



SUMMARY OF THE EXPERT MEETING ON TECHNOLOGY ROADMAPS OF THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE TECHNOLOGY EXECUTIVE COMMITTEE: 25 MARCH 2013

The expert meeting on technology roadmaps of the UN Framework Convention on Climate Change (UNFCCC) Technology Executive Committee (TEC) took place on 25 March 2013 in Bonn, Germany. The meeting, which was organized by the TEC under the umbrella of its work, focused on technologies for adaptation to climate change. It was attended by 34 participants, including members of the TEC, representatives of other UNFCCC bodies, technical experts and the UNFCCC Secretariat.

Specifically, the meeting aimed to: share good practices and lessons learned from developing and using technology roadmaps (TRMs) for mitigation and adaptation; identify specific needs and actions that could assist parties in developing and using TRMs for adaptation; identify the potential role of the TEC and TRMs in supporting enhanced action on adaptation to climate change; and explore ideas on how the TEC and other UNFCCC bodies or processes could potentially catalyze development and use of TRMs to stimulate efforts on mitigation and adaptation. All presentations from the session are available on TT:Clear, the Technology Information Clearinghouse under the UNFCCC: <http://unfccc.int/ttclear/jsp/TrnDetails.jsp?EN=TechRMExpertMeeting>.

Key themes emerging from the day's discussions included: the value of both the process and outcomes of TRM development; the importance of relating TRMs to other roadmapping and planning instruments to avoid duplication of work; and the need to address the imbalance between mitigation and adaptation technologies in the TRMs prepared to date.

This meeting directly preceded the fifth meeting of the TEC, which IISD Reporting Services also reported on. The summary of the fifth meeting of the TEC can be found at: <http://www.iisd.ca/download/pdf/sd/crsvol205num5e.pdf>.

A BRIEF HISTORY OF THE TEC

The TEC was established by the UNFCCC Conference of the Parties at its 16th session (COP 16) in Cancun, Mexico, as one of the two components of the new Technology Mechanism of the Convention. The second component of the Technology Mechanism is a Climate Technology Centre and Network (CTCN), also established at COP 16.

The TEC is comprised of 20 high-level expert members that are elected by the COP and serve in their personal capacities. It reports on its activities and the performance of its functions to the COP through the Subsidiary Body for Scientific and Technological Advice (SBSTA) and Subsidiary Body for Implementation (SBI). The functions of the TEC include:

- Providing an overview of technological needs, and analysis of policy and technical issues related to the development and transfer of technologies for mitigation and adaptation;

- Recommending actions to promote technology development and transfer;
- Recommending guidance on policies and programme priorities related to technology development and transfer with special consideration given to least developed country (LDC) parties to the UNFCCC;
- Promoting and facilitating collaboration between governments, the private sector, non-profit organizations, and academic and research communities on the development and transfer of technologies for mitigation and adaptation;
- Recommending actions to address barriers to technology development and transfer to enable enhanced action on mitigation and adaptation;
- Cooperating with relevant international technology initiatives, stakeholders and organizations, and promoting coherence and cooperation across technology activities, both under and outside the Convention; and
- Catalyzing the development and use of technology roadmaps or action plans at the international, regional and national levels via cooperation between stakeholders such as by developing best practice guidelines to facilitate the development of roadmaps or action plans.

First meeting of the TEC: The TEC's first meeting took place in September 2011 in Bonn, Germany. The Committee addressed organizational matters and elaborated modalities and procedures for the TEC, which were subsequently adopted at COP 17.

Second meeting of the TEC: This meeting was held in February 2012 in Bonn, Germany, and saw the development of the TEC's rolling workplan for 2012–2013. Work also began on modalities for linkages with other relevant institutional arrangements under and outside the Convention. Furthermore, the Committee discussed the engagement of stakeholders in its work.

Third meeting of the TEC: This meeting took place in May 2012 in Bonn, Germany, and included a thematic dialogue with stakeholders on enabling environments and barriers to technology development and transfer. The Committee also considered progress on the implementation of its 2012-2013 workplan and continued work on modalities for linkages with other relevant institutional arrangements under and outside the Convention.

Fourth meeting of the TEC: This meeting took place in September 2012 in Bangkok, Thailand, and continued the thematic dialogue which began at TEC 3 on enabling environments and

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barriers to technology development and transfer. The Committee also considered progress on the implementation of its workplan for 2012-2013, in relation to, *inter alia*: technology roadmaps; relevant work of other institutions under and outside the Convention; technology needs assessments (TNAs); and possible topics for technical papers. It also adopted key messages to forward to COP 18 in Doha, Qatar, on enabling environments and barriers to technology development and transfer, technology roadmaps, and TNAs.

At the meeting, the Committee also agreed to organize an expert meeting on technology roadmaps focusing on technologies for adaptation to climate change. The IISD Reporting Services summary of the fourth meeting of the TEC can be found at: <http://www.iisd.ca/download/pdf/sd/yimbvol205num1e.pdf>.

SUMMARY OF THE MEETING

WELCOME AND OPENING

On Monday morning, 25 March 2013, Gabriel Blanco, Chair of the Technology Executive Committee (TEC), opened the expert meeting on technology roadmaps (TRMs), outlining the meeting's objectives to: share experiences of developing and using TRMs; identify methods to assist parties in developing and using TRMs for adaptation; and explore the potential role that the TEC and TRMs might play to support enhanced action on adaptation to climate change.

Wanna Tanunчайwatana, UNFCCC Secretariat, highlighted that although TRMs have been widely utilized, they were only introduced into the UNFCCC process very recently and that therefore, recommendations and advice to support parties are essential. She explained that outcomes from the meeting would be used to inform the TEC dialogue on research and development.

SESSION I: EXPERIENCES AND LESSONS LEARNED FROM DEVELOPING AND USING TECHNOLOGY ROADMAPS

Antonio Pflüger, Vice-Chair of the TEC, chaired this session. He thanked the Secretariat for supporting the TEC and stressed the TEC's responsibility to provide advice on how to best develop and implement TRMs.

PART I: SETTING THE SCENE: Marc Londo, Energy Research Centre of the Netherlands (ECN), presented the background paper on TRMs (TEC/2013/5/5), which reviewed 159 TRMs. He reported that most of these TRMs were from industry in Annex I countries and intergovernmental organizations, and only 11 of were on adaptation. Londo indicated that, based on six substantive elements used for analysis, very few "quality" TRMs were found, but said this may simply reflect the flexibility currently available to those preparing them and noted the need for further guidance on expectations and methods. In this light, he identified the International Energy Agency (IEA) report "Energy Technology Roadmaps – A Guide to Development and Implementation" as a valuable resource.

Londo concluded that TRMs are particularly suitable for technology management and related policy as they imply a strong consensus-building element among stakeholders, and are valuable for their adaptability to a diversity of country and technological contexts. He cautioned that a lack of stakeholder involvement could result in TRMs simply mirroring existing government wishes rather than looking at the best options for a particular context. He further cautioned, however, that meaningful stakeholder involvement and ownership, while key to creating implementable TRMs, could present a risk of "lock-in" or tunnel vision after drawn-out consensus-building processes.

Chair Blanco emphasized the conclusion in the background paper that the process of developing a TRM is as important as the resultant product. He indicated that in order for the TEC to provide recommendations to COP 19, there is a need to explore the relationships between various technology instruments and ensure that work is not duplicated. On specific linkages, he

highlighted that: development of technology needs assessments (TNAs) should precede that of TRMs, in order to identify country priorities before beginning any roadmapping exercises; and technology action plans (TAPs), national adaptation programmes of action (NAPAs), national adaptation plans (NAPs), and nationally appropriate mitigation actions could use TRMs as frameworks for outlining milestones and timelines for policy formulation.

In ensuing discussions, participants noted: the need for political and financial commitments and monitoring systems for TRMs to be successful; the dominance of the English language in the TRM inventory; challenges in differentiating TRMs from TAPs; the importance of considering the technologies required for implementing NAPAs, particularly in least developed countries (LDCs); the definition of TRMs as a quantifiable common objective; and the lack of TRMs for adaptation.

PART II: GOOD PRACTICES, METHODS AND TOOLS FOR DEVELOPING AND USING TECHNOLOGY ROADMAPS: Vice-Chair Pflüger introduced the speakers for this session.

Cecilia Tam, IEA, presented good practices for TRMs based on IEA experience in developing 17 international and two national-level TRMs in the energy sector. She noted that the IEA develops TRMs for individual technologies only, each of which requires 15-18 months to prepare. Tam identified the logical flow of the TRM process as being: goal establishment; milestone identification; gap and barrier identification; action item establishment; and priority and timeline setting. She explained that a holistic, inclusive development process leads to better and broader implementation, and is at least as important as any resulting TRM document.

Xuedu Lu, Asian Development Bank (ADB), shared the range of TRMs developed by the ADB in several countries and sectors, highlighting key components for efficient development and deployment. He explained that determining the potential of new technologies for a region requires careful investigation, potentially via another roadmap, prior to creating a climate-related TRM. He shared observations that TRMs should have clear criteria, long-term strategies, objectives, readiness of resources, milestones, deliverables and levels of deployment (global, national, sectoral), and that they should include support from relevant players and cooperation between the scientific and business communities.

Celia Greaves, Synnogy Ltd., introduced work commissioned by the UK Government to develop and deploy a fuel cell technology TRM, sharing lessons learned including the value of: steering groups to confirm methods and add legitimacy; workshops to stimulate input from contributors and production of draft materials to facilitate progress at those events; and project champions and sector experts to set optimal timelines and add value to projects.

Lakshmanan Rajasekar, UltraTech, described experiences with developing and using TRMs in the cement industry in India, as outlined in the IEA publication "Technology Roadmap: Low-Carbon Technology for the Indian Cement Industry." He said that moving forward, social acceptance, political will, policy development and financial support are key to ensuring increased energy efficiency in the Indian cement sector. He concluded by underlining the importance to successful TRMs of active involvement of CEOs and industry associations.

In the ensuing discussion, participants commented on several issues such as challenges in modeling development of emerging technologies as compared to mature technologies, and the value of creating TRMs for technologies without looking explicitly at coherence and integration with other industry and policy objectives. They further: questioned whether the IEA could develop common guidance for financially constrained contexts; expressed the importance of leveraging the example of the Indian cement sector to motivate other important emitting sectors and countries; highlighted the need to implement long-term, human

resource intensive TRMs following the IEA model; noted the example of the mitigation and adaptation TAPs recently submitted by Moldova as documents that mirror what a TRM might be expected to include; and suggested that first developing national TAPs to determine if, or how many, TRMs are needed might be prudent.

SESSION II: CATALYSING THE DEVELOPMENT AND USE OF TECHNOLOGY ROADMAPS FOR ADAPTATION TO CLIMATE CHANGE

This session was led by Chair Blanco.

PART I: POTENTIAL ROLES OF TECHNOLOGY ROADMAPS FOR ADAPTING TO CLIMATE CHANGE:

Richard Klein, Stockholm Environment Institute, expressed hope that this meeting would begin a rigorous dialogue on adaptation technologies. He warned however, of the “double-edged sword” nature of adaptation technologies, explaining that traditional approaches to adaptation do not address all drivers of climatic and non-climatic vulnerability. He urged that TRMs be integrated into all steps of adaptation, including: information and awareness; planning and designing; implementation; and monitoring and evaluation. Klein discussed the value of “soft” technologies such as insurance, and underscored the need to collaborate and coordinate the work of the TEC with the Adaptation Committee and financing activities under the Convention.

Golam Rabbani, Bangladesh Centre for Advanced Studies, shared experiences in adaptation in Bangladesh, where 80% of people are rice and vegetables farmers based in rural areas that have been experiencing flooding, drought, sea-level rise, and water and soil salinity problems. He outlined some of the hard and soft adaptive technologies that were introduced, such as infrastructural adjustments, crop diversification, innovative practices and crop intensification. He said these help but do not solve adaptation challenges, as the effects of climate change are worsening annually.

In the ensuing discussion, a participant questioned how appropriate standard TRMs can be for adaptation, where many “technologies” are often well-established but not recognized as being related to adaptation.

PART II: BREAKOUT SESSIONS: STRATEGIES AND RECOMMENDATIONS FOR DEVELOPING AND USING TECHNOLOGY ROADMAPS FOR ADAPTATION: In the afternoon, the meeting split into two breakout groups to brainstorm ways to improve TRM development and use for adaptation technologies, given the large gap between the number of TRMs carried out for mitigation and for adaptation as outlined in the morning session. The groups discussed two questions designed to facilitate dialogue: what are five good technology-related practices of TRMs that could be used in adaptation planning and implementation processes under the Convention; and what are five key potential actions that could be undertaken to catalyze the development and use of TRMs or TAPs by parties in the area of adaptation?

Reporting back to plenary on the discussions in the breakout groups, Rapporteur Kanat Baigarin, Kazakhstan Climate Change Coordination Center, for breakout group one, said that on the first question on good practices, the group suggested TRMs should:

- be integrated sectorally and geographically;
- include learning from traditional technologies and facilitate replication of successes;
- address barriers such as information awareness, social acceptance and capacity limitations;
- set criteria and broad metrics to describe risks, and be specifically aimed at adaptation;
- have clear information systems and data monitoring;
- have political and financial commitment and resources; and
- include guidance at the implementation level and long-term planning on issues such as innovation chains.

He said that all of these points should be based on the principle of inclusiveness, especially reflecting gender balance, and adopt participatory approaches.

On the second question on potential actions, Baigarin said his group noted ideas for action including:

- learning from existing TNAs and implementers such as the UNEP Risø Centre, the Global Environment Facility and UNEP, as well as from stakeholder engagement in the process;
- undertaking gap analyses of existing NAP activities to determine what technology actions are required;
- carrying out risk assessments and identifying actions responding to these;
- developing a working matrix of environmental issues of concern and appropriate response technologies over short, medium, and long-term time horizons, and including an assessment of conditions in which technology performs across particular settings;
- overcoming barriers, strengthening capacities and developing the skills of project implementers at the local level, and ensuring that regulatory and legislative environments are in place; and
- creating roadmap guidance tools to assist implementation of TAPs and development of national innovation systems.

Rapporteur Krzysztof Klincewicz, University of Warsaw, for breakout group two, said that on the first question on good practices, the group suggested TRMs should:

- focus on participation and creating interest of stakeholders, including the private sector;
- be demand-driven and bottom-up processes that are adjustable to circumstances at different governance levels;
- specify priorities, timescales, ownership of solutions and funding requirements;
- have clear stakeholder commitments to provide legitimacy;
- focus on improving access to existing technologies; and
- be knowledge-based.

On the second question on potential actions, Klincewicz reported that the breakout group noted that:

- governments need to have comprehensive climate change action plans;
- plans should be rooted in a sound understanding of specific adaptation challenges and linked to the results of TNAs;
- there is a need for increased integration of currently fragmented efforts;
- knowledge and experiences need to be better shared, using existing or new channels, such as the Nairobi work programme or the Climate Technology Centre and Network (CTCN); and
- responsibility for planning needs to be delegated to the most appropriate level, based on the circumstantial context.

SESSION III: WAY FORWARD

Summarizing the meeting, Vice-Chair Pflüger highlighted the range of TRMs presented over the day and the divergent definitions of TRMs that could cover development, deployment and transfer of technology. He reported outcomes including the importance of: engaging a broad range of stakeholders in TRM development and establishing steering committees to initiate such engagement; continuing the interaction with the Adaptation Committee; and identifying sources of finance for TRMs. On the way forward, Pflüger reviewed discussions on the possibility of refining the background document for future publication and the elements that could be added to continue to clarify the relationship between TRMs and TAPs. Participants agreed that the outcomes of the expert meeting and ways forward would be discussed in further detail during the agenda item on TRMs at the fifth meeting of the TEC.

Chair Blanco adjourned the meeting at 5:48pm.

UPCOMING MEETINGS

B4E Global Summit 2013: Under the theme “Emerging Market Leadership for Global Green Growth,” the 7th annual Business for the Environment (B4E) Global Summit will examine the role of emerging markets in driving the world’s transition to a global green economy. **dates:** 15-16 April 2013 **venue:** The Ashok Hotel **location:** Delhi, India **contact:** Roshilah Atan **e-mail:** roshilah.atan@globalinitiatives.com **www:** <http://www.b4esummit.com/>

Fourth Clean Energy Ministerial: The fourth Clean Energy Ministerial (CEM4) will bring together ministers from more than 20 participating countries under the theme of “Technology and Business Innovation.” Topics that will be discussed include: progress by the 13 clean energy initiatives of CEM; enhancing cooperation between CEM governments; and the development of public-private partnerships to support clean energy development. **dates:** 17-18 April 2013 **location:** New Delhi, India **contact:** CEM Secretariat **www:** <http://www.cleanenergyministerial.org/events/cem4/index.html>

RIMES Training Workshop on Iterative Risk Management for Climate Change Adaptation: The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) is organizing a five-day Training Workshop on Iterative Risk Management (IRM) for Climate Change Adaptation. The training aims to build the capacity of participants to design and implement iterative and flexible risk management plans. The lectures will include a module each on: risk-based approaches to climate change adaptation; the IRM approach, including the IRM process and its application to development and disaster risk reduction (DRR); and IRM and the policy environment for climate change adaptation. During the planning workshop, participants will design IRM Plans for their organizations. **dates:** 22-26 April 2013 **location:** Bangkok, Thailand **contact:** RIMES **fax:** +662 516 5902 **e-mail:** rimes@rimes.int **www:** <http://www.rimes.int/em/?p=1159>

Clean Energy Financing Forum for Central America and the Caribbean: The Clean Energy Financing Forum for Central America and the Caribbean (CEFF-CAC) is sponsored by the Climate Technology Initiative (CTI). The Forum will seek to bring before potential investors, screened clean technology proposals from the region that offer environmental and social benefits. **date:** 26 April 2013 **location:** San Pedro Sula, Honduras **contact:** Fernando Alvarado **e-mail:** fernando.alvarado@flexenergygroup.com **www:** http://cti-pfan.net/events_detail.php?eventsid=43

CIF Trust Fund Committee and Sub-Committee Meetings: This meeting will include the meetings of: the Forest Investment Program (FIP) Sub-Committee; the Scaling Up Renewable Energy Program (SREP) Sub-Committee; the Pilot Program for Climate Resilience (PPCR) Sub-Committee; the Strategic Climate Fund (SCF) Trust Fund Committee; and the Clean Technology Fund (CTF) Trust Fund Committee. **dates:** 29 April to 3 May 2013 **location:** Washington, DC, USA, **contact:** Climate Investment Funds **phone:** +1-202-458-1801 **e-mail:** CIFAdminUnit@worldbank.org **www:** <https://climateinvestmentfunds.org/cif/node/8662>

Second Session of the Ad Hoc Working Group on the Durban Platform for Enhanced Action: The second session of the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) will be held in Bonn, Germany, from 29 April to 3 May 2013. Workstream 1 discussions will continue to address the 2015 agreement, including its scope, structure and design, and the application of the UNFCCC principles. Workstream 2 will address the pre-2020 ambition. **dates:** 29 April to 3 May 2013 **location:** Bonn, Germany **contact:** UNFCCC Secretariat **phone:** +49 228 815 1000 **fax:** +49 228 815 1999 **e-mail:** secretariat@unfccc.int **www:** http://unfccc.int/meetings/bonn_apr_2013/session/7387.php

First meeting of the Advisory Board of the Climate Technology Centre and Network (CTCN): The agenda for this meeting will include the election of a Chair and Vice-Chair,

adoption of operational modalities and rules of procedure, and the setting of the agenda for the second Advisory Board meeting. The meeting will be open to observers. **dates:** 14-15 May 2013 **location:** Copenhagen, Denmark **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **e-mail:** secretariat@unfccc.int **www:** <http://unfccc.int/ttclear/jsp/CTCN.jsp>

UNGA Thematic Debate: Climate Change, Green Energy and Water Sustainability: The 67th Session of the UN General Assembly (UNGA) will host this thematic debate on Climate Change, Green Energy and Water Sustainability. **date:** 16 May 2013 **location:** New York, USA **www:** <http://www.un.org/en/ga/president/67/>

UNFCCC Subsidiary Bodies June 2013: The next session of the UNFCCC subsidiary bodies will take place in June 2013. **dates:** 3-14 June 2013 **location:** Bonn, Germany **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **e-mail:** secretariat@unfccc.int **www:** http://unfccc.int/meetings/upcoming_sessions/items/6239.php

Sixth meeting of the TEC: The sixth meeting of the TEC will: discuss progress made on producing new technology briefs, enabling further engagement with arrangements under and outside of the Convention; present modalities for increasing engagement with stakeholders; and continue the Committee’s other work. **dates:** 26-28 June 2013 **location:** Bonn, Germany **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **e-mail:** secretariat@unfccc.int **www:** <http://unfccc.int/ttclear/jsp/TECMeeting.jsp>

Seventh meeting of the TEC: The seventh meeting of the TEC will be convened on 4-6 September in Bonn, Germany. **dates:** 4-6 September 2013 **location:** Bonn, Germany **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **e-mail:** secretariat@unfccc.int **www:** <http://unfccc.int/ttclear/jsp/TECMeeting.jsp>

IPCC 37: The 37th session of the Intergovernmental Panel on Climate Change (IPCC 37) will consider for approval, two methodology reports: the “2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands”; and the good practice guidance on estimating greenhouse gas emissions and removals from land use, land use change and forestry under the Kyoto Protocol. **dates:** 14-18 October 2013 **location:** Georgia [tentative] **contact:** IPCC Secretariat **phone:** +41-22-730-8208 **fax:** +41-22-730-8025 **e-mail:** IPCC-Sec@wmo.int **www:** http://www.ipcc.ch/scripts/_calendar_template.php?wg=8

19th Session of the Conference of the Parties to the UNFCCC: The 19th session of the Conference of the Parties to the UNFCCC (COP 19), the ninth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP 9) and the subsidiary bodies will convene in Warsaw, Poland. **dates:** 11-22 November 2013 **location:** Warsaw, Poland **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **e-mail:** secretariat@unfccc.int **www:** <http://www.unfccc.int>

GLOSSARY

COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
TAP	technology action plan
TNA	technology needs assessment
TEC	Technology Executive Committee
TRM	Technology Roadmap
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change