

**AD HOC WORKING GROUP ON LONG-TERM COOPERATIVE
ACTION
UNDER THE CONVENTION
Resumed seventh session
Barcelona, 2–6 November 2009**

Non-paper No. 47*

6/11/09 @ 13:00

**CONTACT GROUP ON ENHANCED ACTION ON
DEVELOPMENT AND TRANSFER OF TECHNOLOGY**

Draft text

Recognizing that climate change poses a serious threat to the social and economic development of all developing country Parties, particularly small island developing states and least developed countries,

Confirming the importance of promoting and cooperating on the research, development, demonstration, deployment, transfer and diffusion of new and existing technologies for mitigation and adaptation under the Convention now, up to and beyond 2012, in order to achieve the ultimate objective of the Convention,

Recognizing that all countries, especially developing countries, need access to resources required to achieve sustainable social and economic development and that, in order for developing countries to progress towards that goal, their energy consumption will need to grow taking into account the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general, including through the application of new technologies on terms which make such an application economically and socially beneficial.

Recognizing that climate change represents an urgent, grave and potentially irreversible threat to human societies and the planet and is thus an emergency,

Stressing the need to ensure that international rights and obligations relating to intellectual property are supportive of and do not run counter to the objectives of the Convention,

Recognizing that early and rapid reduction of emissions requires the transfer of or access to environmentally sound technologies on a massive scale,

Noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries,

Stressing that the climate debt of developed countries must be repaid to developing countries, inter alia through deep emission reductions by developed countries, provision of finance, and concrete and effective transfer of technology to meet the agreed full incremental implementation costs,

Recognising further that developing countries particularly those with insufficient or no manufacturing capacity in environmentally sound technologies will have more difficulties in accessing adaptation and mitigation technologies,

Stressing the need for effective mechanisms and enhanced means for the removal of obstacles to the scaling up of the development and transfer of technology to developing country Parties,

* This non-paper supersedes non-paper No. 36.

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Considering the need to promote and implement tech transfer for adaptation and mitigation, while assuring the principle of social and environmental integrity in technological investments.

Recognizing the circumstances of Parties included in Annex I to the Convention undergoing the process of a transition to a market based economy and other Annex I countries which have special circumstances recognized by COP decisions.

Options for paragraph 1¹

Option 1 The objective of enhanced action on technology research, development, demonstration, deployment, diffusion and transfer related to adaptation and mitigation is to achieve the full implementation of Article 2, Article 4, paragraphs 1(c), 3, 5, 8 and 9, of the Convention, in the context of Article 4, paragraph 7, of the Convention;

Option 2 The objective of enhanced action on technology development, deployment, transfer, and diffusion is to enable global action on mitigation and adaptation, in the implementation of the Convention. Such action should be country-driven and be based on a learning-by-doing practices;

Option 3 The objective of enhanced action on technology development and transfer is to enable the implementation of the mitigation and adaptation provisions of the Convention;

Options for paragraphs 2 to 5

Option 1

2. The pursuit of this objective shall be guided by the principles and provisions of the Convention, as well as by country drivenness and the best available science, to achieve the following:

- (a) Removal of barriers for technology development and transfer to developing countries;
- (b) Ensuring accessibility, affordability, appropriateness and adaptability of the technologies required by developing country Parties for enhanced action on mitigation and adaptation;
- (c) Provision of agreed full costs and agreed full incremental costs in accordance with Article 4, paragraph 3, of the Convention;
- (d) Ensure adequacy and predictability of funds to developing countries for technology development and transfer, taking into account the important role of public finance in supporting technology outcomes, including research, development and technology transfer needs, demonstration, deployment, diffusion and transfer of technologies to the developing country Parties;
- (e) Support the development and enhancement of endogenous technologies and capacities across the technology life cycle in developing countries;
- (f) Ensure that identification of technology needs is nationally determined, based on national circumstances and priorities;
- (g) Address country specific needs and priorities, particularly the urgent need for the development and transfer of technologies for adaptation in all developing country Parties, in particular the small island developing states and the least developed countries;
- (h) [Address][Recognise] the need for economic diversification to meet the specific needs and concerns of developing countries whose economies are affected by the adverse impacts of response measures;

¹ To assist the reader, references to paragraph numbers are to those used in Non-paper 36.

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- (i) Promote incentives for enhanced cooperative action on technology development, deployment, transfer and diffusion for climate change mitigation and adaptation.
3. The Technology Mechanism is hereby established and will operate under the authority and guidance of the COP and be accountable to it. It shall be comprised of:
- (a) An Executive Body on Technology comprised of and supported by a strategic planning committee, technical panels, a verification group and a secretariat, with a technology action plan as a starting point of its work to enable implementation of enhanced action on technology development and transfer;
 - (b) A Multilateral Climate Change Fund operating under the authority and guidance of the COP and accountable to the COP to support a list of activities and costs eligible for support as agreed by the COP;
 - (c) Technology Incentive for Development and Transfer;
 - (d) Technology Capacity Building Program.
4. The Technology Mechanism will have the following functions:
- (a) Accelerate the development, demonstration, deployment, adoption, diffusion and transfer of environmentally sound technologies from Annex II Parties to developing country Parties, in order to avoid the lock-in effects of technologies that are not environmentally sound, and to promote sustainable development in developing country Parties;
 - (b) Provide access to technology for adaptation at national, subregional and regional levels, enabled by capacity-building, and the provision of new and additional, adequate and predictable financing resources to meet the costs of both integration of adaptation into the development process and stand-alone adaptation activities;
 - (c) Monitor and assess the financial support and performance of development and transfer of environmentally sound technologies in terms of speed, range and size of the technological flow;
 - (d) Removal of barriers for technology development and transfer to developing countries, and enhance the means of facilitating this transfer in order to promote urgent access to advanced environmentally sound technologies;
 - (e) Promote the establishment of and strengthen, as appropriate, national and regional technology innovation centres and networks, including the functions contained in Annex II, including centre-to-centre twinning arrangements, with a view to enhancing cooperative research and development and North-South, South-South, and triangular technology cooperation, to accelerate the development, demonstration, deployment, diffusion and transfer of environmentally safe and sound technologies to support action on mitigation and adaptation by developing country Parties.

Option 2

2. National policies and actions support technology research, development, demonstration, deployment, diffusion and transfer, drive technology financing, leverage the private sector, build capacity, and create suitable investment conditions. Parties should, in the context of their national strategies and consistent with their national circumstances:
- (a) Implement actions, consistent with relevant national social, economic, energy and environmental policies, that establish conditions which promote the development, deployment and diffusion of environmentally sound technologies;
 - (b) Promote scaled-up public and private sector investment in research, development and demonstration for environmentally sound technology areas

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through enhanced support and strengthened incentives for private-sector participation;

- (c) Enhance enabling environments, including technology-specific policies and measures with adaptation and/or mitigation benefits, that create the conditions conducive to private- and public-sector technology development, deployment, transfer and diffusion including national social, economic, energy and environmental policies and measures, and deployment schemes to address barriers to technology development, deployment, diffusion, and transfer of technologies for mitigation and adaptation;
- (d) Provide incentives to mobilize private capital and enhance and/or establish incentives at the national level, through the provision of financial support as appropriate with a view to promoting transfer and diffusion of environmentally sound technologies to developing country Parties;
- (e) Promote and support the development and transfer of innovative climate-friendly technologies including through the formulation and sharing of national technology action plans, that should be integrated into national adaptation and mitigation plans, and where appropriate, build on and include technology needs assessments as established by decision 4/CP.7;
- (f) Scale up technology research, development, and demonstration and to support cooperative research and development programmes and initiatives, including through national technology research innovation centres and networks.

3. International cooperative actions that promote the development and deployment of environmentally sound technologies should be conducted and acknowledged. Parties should, to the extent appropriate, and consistent with their national strategies:

- (a) Participate in international programmes that support the development and use of common performance standards, testing, verification and certification programmes;
- (b) Participate in international partnerships to advance the development, demonstration, deployment, diffusion and transfer of environmentally sound technologies, including through formulation of international technology roadmaps and action plans;
- (c) Establish voluntary technology arrangements and partnerships with intergovernmental organisations, the private-sector, academia, civil society organizations and governments for enhancing cooperative action amongst Parties on adaptation and mitigation by developing countries including cooperative research and development, large-scale demonstration and deployment projects on key technologies for mitigation and adaptation, cooperation on specific sectors or greenhouse gases, and cooperation on climate observation and warning systems for enhancing resilience, consistent with Article 11, paragraph 5 of the Convention;
- (d) Engage in cooperative activities that support nationally-identified capacity-building needs that support technology actions for mitigation and adaptation purposes;
- (d).alt Engage in cooperative activities that support nationally-identified capacity-building needs that support technology actions for mitigation and adaptation purposes including, inter alia, analysis, information, training activities and advice on development and implementation of relevant best practices, institutional and regulatory frameworks that promote the development and use of environmentally sound technologies; advice and support for the development and implementation of national technology actions and plans; advice and technical assistance to facilitate increased private sector investment,

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including advice on the establishment of public-private partnerships for promoting environmentally sound technologies; and training, information and workforce development programmes to build capacity, including national technology innovation systems.

- (e) Support cooperation and facilitate participation in technology innovation centres and networks, including through centre-to-centre twinning arrangements with a view to enhancing north-south, south-south and triangular cooperation.

4. The Technology Action Committee (TAC) is hereby established to replace the EGTT and to advance all Parties' abilities to accelerate the development, deployment, diffusion and transfer of environmentally sound technologies. The Technology Action Committee will seek to enhance actions by strengthening the facilitative role of the UNFCCC to leverage technology activities inside and outside the Convention.

4. alt.1 The Advisory Group for Technology Cooperation is hereby established under the Convention. The Advisory Group for Technology Cooperation comprises three facilities under the form of public-private partnership: Regional Hubs for Technology Transfer, Sectoral Innovation Centers and an Executive Coordinating Council.

- (a) The Regional Hubs for Technology Transfer provide services such as support for actions for mitigation and adaptation and promoting technology transfer and diffusion to developing country Parties.
- (b) The Sectoral Innovation Centers develop technology roadmaps, initiate R&D and identify best available technologies and best practices in relevant sectors.
- (c) The Executive Coordinating Council coordinates overall activities of the AGTC and communicates their activities to the COP.

4. alt.2 Recalling Articles 4.1(c) and 4.5 of the Convention, Parties agree that a technology mechanism to support and accelerate the global penetration of environmentally sound technologies by enhancing and scaling up technology cooperation through the provision, upon request, of technical assistance and training for developing countries' mitigation and adaptation actions that further the implementation of the Convention through a Climate Technology Centre and Network. The Climate Technology Centre will be operated by full-time staff, in accordance with the Centre's functions; and comprised of and supported by technology experts and practitioners. The Climate Technology Network will be comprised of and supported by technology experts and practitioners.

4. alt.3 The Climate Technology Centre will have the following functions:

- (a) Provide technical assistance and consultation, training, and the development and customization of analytical tools, policies and best practices for conducting country-driven planning to support the dissemination of environmentally sound technologies;
- (b) Promote close collaboration on deployment of technologies for climate mitigation and adaptation between governments, industries, and research communities of developed and developing countries;
- (c) Act as a clearinghouse to promote the broad exchange and diffusion of information on technologies for mitigation and adaptation.

4. alt.3 bis The Climate Technology Network will have the following functions:

- (a) Seek cooperation and coordination with relevant international technology initiatives and organizations and liaise with other bodies under the Convention, as appropriate;
- (b) Provide advice and support to Parties and their domestic stakeholders for the identification of needs and implementation of responsive technologies, practices and processes, and opportunities for technology cooperation to support

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mitigation and adaptation actions that further implementation of the Convention;

- (c) Provide training, information and workforce development programmes to build and/or strengthen domestic capacity in developing countries to identify technology options, make technology choices, and operate, maintain, and adapt technologies, including through training of trainers and on-the-job technical and vocational training.

Option 3

2. A Technology Action Framework is hereby established to address all aspects of [cooperation among Parties on] technology research, development, demonstration, deployment, diffusion and transfer.
3. The Technology Action Framework shall aim to support Parties to identify and remove possible barriers as identified in their Technology Needs Assessments while ensuring that adequate capacity is developed and maintained in developing countries for this purpose.
4. The Technology Action Framework shall be linked with the Coordinating Mechanism and NAMAs and Low Emissions Growth Plans, as well as with national adaptation planning processes. Support for the design and implementation of technology actions shall be facilitated by a Coordinating Mechanism and the Framework for Action on Adaptation to be established under a Copenhagen Agreement.
5. The Technology Action Framework² will comprise:
 - (a) A [Panel][Committee], to fulfil the following functions, inter alia:
 - (i) Gather international Technology Action Plans which shall identify short-, medium-, and long-term action across all stages of the technology development cycle, including research, development, demonstration, diffusion, transfer and the use of existing and new environmentally safe and sound technologies to support action on mitigation and adaptation and to promote sustainable development paths;
 - (ii) Provide guidance on the establishment of networks of centres, referred to in paragraph X with a view to enhancing cooperative research and development and North-South, South-South, and triangular technology cooperation;
 - (iii) Accelerate the global penetration of environmentally safe and sound technologies by enhancing technology cooperation through the provision, upon request, of technical assistance and training to support developing countries mitigation and adaptation actions, including assisting in the development of rigorous technology development and transfer project proposals and in matching with the most appropriate form of investment support, particularly with a view to leveraging private-sector funding;
 - (iv) Seek cooperation and coordination with relevant international technology initiatives and organizations;
 - (v) Encourage and strengthen collaborative partnership arrangements with national and international public- and private-sector institutions and initiatives;
 - (vi) Identify areas of technology cooperation with the private-sector [and make recommendations to the COP for action];
 - (vii) Provide guidance and support including technical and policy advice, including on technology needs assessments, technology action plans and low-

² The framework also encompasses paragraphs 6-15.

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emission development strategies, to Parties on request and assist the coordinating mechanism with the assessment of NAMAs and other relevant bodies as required;

- (viii) Monitor and assess the progress of the international technology action plans according to global technology objectives. These objectives should guide national and international development towards low carbon and climate resilient economies.

Option 4

2. The Conference of the Parties decides to establish a Technology Body to:
 - (a) Facilitate and promote, through licensing of patented technologies, wide diffusion of existing adaptation and mitigation technologies similar to the scale of information communication technologies to developing countries as a high priority;
 - (b) Stimulate further research and development of these existing adaptation and mitigation technologies and promote and facilitate their wide diffusion;
 - (c) Facilitate cooperative research and development of technology to slow down glacier melting in vulnerable mountaineous ecosystems;
 - (d) Stimulate and encourage, through cooperation with private sector, public institutions, academia and research institutions, research and development, demonstration and production of emerging technologies, particularly mitigation technologies and their subsequent diffusion;
 - (e) Promote strengthening of institutional and technical capacity to enable development of adaptation technologies in developing countries;
 - (f) Facilitate and promote access to clean and environmentally sound technologies identified by developing countries;
 - (g) Promote capacity building in developing countries as an integral part of the technology development and transfer, including twining, fellowships and attachments; and
 - (h) Cooperate with Parties, private sector and other interested institutions in the implementation Article 4, paragraph 5, of the Convention.
3. The Technology Body will be composed by experts nominated by Parties with equitable and balanced representation of all Parties, taking into account the specific needs and special situations of least developed country Parties.
4. The Technology Body shall also provide policy advice to the COP on implementation of Article 4, paragraph 5, of the Convention.
5. The Technology Body will be assisted by Technology Panel(s) comprising of mitigation and adaptation technology experts, financial and investment and legal experts. The Technology Body shall elaborate on its work programme and developed detailed terms of reference of the Technology Panel and report to the 16th meeting of the Conference of the Parties for its consideration.

Option 5

2. A financing and technology mechanism shall be created to ensure full, effective and sustained implementation of the Convention and which is comprised of an adaptation and mitigation pillar.
3. Parties shall established an Executive Body on Finance and Technology for Adaptation (EBFTA) and an Executive Body on Finance and Technology for Mitigation (EBFTM) under the authority and guidance and accountable to the COP.

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4. The executive bodies will decide on the disbursement of the Adaptation Fund and a Mitigation Fund to be created under the Convention.
5. The executive bodies shall be supported by technical panels on research and development, capacity-building, transfer of technologies, observation systems and information management, REDD+, and market mechanism to perform, inter alia, the following functions:
- (a) Organize, coordinate, monitor and evaluate the implementation of the comprehensive framework for adaptation and mitigation, including the enabling means of financing, technology and capacity-building;
 - (b) Coordinate disbursements from the Adaptation Funds according to the needs as indicated in national plans for adaptation submitted by developing countries, and from the Mitigation Fund according to the needs indicated in NAMAs and REDD+ activities as requested by developing countries;
 - (c) Provide financial and technical support, available on request by developing countries, for the preparation of REDD+ activities and for the elaboration of national adaptation plans and NAMAs;
 - (d) Manage a registry and certification system for receiving financial resources related to mitigation and adaptation in compliance with the financial commitments of developed country Parties under Article 4.3 of the Convention;
 - (e) Coordinate with regional development banks concessional loan arrangements for the private-sector in developing countries for the implementation of specific mitigation activities;
 - (f) Articulate technology transfer and financing mechanisms under the Convention with other United Nations organizations, multilateral financial institutions established under bilateral or multilateral development programmes and other relevant international forums not directly related to climate change, with the assistance of technical panels to be created.
- 5.bis The technical panels shall compromise government representatives elected by the COP with balanced regional representation, who are experts on matters related to each of the technical panels, and be open to input from other experts.

Options for paragraph 6

Option 1. [Developed country Parties [and other developed country Parties included in Annex II to the Convention]] are encouraged to provide appropriate financial and technical support through bilateral and multilateral channels to developing country Parties to scale up technology research, development and demonstration and to support cooperative research and development programmes and initiatives.

Option 2. Developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to developing country Parties to meet the agreed full costs and agreed full incremental costs of implementing measures as contained in Article 4.1 (c), and for enhancing the implementation of Article 4.5 of the Convention.

Options for paragraph 7

Option 1. A fast track technology capacity building programme to support action on mitigation and adaptation by developing countries shall be [further] elaborated [by the [technology body], referred to in paragraph 4 (a) above, taking into account the elements contained in Annex I, for consideration by the COP at its XX session]. Support for implementation of actions to address developing countries' capacity building needs in relation to technologies relevant for adaptation and mitigation should be based on existing or new needs assessments incorporated where appropriate in low emission growth plans and/or adaptation actions/programmes building on the Capacity Building Framework. Such support should be

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facilitated by the Coordinating Mechanism and/or the Framework for Action on Adaptation or any other relevant channels.

Option 2. A Technology Capacity building program shall be further elaborated to manage and generate technological change, and enhance absorptive capacity in developing countries, including:

- (a) Research, development and demonstration of new technologies; and
- (b) Enhancing human and institutional capacity.

Options for paragraph 8

Option 1. [A technology development and transfer [facility][service][hub][Advisory Group for Technology Cooperation] is hereby established to accelerate the global penetration of environmentally safe and sound technologies by enhancing technology cooperation through the provision, upon request, of technical assistance and training to support developing countries mitigation and adaptation actions, including assisting in the development of rigorous technology development and transfer project proposals and in matching with the most appropriate form of investment support, particularly with a view to leveraging private-sector funding.]

Option 2 Establish a technology leveraging service which would provide an interactive project development and facilitation service for actions identified through national mitigation and adaptation planning processes.

9. [The [technology body] is requested to identify appropriate actions to address barriers to technology development and transfer encountered by developing countries Parties, including those related to intellectual property rights, to enable action on mitigation and adaptation;]

9 bis. Specific measures shall be established to remove barriers to development and transfer of technologies from the developed country Parties that have commitments under the Convention to transfer environmentally sound technologies to developing country Parties arising from intellectual property rights (IPR) protection, including:

- (a) All necessary steps shall be immediately taken in all relevant fora to mandatorily exclude from patenting climate-friendly technologies held by Annex II countries which can be used to adapt to or mitigate climate change;
- (b) Creation of a “Global Technology Pool for Climate Change” that promotes and ensures access to technologies that can be used to adapt to or mitigate climate change and associated know-how and trade secrets to developing countries including on non-exclusive royalty-free terms in order to provide better information service and reduce transaction costs.

10. [The [technology body] is requested to develop and implement, as part of its programme of work and through a country driven process mediated through the recipient governments, practical and concrete actions that address specific needs of developing countries on the development and transfer of technologies for adaptation, taking into account the indicative list of priorities contained in Annex II;]

[10.bis Any international agreement on intellectual property shall not be interpreted or implemented in a manner that limits or prevents any Party from taking any measures to address adaptation or mitigation of climate change, in particular the development and enhancement of endogenous capacities and technologies of developing countries and transfer of, and access to, environmentally sound technologies and know-how.

10.bis.1 Specific and urgent measures shall be taken and mechanisms developed to remove barriers to development and transfer of technologies arising from intellectual property rights protection, in particular:

- (a) Creation of a Global Technology IPR Pool for Climate Change that promotes and ensures access to intellectual property protected technologies and

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associated know-how to developing countries on non-exclusive royalty free terms;

- (b) Take steps to ensure sharing of publicly funded technologies and related know-how, including by making the technologies and know-how available in the public domain in a manner that promotes transfer of and/or access to environmentally sound technology and know-how to developing countries on royalty free terms.

10.bis.2 All necessary steps shall be immediately taken in all relevant forums to exclude from IPR protection and revoke existing IPR protection in developing countries and least developed countries on environmentally sound technologies to adapt to and mitigate climate change, including those developed through funding by governments or international agencies and those involving use of genetic resources that are used for adaptation and mitigation of climate change.

10.bis.3 Developing countries have the right to make use of the full flexibilities contained in the Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement, including compulsory licensing.]

Options for paragraph 12³

Option 1. [Developed country Parties are encouraged to:

- (a) Double expenditure on research, development and demonstration of technologies for mitigation and adaptation by 2012 and quadruple expenditure on research, development and demonstration of technologies for mitigation and adaptation by 2020;
- (b) Enhance national policies and incentives to stimulate increased investment by the private sector in research, development and demonstration of new technologies for mitigation and adaptation;
- (c) Enhance national policies and incentives to promote the transfer and diffusion of the environmentally safe and sound technologies to developing countries;]
- (d) [Developed country Parties] [and other developed country Parties included in Annex II to the Convention]], in a position to do so, are encouraged to provide appropriate financial and technical support through bilateral and multilateral channels to developing country Parties to scale up technology research, development and demonstration and to support cooperative research and development programmes and initiatives.

Option 2. Activities eligible for support from the technology mechanism[, which shall be primarily determined by country driven processes and defined through technology action plans, nationally appropriate mitigation actions and national adaptation plans,][, as determined through country-driven processes, including nationally appropriate mitigation actions and national action plans,] include, inter alia:

Sub Option 1

- (a) Promotion, facilitation and implementation of activities along the entire technology cycle to enable the accelerated adoption of ESTs;
- (b) Support for research, development, manufacture, commercialization, deployment and diffusion of technologies for adaptation and mitigation in accordance with decision 1/CP.13;
- (c) Adaptation technologies to address the adverse effects of climate change and finance the removal of barriers to the large-scale transfer of technologies for adaptation;

³ Note that it was agreed to delete paragraph 11 from non-paper 36.

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- (d) Technologies to address the adverse impact of response measures, and finance the removal of barriers to the large-scale transfer of technologies for reducing the adverse impact of response measures;
- (e) Capacity-building to manage and generate technological change, enhance absorptive capacity, create enabling conditions in developing countries, inter alia, costs of:
 - (i) Research, development and demonstration of new technologies;
 - (ii) Enhancing human and institutional capacity;
 - (iii) Guarantees on foreign direct investment for environmentally sound technologies.
- (f) Commercialization of new and emerging technologies, inter alia:
 - (i) Venture capital, with public investment leveraging private capital markets for emerging technologies;
 - (ii) Research, development, and demonstration of new technologies, financed by venture capital and other sources;
 - (iii) Joint technology development
- (g) Creation of manufacturing facilities for EST, including low-GHG emission technologies, inter alia, costs of:
 - (i) Compulsory licensing, cost associated with patents, designs, and royalties;
 - (ii) Conversion of existing manufacturing facilities or of establishing new facilities;
 - (iii) Research and development activities, including joint research, development, design, and demonstration;
 - (iv) Technology adaptation;
 - (v) Retraining and dissemination of know-how;
 - (vi) Operation;
 - (vii) Monitoring and verification.
- (h) Procurement of low-GHG emission technologies, including software and hardware, inter alia:
 - (i) Cost of premature modification or of replacement of existing equipment, as well as the cost of new equipment;
 - (ii) Cost of retraining and dissemination of know-how;
 - (iii) Cost of technical assistance for the design, installation, and stable operation of the technology;
 - (iv) Cost of fuel and other operational costs;
 - (v) Cost of technologies for fuel switching;
 - (vi) Cost of monitoring and verification.
- (i) Actions related to developing and transferring win-win environmentally safe and sound technologies and know-how that have a great potential to reduce GHG emissions substantively and simultaneously address the adverse impacts of climate change and the adverse impacts of response measures in developing country Parties;

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Sub Option 2

- (a) Cooperative research, development and demonstration programmes to providing opportunities for participation by [developing country Parties][all Parties];
 - (b) Deployment and diffusion of environmentally safe and sound technologies and know-how that have a great potential to reduce greenhouse gas emissions substantively and simultaneously address the adverse impacts of climate change and the adverse impacts of response measures in developing country Parties;
 - (c) Incentives to engage the private sector;
 - (d) Incremental costs of soft and hard technologies for implementation of adaptation and mitigation actions;
 - (e) Climate change observation systems and related information management;
 - (f) Purchasing of licenses and other intellectual property rights issues;
 - (g) Technology innovation centres;
 - (h) Actions on deployment of technologies;
 - (i) Capacity building actions including technical training and training for technology action planning in the context of actions on mitigation and adaptation;
 - (j) Development and implementation of national technology plans for mitigation and adaptation;
 - (k) Support for the enabling environments, in the context of the implementation of national adaptation and mitigation plans.
13. [All Parties are encouraged to:
- (a) Promote and support the development and transfer of innovative climate-friendly technologies including through the formulation and sharing of national technology action plans, that should be integrated into national adaptation and mitigation plans and processes, and where appropriate, build on and include technology needs assessments as established by decision 4/CP.7;
 - (b) Implement actions, consistent with relevant national social, economic, energy and environmental policies, that establish conditions which promote the development, deployment and diffusion of environmentally safe and sound technologies;
 - (c) Promote greater public and private sector investment in research, development and demonstration for targeted environmentally sound technology areas through enhanced support and strengthened incentives for private-sector participation;
 - (d) Consistent with international obligations, enhance enabling environments, including technology-specific policies and measures with both adaptation and mitigation benefits, that create the conditions conducive to private- and public-sector technology development, deployment, transfer and diffusion. Policies and measures should include national social, economic, energy and environmental policies, and deployment schemes to address barriers to technology development, deployment, diffusion, and transfer of technologies for mitigation and adaptation;
 - (e) Participate, to the extent possible, in international programmes that support the development and use of common performance standards, testing, verification and certification programmes;
 - (f) Participate in international partnerships to advance the development, demonstration, deployment, diffusion and transfer of environmentally safe and sound technologies;

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- (g) Establish voluntary technology [agreements][arrangements] and partnerships with intergovernmental organisations, the private-sector, academia, civil society organizations and local and sub-national governments for enhancing cooperative action amongst Parties on adaptation and mitigation by developing countries. Those [agreements][arrangements] could include cooperative research and development, large-scale demonstration and deployment projects on key technologies for mitigation and adaptation, cooperation on specific sectors or greenhouse gases, and cooperation on climate observation and warning systems for enhancing resilience, consistent with Article 11, paragraph 5 of the Convention. Parties should report in their national communications on the voluntary technology [agreements][arrangements] and the related financial support of such [agreements][arrangements] and partnerships;
- (h) Engage the private business and financial sectors by providing incentives to mobilize private capital and enhance and/or establish incentives at the national level, through the provision of financial support as appropriate, such as concessional loans and risk guarantees, tax exemption and subsidies for the owners of patented technologies, with a view to promoting transfer and diffusion of environmentally safe and sound technologies to developing country Parties;]

Options for paragraph 14

Option 1. [Developing country Parties shall be provided with the necessary and immediate financial and capacity building support to prepare national technology action plans, including through the support of the technology development and transfer [facility][service][hub] and technology innovation centres, and will be assisted to implement the actions identified within these plans, for enhancing the implementation of Article 4, paragraph 1(c) and 5, of the Convention;]

Option 2. Activities eligible for international support shall be primarily identified and determined through country-driven planning and processes. These activities shall include those that facilitate development, deployment, diffusion and transfer of environmentally sound technologies to address mitigation and adaptation needs, including those that address capacity-building needs and readiness functions and activities that leverage public and private investment in technology development, deployment diffusion and transfer.

Options for paragraph 15

Option 1. [The Conference of the Parties shall periodically monitor and assess the effectiveness of the implementation of Articles 4, paragraphs 5 and 1 (c), of the Convention and of the Technology Mechanism referred to in paragraph 1 above.]

Option 2. Technology support, for both mitigation and adaptation, shall be reported in the national communications and shall be subject to the in-depth review of national communications in accordance with updated review guidelines.

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Annex I

Possible Elements of a Technology capacity building programme

1. Analysis, information, training activities and advice on development and implementation of relevant policies, institutional and regulatory frameworks that promote the development and use of environmentally sound technologies.
2. Advice and support for the development and implementation of national technology actions, including for the preparation and implementation of national technology action plans.
3. Advice and technical assistance, to facilitate increased private investment in key greenhouse gas emitting sectors, including advice on the establishment of public–private partnerships for promoting environmentally sound technologies.
4. Advice and support for the identification of policy instruments and infrastructure required for the deployment, diffusion and transfer of identified technological options for the implementation of NAMAs and adaptation actions.
5. Training, information and workforce development programmes to build capacity, including national technology innovation systems, to ensure that all market actors understand the costs, performance and benefits of climate change technologies.

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Annex II

Indicative list of priorities for practical and concrete action on technologies for adaptation

1. Strengthen national institutional and personnel capacity of Parties, particular developing country parties, to identify and explore technologies for adaptation including indigenous technologies and further enhance the implementation of outcome the NAPAs and TNAs.
2. Strengthen collaboration among and expertise of regional excellence centres in order to provide technological support for adaptation to address regional specific needs.
3. Identify and prompt development and transfer of common technologies for adaptation including early warning and observation technologies.
4. Providing funding opportunities to research and development activities regarding technologies for adaptation in national level.
5. Facilitate the information sharing on technologies for adaptation among parties [through, inter alia, the technology information platform as referred to in paragraph 11].
6. Improving the understanding of the role of oceans in climate change and vice versa, and the effects of climate change on marine ecosystems, marine biodiversity and coastal communities, especially in developing countries and small island States, and including marine scientific research and sustained integrated ocean observatory systems.

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Appendix

Possible functions and structure of proposed institutional arrangements

Option 1 (Executive Body on Technology)

Functions

1. Develop a Technology Action Plan to serve as a starting point for the work of the Executive Body.
2. Accelerate the development, demonstration, deployment, adoption, diffusion and transfer of environmentally sound technologies from Annex II Parties to developing country Parties, in order to avoid the lock-in effects of technologies that are not environmentally sound, and to promote sustainable development in developing country Parties.
3. Provide access to technology for adaptation at national, subregional and regional levels, enabled by capacity-building, and the provision of new and additional, adequate and predictable financing resources to meet the costs of both integration of adaptation into the development process and stand-alone adaptation activities.
4. Remove barriers to technology transfer and enhance the means of facilitating this transfer in order to promote urgent access to advanced environmentally sound technologies while balancing rewards for innovators with the common good of humankind, including, inter alia, jointly-developed technology and sharing of intellectual property rights.
5. Enhance enabling environments to facilitate access to technology, including through financing environments that leverage private-sector financial resources, including policy dialogues and involvement in development, demonstration, deployment, adoption, diffusion and transfer of environmentally sound technologies.
6. Build on existing activities under the Convention and coordinate action by different stakeholders at international, regional and national levels to promote coherence through the integration of ongoing activities related to development and transfer of technologies.
7. Provide the means for the full implementation of Convention commitments on development, deployment, adoption, diffusion and transfer of environmentally sound technologies, and related financing and capacity-building.
8. Develop strategy and technology action plans and monitor and verify the implementation of the specific operational policies, guidelines and administrative arrangements, including the disbursement of resources, for the purpose of achieving the objectives of the multilateral technology fund, taking into account the cost-effectiveness of the proposed activities as well as the potential for their replicability.
9. Monitor and assess the performance of development and transfer of environmentally sound technologies in terms of speed, range and size of the technological flow and provide advice and recommendations on the overall implementation of technology action under the Convention.
10. Provide technical and technology-related financing and policy advice, including on technology needs assessments, technology development plans or low-emission development strategies, to Parties as requested.

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Structure

1. A Strategic Planning Committee to:
 - (a) Develop strategy;
 - (b) Provide regular guidance;
 - (c) Assess and elaborate technology-related matters;
 - (d) Continuously evaluate progress, including financial and technological flows and range and effectiveness of technologies transferred;
 - (e) Develop updates for the Technology Action Plan (TAP) at regular intervals;
 - (f) Perform any other functions to be assigned to it by the EBT;
 - (g) Capacity-building.
2. Technical Panels to generate and compile current expert information related to, inter alia:
 - (a) Policies and measures;
 - (b) Intellectual property cooperation, sharing and partnership;
 - (c) Sectoral, cross-sectoral and cross-cutting cooperation;
 - (d) Assessment, monitoring and compliance related matters;
 - (e) Dissemination of knowledge;
 - (f) Documenting, scaling up and diffusion of indigenous adaptation technologies which already exist in developing countries.
3. A Verification Group to put in place a measurement, reporting and verification system for compliance with the provision of financing and the development, demonstration, deployment, adoption, diffusion, and transfer of environmentally-sound technologies by [Annex I Parties][developed countries and other developed country Parties included in Annex II of the Convention] to developing countries under the mechanism, and the overall compliance with financing and technology commitments under the Convention, including the MRV requirements under the Bali Action Plan.
4. A Secretariat to:
 - (a) Support and facilitate the activities of the Executive Body of Technology;
 - (b) Compile and prepare a final report on the financial and technological contributions made and reported by Parties to the technology mechanism, including the overall MRV requirements under the Bali Action Plan.

Option 2 (Technology Executive [Committee][Panel])

Functions

1. Develop and facilitate the implementation of an international Technology Action Plan.
2. Advise other bodies under the Convention, as appropriate, on financing of technology development and transfer, including on the implementation of the Action Plan on Technology and other technology financing arrangements that form part of the Copenhagen agreed outcome.
3. Seek cooperation and coordination with relevant international technology initiatives and organizations, including on financing technology deployment, diffusion and transfer, and advice on issues related to IPR.
4. Encourage and strengthen collaborative partnership arrangements with national and international public- and private-sector institutions and initiatives, and stimulate the establishment of facilitative mechanisms to leverage private-sector financing to help meet developing countries' needs.

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5. Identify areas of cooperation and approve procedures and modalities for technology cooperation with the private-sector and make recommendations to the COP for action.
6. Elaborate policy documents, terms of reference, criteria and guidance, and develop special reviews on existing technologies, including maintaining an inventory of existing adaptation technologies in developing countries, including information on their state of development, deployment, diffusion and transfer.
7. Provide guidance and support including technical and technology-related financing and policy advice, including on technology needs assessments, technology action plans and low-emission development strategies, to Parties on request and assist the coordinating mechanism with the assessment of NAMAs and other relevant bodies as required.
8. Monitor and assess performance and progress, using performance indicators, and provide advice and recommendations on the overall implementation of technology action under the Convention.

Structure

1. Strengthen cooperation and make efficient use of the current institutional arrangements and establish a Technology Executive [Board][Committee] to advise the COP on technology policy issues. The [Board][Committee] should be serviced by a strengthened professional secretariat and advised by a technology panel, building upon and replacing the Expert Group on Technology Transfer, and comprising experts nominated by Parties. To enhance the involvement of the private sector and relevant international organizations, a consultative group for sectoral technology cooperation is established to assist the technical panel in the provision of advice to the [Board][Committee]. The consultative group is comprised of representatives of national and regional technology innovation centres and sectoral technology cooperation bodies.
2. The consultative group for sectoral technology cooperation will support the Technical Panel to provide advice to the Technology Executive [Committee][Board] on:
 - (a) Options for cooperation and coordination with relevant sectoral, regional and international technology initiatives and organizations, including on financing technology deployment, diffusion and transfer, and advice on issues related to IPR;
 - (b) Opportunities for collaborative public-private partnership arrangements with national and international public- and private-sector institutions and initiatives, and stimulate the establishment of facilitative mechanisms to leverage private-sector financing to help meet developing countries' needs;
 - (c) Identify and promote best practices and best available technologies, through analysing emission reduction potentials and setting indicators, and advise on appropriate ways of promoting the transfer and diffusion of existing best available technologies and those that will be available in the short-term, medium-term and long-term in all relevant sectors.

Elements of the international Technology Action Plan

Option 1

1. Define specific institutional arrangements, policies, actions and funding requirements for all relevant technologies under the following classifications: public domain technologies, [IPR protected] [patented] technologies and know-how, future technologies.
2. Include specific actions and timelines for the first three years, and be reviewed and updated for successive three-year periods in the light of lessons learned.
3. Support the establishment of and/or strengthen existing national and regional technology innovation centres.

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4. Accelerate research, development, demonstration, diffusion and transfer of environmentally sound technologies for mitigation and adaptation.
5. Develop an effective strategy that identifies and proposes specific measures to overcome the barriers to technology development and transfer.

Option 2

1. The plan for technology action should build on and enhance coordination and collaboration with relevant international and national efforts and be informed by national technology action plans.
2. The plan for technology action shall be implemented with financial support through the financial mechanism of the Convention and other financial arrangements as part of the Copenhagen agreed outcome, including all the available means to ensure the affordability of technologies, products and related services.
3. Technology action plans shall be informed and supported by comprehensive global technology road maps that provide an overview of what needs to be done to promote wider and more rapid development and deployment of key technologies, and which shall identify:
 - a) The current state of development of the technology, including technologies for adaptation;
 - b) Key stakeholders and relevant existing and emerging efforts contributing to the development of the technology;
 - c) Gaps and barriers to commercial maturity;
 - d) Opportunities for cooperation between developed and developing country Parties, including their respective private-sectors.
4. Technology action plans and technology road maps should build on and work collaboratively with other relevant international and national efforts and institutions to maximize efficiency of effort and avoid duplication.

Option 3

1. The plan for technology action should build on and enhance coordination and collaboration with relevant international and national efforts and be informed by national technology action plans.
2. The plan for technology action shall be implemented with financial support through the financial mechanism of the Convention and other financial arrangements as part of the Copenhagen agreed outcome, including all the available means to ensure the affordability of technologies, products and related services.
3. The international technology action plan will be based upon a regular assessment of global technology needs for long term action on climate change with the aim of accelerating short-, medium-, and long-term action across all stages of the technology development cycle, including research, development, demonstration, diffusion, transfer and use of existing and new environmentally safe and sound technologies, in order to achieve the ultimate objective of the Convention and support action on mitigation and adaptation and to promote a shift to sustainable development paths. The Plan shall specify actions for an initial period of three years and be regularly updated every successive three years. It will:
 - (a) Assess the steps required to accelerate research, development, demonstration, diffusion and transfer of environmentally sound technologies for mitigation and adaptation, through developing a comprehensive overview of what needs to be done to promote wider and more rapid development and deployment of key technologies, and which shall identify:

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- (i) The current state of development of technologies for mitigation and adaptation;
 - (ii) Key stakeholders and relevant existing and emerging efforts contributing to the development of these technology;
 - (iii) Gaps and barriers that prevent technologies from reaching commercial maturity;
 - (iv) Opportunities for cooperation between developed and developing country Parties, including their respective private sectors;
 - (v) Prioritized technologies that should be the focus for specific programmes of action to accelerate the development and transfer of technology.
- (b) Define specific, time-bound actions and associated funding requirements with specific programmes of action developed for each prioritized technology, encompassing:
- (i) Measures to overcome the barriers to technology development and transfer;
 - (ii) Policies and measures to enhance enabling environments;
 - (iii) Capacity-building activities;
 - (iv) Actions to promote cooperative research and development;
 - (v) Measures to address intellectual property rights;
 - (vi) Incentive mechanisms;
 - (vii) Actions to enhance the development and transfer of technologies for adaptation;
 - (viii) The establishment and/or strengthen of existing national and regional technology innovation centres.

Elements of a national Technology Action Plan

1. A national technology needs assessment.
2. Identification of technological options for [specific] [all] [sectors] [greenhouse gases] [priority areas by sector and by technology].
3. Identification and removal of barriers to the development, deployment, diffusion and transfer of [win-win technological options such as carbon dioxide capture and storage, clean fossil fuel and non-energy use of fossil fuel technologies][identified technological options].
4. Priority areas shall be identified sector by sector and technology by technology. For the most GHG-intensive sectors, nationally appropriate deployment schemes should be developed within the context of TNAs and low-emission development strategies, taking into account specific barriers for technology deployment in these sectors.
5. Policy instruments, enabling environments and infrastructure required for the deployment, diffusion and transfer of identified technological options.
6. Identification of capacity-building needs.
7. Opportunities for joint research and development between developing country Parties, and between developed and developing country Parties to be financed by developed country Parties.
8. For the most greenhouse gas intensive sectors, nationally appropriate deployment schemes should be developed, taking into account specific barriers to technology deployment in these sectors.

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9. Measures that promote wide diffusion of existing and emerging adaptation technologies in similar climates.
10. Measures to address intellectual property rights.
11. Incentive mechanisms.
12. Voluntary partnerships and agreements.
13. Actions to enhance the development and transfer of technologies for adaptation.
14. The establishment and/or strengthen of existing national and regional technology innovation centres.
15. Within the context of the national adaptation and mitigation planning, identification of actions that, in order to be implemented, require international support.
16. Periodic review of progress to identify areas where international cooperation should be strengthened.

Elements of the Technology Development and Transfer Leveraging [Facility][service]

1. Identify and help facilitate the transfer of low greenhouse gas emitting technologies, particularly renewable energy and energy efficiency technologies.
2. Assist particularly vulnerable developing countries to identify and help facilitate the transfer of appropriate adaptation technologies.
3. Provide an interactive facilitation service for actions identified through low-emission development strategy, TNA, NAMA, and/or national adaptation planning processes.
4. On a voluntary basis, assess potential actions, assist in the development of rigorous projects proposals and assist in matching with the most appropriate form of investment support, particularly with a view to leveraging private-sector funding.
5. Assist in the undertaking of nationally appropriate mitigation actions.

Elements of the Climate Technology Hub and Corps

1. To be operated by full-time Hub staff and comprised of and supported by technology experts and practitioners, to undertake the following functions:
 - (a) Provide technical assistance and consultation, training, and the development and customization of analytical tools, policies and best practices for conducting country-driven planning to support the dissemination of environmentally sound technologies;
 - (b) Promote close collaboration on deployment of technologies for climate mitigation and adaptation between governments, industries, and research communities of developed and developing countries;
 - (c) Act as a clearinghouse to promote the broad exchange and diffusion of information on technologies for mitigation and adaptation;
 - (d) Seek cooperation and coordination with relevant international technology initiatives and organizations and liaise with other bodies under the Convention, as appropriate.
2. A Climate Technology Corps comprised of and supported by technology experts and practitioners that will undertake the following functions on a country-specific basis:
 - (a) Provide advice and support to Parties and their domestic stakeholders for the identification of needs and implementation of responsive technologies, practices and processes, and opportunities for technology cooperation to

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support mitigation and adaptation actions that further implementation of the Convention;

- (b) Provide training, information and workforce development programmes to build and/or strengthen domestic capacity in developing countries to identify technology options, make technology choices, and operate, maintain, and adapt technologies, including through training of trainers and on-the-job technical and vocational training.

Possible elements of an incentive mechanism for technology development and transfer

1. An incentive mechanism for enhanced cooperative action on technology development, deployment, transfer and diffusion for mitigation and adaptation projects and programmes [shall][should] be established in order to stimulate accelerated diffusion and transfer of existing and new environmentally safe and sound technologies to developing country Parties.
2. For the purpose of meeting its commitments for measurable, reportable and verifiable support for environmentally sound technologies and know-how in accordance with Article 4, paragraph 5, of the Convention, a [an Annex II] Party may transfer to, or acquire from, other Parties, Environmentally Sound Technology Rewards (ESTR) resulting from projects and programmes, including sectoral actions, that accelerate the deployment, diffusion or transfer of environmentally sound technologies for mitigation or adaptation in any sector of the economy, provided that the following conditions are met:
 - (a) Host Parties establish technology targets or objectives;
 - (b) Voluntary participation is approved by each Party involved;
 - (c) Any such project or programme results in measurable, reportable and verifiable reductions of greenhouse gas emissions by sources, storage or capture, enhancement of removals by sinks, or increases in climate resilience that is additional to any that would otherwise occur;
 - (d) The project or programme contributes to the achievement of the technology targets and objectives of the host Party in receipt of that technology;
 - (e) The host Party has allocated ESTRs to the project or programme, proportionate to the volume of emissions reduced or removed or increase in climate resilience;
 - (f) Participants in the ESTR mechanism may involve private and public companies;
 - (g) The acquisition of ESTRs is recognized as a contribution towards the efforts of Parties to meet their commitments under Article 4, paragraph 5, of the Convention.

Functions of Technology Innovation Centres

1. Be coordinating nodal centres to facilitate and enable:
 - (a) The identification of key technological products that have strong sustainable development and climate change benefits along with their projected price and performance targets;
 - (b) The development of such products;
 - (c) The development of markets for these products, in partnership with appropriate public- and private-sector organizations.
2. Promote joint research and development and technology cooperation activities between developing countries and between developed and developing countries, which may include the sharing of intellectual property rights.

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3. Promote the deployment, diffusion and transfer of environmentally sound technologies for mitigation and adaptation to developing country Parties.
4. Stimulate capacity-building, in particular for endogenous technologies, including by providing cooperative training and development facilities and training opportunities, supported by public-private partnerships, to develop and deploy renewable energy and energy efficiency technologies and environmentally sound adaptation technologies.
5. Improve access to information on existing and new technologies.
6. Stimulate the establishment of twinning centres agreements between centres in developing and developed country Parties, including South-South-North partnership, as a means of exchanging experiences and promoting joint R&D and technology cooperation activities.