



Technology Executive Committee

25 August 2026

Thirty-third meeting

15–18 September 2026 (18 September 2026 TEC-CTCN Advisory Board Joint Session)

Draft working paper on how developing countries can be supported in implementing their technology action plans and technology needs assessment outcomes

Cover note

A. Background

1. In June 2022, the Subsidiary Body for Implementation, in its consideration of the Poznan strategic programme on technology transfer,¹ invited the TEC, in consultation with the Climate Technology Centre and Network (CTCN) and the operating entities of the Financial Mechanism, to consider, when updating the guidelines for technology needs assessments (TNAs), how developing countries can be supported in updating their TNAs and implementing their technology action plans (TAPs) and TNA outcomes.
2. In September 2022, the TEC reflected this guidance in the formulation of its work on TNAs under its new rolling workplan (2023-2027), which forms part of the joint work programme of the Technology Mechanism (2023-2027).
3. As per activity B.1.1 of its rolling workplan,² the TEC, in 2025, developed a beta version of a practical guide on how developing countries can be supported for conducting and updating their TNAs, which was reviewed by stakeholders and released in 2026³. At TEC 30⁴, the TEC agreed to initiate the work on a knowledge product on how developing countries can be supported to implement their TAPs and TNA outcomes in 2026, informed by lessons learned from the development and dissemination of the aforementioned practical guide. The UNEP Copenhagen Climate Centre (UNEP-CCC) is the lead partner for the implementation of this activity.
4. At TEC 32, the TEC agreed on an annotated outline for the knowledge product and the proposal to first produce a paper presenting easy-to-digest practical information that could inform and inspire action and support for TNA implementation, and to subsequently develop an outreach-oriented product thereon.

B. Scope of the note

5. The annex to this note contains a draft working paper on how developing countries can be supported to implement their TAPs and TNA outcomes, developed by the open-ended activity group in partnership with UNEP-CCC. The working paper would serve as the basis for developing a practical guide on support for TNA implementation, following the TEC 33 meeting, and would include visual elements.

¹ FCCC/SBI/2022/10, paragraph 98.

² Available at: <https://unfccc.int/ttclear/tec/workplan>.

³ Available at: <https://unfccc.int/ttclear/tec/support.html#Practicalguide>.

⁴ See [TEC/2025/30/17](#), para. 29(c).

C. Possible actions by the Technology Executive Committee

6. The TEC will be invited to consider the draft working paper contained in the annex and provide guidance to the open-ended activity group for any necessary refinements, with a view to finalizing the paper and using it as the basis for developing a practical guide.

Annex

Working paper to inform a TEC practical guide on how developing countries can be supported in implementing their technology action plans and technology needs assessment outcomes

Context

1. In 2022, Parties invited the TEC to consider how developing countries can be supported in updating their TNAs and implementing their TAPs and TNA outcomes¹. The TEC has responded to this invitation in the formulation of its rolling workplan for 2023-2027², namely by producing two practical guides, focusing on:

(a) How developing countries can be supported for conducting and updating their TNAs, released in 2026³; and

(b) How developing countries can be supported for implementing their TAPs and TNA outcomes (forthcoming).

2. These two practical guides offer strategic approaches to planning and mobilizing support for conducting TNAs and advancing the implementation of their outcomes. They complement the technical guidance produced under the GEF-funded Global TNA Project, which offers methodological direction and sectoral insights to developing countries that are preparing their TNAs and TAPs.

3. The current paper provides a synthesis of available information on avenues of support that developing countries may utilize for implementing TAPs and TNA outcomes. The content of this paper will be used to develop the practical guide on how developing countries can be supported for implementing their TAPs and TNA outcomes.

I. Introduction

1. The Technology Needs Assessment (TNA) was formalized as a central mechanism under the United Nations Framework Convention on Climate Change (UNFCCC) technology transfer framework⁴ for the articulation of technology needs of developing countries to take climate action. Over time, the process has evolved to go beyond identification and prioritization of climate technologies and include more focus on articulating implementation pathways for prioritized technologies in line with respective national circumstances, including by analysing barriers to and enabling conditions for technology deployment, and engaging stakeholders across government, private sector, and research communities, namely through the elaboration of technology action plans (TAPs).⁵

2. Over more than two decades, TNAs and their outcomes have continued to shape the climate technology agenda in developing countries and in the intergovernmental process on climate change (see table 1). The Technology Mechanism, comprising the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN), is tasked with facilitating the undertaking and updating of TNAs, as well as enhancing the implementation of their results, particularly TAPs and project ideas, and capacity-building

¹ FCCC/SBI/2022/10, para. 98.

² See <https://unfccc.int/ttclear/tec/workplan>.

³ Available at: <https://unfccc.int/ttclear/tec/support.html#Practicalguide>.

⁴ Decision 4/CP.7, annex.

⁵ TEC and UNEP-CCC (2017), Enhancing Implementation of TNAs - Guidance for preparing a TAP. Available at: <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2020/09/tap-guidance-2020-4.pdf>.

related to TNAs. The adoption of the Belém Technology Implementation Programme, the first-ever implementation programme under the Paris Agreement, places renewed emphasis on TNAs as vehicles for articulating climate-related technology priorities in developing countries.

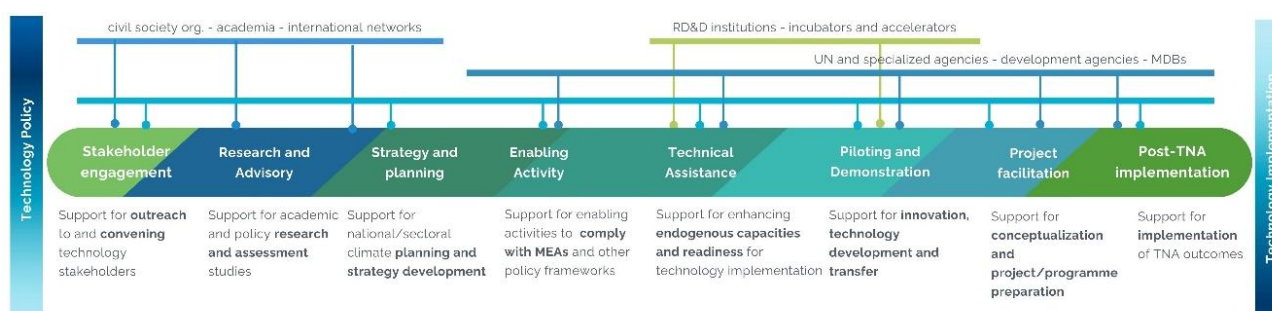
Table 1

TNAs under Paris Agreement (non-exhaustive)

Decision 15/CMA.1 – technology framework	TNAs are placed at the heart of implementation and support efforts under the technology framework of the Paris Agreement.
Decision 1/CMA.5 – first global stocktake	The first global stocktake under the Paris Agreement pointed to the importance of ensuring the availability of and access to enhanced financial and capacity-building support for developing countries for implementing and scaling up prioritized technology measures, including those identified in TNAs and TAPs.
Decision 18/CMA.7 – Belém Technology Implementation Programme	One of the objectives of the Belém Technology Implementation Programme, established as an outcome of the first global stocktake and adopted in 2025, is to strengthen support for the implementation of technology priorities identified by developing countries, including in their TNAs and TAPs.

3. Nearly all developing countries have completed at least one round of TNAs: 111 have submitted TNA reports to the secretariat, a number of them across successive rounds, and 79 have elaborated TAPs setting out implementation pathways for their prioritized technologies⁶. Consistent and growing attention has therefore been directed to TNA outcomes, in particular TAPs, as important bridges between climate technology planning and implementation on the ground, including for mobilizing support for climate technology action.

4. The technology framework of the Paris Agreement indicates that support for technology development and transfer is broader than just financial support, as it may include all aspects of support for the implementation of Article 10 of the Paris Agreement. Evidence gathered by the TEC shows that the TNA process is being supported by a diverse range of actors under and outside the UNFCCC, and through an array of support modalities (see Figure 1).

Figure 1⁷**Examples of TNA-related types of support modalities and support providers across the value chain of technology planning and implementation (non-exhaustive)**

⁶ See TNA country Reports submitted to the UNFCCC Secretariat:

<https://unfccc.int/tclear/tna/reports.html>.

⁷ Extracted from: TEC (2026) TEC practical guide: How developing countries can be supported for conducting and updating their technology needs assessments. Available at:

<https://unfccc.int/tclear/tec/support.html#Practicalguide>.

5. In a 2024 analysis⁸, the TEC and UNEP-CCC compiled various elements that may contribute to the successful implementation of TNAs and TAPs, across various stages of planning, formulation, stakeholder engagement and implementation (see Table 2). These elements are recurring observations from tracking implementation efforts centered around or informed by TNAs, including drawing from the ‘success stories from TNAs’ series, released by UNEP-CCC, reflecting implementation examples from participating countries in the Global TNA Project⁹.

6. Developing countries tap into a range of support avenues to strengthen the TNA/TAPs themselves, particularly in terms of technical granularity and operational orientation, and the follow-on implementation efforts, to strengthen their utility as entry points for financing and implementation. For example, there is growing evidence of the integration of TNA outcomes in project proposals submitted to climate finance institutions such as the Green Climate Fund (GCF), Global Environment Facility (GEF), and Adaptation Fund¹⁰.

Table 2

Summary of success factors in the implementation of TNAs and TAPs (non-exhaustive)

TNA/TAP development process	- Engagement of key stakeholders including line ministries as well as academia, research and development (R&D), practitioners, businesses, and NGOs in the TAP development to ensure TAPs are country- and demand-driven - Aligning the in-country TNA institutional arrangements with existing ones on climate change - Cross-integration of TNA results in a country’s overarching policy framework and processes on climate change and development - Ensuring coherent messaging in the formulation of climate strategies and priorities, often reflected in a national climate change strategy - Capitalizing on the existing domestic capacity and expertise - including through formal and informal networks, stakeholder platforms and communities of practice
Structuring and formulation of TNAs/TAPs	- Detailed and concrete information about foreseen outputs, timeline, scale of actions, associated costs and benefits, roles and responsibilities of different actors, and potential funding sources - Coupling identified technology needs with information on the financial and capacity-building needs for their implementation - Including socio-economic co-benefits of adaptation technologies and coupling mitigation actions with adaptation co-benefits to enhance the feasibility of their implementation - Focusing on integrated and cross-sectoral technology solutions whether in the formulation of TAPs or at the project level - Focusing on few interlinked sectors instead of broad-ranging TAPs to ensure effective articulation of needs and priorities and the mobilization of resources for implementation of technology actions contained in TAPs - Factoring in different ecological contexts and sub-national development needs within a country to ensure priority actions identified in the TAPs are context-specific and relevant to implementation actors on the ground. - Considering gender issues and impacts of technology measures on marginalized and vulnerable groups in the formulation of TAPs to ensure better alignment with socio-economic safeguards of climate funds and implementation partners
Engagement of TNA/TAP	- Management planning combined with capacity-building (i.e. among government officials) and strong in-country coordination (i.e. with focal points

⁸ TEC and UNEP-CCC (2024), Analysis of success stories from implemented TAPs, available at: <https://unfccc.int/tclear/tec/support.html#analysis>.

⁹ See <https://unfccc.int/tclear/tna/outcomes.html#sstories>.

¹⁰ UNEP-CCC (2025) TNA Implementation tracking note <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2025/11/tna-implementation-tracker-25.pdf>.

implementation partners	of GEF, GCF, Adaptation Fund) to ensure the commitment and ownership of relevant stakeholder for promoting and applying TNA/TAP results in their sectoral and thematic areas of work - Engaging potential funders at an early stage and throughout the process, for example through ‘donor conference’ as a final step of the TNA process - Utilizing the reach and efforts of equipped and trained national technology ‘champions’ who have a task or a clear incentive or motivation to advance a technology to implementation beyond TNA/TAP - Participating in international initiatives to promote technology priorities in specific sectors - Utilizing regional or global partnerships to raise the profile of technology needs and improve engagement capacity with implementation partners - Participating in multi-country and regional readiness projects and project preparation facilities for strengthening engagement with technology implementation partners, including though conducting in-depth technical assessments of needs and improving institutional and domestic implementation capacity; - Taking an agile approach in utilizing existing and emerging opportunities to integrate technology priorities across various policies, programmes and projects at both national and global levels
Post-TNA/TAP implementation	- Development of pilots to demonstrate the viability of a technology option, thereby increasing the likelihood for financial support and investments - Consideration of TNA prioritised technology options in proposals submitted to the GCF, GEF and Adaptation Fund - Tracking the implementation results including to enhance transparency and enable monitoring, evaluation, and learning - Utilizing technical assistance, readiness support and PPFs to advance the technology implementation; - Conducting continued and/or recurring work with implementing agencies, utilizing their cumulative knowledge of the national/local context and know-how in a specific sector or region; - Utilizing bilateral support and resources available through ongoing projects or activities to integrate, disseminate, follow-up and elaborate on their TNA results; - Utilizing regional, multi-country and umbrella projects and programmes to advance sectoral goals including in-depth articulation of technology needs and priorities; - Using direct-access funding windows, small-grant programmes, and demonstration projects to enhance the ownership of domestic actors in technology implementation and support the uptake of technology and the sustainability of results over time; - Utilizing domestic resources (including from the private and financial sector and at the sub-national and local levels) and capacities (e.g. research and R&D institutions) to advance the implementation of prioritized technologies; - Strengthening the ecosystem of support and investment infrastructure for climate action in the country, for example through the engagement with multilateral development banks

7. Building on the growing body of knowledge and evidence on available and utilized support for the implementation of TAPs and TNAs outcomes, this paper aims to provide a practical resource for technology decision-makers and experts in developing countries, particularly national designated entities (NDEs) for matters related to technology development and transfer under the UNFCCC, who look for support to advance the implementation of their TAPs and TNA outcomes, towards achieving their climate and sustainable development goals.

II. From Technology Action Plans to implementation

8. Implementation of TAPs does not proceed through a single mechanism but rather emerges from the interaction of multiple enabling factors, pursued through various support avenues involving a diverse array of implementation partners, and often takes place over several years. Adopting a portfolio approach that combines and periodically rebalances several support options, responding to the evolving institutional capacity, sectoral priorities, and access to finance in a given country, is therefore more effective for implementing TAPs and TNA outcomes¹¹.

9. In this guide, five non-exclusive and mutually reinforcing support pathways are highlighted: national-level support; grants and multilateral support, bilateral support, technical support, and private sector engagement. For each pathway, a non-exhaustive list of types of support (actions or “what”) and support providers (actors or “who”) are outlined as indication of support options that may be leveraged, together with considerations for how each can be most effectively utilized (“how”) within the broader portfolio of support avenues, illustrated through examples of country experiences.

10. The use of various support pathways is often sequenced and evolving. National-level policy integration and technical assistance, for instance, may be needed to bring a prioritised technology to the point at which it can attract financing or private sector engagement. As institutional capacity develops, technology priorities are updated and the conditions for support change, countries may revisit which avenues to draw on and in what proportion. Effectiveness further depends on coherence. Where support is mobilized from several providers at the same time, in-country coordination is required to ensure that activities reinforce rather than duplicate one another, and that they remain aligned with nationally identified priorities.

A. National-level support for policy and institutional integration

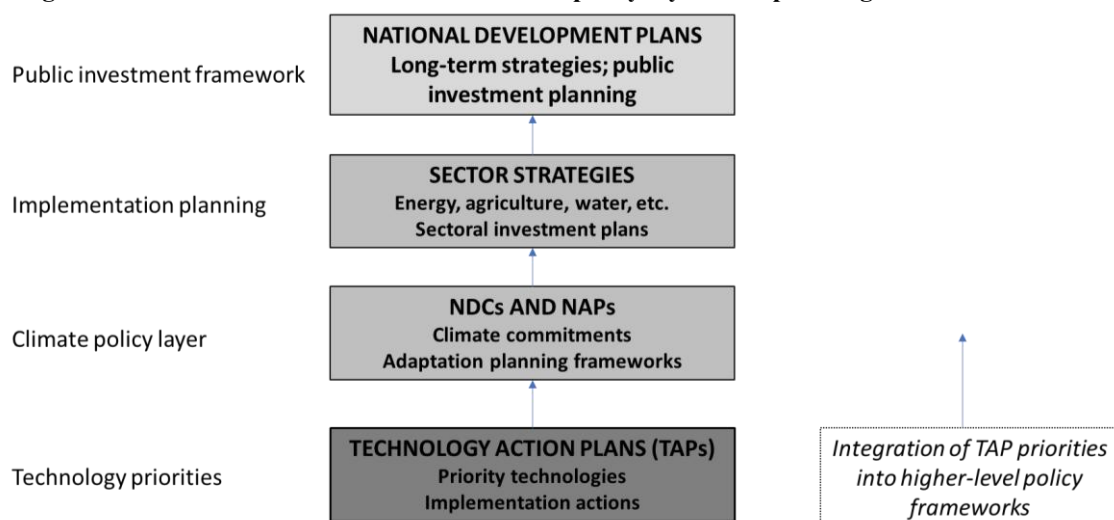
11. Many developing countries have incorporated priorities identified through the TNA process into their Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), in some cases informing sectoral climate strategies and even national development plans. Equally, TNAs are in a number of cases undertaken in alignment with priorities already set out in a country's NDC or NAP. The TEC has analysed the entry points through which the TNA and NDC processes connect, and country experience documented by the TEC illustrates both directions of this relationship.¹² Some developing country Parties have also integrated their TNAs into their reporting under the enhanced transparency framework of the Paris Agreement, namely through the biennial transparency reports (BTRs), using them to articulate both support needed (prioritized technologies) and tracking of support received (implemented TAPs).

12. **Integrating technology priorities into national climate policy frameworks** enhances both political ownership and institutional alignment, and ensures that technology deployment contributes directly to the achievement of national climate and development objectives. Domestic actors play a key role in advancing policy coherence and integrated planning around prioritized technologies for climate action and sustainable development (see table 3). International support providers could also be mobilized to assist in-country coordination and planning efforts, for example in the context of preparing NDCs and NAPs.

¹¹ UNDP (2022), System Change: A Guidebook for Adopting Portfolio Approaches, Bangkok. Available at: <https://www.undp.org/sites/g/files/zskgke326/files/2022-03/UNDP-RBAP-System-Change-A-Guidebook-for-Adopting-Portfolio-Approaches-2022.pdf>.

¹² TEC (2022), Policy brief on linkages between technology needs assessment process and nationally determined contributions process. Available at: <https://unfccc.int/ttclear/tec/tnandclinkages.html#brief15>.

Figure 2

Integration TAPs and other TNA outcomes across policy layers and planning frameworks

13. Policy coherence, institutional alignment and effective in-country coordination are also critical to connect TAPs and other TNA outcomes to investment decision-making processes, thereby **leveraging climate support and budgeting plans and processes to implement TAPs**. Several developing countries have established National Financing Vehicles, resourced through international finance and/or domestic budget allocations and the domestic private sector, to implement and monitor green and climate action projects¹³.

14. Integration of TNA outcomes into the investment and financing dimensions of national climate and development frameworks, including NDCs, NAPs, national development plans and sectoral investment strategies, as well as public expenditure frameworks, articulation of technology related support needs for climate action (e.g. in BTRs) and climate finance country programming (e.g. in relation to climate funds and multilateral development banks) improves their visibility, fundability, and access to both domestic and international sources of finance. This is of particular relevance for prioritized adaptation technologies, that may generate limited commercial returns and therefore depend more heavily on public expenditure planning and dedicated sources of adaptation finance. It also improves reporting and accountability, as TAP actions become linked to formal monitoring and reporting frameworks. Table 3 provides indicative examples of support options that could be utilized by governments to this end.

Table 3

Examples of national-level support for policy and institutional integration (non-exhaustive)

Actions (What type of support could be utilized?)	Actors (Who can provide support?)
A.1 Integrating technology priorities into national climate policy frameworks	
- Multi-stakeholder engagement and consultation - Awareness-raising and outreach around TNA outcomes - Technical and programming support for climate technology policy, strategy and action planning	- National and sub-national government institutions, including line ministries - National climate change coordination bodies and inter-ministerial committees - Academia, research institutions and think tanks - Actors supporting the development of NDCs, NAPs and other climate strategies and plans

¹³ UNEP-CCC (2020), Finance Guide for Implementation of TAPs. Available at: <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2020/09/finance-guide-for-implementation-of-technology-action-plans.pdf>.

• Mainstreaming technology priorities into NDCs, NAPs, LT-LEDS, sectoral plans and national development strategies • Institutional coordination and governance support • Capacity-building for policy design, implementation, monitoring and reporting • Policy advisory support and institutional capacity-building	• National focal points for intergovernmental frameworks on climate change and sustainable development
A.2 Leveraging climate support and budgeting plans and processes to implement TAPs	
• Integration of TNA/TAP outcomes into national and sub-national public investment programmes, budget frameworks, and climate finance strategies • Development of national and sub-national climate investment and project pipelines based on TNA and TAP outcomes • Integration of TNA outcomes into country-level climate finance programming and investment planning • Alignment of technology priorities with bilateral and multilateral financing programmes and donor programming • Coordination of domestic and international financing and implementation support	• Ministries of finance, planning, environment and sectoral line ministries • National climate finance coordination mechanisms and public investment planning bodies for climate change • National focal points in charge of formulating country programming and financing frameworks in relation to multilateral development banks (MDBs), climate funds, and bilateral development partners • Support providers for implementation planning and finance advisory for NDC implementation

Highlight box 1 – How to effectively utilize national level support for implementing TAPs and TNA outcomes – insights from Uganda

National-level support for policy and institutional integration, involving domestic expertise (e.g. academia and research institutions), in-country coordination (e.g. across line ministries and between technology, finance, and climate focal points), and complemented by international support could be effectively utilized for embedding technology priorities into national strategies, policies, budgets, institutional mandates, and investment planning.

Uganda's experience in conducting TNAs and integrating their results into national policies provides a successful example of placing technology priorities at the heart of climate and development agendas. Uganda concluded its first TNA in 2006 for climate change mitigation, with support from the GEF and UNDP. In the period of 2019-2021, a TNA for both mitigation (focusing on the energy sector) and adaptation (focusing on agriculture, forestry and water sectors) was conducted as part of the GEF-funded Global TNA Project, implemented by UNEP-CCC. The country has also utilized support from the UN Technology Bank for LDCs in 2020 and 2026 to conduct TNAs for its broader STI and sustainable development agenda. Various rounds of TNAs, with varying scope, exhibit both continuity and evolution in technology needs and priorities of Uganda. In the agriculture and forestry sectors, for instance, the later TNA focuses on priority technologies that were identified but not included in the priority technologies of the first TNAs, such as those relating to forest conservation and restoration.

Beyond TNAs themselves, a review of key climate and development policy documents in Uganda shows a coherent approach in embedding technology priorities of the country across various policy and planning instruments. For example, technologies highlighted in [Uganda's sectoral NAP for agriculture](#) (developed with support from the government of Germany, through UNDP and FAO) are informed by the 2006 TNA and provide the basis for the prioritized technologies in the TNA conducted in 2019. The national development plans (2020/21-2024/25 and 2025/26-2029/30), released by the national planning authority, reflect the combined outcomes of the TNAs conducted into a comprehensive set of priorities that aligns the climate, development and innovation agendas, for example, by promoting innovation and entrepreneurship in the agriculture sector towards advancing sustainable development goals.

B. Grants, readiness support and concessional finance

15. Access to finance remains one of the most significant barriers to TAP implementation. Alongside the domestic planning processes, developing countries draw on international public finance to support the implementation of technology priorities identified in their

TNAs. Developing countries can leverage **grants as a catalyst for early-stage action and innovation**, for example to undertake feasibility studies and technical assessments, project preparation and concept development, technology pilots and demonstration activities, capacity-building and institutional strengthening, policy development, and research and knowledge generation. Moreover, grants and patient public finance may be used to support technologies with high impact potential but limited commercial maturity or return, especially for climate technologies supporting adaptation goals, in areas such as early warning, coastal and ecosystem-based protection, water management and agricultural extension.

16. **Readiness and enabling support are also frequently utilized to address early-stage barriers to implementation**, directed at the institutional conditions for implementation, including strengthening institutional capacity and coordination, building advisory capacity for climate finance access, supporting climate finance planning and programming, and developing investment and project pipelines (see Table 4).

17. These instruments provide critical enabling support and creating the conditions needed to attract larger-scale financing and technology deployment. Developing countries often **combined the use of grants and concessional finance** (e.g. provided by multilateral development banks and climate funds), with grants supporting upstream activities, while concessional finance enables infrastructure investment, early deployment and technology scale up. This sequence improves project bankability and increases the likelihood of attracting additional financing.

Table 4

Examples of support through concessional finance, readiness support and grants (non-exhaustive)

Actions (What type of support?)	Actors (Who can provide support?)
B.1 Grants as a catalyst for early-stage action and innovation	
• Feasibility studies and technical assessments • Project preparation and concept development • Technology pilots and demonstration activities • Capacity-building and institutional strengthening • Policy development and enabling environment support • Research, innovation, and knowledge generation	• Multilateral institutions and climate funds • Bilateral development partners, incl. national governments and public institutions • Research institutions • Technical cooperation organizations • Philanthropic organizations (e.g. foundations)
B.2 Readiness support to address early-stage barriers to implementation	
• Institutional capacity-building and coordination • Capacity-building and advisory support for climate finance access • Climate finance planning and programming support, incl. identification of appropriate climate support providers • Investment and project pipeline development • Policy, regulatory, and enabling environment support • Project preparation support for subsequent financing and implementation	• Climate funds and their readiness programmes • Multilateral and bilateral development partners • UN and specialized agencies • Technical assistance providers • International networks and alliances for climate action and sustainable development

Highlight box 2 – How to maximize benefits from grants, readiness support and concessional finance for implementing TAPs and TNA outcomes – insights from Eswatini

Grants and readiness support, for example provided through multilateral climate funds, bilateral development partners and international and regional organizations, may be utilized most efficiently and effectively for supporting early-stage activities, project preparation, technology demonstrations, market creation, and deployment of technologies requiring high upfront investment or de-risking.

Eswatini conducted a TNA with support from the Global TNA Project between 2016-2018, covering both mitigation (in energy, waste, forestry and biodiversity sectors) and adaptation (in water, agriculture, forestry and biodiversity sectors). In 2021, the country mobilized the GCF readiness support to conduct a more in-depth assessment of its prioritized technologies in the water sector ([supported through the Global Water Partnership](#)) and the agriculture sector ([supported through the FAO](#)). These efforts aimed at identifying technology, capacity, policy and financing gaps before project design, thereby improving targeting of climate finance towards the most critical technology and capacity gaps in these sectors, and strengthening readiness for larger-scale GCF investments. The [Eswatini Country Programme under the GCF](#) (2024) showcases the integration of country's climate technology priorities in its climate finance programming.

C. Bilateral support and technology cooperation

18. Bilateral cooperation, including North-South and South-South cooperation provide an important complement to multilateral channels of support by offering flexible, targeted support that can be tailored to specific country contexts and implementation needs (see Figure 3). Unlike multilateral mechanisms, bilateral cooperation can often be mobilised more rapidly and can respond directly to country priorities as identified through national processes such as TNAs and TAPs, with flexibility. This makes it particularly valuable for addressing specific barriers and advancing implementation in a timely and context-sensitive manner, e.g. through technical assistance, pilot projects, policy support and capacity-building.

19. With these considerations, developing countries can strategically position the **role of bilateral partners in advancing their climate technology priorities** to respond to specific country needs and address implementation barriers (see Table 5). Proactive engagement by national governments in developing countries is critical to communicate climate technology priorities to bilateral partners and to integrate these priorities into broader development cooperation frameworks, thereby **aligning bilateral programmes with national technology strategies**.

20. Bilateral cooperation has been particularly effective in supporting **pilot and demonstration projects**. In line with the technology framework of the Paris Agreement, the TEC's work on collaborative research, development and demonstration¹⁴, underscores the importance of **international technology partnerships** to promote innovation, including by supporting the development of endogenous technologies and local supply chains. These initiatives test technologies under local conditions, build technical and institutional capacity, and reduce uncertainty.

21. Carbon market mechanisms have long supported technology transfer under the UNFCCC, particularly through the Kyoto Protocol.¹⁵ Opportunities for **cooperation under Article 6 of the Paris Agreement** may also provide additional avenues to support technology implementation through bilateral cooperation, in the context of technology transfer, capacity-building, and financing for mitigation actions. These include both market-based approaches (such as carbon markets under Article 6.2 and 6.4) and non-market mechanisms (under Article 6.8).

Table 5

Examples of bilateral support and cooperation for technology implementation (non-exhaustive)

Actions (What type of support?)	Actors (Who can provide support?)
C.1 Aligning bilateral programmes with national technology strategies	
Support for technology pilots, innovation programmes, and sectoral reforms	Partner country ministries and government agencies

¹⁴ TEC (2021). Compilation of good practices and lessons learned on international collaborative research, development and demonstration (RD&D) initiatives of climate technology. Available at: <https://unfccc.int/tclear/tec/rdandr/#Compilation>.

¹⁵ See UNFCCC (2010) The contribution of the clean development mechanism under the Kyoto Protocol to technology transfer. Available at: https://cdm.unfccc.int/Reference/Reports/TTreport/TT_2010.pdf.

• Technical cooperation and knowledge exchange to adapt technologies to local contexts • Capacity-building and institutional strengthening to support implementation • Development of implementation-ready concepts that can be scaled through additional financing	• Bilateral development agencies and cooperation partners • North–South and South–South cooperation partners, including research institutions and NGOs
C.2 Facilitating partnerships, pilots and demonstration projects	
• Technical assistance and advisory support for project development and implementation • Financing and implementation support for technology pilots and demonstration projects • Collaborative research, development and demonstration • Technology transfer and knowledge exchange facilitation • Evidence generation and learning support to enable scaling and further investment	• Bilateral development agencies and cooperation partners • Government agencies and implementing institutions • Research institutions, universities, centres of excellence • Private sector actors and technology providers
C.3 Cooperation under Article 6 of the Paris Agreement	
• Article 6 readiness and implementation framework support, including the integration of technology priorities • Mitigation activity identification and development support, informed by TNAs and TAPs • Technology transfer, knowledge exchange, and partnership facilitation	• Bilateral development agencies and cooperation partners • National governments and Article 6 focal points • Private sector and project developers

Highlight box 3 – How to maximize benefits from bilateral and technology cooperation to advance the implementation of TAPs and TNA outcomes – insights from Georgia

Bilateral support and technology cooperation, if aligned with nationally identified technology priorities, could be effectively utilized to enable knowledge exchange, technology transfer, pilot projects, targeted policy support, and catalytic financing, including through long-term partnerships and cooperation for technology transfer that could complement and strengthen domestic initiatives.

Georgia completed its TNA under the GEF-funded Global TNA Project in 2012. In 2021–2023, with readiness support of the GCF and technical assistance from the CTCN, the TNAs were updated across four sectors (electricity generation and transmission, buildings, transport and agriculture), and technology roadmaps were developed for each priority technology. Georgia's transparency report under the Paris Agreement ([biennial transparency report 2024](#)) includes successful examples of support received through bilateral channels that has helped advanced its technology priorities, in line with its TNAs. To advance its technology priorities in the energy sector, Georgia utilized a [twinning arrangement](#) with the Austrian regulatory authority for energy, funded through the [Eastern Partnership](#) of the European Union, to strengthen legislative and regulatory frameworks in the sector. This project was focused on the development of network tariff setting methodologies, energy efficiency and renewable energy regulatory strategy and creating regulatory framework for enabling demand side involvement. Georgia also mobilized concessional loans for energy sector reform, in line with its NDC targets, through policy-based lending from the [Kreditanstalt für Wiederaufbau \(KfW\)](#) through the German Federal Ministry for Economic Cooperation and Development.

D. Technical assistance and advisory support

22. Technical assistance (TA) plays a central role in supporting the implementation of TAPs by providing the expertise, advisory services, and capacity-building needed to translate planning outputs into actionable and investment-ready initiatives. TA can be provided by both domestic and international actors and is particularly important where technical and institutional capacities are limited. While readiness, enabling and preparatory support from multilateral entities or bilateral cooperation often includes TA components, developing

countries can also draw on a much broader range of TA providers to access the knowledge and expertise needed to address their specific implementation needs (see Table 6).

Table 6

Examples of technical assistance and advisory support for technology implementation (non-exhaustive)

Actions (What type of support?)	Actors (Who can provide support?)
D.1 Technical elaboration of implementation pathways	
- Feasibility, technical, economic, and risk assessment support - Policy and technical support for alignment with national standards and regulatory frameworks - Implementation roadmapping and technology matchmaking support based on TNA outcomes	- Multilateral organizations - Bilateral development partners - UN and specialized agencies - TA-focused facilities e.g. CTCN - Research institutions and technical experts
D.2 Facilitating project preparation	
- Project concept development and programming support - Financial modelling, cost estimation, and financing structuring of projects - Technical documentation of economic, environmental and social assessment of projects - Alignment support with financing institution requirements and standards	- Multilateral organizations - Bilateral development partners - Project preparation facilities - Technical and financial advisory organizations and networks
D.3 Strengthening the enabling environment	
- Policy, regulatory, and institutional framework support for technology deployment, incl. project management and procurement capabilities - Coordination mechanism and platforms support incl. to advance whole-of-government and whole-of-society approaches to climate technology implementation - Investment readiness and climate finance access support - Institutional capacity-building, knowledge transfer, and advisory support - Monitoring, evaluation and learning capabilities	- Domestic and international public institutions - Global and regional partnerships, coalitions, initiatives, and networks - UN agencies and development partners - Technical organizations and capacity-building providers - Research institutions and knowledge networks

Highlight box 4 – How to effectively utilize technical assistance and advisory services to support implementation of TAPs and TNA outcomes – insights from Fiji

Technical assistance and advisory support can be effective support options for developing countries when addressing technical, institutional, and project preparation gaps throughout the technology implementation cycle, often utilized simultaneous or as part of broader processes and programming efforts.

Fiji completed its TNA under the GEF-funded Global TNA Project in 2024, focusing on the agriculture sector and coastal zones for climate change adaptation, and the transport (domestic maritime shipping) and energy sectors (rural electrification) for climate change mitigation, which are also reflected in the [NDC 3.0 of the country](#). Fiji has utilized technical assistance and advisory support from the NDC Partnership in developing its NDCs and the associated investment plans.

In addition to global support for NDC development and implementation, Fiji has tapped into regional support avenues, for example the Regional Pacific NDC Hub to implement its NDC targets and boost its capacity to access climate finance from the GCF and the Adaptation Fund. The Regional Pacific NDC Hub contributes to the NDC Partnership and operates through a partnership between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the Global Green Growth Institute (GGGI), the Pacific Community and the Secretariat of the Pacific Regional

Environment Programme (SPREP) with financial support from the governments of Australia, Germany, New Zealand and the United Kingdom.

Beyond these umbrella programmes, Fiji has benefitted from technical assistance and cooperation with individual support providers in such consortiums. For example, the Pacific Community has provided [multiple technical assistance projects](#) in the agriculture sector and is the implementing entity for a project funded by the Adaptation Fund with a value of over USD 5 million that is aimed at [strengthening the adaptive capacity of coastal communities of Fiji to climate change through Nature-based seawalls](#).

E. Private sector collaboration and partnerships

23. The private sector plays an increasingly important role in climate action, and is essential for scaling up the implementation of climate technologies identified through TAPs (see Table 7). While public finance and international support can catalyse initial actions, long-term deployment and sustainability depend on the mobilisation of private investment and participation. As such, addressing market and policy barriers - e.g. regulatory uncertainty, high investment risks, limited access to finance and limited project pipelines - supports increased private sector participation and investment.

Table 7

Examples of support for technology implementation through private sector collaboration and partnerships (non-exhaustive)

Actions (What type of support?)	Actors (Who can provide support?)
- Private investment support for technology deployment projects - Technology development, commercialization, and transfer support - Provision of goods, services, and technical expertise across technology supply chains - Operation and maintenance support for infrastructure and technology systems - Innovation, market development, and technology scaling support for climate solutions - Mobilization of private capital, including equity investment and other financing instruments - Fiscal and financial measures and risk-mitigation instruments	- Domestic enterprises and businesses, involved in technology deployment, supply chains, and service provision - Multinational corporations and technology providers - Financial institutions, investors, and project developers - Industry associations and business networks - Ministries of finance, industry, energy, and other sectoral ministries

Highlight box 5 – How to leverage the engagement of private sector in implementing TAPs and TNA outcomes – insights from Jamaica

Public-private partnerships and other collaborative frameworks to combine public and private support for climate technology and innovation could help advance commercialization, technology deployment, innovation, operation and maintenance. This may entail engaging domestic and international private actors in technology cooperation (e.g. through North-South, South-South, and triangular cooperation).

Jamaica conducted its first TNA in 2004, supported by the GEF, through UNDP. In 2009, the country adopted its national development plan for [Vision 2030](#), committing to building a “Technology Enabled Society” by deepening the application of science, technology, and innovation. In 2017, the intended NDC of Jamaica was submitted. In the same year, Jamaica with support from the Commonwealth Climate Finance Access Hub through the placement of a national climate finance adviser, implemented a [readiness initiative to mobilise the private sector](#) to support low carbon and climate resilient development in Jamaica and other Caribbean countries. In 2019, through another [GCF readiness grant](#), Jamaica assessed the enabling environment for a Caribbean green bond listing on the Jamaica Stock Exchange, including to foster the adoption of green technologies by local companies.

In the period of 2020-2023, a new TNA was conducted as part of the Global TNA Project. The outcomes of the TNA process are embedded in [Jamaica's Long-term Emission Reduction and Climate Resilient Strategy \(LT-LEDS\)](#), released in 2023. The LT-LEDS also includes considerations for the engagement of the private sector, including to support technology development and implementation in support of national development and climate goals. Following earlier preparatory work, in 2024, UNDP and the Jamaica Stock Exchange entered into a [strategic partnership](#) under the Climate Promise project with a view to promoting sustainable finance and attracting investments from domestic and international actors including the private sector in renewable energy, climate-smart infrastructure, and green industries through the issuance of Jamaica's first Green Bonds.

III. Practical Recommendations

24. National governments are central to fostering policy coherence, coordinating implementation, and aligning planning with national priorities. Building on the overview of support types and providers set out in the previous chapter, this section brings together practical considerations on how decision-makers in developing countries may strengthen the conditions for effective mobilization and use of available support.

25. The considerations are grouped by the tasks that arise at national level rather than by support avenue, since most of them apply across several avenues at once. They are indicative and non-exhaustive, and their relevance depends on national circumstances, institutional arrangements and the stage that particular technology priorities have reached.

1. Anchoring technology priorities in national frameworks and budgets

- Integrating TNA outcomes into NDCs, NAPs, national development plans and sectoral strategies, aligned with the revision cycles of these frameworks wherever possible.
- Securing visibility and institutional mandates for the uptake of endorsed technology priorities, enabling line ministries to coordinate, act and report on their implementation, e.g. through an inter-ministerial committee or a cabinet decision.
- Reflecting TAPs and other TNA outcomes in public investment programmes, medium-term expenditure frameworks and climate finance strategies, and engaging ministries of finance and planning at the point at which sectoral budget submissions are prepared.
- For prioritized technologies with limited scope for cost recovery, making the case for public expenditure allocations and dedicated sources of climate finance (e.g. for climate change adaptation).
- Where national financing vehicles exist, using them to connect TAPs and other TNA outcomes with domestic budget allocations and international finance.

2. Strengthening in-country coordination and institutional roles

- Establishing or designating a coordination mechanism for TAP implementation, with clear roles and responsibilities for the lead institution and participating ministries and agencies.
- Identifying the line ministries and agencies with mandates relevant to each prioritized technology and involving them before support is sought.
- Establishing working relationships between the NDE, climate fund focal points, and finance and planning ministries so that technology priorities are reflected in country programming and investment planning.
- Assigning responsibility for TAP implementation to a standing institutional function rather than to a project team, so that it continues beyond the lifetime of individual projects.
- Where several providers are supporting climate technology implementation in a country, maintaining a shared overview of actions and actors to strengthen coordination and synergy, identify duplication and gaps, and ensure alignment with national priorities.

3. Priority-setting and programming of the support needed

- Developing national and, where relevant, sub-national investment and project pipelines from TAPs, including indicative costs, timelines, and responsible institutions.
- Distinguishing priorities that can attract repayable finance from those that require grants or other non-repayable support, and approaching providers accordingly.
- Identifying technology solutions that advance multiple national climate and development priorities (e.g. combining adaptation and mitigation benefits or offering sustainable development co-benefits), and presenting them in those terms, as they may align with a wider range of support providers and programming frameworks.
- Using technical assistance to elaborate implementation pathways, feasibility, costing and financing structures, and to develop project concepts that are aligned with the requirements of prospective support providers.
- Using readiness support to build the institutional capacity required to access climate finance, including for the preparation of investment-ready proposals.
- Drawing on TAPs to identify market opportunities, investment needs and potential roles for private actors in prioritized sectors

4. Engaging support providers and combining sources coherently

- Coordinating bilateral support with domestic initiatives and with multilateral finance addressing the same priority or sector.
- Combining modalities, such as grants, readiness support, concessional finance, blended arrangements and risk mitigation instruments, according to the characteristics of the technology and the terms and requirements of available support.
- Reviewing the risks attached to the portfolio of priorities to identify if several depend on the particular providers, instruments or policy decisions.
- Drawing on a range of technical assistance providers to access specialized expertise for implementation roadmapping, feasibility studies, business case development, investment planning and the preparation of financing proposals.
- Linking technical assistance to identified financing opportunities from the outset, leveraging implementation partners with established experience and relationships with relevant support providers.
- Establishing public–private partnerships and other collaborative frameworks to combine public and private resources, including through North–South, South–South and triangular cooperation.
- Screening support options early (e.g. eligibility criteria, proposal requirements, and specific mandates of prospective support providers) to assess suitability and prospects for successful implementation.

5. Building, retaining and leveraging domestic capacity

- Leveraging domestic expertise such as line ministries, academia, research institutions and technology practitioners to advance technical articulation of implementation pathways for technology priorities (e.g. for stakeholder engagement, research and advisory, strategy and planning), while drawing on international support to address remaining gaps.
- Directing technical assistance, advisory support and institutional capacity-building to recurring functions: project preparation, procurement, financial management, and monitoring and evaluation.
- Establishing long-term partnerships with research institutions and centres of excellence, to support institutional learning and the development of endogenous capacities and local supply chains.

- Using pilot and demonstration projects to test prioritized technologies under local conditions, and documenting the results in a form usable in subsequent financing proposals.
- Engaging private sector actors early in the TNA and TAP process, including to identify technology champions and early movers in prioritized sectors.
- Exploring and applying supply and demand side policies, including fiscal and financial instruments, public procurement, standards and pricing frameworks, to establish the conditions under which domestic enterprises and supply chains can participate in technology deployment.

6. Tracking, reporting, learning and revisiting

- Submitting TNA and TAP reports to the secretariat, and circulating them nationally to strengthen visibility and uptake.
- Establishing a system to track TAP implementation at the national level, including support received, implementing partners, and progress against indicative timelines.
- Sharing lessons and useful experience across sectors and technology priorities (e.g. provider requirements and approaches that have worked elsewhere) to improve subsequent implementation efforts in a country or region.
- Connecting the articulation of technology priorities in TNAs and support needed/received for their implementation with the BTR or other national reporting processes.
- Revisiting the mix of support avenues as institutional capacity develops, priorities evolve, and the conditions and options for support change.
- Updating TNAs and TAPs to reflect developments in technology, national circumstances, and available support, and to remain aligned with the revision cycles of the frameworks into which they feed.

Highlight box 6 - A practical checklist

The questions below may help decision-makers assess whether the institutional, financial and implementation conditions are in place to advance priority actions identified through TNAs and TAPs.

- **Are TNA outcomes reflected in national climate and development frameworks?**
→ Consider integrating TNA outcomes into NDCs, NAPs and other relevant frameworks, aligning with their update cycles, and engaging ministries of finance and planning to inform sectoral budgets and plans (III.1)
- **Have TNA outcomes been endorsed at a level that enables ministries to act?**
→ Consider securing appropriate political endorsement and institutional mandates, and establishing relevant coordination mechanisms (III.1, III.2)
- **Is implementation responsibility assigned to a standing institutional function?**
→ Consider assigning responsibility to a standing function, so that implementation continues beyond the lifetime of individual projects (III.2)
- **Are technology priorities visible in national financing and support programming?**
→ Consider establishing working relationships between the NDE finance and planning ministries, climate finance focal points and development partners (III.1, III.2)
- **Are priorities matched to appropriate types of finance and support?**
→ Consider distinguishing between priorities suited to repayable finance and those requiring grants or other non-repayable support (III.1, III.3)
- **Is there an implementation-ready pipeline of priority technologies?**
→ Consider developing such a pipeline, and using technical assistance and readiness support to bring concepts to that stage (III.3)
- **Are provider requirements and financing opportunities understood before preparation begins?**
→ Consider establishing these at the outset, and linking technical assistance to identified financing opportunities (III.4)

- **Is support across providers coordinated and diversified?**
→ Consider maintaining an overview of support providers, activities and financing instruments to identify synergies, duplication, gaps and concentration risks (III.2, III.4)
 - **Are domestic capacities being strengthened and retained beyond individual projects?**
→ Consider leveraging domestic expertise where available, directing capacity-building at functions required repeatedly, and using supply- and demand-side measures to enable domestic enterprises and supply chains to participate (III.5)
 - **Is implementation being tracked and learning used to adjust support?**
→ Consider putting a tracking system in place, reporting through national reports and to the secretariat, sharing lessons and revisiting which support avenues to draw on as conditions change (III.6)
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