just transition;

(ix) Promoting women's leadership in industry;

(c) Developing investment plans for industrial decarbonization;

(d) Increasing investment for supporting research and development and innovation for decarbonization and using blended finance;

(e) Taking advantage of international cooperation, existing good practices and knowledge-sharing.

[3] Intergovernmental Panel on Climate Change. 2022. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. P Shukla, J Skea, R Slade, et al. (eds.). Cambridge and New York: Cambridge University Press. Available at https://www.ipcc.ch/report/ar6/wg3/.

8. The TEC also recommends that the COP and the CMA encourage international development organizations seeking to support the deep decarbonization of hard-to-abate industries to:

(a) Foster market linkages between stakeholders in hard-to-abate industries, low- and near-zero emission technology providers, and donor organizations and collaborative research and development programmes;

(b) Enhance global cooperation between global industry stakeholders, technology providers, initiatives, and funding bodies through strategic linkages;

(c) Support cross-border green energy purchases through electricity interconnectors;

(d) Develop new or harmonize existing standards for decarbonization technologies;

(e) Promote peer-to-peer knowledge exchange between countries with similar technology interests;

(f) Facilitate support and cooperation between developed countries and developing countries and South–South and triangular cooperation;

(g) Promote transparency and use of monitoring systems.

IV. Gender-responsive technology and infrastructure for sustainable urban mobility

9. Drawing from its policy brief on gender-responsive technology and infrastructure for sustainable urban mobility, the TEC highlights the following key messages:

(a) Substantive action will be required for urban mobility to contribute to achieving the goals of the Paris Agreement and promoting sustainable development;

(b) Addressing gender-based differences in travel behaviour, access to and affordability of transport, safety while using various modes of transportation and employment in the transportation sector will help achieve climate action in the sector. Without consideration of all genders, especially women, in policies and actions for achieving zero- and low-emission and climate-resilient urban mobility, they will fall short of fully contributing to achieving emission reduction targets and sustainable development and to facilitating equitable and just transitions;

(c) Different genders often have different travel needs and behaviours owing to gender roles and social norms, as well as to characteristics of individuals such as race, ethnicity, sexual orientation, gender identity, disability status and class, which intersect to create unique dynamics and effects, necessitating gender-specific policy considerations;

(d) There is considerable evidence that existing urban mobility systems neither provide women and gender-diverse people with the same level of access, safety, comfort and connectivity as they do for men, nor provide equal employment opportunities. This is in part because women's needs were overlooked in the design of these systems, information on women's needs was not collected when designing these systems and provisions to protect women from harassment and gender-based violence are inadequate;

(e) Policy options and successful initiatives relating to gender-responsive technology and infrastructure for sustainable urban mobility have been well documented, so the emphasis needs to shift towards integrating those options into policy, programme and project documents at the national – especially the city – level.

10. To accelerate the implementation and scale-up of gender- and climate-responsive technology solutions in urban mobility systems, the TEC recommends that the COP and the CMA encourage Parties, international organizations and other stakeholders, as relevant, to:

(a) Improve the collection, availability and use of gender and transport data for urban mobility planning that addresses climate change and social inequalities;

(b) Consider implementing mutually supportive principles and measures, adopting approaches such as ‘avoid-shift-improve’, and participating in initiatives and using toolkits for implementing zero- and low-emission sustainable urban mobility, such as those described in the policy brief referred to in paragraph 9 above;

(c) Raise the visibility of gender- and climate-responsive urban mobility policies in the planning and reporting instruments under the Paris Agreement and those related to sustainable development, including those by non-State actors, and highlight the need for those policies to reflect and enhance national commitments relating to sustainable urban mobility and create a coherent framework for mutually reinforcing action on climate change and sustainable mobility;

(d) Foster enabling environments and supportive policy frameworks that contribute to the achievement of gender equality, for example by promoting action towards achieving sustainable development goals related to gender and the creation of greater employment opportunities for women in the urban mobility sector.

V. Climate Technology Progress Reports

A. Climate Technology Progress Report 2022

11. The TEC, in the context of its collaboration with UNEP Copenhagen Climate Centre, contributed to the development of *The Climate Technology Progress Report 2022*, which identifies innovative approaches to stimulating the uptake of existing climate technologies on the basis of data and case studies from the African region. Drawing on the report, the TEC highlights the following key messages:

(a) The technology feasibility assessment methodology set out in the report provides a reproducible, transparent approach to examining technologies that are feasible for adoption, noting that feasibility is context-dependent and may vary by social group and location;

(b) There is a need to nurture the development of institutional, social and policy capabilities through long-term programmatic activities;

(c) Financial interventions are important not only to compensate for viability gaps in individual transactions, but also to address market failures and contribute to market creation for climate technologies;

(d) Institutionalizing human skills, resources and practices within organizations is critical to enhancing feasibility and opportunities for strengthening cooperation at various levels of governance in the context of technology development and transfer;

(e) There is a lack of workers with digital skills and skilled workers, which is hindering the development of the digital sector, including the lack of legal frameworks for data protection in relation to the digital marketplace. Upgrading curricula, expanding coverage and placing additional focus on digital skills in technical and vocational education and training is needed;

(f) There is an important intersection between climate action and development needs where major developmental issues, including access, equitable development and distributional aspects, need to be addressed alongside the implementation of climate technologies.

12. The TEC recommends that Parties, international organizations and international donors, as relevant:

(a) Cooperate on increasing the availability of technology feasibility assessments that respond to the needs of different social groups and contexts;

(b) Consider the findings set out in paragraph 11 (b–f) above when planning and implementing interventions.

B. Climate Technology Progress Report 2023

13. The TEC and the CTCN, in the context of collaboration with UNEP Copenhagen Climate Centre, contributed to the development of *The Climate Technology Progress Report 2023*, which identifies innovative approaches to stimulating the uptake of existing climate technologies on the basis of data and case studies on urban system transformation from the Asian region. Drawing on the report, the TEC highlights the following key messages:

(a) Transitioning to technology-inclusive systems and implementing groups of technologies on the basis of their individual synergies and trade-offs can produce benefits across multiple sectors and regions;

(b) The progress of climate technology is not exclusively reliant on research and development; instead, it is deeply contingent on the presence of robust urban infrastructure and the mobility patterns of urban infrastructure users;

(c) Synergistic benefits for mitigation, adaptation and development goals of climate technologies can incentivize governments to accelerate their adoption. There are feasible synergistic options for water management, public transport, building cooling, social housing, and energy distribution and generation, among other technology groups;

(d) The work of government climate leaders, front runners and local governments in introducing climate technologies is essential for integrating climate technologies into long-term urban development and climate action plans, managing the land and infrastructure required for technology adoption, demonstrating both small- and large-scale climate technologies, and setting ambitious targets;

(e) Successful technology-inclusive initiatives typically involve a combination of national and subnational policies and instruments, and, when paired with the provision of incentives and undertaken collaboratively, these measures promote replicability across cities;

(f) Finance flows for urban infrastructure are hampered by a ‘business as usual’ mindset. It is critical to embrace a new paradigm for urban infrastructure investment that includes aggregation, green and climate financing, impact and innovation funding, and investment through a gender lens;

(g) Given the growing complexity of investment approaches, project preparation and transaction management are becoming critical. Financing project development and preparation facilities can play an important role in originating, developing and curating pipelines of investment-ready projects.

14. The TEC recommends that Parties, international organizations and international donors, as relevant, consider the findings set out in paragraph 13 above when developing and implementing interventions and policies in urban contexts.

Annex II

Climate Technology Centre and Network technical assistance projects completed during the reporting period for each area of system transformation*

[English only]

Country	*Thematic area*	*Title of project*
Water–energy–food nexus		
Ghana	Adaptation	Promoting and upscaling appropriate solar irrigation technology options for smallholder farmers in Ghana through innovative climate adaptation financing mechanisms, a conducive policy framework for technology regulation and tailored training modules
Indonesia	Adaptation	Identification of technical practices for climate-smart agriculture (CSA) in Indonesia
Liberia	Adaptation	Upscaling lowland rice production to improve food security through improved solar powered irrigation practices
Mozambique	Adaptation	Solar based irrigation for women's empowerment - "pay as you irrigate" as a means of water management and food security in Mozambique (AFCIA)
Seychelles	Adaptation	Formulation of a Pre-Concept Proposal to the Innovation Facility of the Adaptation Fund, for a holistic watershed management approach including wetland creation for water supply
Tunisia	Adaptation, mitigation	Smart drinking water network in Tunisia: first phase in Sousse and Monastir
Buildings and infrastructure		
Bangladesh	Adaptation	Technology for Monitoring & Assessment of Climate Change Impact on Geomorphology in the Coastal Areas of Bangladesh
Belize	Adaptation	Groundwater monitoring for mapping aquifers in Belize as a tool for climate change adaptation planning
Honduras	Adaptation	Designing nature-based solutions with an ethnic and gender-equity approach, to increase the resilience of rural mountain communities in protected natural areas affected by extreme weather events in Honduras
Mexico	Mitigation	Analysis of the current situation of the construction and demolition sector in respect of the Circular Economy in Mexico City
Nepal	Adaptation	Customized weather and climate information system for climate-resilient agriculture in Nepal
Pakistan	Adaptation, mitigation	Adoption of green buildings in Pakistan to achieve Pakistan's Nationally Determined Contributions
Peru	Adaptation	Monitoring system of adaptation measures in the water sector, analysis of barriers and financial sustainability for its implementation
Samoa	Adaptation, mitigation	Developing a framework and methodology to carbon sinks from the forestry sector using Earth observation in Samoa
Togo	Adaptation, mitigation	Development of a methodology to create climate-smart municipalities in Togo and the preparation of action plans for adaptation and mitigation to climate change for 4 of these municipalities
Viet Nam	Adaptation	Localization of water resources management technology to adapt to climate change in Hong-Thai Binh river basin

* For all projects and related documents. see https://www.ctc-n.org/technical-assistance.

Country	*Thematic area*	*Title of project*
Sustainable mobility		
Bangladesh	Mitigation	Development of Framework for Real-Time Transport Information Systems for Public Transport in Greater Dhaka
Lao Peoples' Democratic Republic	Adaptation, mitigation	Technical Capacity Enhancement for Planning an Urban Public Transport System in Vientiane, Lao PDR (pro bono support from the Republic of Korea)
Energy systems		
Dominica	Adaptation, mitigation	Technical and economic feasibility of solar units and water storage on public buildings in Dominica
Mongolia	Adaptation, mitigation	Feasibility study of a combined heat and power supply using green hydrogen
South Africa	mitigation	Capacity Development for the Deployment of Demand Response (DR) in South Africa to Mitigate against Carbon Emissions and Electricity Supply Shortages
Thailand	mitigation	Development of a national hydrogen strategy and action plan for accelerating Thailand's net-zero target
Business and industry		
Cambodia	Adaptation, mitigation	Market assessment in the application of climate technologies in the agricultural sector for rural development in Cambodia
Costa Rica	Adaptation, mitigation	Supporting the transition to a circular economy in Costa Rica
Pakistan	Adaptation, mitigation	Technologies Framework for Implementation of Nationally Determined Contributions for Pakistan
Technology needs assessment		
Chile	Adaptation, mitigation	Technology Needs Assessment (TNA) and Technology Action Plan (TAP) for Chile's NDC implementation
Georgia	Adaptation, mitigation	Updating of Georgia's technology needs assessment (TNA) through development of technology road maps for prioritized technologies (GCF readiness funding)
Kyrgyzstan	Adaptation, mitigation	The Technology Needs Assessment (TNA) and Technology Action Plans (TAPs) for the Kyrgyz Republic (GCF readiness funding)