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LEGAL INSTRUMENTS GOVERNING TECHNOLOGY TRANSFER FOR CLIMATE CHANGE MITIGATION

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ABSTRACT

The intensifying phenomenon of global climate change poses an unprecedented threat to ecological stability, economic development, and human survival. This article critically examines the multifaceted implications of climate change while exploring comprehensive mitigation strategies through a techno-legal lens. The research identifies and analyses significant gaps in the existing international legal framework governing climate action and evaluates the efficacy of institutional mechanisms such as the UNFCCC, Kyoto Protocol, and Paris Agreement. By juxtaposing legal inadequacies with technological advancements—like Artificial Intelligence, blockchain, remote sensing, and carbon capture techniques—the study underscores the transformative potential of emerging technologies in addressing climate-related challenges. The article further explores national climate legislations, particularly India's evolving legal stance, proposing the integration of the Latin maxim *"Ubi jus, ibi remedium"* to ensure enforceable remedies for climate grievances. Through doctrinal research, comparative legal analysis, and reference to recent IPCC and UNEP reports, the study advocates for a reformed, inclusive, and technology-enabled climate governance model that balances legal accountability with innovation. Ultimately, it calls for a paradigm shift in climate jurisprudence to secure a sustainable and resilient future for all.

Introduction

Climate change and environmental degradation, including biodiversity loss, remain major threats, with the IPCC warning of surpassing 1.5°C by 2040 and widespread impacts on people and ecosystems.[1406] Climate change and environmental degradation trigger security risks by driving food shortages, conflict, crime, and forced migration. Climate change and environmental degradation threaten global security by fueling food shortages, conflict, crime, and displacement—undermining stability at all levels. The UN Secretary-General and the IPCC's Fourth Assessment echo this concern, urging urgent, coordinated action from governments, businesses, and civil society.

The 1972 UN Conference on the Human Environment marked a key milestone in global environmental action, resulting in a declaration that outlined principles to safeguard the environment. Notably, Principle 20 emphasized making environmental technologies accessible to developing countries.[1407]

[1406] TrungThanh Nguyen, Ulrike Grote, *et al.*, "Security Risks from Climate Change and Environmental Degradation:Implications for Sustainable Land Use Transformation in the Global South" 63 *Current Opinion in Environmental Sustainability* (2023), *available at*: https://www.sciencedirect.com/science/article/pii/S1877343523000696 (last visited on March 02, 2025)

[1407] Hee-Eun Kim, XIII *The Role of the Patent System in Stimulating Innovation and Technology Transfer for Climate Change: Including Aspects of Licensing and Competition Law* (Nomos Verlagsgesellschaft Mbh & Co, Germany, 2011).

Adopted in 1992 and enforced in 1994, the UNFCCC marked a global commitment to stabilize greenhouse gas levels and prevent harmful human impact on the climate, guided by the principle of common but differentiated responsibilities and respective capabilities.

The role of technology in climate action is increasingly recognized, with timely development and transfer to developing countries vital for sustainable development. However, key challenges remain, requiring deeper analysis and stronger global cooperation to overcome barriers and advance technology sharing.[1408]

Since the UNFCCC's adoption, technology development and transfer has remained central to the climate agenda and was reaffirmed in the Paris Agreement as key to meeting mitigation goals. Accelerating climate technology deployment is crucial, especially for developing and least developed countries facing the harshest climate impacts.[1409]

Many scientists and policymakers view global warming as one of humanity's greatest challenges.[1410] Technology offers a vital solution—both to reduce its causes and to adapt to its impacts—with several tools already available and more innovations likely to emerge.

Access to climate technologies is crucial, particularly for developing regions like South Asia, where climate change threatens livelihoods, food and water security, and economic stability. Global mitigation efforts are equally essential, as the region faces severe and growing impacts. Various technologies—often termed green[1411], clean[1412], environmental[1413], climate-responsive[1414], or environmentally sound[1415]—can help reduce both the causes and effects of climate change, with many of these terms used interchangeably in IPCC reports.

Environmentally Sound Technology (EST), as defined in Article 34.1 of Agenda 21—a non-binding UN action plan from the 1992 Rio Earth Summit—highlights the benefits of eco-friendly technologies, including lower pollution, sustainable resource use, improved recycling, and better waste management compared to conventional alternatives.[1416]

Evolution of Technological development and Transfer under the UNFCCC Framework

Several climate-related conferences and conventions—including the 1988 Toronto Conference, the 1989 Basel Convention, and the 1991 Espoo Convention—followed the Montreal Protocol. However, the 1992 Rio Earth Summit (UNCED[1417] marked a pivotal moment in promoting technology development and transfer to address environmental challenges, especially climate change.

1408 United Nations Department of Economic and Social Affairs, Climate Change, *Technology Development and Technology Transfer, Prepared for the Beijing High-level Conference on Climate Change*, Beijing, China (November 7-8 ,2008), *available at*: https://www.un.org/en/desa/beijing-high-level-conference-climate-change-technology-development-and (last visited on March 02, 2025).

1409 Nicola Sharman, "Inter-State Climate Technology Transfer under the UNFCCC: A Benefit-Sharing Approach" 31 *Review of European, Comparative & International Environmental Law* 435-446 (2022), *available at*: https://onlinelibrary.wiley.com/doi/10.1111/reel.12454 (last visited on March 02, 2025).

1410 Indur M. Goklany, "Is Climate Change the Number One Threat to Humanity?" 3 *Wiley Interdisciplinary Reviews:Climate Change* 489-508 (2012), *available at*: https://www.researchgate.net/publication/264619332_Is_climate_change_the_number_one_threat_to_humanity (last visited on March 02, 2025).

1411 *Environmentally friendly technologies are those that reduce or mitigate the negative effects caused by* the mankind to the physical environment.

1412 Clean technology refers to innovative technological solutions that aim to improve the environment and reduce environmental damage by reducing pollution, waste and greenhouse gas emissions and by increasing energy efficiency and the use of renewable resources.

1413 Commission of the European Communities, "Environmental Technology for Sustainable Development" (2002), *available at*: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0122:FIN:EN:PDF (last visited on March 03, 2025).

1414 Technologies that we use to address climate change are known as climate technologies" defined in *Technology and the UNFCCC, Building the foundation for the Sustainable Development*, UNFCCC, *available at*:https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/NAD_EBG/54b3b39e25b84f96aeada52180215ade/b8ce50e79b5746908866021691f4f479b.pdf (last visited on March 5, 2025).

1415 Environmentally Sound Technologies (ESTs) defined by UNEP, *available at*: https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/environmentally-sound(last visited on March 05, 2025).

1416 United Nations, *Agenda 21: Programme of Action for Sustainable Development*, UN Doc A/CONF.151/26 (1992), *available at*: https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf (last visited on March 05, 2025).

1417 United Nations, *Report of the United Nations Conference on Environment and Development, Held in Rio de Janeiro from 3-14 June 1992*, UN Doc. A/CONF.151/26, I (August 12, 1992), *available at*: https://documents.un.org/doc/undoc/gen/n92/836/55/pdf/n9283655.pdf (last visited on March 05, 2025).

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Agenda 21[1418], adopted at UNCED, emphasizes the need for favorable access to and transfer of environmentally sound technologies to developing countries, along with the necessary know-how and capacity-building for their effective use. Building on this, the Johannesburg Plan of Implementation[1419] from the World Summit on Sustainable Development calls on governments and international bodies to promote technology transfer, capacity-building, and the spread of cleaner, energy-efficient, and affordable technologies, especially in developing nations.

While several climate-focused conferences followed the Montreal Protocol—such as the 1988 Toronto Conference, the 1989 Basel Convention, and the 1991 Espoo Convention—the 1992 UNCED in Rio de Janeiro (Rio Earth Summit) marked a pivotal shift in advancing technology development and transfer for environmental issues, especially climate change. The UNFCCC[1420], as its name suggests, was designed to provide a comprehensive framework for addressing climate change through the integration of economic, technological, legal, and social measures.

The UNFCCC primarily aims to stabilize greenhouse gas concentrations to avoid harmful human interference with the climate system.[1421] To achieve this, it establishes a framework of general obligations, guiding principles, institutional structures, and a decision-making process led by the Conference of the Parties (COP). More specific legal instruments, like the Kyoto Protocol (1997) and the Paris Agreement (2015), were later adopted to implement detailed commitments.[1422]

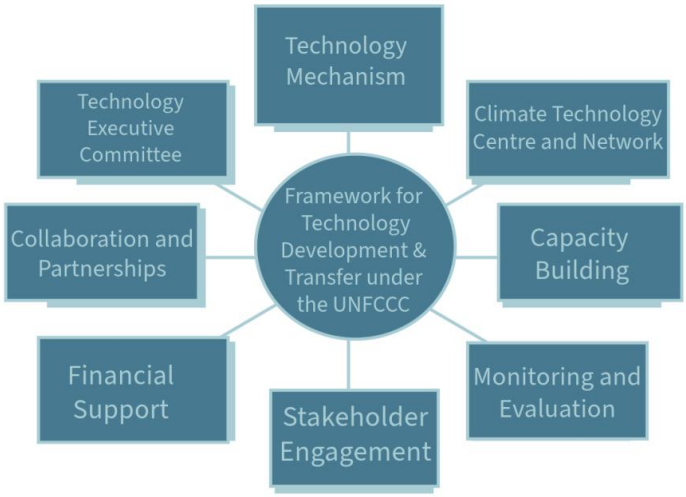

Figure 1: Framework for Technology Development and Transfer under the UNFCCC

From its inception, the UNFCCC has emphasized technology development and transfer as a key element to support national climate action. Specific provisions related to technology were included in the Convention's original text when it was adopted in 1992.[1423]

Legal Framework for Climate Technology in the Climate Change Regime

The UNFCCC, under Article 4, stresses the importance of climate technology, financing, and transfer. Article 4.3 mandates developed nations to provide financial and technological support to developing countries[1424], while Article 4.7 links developing nations' ability to meet their commitments to the support they receive. It highlights the duty of developed countries and the need to prioritize development and poverty reduction in poorer nations.[1425]

The UNFCCC endorses the principle of "common but differentiated responsibilities" (CBDR), placing responsibility on parties to support technology transfer. It calls for collaboration in

1418 *Supra note* 11.

1419 United Nations, *Report of the World Summit on Sustainable Development, Held in Johannesburg, South Africa from 26 August - 4 September 2002*, UN Doc A/CONF.199/20 (2002), *available at*: https://www.un.org/en/conferences/environment/johannesburg2002#:~:text='The%202002%20World%20Summit%20on,account%20respect%20for%20the%20environment (last visited on March 05, 2025).

1420 United Nations, Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, *Report of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change of the work of the second part of its fifth session, Held in New York from 30th April to 9th May, 1992*, U.N. Doc A/AC.237/18 (Part II)/Add.1 (October 16, 1992), *available at:* https://digitallibrary.un.org/record/151412 (last visited on March 10, 2025).

1421 *Id.*, art.2.

1422 UNFCCC, *Observer Handbook for COP 28*, (2023), *available at*: https://unfccc.int/sites/default/files/resource/Observer%20Handbook%20for%20COP%2028.pdf (last visited on March 10, 2025).

1423 *Supra note* 8

1424 *Supra note* 15, art.4.3.

1425 *Id.*, art. 4.7.

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developing and sharing technologies to reduce emissions across sectors, while emphasizing the need for transparent and timely information on climate impacts and related socio-economic effects.[1426]\

The UNFCCC requires industrialized (Annex II) countries to promote and support the transfer of environmentally sound technologies to help developing nations implement the Convention. This includes both financial support and capacity-building, with all capable parties and organizations encouraged to assist in these efforts.[1427]

Following the Convention's adoption, efforts focused on building global understanding of climate technology issues by studying existing technologies, the needs of developing countries, available international support, and potential tools for GHG mitigation and climate adaptation.[1428]

From 1997 to 2001, countries expanded their efforts through regional consultations on climate technology in Latin America, Africa, and Asia-Pacific. These workshops addressed various technology-related issues, and the Kyoto Protocol's Article 10(c) also introduced a specific provision on technology development and transfer.[1429]

Kyoto Protocol[1430] and Climate Technology Development and Transfer

The IPCC's 1995 Second Assessment Report[1431] confirmed human activity as the main cause of global warming, prompting global discussions that led to the Kyoto Protocol—the only UNFCCC agreement with legally binding GHG emission limits. Adopted in 1997 and enforced from 2005, it committed industrialized nations to binding targets for 2008–2012.[1432]

The Kyoto Protocol classified countries into Annex I (developed) and Non-Annex I (developing), with Annex II being a subset of developed countries obligated to support developing nations. Only Annex I countries had binding emission targets, in line with the CBDR principle. To help meet these targets, the Protocol introduced three flexible mechanisms.

1. **Clean Development Mechanism (CDM):** Allows countries to earn Certified Emission Reductions (CERs) by funding emission-reduction projects in developing nations.[1433]
2. **International Emissions Trading (IET):** Enables countries to purchase emission credits from others with surplus allowances.[1434]
3. **Joint Implementation (JI):** Permits countries to invest in emission-reduction projects in other developed nations to earn Emission Reduction Units (ERUs).[1435]

The Kyoto Protocol highlights the importance of international cooperation to develop, implement, and share environmentally sustainable technologies. It calls for practical steps and financing to support technology transfer, particularly to developing nations. The Protocol urges policies that enhance access to publicly owned or accessible technologies and promote private sector involvement. Article 11.2 reaffirms developed countries' obligation to fund these technology transfer efforts.[1436]

Innovative Methods for Technology Transfer

The Kyoto Protocol introduced flexibility mechanisms like the CDM to help developed nations meet emission targets efficiently while promoting technology transfer. It also

1426 *Id.,* art.4.1.

1427 *Id.*, art. 4.5.

1428 *Supra note* 14

1429 *Ibid.*

1430 Conference of Parties, United Nations Framework Convention on Climate Change, *Report of the conference of the Parties on its third session, held at Kyoto from 1 to 11 December 1997,* U.N. Doc. FCCC/CP/1997/7/Add.1 (March 25, 1998), *available at:* https://unfccc.int/cop3/resource/docs/cop3/07a01.htm (last visited on March 10, 2025)

1431 Intergovernmental Panel on Climate Change (IPCC), *Climate Change 1995: The Science of Climate Change, Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, *available at*: https://archive.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf (last visited on March 10, 2025).

1432 Michael I Goldstein and Dominick A. DellaSala (eds.), *Encyclopedia of the Anthropocene* (Elsevier, 1st edn., 2017).

1433 Supra note 25, art. 12.

1434 *Id.*, art.17

1435 *Id.,* art.6

1436 *Id.,* art.10 (C)

established a strong compliance system to ensure commitments were met.[1437]

1. **The Clean Development Mechanism**

Under Article 12 of the Kyoto Protocol, Annex B countries can undertake emission-reduction projects in developing nations through the CDM, earning Certified Emission Reductions (CERs) to meet their targets, while also promoting sustainable development—for example, via solar electrification or energy-efficient systems.[1438]

CDM projects offer multiple benefits, including investment in climate mitigation in developing countries, technology transfer or diffusion, and improved community well-being through job creation and economic growth.[1439]

In addition to generating tradable CER credits, CDM projects promote increased investment in developing countries, facilitate climate-friendly technology transfer, enhance skills and livelihoods, create jobs, and boost economic activity.[1440]

While the CDM is intended to promote sustainable development and reduce emissions by advancing clean technologies, in practice, it has often funded outdated, polluting, and unsustainable technologies—some of which have paradoxically contributed to increased GHG emissions rather than reducing them.[1441]

Technology is key to the CDM's success, enabling emission reductions, better monitoring, capacity-building, and faster climate action in developing countries. Though the CDM aims to cut emissions and promote sustainable development, it lacks a clear mandate on technology transfer. While the COP recognized its importance, future climate agreements should explicitly require the CDM to support technology transfer.[1442] Undoubtedly, the CDM has accelerated the transfer of environmental technologies and enhanced financial and technical support; however, it has fallen short in driving policy changes.[1443]

According to the 2009 World Economic and Social Survey by the U.N. Department of Economic and Social Affairs, the CDM has operated on too limited a scale and focused on too few developing countries to effectively initiate and sustain a strong push toward greener technologies.[1444]

The Paris Agreement and Clean Technology

On December 12, 2015, world leaders at COP21 in Paris adopted the landmark Paris Agreement to combat climate change. Its key long-term goals include:

1. The main aim is to cut global GHG emissions to keep temperature rise well below 2°C above pre-industrial levels, ideally limiting it to 1.5°C, to reduce climate risks and impacts.

[1437] Chen Zhou, *The Legal Barriers to Technology Transfer Under the UN Framework Convention on Climate Change the Example of China* (Springer Nature, Singapore, 2019).

[1438] United Nations Framework Convention on Climate Change (UNFCCC), *The Clean Development Mechanism, available at:* https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism (last visited on March 18, 2025).

[1439] *Ibid.*

[1440] United Nations Framework Convention on Climate Change (UNFCCC), Benefits of the Clean Development Mechanism (2011), *available at:* https://cdm.unfccc.int/about/dev_ben/ABC_2011.pdf (last visited on March 18, 2025).

[1441] *Supra note* 26.

[1442] WTI (World Trade Institute), *Reforming the CDM to Accelerate Technology Transfer* (2009), *available at*: https://www.wti.org/media/filer_public/af/1f/af1ff357-1528-4563-9850-8a7f0d823c34/wp_2009_42_de_sepibus_reforming_the_cdm_to_acc_tt.pdf, (last visited on March 18, 2025).

[1443] Stéphanie Chuffart, "Technology Transfer and Dissemination under the UNFCCC: Achievements and the New Perspectives" *Centre for Climate Change Law, Columbia Law School* (2013), *available at*: https://climate.law.columbia.edu/content/technology-transfer-and-dissemination-under-unfccc-achievements-and-new-perspectives-0 (last visited on March 20, 2025).

[1444] United Nations, *World Economic and Social Survey 2009: Promoting Development, Saving the Planet (2009), available at:* https://www.un.org/en/development/desa/publications/world-economic-and-social-survey-2009.html (last visited on March 20, 2025).

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2. Regular assessments of countries' progress are vital for ensuring transparency and accountability in achieving the Agreement's goals.
3. Developing nations need financial support to strengthen their resilience and capacity to mitigate and adapt to climate change impacts.[1445]

Under Article 10 of the Paris Agreement, a global technology mechanism is established, guided by the UN's Technology Executive Committee (TEC) and implemented through the Climate Technology Centre and Network (CTCN). Although the Agreement includes provisions for technology development and transfer, obligating states to enhance cooperation, it lacks specific guidance on how states should strengthen these collaborative efforts.[1446]

Provisions related to Technology Development and Transfer

The Paris Agreement, under Article 10.2[1447], highlights the crucial role of technology in achieving its mitigation and adaptation goals. It calls on Parties to enhance cooperation in developing and transferring climate technologies. To support these efforts, the Agreement establishes a technology mechanism to facilitate the deployment and dissemination of such technologies.[1448]

Article 10.4[1449] of the Paris Agreement establishes a technology framework to guide the Technology Mechanism in advancing technology development and transfer. This framework supports the implementation of the Agreement by ensuring that developing countries receive necessary assistance, including financial support, for balanced adaptation and mitigation. It stresses collaboration across all stages of the technology cycle and mandates that the global stocktake under Article 14[1450] evaluate ongoing efforts to support technology development and transfer in developing nations.[1451]

Article 13.10[1452] of the Paris Agreement mandates that developing countries report the financial, technological, and capacity-building support they need and receive, ensuring transparency and accountability in the process.

Institutional Framework for Technology Development and Transfer under the UNFCCC

Through successive developments at the COP under the UNFCCC framework, a strong and structured institutional mechanism has been established.

Technological Framework under the UNFCCC

There is a comprehensive technological framework under the UNFCCC.

1. **Subsidiary Body for Scientific and Technological Advice (SBSTA)**

The **Subsidiary Body for Scientific and Technological Advice (SBSTA)** is a key pillar of the UNFCCC, serving as one of its two permanent subsidiary bodies. Its main role is to offer timely, science-based guidance on technological and scientific matters linked to the Convention. SBSTA promotes broad participation from all parties and fosters a holistic approach to addressing climate change. It plays a vital advisory role to the COP in several crucial areas.[1453]

The SBSTA assists the COP in the following key areas:

- **Assessing existing scientific knowledge** on climate change and its impacts.

1445 The Paris Agreement, 2015, art.2
1446 Chaewoon Oh, "Evaluation of the UNFCCC Technology Mechanism's Contribution to an International Climate Policy Framework" 22 *International Environmental Agreements: Politics, Law and Economics* 527–542 (2022), *available at*: https://link.springer.com/article/10.1007/s10784-021-09559-y#:~:text=Two%20technology%20subregimes%20of%20the,climate%20policy%20framework%20with%20five(last visited on March 20, 2025).
1447 *Supra note* 42, art.10.2.
1448 *Id.*, art.10.3.
1449 *Id.*, art.10.4.
1450 *Id.*, art. 14.
1451 *Id.*, art. 10.6.
1452 *Id.*, art. 13.10.
1453 *Supra note* 15, art.9.

- **Evaluating the effects** of implemented strategies under the Convention.
- **Identifying and promoting innovative technologies**, and advising on their development and dissemination.
- **Providing guidance on scientific issues**, fostering international cooperation in research, and supporting capacity building, particularly in developing countries.
- **Addressing scientific, technological, and methodological issues** raised by the COP and its subsidiary bodies.[1454]

2. Subsidiary Body for Implementation (SBI)

The COP has created a subsidiary body to support the evaluation and review of the Convention's implementation. This body ensures inclusivity by allowing participation from all parties and provides regular reports to the Conference on key policy and implementation matters.[1455]

It addresses all implementation-related challenges under the Convention, Kyoto Protocol, and Paris Agreement, bringing them under a unified framework. The subsidiary body structures its agenda around key pillars crucial for effective treaty execution: transparency, mitigation, adaptation, finance, and technology.[1456] The SBI also monitors annual GHG emission trends in developed countries and reports on policies and actions from both developed and developing nations. These reports help track global emissions, mitigation and adaptation efforts, and support provided in terms of finance, technology, capacity-building, research, and public awareness.[1457]

Article 10.2 of the UNFCCC outlines the SBI's core responsibility: evaluating how effectively Parties are fulfilling their commitments. This involves analyzing national communications to assess the overall impact of actions taken.[1458] The SBI's role was further expanded after the 2007 Bali Decisions, when the COP tasked it with overseeing the Expert Group on Technology Transfer (EGTT), reinforcing its role in enhancing technical cooperation for climate change mitigation and adaptation.

Technology Transfer Framework under COP 7

At COP 7 in 2001, countries adopted the "Framework for actions to enhance the implementation of Article 4.5,"[1459] marking a major step in advancing climate-related technology transfer. The creation of the Expert Group on Technology Transfer (EGTT) under this framework strengthened global cooperation and support for sustainable development.

Expert Group on Technology Transfer (EGTT)

The Expert Group on Technology Transfer (EGTT), established at COP 7 under the Marrakesh Accord, was created to strengthen the implementation of Article 4.5 of the Convention. Its main role was to assess and propose effective strategies for promoting and facilitating technology transfer.[1460] The EGTT made several key recommendations, including exploring new funding options, developing fast-track systems for affordable environmentally sound technologies (ESTs), and enhancing collaboration in R&D for widely beneficial technologies.[1461]

1454 *Id.,* art. 9.2.
1455 *Id.*, art. 11.
1456 UNFCCC, "Subsidiary Body of Implementation" (SBI), *available at:* https://unfccc.int/process/ bodies/subsidiary-bodies/sbi (last visited on March 25, 2025).
1457 *Ibid.*
1458 *Supra note* 15, arts.10.2(a),10.2(b).
1459 Conference of Parties, UNFCCC, *Report of the conference of the parties on its seventh session, Held in Marrakesh, Addendum, Part two: Action taken by the conference of the parties*, Volume I, FCCC/CP/2001/13/Add.1, (January 21, 2002), *available at*: https://unfccc.int/documents/2518 (last visited on March 25, 2025).
1460 *Id.*, cl. 1
1461 UNFCCC, "Expert Group on Technology Transfer, Five Years of Work, 2007", *available at:* https://unfccc.int/resource/docs/publications/egtt_eng.pdf (last visited on March 25, 2025).

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The core framework adopts a participative, integrated, and country-driven approach and focuses on five key areas, each with clear definitions, objectives, and implementation strategies:

(a) Technology Needs and Assessments,
(b) Technology Information,
(c) Enabling Environments,
(d) Capacity Building, and
(e) Technology Transfer Mechanism.[1462]

Technology Mechanism

The establishment of the Technology Mechanism[1463] at COP 16 in Cancun marked a major milestone in global technology cooperation. It significantly enhanced efforts to advance and exchange innovative technologies for climate change mitigation and adaptation. The Mechanism seeks to improve access to technology and expertise, ensure fair pricing for both developers and users, and facilitate the low-cost transfer of publicly available technologies.[1464]

Figure 2: Institutional Network and their Interrelations within the Technological Framework[1465]

The Technology Mechanism consists of the following two components: (a) A Technology Executive Committee (TEC)[1466], (b) A Climate Technology Centre and Network (CTCN)[1467].

Technology Executive Committee

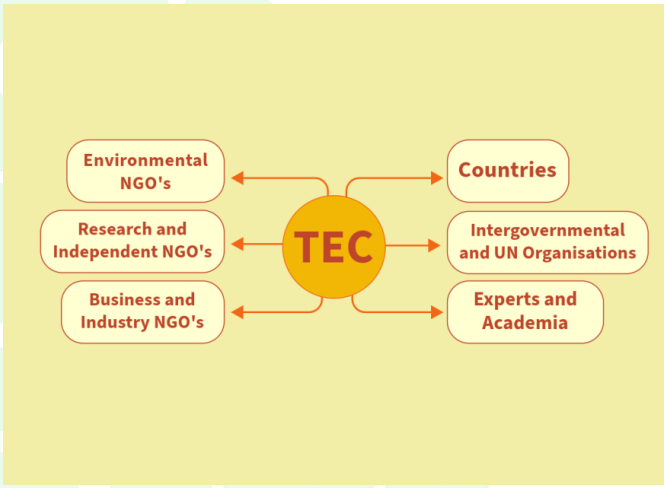

Figure 3: Working of the Technology Executive Committee (TEC)[1468]

The TEC serves as the **policy arm** of the UNFCCC Technology Mechanism. Comprising **20 technology experts** from both developed and developing countries, it convenes multiple times annually and organizes climate technology events to advance policy discussions on key climate technologies.

Functions of the Technology Executive Committee (TEC):

The TEC, as the policy arm of the Technology Mechanism, plays a crucial role in advancing climate technology.[1469] Its key functions include:

1462 Conference of Parties, UNFCCC, *Framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention,* 24 FCCC/CP/2001/13/Add.1 (2002), *available at:* https://unfccc.int/resource/docs/cop7/13a01.pdf (last visited on March 26. 2025).

1463 Conference of Parties, UNFCCC, Report of *the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010,* Decision 1/CP.16, UN Doc. FCCC/CP/2010/7/Add.1 (March 15, 2011) *available at:* https://unfccc.int/documents/6525 (last visited on March 26, 2025).

1464 *Id.,* cl. 118.

1465 Technology Mechanism, *available at:* https://unfccc.int/ttclear/support/technology-mechanism.html (last visited on March 26, 2025)

1466 *Id.,* cl. 117(a).

1467 *Id.*, cl. 117(b).

1468 TEC, TT:CLEAR, *available at*: https://unfccc.int/ttclear/tec (last visited on March 26, 2025)

1469 *Id.*, appendix IV.

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1. **Analysis & Synthesis**: Summarizes technological needs and provides technical and policy analyses on the development and diffusion of adaptation and mitigation technologies.
2. **Policy Recommendations**: Proposes strategies and actions to accelerate the deployment of climate technologies, especially for least developed countries.
3. **Program Guidance**: Recommends programmatic goals and policies focused on technology development and transfer.
4. **Collaboration & Facilitation**: Promotes cooperation among governments, private sector, academia, and NGOs to advance and share climate technologies.
5. **Barrier Removal**: Encourages actions to overcome challenges hindering technology development and transfer.
6. **Coordination**: Builds partnerships with global technology initiatives and ensures coherence with other technology-related efforts under and beyond the Convention.
7. **Action Plans & Roadmaps**: Supports the development of national, regional, and global technology action plans, including strategic guidance for implementing mitigation and adaptation technologies.[1470]

The Climate Technology Centre and Network (CTCN)[1471]

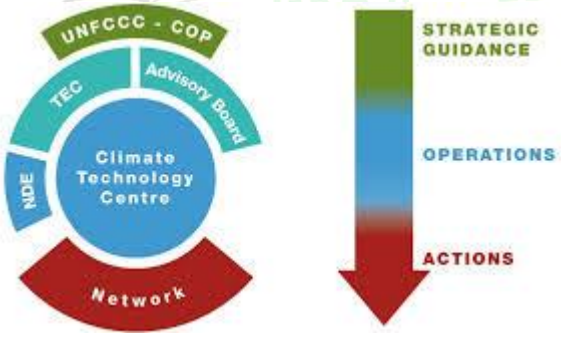

Figure 4: CTCN Structure[1472]

The 1972 Declaration of the United Nations Conference on the Human Environment laid the foundation for obligating developed nations to share environmentally sound technologies under international law. Later, instruments like the 1992 UNFCCC further reinforced these provisions, emphasizing the dissemination of technical methods for environmental protection.[1473] The primary purpose of the CTCN is to support developing countries in identifying their climate technology needs and adopting suitable technologies to effectively mitigate and adapt to climate change.[1474]

Established by COP 16, the CTCN serves as the operational arm of the Technology Mechanism. It is hosted by UNEP in collaboration with UNIDO and supported by 11 partner institutions specializing in climate technologies. The Centre facilitates a global network of technology centres, organizations, and private sector actors across national, regional, and sectoral levels.[1475]

The CTCN provides free technical assistance to developing countries on climate technology issues. Nations submit requests through their National Designated Entity (NDE), the official national focal point. Upon receiving a request, the CTCN mobilizes its global network of experts to deliver tailored, locally appropriate solutions.[1476]

The CTCN supports climate technologies by:

1. Providing technical assistance to accelerate technology transfer in developing countries.

1470 *Id.*, cl. 121

1471 *Supra note* 58.

1472 CTCN, "Introduction to the Climate Technology Centre and Network" *available at*: https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/events_SE-TEC-CTCN-SB40/ff5136555fad41e98395f0d07c5ab52b/1e4e0f7a0d2141cd8e8abe05b9ae52a4.pdf (last visited on March 28, 2025).

1473 Karen M. Sullivan, "Implementing the UNFCCC Technology Mechanism and the 5 "PS" Progress, Practicalities, Priorities, Pathways and the Public Sector"15 *Lae Environmental and Development Journal* 12 (2019), *available at*: https://eprints.soas.ac.uk/33079/ (last visited on March 28, 2025).

1474 *Ibid.*

1475 *Supra note* 58, cl. 123.

1476 *Supra note* 58

2. Facilitating knowledge and information sharing.
3. Promoting collaboration among stakeholders via its network of sectoral and regional experts from industry, government, and academia.

The Climate Technology Centre and Network's (CTCN) Operational Mechanism

The CTCN provides services to developing nations through national NDEs, which serve as liaisons between the CTCN and local partners, including businesses and government bodies. It is developing a Knowledge Management System (KMS) to promote open sharing of data on climate technologies, best practices, and lessons learned. The CTCN is also building strong partnerships with:
• Global and local institutions to promote knowledge exchange and provide policy/technical advice;
•Private-sector actors to boost investment and market opportunities;
• Development partners to support national priority programs and implement CTCN-assisted policies.

CTCN has received financial support from donors such as Canada, Denmark, Japan, Sweden, Norway, Switzerland, the United States, and the European Commission.[1477] It has responded to the needs of developing countries by fostering institutions for technology development and transfer through targeted policies, regulatory measures, and financial assistance.[1478]

Conclusion

The UNFCCC is a landmark agreement addressing climate change through both mitigation and adaptation strategies. The Kyoto Protocol marked a major advancement by laying the foundation for technology transfer, particularly through mechanisms like the Clean Development Mechanism (CDM), which supports emission-reduction projects using clean technologies unavailable in host countries.

While the Cancun and Durban Climate Talks aimed to establish a coherent framework for technology development and transfer, the current institutional links remain inadequate. The Paris Agreement, adopted at COP21 in 2015, represents a critical milestone in climate action, yet lacks a clearly defined institutional framework. Strengthening the linkage between the technology and finance mechanisms remains imperative.

International climate law now envisions a technological mechanism that extends beyond simple transfer—it empowers countries, drives innovation, and improves financial accessibility in the global climate response. This mechanism is vital for helping developing countries reduce greenhouse gas emissions and build resilience against climate impacts.

Its success highlights the power of global collaboration in confronting one of the greatest challenges of our time. As climate threats intensify, the relevance of this mechanism will grow, demanding ongoing commitment to strengthening its framework, ensuring fair access to technologies, and boosting support for capacity-building efforts.

Ultimately, the technology mechanism represents a vision of global solidarity and progress, proving that through cooperation, innovation, and determination, we can build a more sustainable and equitable world. Its contribution to climate mitigation also furthers broader goals of social justice and environmental stewardship, paving the way for a brighter future for generations to come.

[1477] *Supra note* 66

[1478] Woo Jin Lee and Rose Mwebaza, "The Role of the Climate Technology Centre and Network as a Climate Technology and Innovation Matchmaker for Developing Countries" 12 *Sustainability* (2020), *available at*: https://www.mdpi.com/2071-1050/12/19/7956#:~:text=The%20CTCN%20has%20three%20core,climate%20technology%20stakeholders%20%5B20%5D(last visited on March 28, 2025).