



## **SUMMARY OF THE TECHNOLOGY NEEDS ASSESSMENT FOR CLIMATE CHANGE EXPERIENCE SHARING WORKSHOP: 10-12 SEPTEMBER 2012**

The Technology Needs Assessment (TNA) for Climate Change Experience Sharing Workshop took place in Bangkok, Thailand from 10-12 September 2012. Approximately 70 participants representing governments, international organizations and civil society participated in the three-day workshop. Organized by the UN Environment Programme (UNEP) Risø Centre (URC), in collaboration with the UN Framework Convention for Climate Change (UNFCCC) Secretariat, the objective of the workshop was to: showcase best TNA practices; get feedback from participating countries on conducting and reporting TNAs and Technology Action Plans (TAPs); enhance capacity of National TNA Coordinators in project proposal development; and facilitate interaction between country representatives and the funding community.

The workshop was divided into five modules. Module I on “TAPs for mitigation and adaptation by sector” and module II on “the TNA and TAP process-experience-driven reflection on the state of the art” took place on Monday. Throughout the day on Tuesday, participants addressed module III on “Regional Knowledge Diffusion on TNA and TAP Experiences and Outputs by Sector.” On Wednesday, module III was briefly revisited in the morning and then participants focused on modules IV on “From Plans to Action – Developing Project Proposals Capable of Attracting Funding”; and module V, which was a training session led by the UNFCCC Secretariat.

### **A BRIEF HISTORY OF THE UNFCCC AND TECHNOLOGY NEEDS ASSESSMENTS**

The international political response to climate change began with the adoption in 1992 of the UNFCCC, which sets out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases to avoid “dangerous anthropogenic interference” with the climate system. The UNFCCC entered into force on 21 March 1994 and now has 195 parties.

In December 1997, delegates to the 3rd Conference of the Parties to the UNFCCC (COP 3) in Kyoto, Japan, agreed on a Protocol to the UNFCCC that commits industrialized countries and countries in transition to a market economy to achieve emission reduction targets. These countries, known as Annex I parties under the UNFCCC, agreed to reduce their overall emissions of six greenhouse gases by an average of 5.2% below 1990 levels between 2008-2012 (the first commitment period), with specific targets varying from country to country. The Kyoto Protocol entered into force on 16 February 2005 and now has 192 parties.

At COP 7 in Marrakech, Morocco, in December 2001, the Marrakech Accords were adopted, which contained a framework for technology transfer, including TNAs (Decision 4/CP.7). Since then, developing country parties have been conducting TNAs, and the Global Environment Facility (GEF) has funded 92 such TNAs, while the UN Development Programme (UNDP) has supported 78 and UNEP has supported 14. A handbook on Conducting TNAs for Climate Change was released in 2004 by the UNFCCC Secretariat to provide guidance on the identification of needs for climate change mitigation and adaptation.

A workshop on best TNA practices was held in Bangkok, Thailand, from 27-29 June 2007, which provided a forum for exchanging lessons learned from conducting assessments and provided assistance to non-Annex I parties to identify needs and practical actions, as well as to complete TNAs and implement results.

The GEF, in response to Decision 4/CP.13 (Development and transfer of technologies under the Subsidiary Body on Implementation), which was adopted at COP 13 in Bali, Indonesia, created a strategic programme to scale up the level of investment for technology transfer and proposed a funding window to support TNAs. The GEF-financed TNA project commenced under the Poznań Strategic Programme on

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Technology Transfer in November 2009 to provide assistance to developing countries to carry out TNAs. In November 2010, an updated handbook for Conducting TNAs for Climate Change was prepared and released by UNDP, with the Expert Group on Technology Transfer and the Climate Technology Institute (CTI).

At COP 16 in Cancun, Mexico, parties adopted the Cancun Agreements (Decision 1/CP.16), which established a Technology Mechanism, including a Technology Executive Committee (TEC) and a Climate Technology Centre and Network (CTCN). The Cancun Agreements mandate the TEC to provide an overview of technological needs and an analysis of policy and technical issues related to the development and transfer of technologies for mitigation and adaptation. In addition, the Agreements mandate the CTCN to, at the request of a developing country party, provide advice and support related to the identification of technology needs and the implementation of environmentally-sound technologies, practices and processes.

**UNFCCC TNA WORKSHOP 2011:** The UNFCCC TNA Workshop convened in Bonn, Germany, from 1-2 June 2011. The objectives of the workshop were to: share good practices and lessons learned from non-Annex I parties' experiences in conducting TNAs; identify specific needs and practical actions to assist parties in implementing their results; and discuss the roles of TNAs in the context of the implementation of the newly-established Technology Mechanism.

## REPORT OF THE MEETING

The Technology Needs Assessment (TNA) for Climate Change Experience Sharing Workshop opened on Monday, 10 September. Wijarn Simachaya, Secretary-General, Office of Natural Resources and Environmental Policy and Planning (ONEP), Thailand, welcomed participants to Bangkok, highlighting finance, technology and capacity building as key to implementing climate change mitigation and adaptation actions.

Wanna Tanunчайwatana, UN Framework Convention for Climate Change (UNFCCC) Secretariat, provided the background, context and expectations for the workshop. She noted that the workshop outcomes will be forwarded to the 37th session of the Subsidiary Body for Scientific and Technological Advice.

Said Irandoust, President, Asian Institute of Technology (AIT), described the workshop as an excellent opportunity for participants to contribute to capacity building by showcasing best practices, sharing experiences and providing feedback.

Mark Radka, UN Environment Programme (UNEP), delivered the keynote address, describing technology transfer as "a broad, complex and unruly process" which involves more than the transfer of hi-tech equipment but also includes the sharing of knowledge and technical capabilities among communities of practice. He urged the sharing of good practices that are adaptable to local situations. He further expressed hope that the workshop would provide input to the process of: linking TNAs, low-emission development strategies (LEDS) and nationally appropriate mitigation actions (NAMAs); and enhancing synergies among TNAs, the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).

## MODULE I: TECHNOLOGY ACTION PLANS FOR MITIGATION AND ADAPTATION BY SECTOR. RESPONSES TO THE CALL FOR INPUTS FROM RELEVANT STAKEHOLDERS

Ivan Nygaard, UNEP Risø Centre (URC), moderated this session on Monday, 10 September. Jorge Rogat, URC, gave an overview of Technology Action Plans (TAPs), highlighting that it involved countries from Africa, the Mediterranean, Asia, the Commonwealth of Independent States (CIS) and Latin America and the Caribbean, and was implemented from 2009-2012. He explained that the aim was to create TAPs that are in line with national sustainable development priorities.

Elhadji Diagne, Senegal, presented a TNA for adaptation to climate change in the agriculture sector. Highlighting Senegal's dependence on rain-fed agriculture, he listed priorities identified through the TNA: improved seed banks; intercropping; recognition and conservation of forage reserves; and assisted natural regeneration. He explained that improving the seed banks had been prioritized for action, and a national programme had been established to improve peanut and rice varieties through a US\$17 million project. Diagne highlighted the importance of: incentives through the tax regime; reduced importation of seeds from other sources; quality control; infrastructure for processing and distribution; marketing; and systems for intellectual property rights.

Surajate Boonya-Aroonnet, Thailand, presented a TNA for water resources management, which prioritized: a network and management system for reservoirs; weather and hydrological prediction; flood and drought risk management; and early warning using Sensorweb environmental monitoring systems. He noted that the TNA distinguished between technology to be sourced externally and technology being developed domestically. He further highlighted the need for: partnership with the best institutions conducting climate modeling; workflow management, including consideration of actions to be taken after early warnings are issued; capability development; investment; organizational development; and new policies and laws to provide a supporting framework.

Francisco Sancho, Costa Rica, presented on the integration of public transport and metropolitan road decongestion systems in Costa Rica. He highlighted barriers including: poor use of financing structures and limited budgets; lack of private investment and public-private partnerships; preference for private transport; and excessive bureaucracy. He discussed measures to create a framework to overcome barriers and accelerate technology dissemination and transfer, and noted strategic measures for using sustainable technologies and strengthening transport management.

Maka Tsereteli, Georgia, provided an overview of a TAP for mitigation through energy efficiency. She observed that the focus had been on efficient construction, efficient wood stoves and solar water heaters. She discussed common barriers including: insufficient awareness; lack of a state strategic vision and limited institutional capacity in energy efficiency and renewable energy; poor coordination of donor projects; low affordability among customers; and high production costs. Tsereteli also provided an overview of two pilot projects: one for efficient construction of sustainable social housing; and the other for efficient wood stoves in rural Georgia.

In the ensuing discussion, participants discussed: the relationship between project ideas and TAPs; how to involve policymakers in the process; and how to foster linkages

between what a new project is doing and what is already being done on the ground. One participant emphasized the need to focus on a limited range of technologies in order to build the capacity of stakeholders.

## **MODULE II: THE TNA-TAP PROCESS – EXPERIENCE-DRIVEN REFLECTIONS ON THE STATE OF THE ART**

This module took place on Monday, 10 September. It included: country presentations on the TNA-TAP process; a moderated roundtable discussion; a presentation on LEDS and a panel discussion with members of the TEC.

### **TNA-TAP PROCESS: A GLOBAL PERSPECTIVE:**

Jorge Rogat, URC, moderated the session. Ivan Nygaard, URC, briefed participants on the process for progressing from conducting TNAs to undertaking TAPs. He invited participants to consider whether the organizational structure of the TNA process was able to ensure that a political process was established at national level, and whether the project elements provided the necessary support.

From Africa and the Mediterranean, Birama Diarra, Mali, described activities undertaken as part of the process, including a national workshop to select priority areas for mitigation and adaptation. He cited difficulties encountered, such as a lack of documentation in French, and problems in achieving consensus on selection criteria. He proposed that the URC motivate national coordinators and organize regional workshops.

From Asia and the CIS, Widiatmini Sih Winanti, Indonesia, described how, using the TNA process, the TAP was aligned to support Indonesia's LEDS and national sustainable development priorities. She explained that two working groups were established: one on mitigation, covering the forestry, energy and waste sectors; and the other on adaptation, covering food security, coastal vulnerability and water resources. She further explained that the TAP was aligned with targets for control of forest fires and peat burning, and prevention of deforestation, as well as with objectives for water systems, land-use and waste management construction. On lessons learned, Winanti highlighted the special efforts needed to collect the latest baseline data, understand and implement the methodologies proposed by UNEP, and arrange stakeholder meetings.

From Latin America and the Caribbean, Joanna Zegarra, Peru, discussed the institutional organization for the TNA process relating to water and waste management in Peru. On lessons learned, she emphasized: the importance of the Ministry of Environment; the need for the Ministry of Finance to actively participate in technology discussions and on the steering committee; and the important role of technical experts. She noted the need for a continuous process of "systematization" and a continuous bottom-up approach to capacity building. On the TNA's contribution to sustainable development, she observed that the TNA process has introduced discussion on evaluation and prioritization of technology.

**MODERATED ROUNDTABLE DISCUSSION:** This session was moderated by Jorge Rogat. Panel discussions centered on the following issues:

- Practical implications including institutionalization of critical functions at the country level;
- Applied research needs aimed at further process improvement; and

- Building national capacity on the basis of existing knowledge/best practice.

On practical implications, Maria Paz Cigaran, URC, said the TNA-TAP process should be more detailed, receive additional resources and involve more stakeholders. She said having one steering committee for each of the different projects would help. On applied research needs, she discussed continuous improvement of technology options. On building national capacities, she said there are not enough workshops for sharing experiences at a deeper level.

Addressing challenges, Mokbul Morshed, AIT, noted that recent data had not been used in the development of TAPs. He said publications are important and should be accessible and translated into local languages, and that synthesis reports should be standardized and edited appropriately.

On general practical issues, Daniel Bouille, URC, highlighted lack of common terminology, calling for the use of terminology developed by the Intergovernmental Panel on Climate Change (IPCC). He also noted the need to clarify the role of the URC and regional centers. On methodological aspects, he observed that methodologies were often imposed in a top-down fashion on developing countries and did not take national circumstances into account. He called for enhancing synergies between the TEC, CTCN and regional and coordination centers. He also identified a lack of coherence between barriers and measures, saying that an enabling framework is necessary but not sufficient.

Secou Sarr, Environment and Development Action in the Third World (ENDA), noted that the technologies identified will be relevant at the local level, and observed that the extent of work required for TAPs had been underestimated. He said that market assessment is difficult for some countries due to difficulty in getting the relevant data. He proposed identifying champions and providing them with opportunities to develop business plans.

Participants discussed incentives for governments to get involved in the TNA process and the need for the process to include financial resources for implementing projects. One participant proposed connecting the TNA process to voluntary actions under the UNFCCC, and "customizing" the next round of TNAs according to national circumstances, such as country size.

Participants also provided comments on the guidebook, calling for, *inter alia*, improvements to clarity of some illustrations and instructions. Some felt that it was difficult to follow the TNA methodology, while others emphasized there is not "one right way," and that the guiding material provides the basis for countries' own thinking and ideas.

**FROM TNAs TO LOW CARBON DEVELOPMENT STRATEGIES AND NAMAS:** Subash Dhar, URC, presented on ways to link the development of TNAs to LEDS and NAMAs, highlighting that the priorities identified in the TNA process focus on certain key sectors including energy, transport, agriculture, industry and others.

He noted that while nationally appropriate technologies have been identified, the potential scale of implementation is not clear, and that pure carbon measures, such as carbon capture and storage, are largely ignored. He added that some analysis of TAPs could be used to compare business-as-usual scenarios with alternative scenarios, and to relate potential mitigation gains to NAMAs and to global climate goals.

Another participant noted that the TNA methodology can be used for detailed prioritization of measures to be implemented.

**PANEL DISCUSSION WITH TEC MEMBERS ON THE CHALLENGES OF THE TNA PROCESS:** Gabriel Blanco, Chair of the TEC, moderated the session.

Panelists addressed three issues, as follows:

- Linkages and interactions between the TNA process and TEC work plan - possible activities of the TEC in supporting and strengthening the TNA process;
- Support of the TEC to the work on TNAs and TAPs - how the TEC can assist the TNA and TAP processes to possibly link the results of TNAs and TAPs with mechanisms to deliver financial, technology and capacity building support; and
- Linkages with other processes under the UNFCCC - how the TEC can assist the TNA process in becoming complementary to other national reporting streams such as national communications, NAMAs, national adaptation programmes of action (NAPAs) and national adaptation plans.

On linkages and interactions between the TNA process and TEC work plan, Antonio Pflüger, Germany, proposed: disseminating messages more widely; and delivering coherent messages to facilitate prioritization and encourage private sector investment in developing countries.

Nagmeldin Elhassan, Sudan, highlighted the responsibility of the TEC to respond to information provided and needs identified in TNAs.

One participant noted that most commercially available technologies are only for mitigation, calling for the TEC to make more effort to develop guidelines, methodologies and adaptation technologies. He also highlighted the lack of financing as a big challenge for the TEC and CTCN. In response, Blanco noted that the TEC had decided that it would focus first on adaptation-related activities, having learned a lot from the information contained in TNAs. He also emphasized financing to support the implementation of the outcomes of the TNA process, adding that this crucial message would be delivered to the 18th Conference of the Parties to the UNFCCC (COP 18).

Krzysztof Klincewicz, Poland, highlighted the challenge of ensuring that TNAs “are not just pieces of paper.” He noted lack of good practices for adaptation planning and the need for support and guidelines for adaptation technologies. He noted that the TEC is only one part of the equation and that the CTCN will have regional networks and address implementation.

Responding to a question on how the TEC would ensure that developing countries are treated equally, Blanco noted that developing countries would be ranked according to their needs.

Klincewicz called for sharing experiences in operationalizing activities, noting that for this round, TNAs are still works-in-progress. He pointed out that institutions such as the Green Climate Fund (GCF), the TEC and the Adaptation Committee are new institutions and that it was too early to draw conclusions about their effectiveness.

**THE ROLE OF THE CTCN IN PROMOTING DEVELOPMENT, TRANSFER AND DEPLOYMENT OF CLIMATE TECHNOLOGIES:** Mark Radka, UNEP, invited participants to provide advice on the CTCN’s design and role, explaining that it is in the process of being created. He noted

that the Centre has a broad mandate to provide information, advice, training and other kinds of support, including for public-private partnerships and collaborative research and development, and that the question of its institutional hosting will be addressed by COP 18.

Radka invited participants to make recommendations based on their TNA experience, including regarding: where the National Designated Entity (NDE) should be located within national climate change administrations; how to ensure that the NDE represents broad technology interests in its country; and what support NDEs would need to fulfill their role in the CTCN.

**WRAP UP:** Blanco observed that the TNA exercise is a crucial source of information. He provided an overview of the suggestions that had been made during the day, including that: countries can integrate and mainstream the TNA process in sectoral planning; TNAs should have the financial resources to implement activities; TNAs could be integrated with UNFCCC processes such as national communications, NAMAs and national adaptation plans; and TNAs should be customized according to national circumstances.

Blanco concluded that while the TNA process has been a useful experience in many ways, it can be improved through some changes and integration with other processes.

Providing an overview of TAPs for mitigation and adaptation, Maria Paz Cigaran, URC, noted that the TAPs presented offered different approaches and scopes of work. She identified common elements from participants’ discussions, observing that: a single technology does not solve all the problems; project ideas need to be developed to become bankable; the main challenges are how to catalyze private capital and involve relevant communities; information on the changing climate is very important, especially for adaptation; flexibility in management and solutions is needed; and structural measures, for example in the energy and transport sectors, are very useful.

On the TNA-TAP process, Cigaran identified commonalities such as: a lack of data for start-up diagnosis; the country-driven nature of the processes; and the use of TNA guidelines in all the project examples. She summarized the challenges faced, including: underestimation of the amount of work and resources needed; tools not being available on time and only in English; lack of incentives for stakeholders to participate; difficulty in reaching consensus; and different guidance offered by the guidebooks and by the regional centers.

Cigaran highlighted some of the achievements of the process, including: participation of newcomers to the process, such as economic and finance ministries, technology institutions and the private sector; application of new tools; introduction of multi-criteria analysis with a possibility of broader application; and systematization of the TNA experience.

Cigaran summarized recommendations from the discussions, including the need to: develop methods and guidelines for adaptation; reinforce the community-based component of the TNA; standardize concepts and introduce greater clarity on the roles of the URC and the regional centers; avoid repetition of material from other documents; access the different skills needed for the project by including, not just “champions,” but also actors with climate change and sectoral knowledge, and specific technical expertise; offer training at the national level; promote customized approaches that allow for regional,

national and technological differences; affirm TNAs as part of a bigger process, not a standalone effort; and maintain flexibility.

Cigaran noted that the organizations and actors involved are in a learning process, and that TNAs have some synergies with LEDs and NAMAs. She added that TNAs are providing valuable input to the TEC including information on investment opportunities.

### **MODULE III: REGIONAL KNOWLEDGE DIFFUSION ON TNA-TAP EXPERIENCES AND OUTPUT BY SECTOR**

On Tuesday, 11 September, participants convened in three parallel sessions: Africa and the Mediterranean; Asia and CIS; and Latin America and the Caribbean. The Africa and the Mediterranean group focused on adaptation in the agriculture and water sectors, and mitigation in the energy sector. The Asia and CIS group focused on adaptation in the water, food and agriculture sectors, and mitigation in the energy, agriculture, forestry and land use, land-use change and forestry (LULUCF) sectors. The Latin American and the Caribbean group focused on mitigation in the energy sector and adaptation in the agriculture and livestock, and water sectors. These groups the following issues: challenges identified in setting targets; specificity of measures; cost and timing of measures; and the actors involved in the implementation of measures.

**AFRICA: Adaptation TAP: Agriculture Sector:** This session was moderated by Ivan Nygaard. Ouiam Lahlou, Morocco, presented on TNAs for climate change adaptation in the agriculture sector. She said water and agriculture had been identified as sectors for adaptation and that the criteria used for the selection of technologies were based on national priorities, institutional commitment, potential for adaptation to climate change, technology implementation constraints, and financial barriers. She highlighted drip irrigation and efficient irrigation networks as prioritized technologies and provided an overview of the action plans for the identified technologies.

Lea Kai, Lebanon, presented on a TNA project in the agriculture sector in Lebanon, highlighting selected technologies including: conservation agriculture; selection of adapted varieties and rootstocks; risk-coping production systems; integrated pest management; integrated production and protection for greenhouses; early warning system information and communication technologies; and index insurance.

**Adaptation TAP: Water Sector:** This session was moderated by Libasse Bar, ENDA. Birama Diarra, Mali, discussed TAPs for adaptation technologies related to water resources under Mali's TNA. He presented prioritized technologies including boreholes, small dams and deepening of ponds. He highlighted barriers including costs and acquisition, insufficient data on the hydro-geological context, and cultural considerations, such as lack of training and awareness. Diarra noted that the main challenge was the identification and mobilization of financial resources.

Ouiam Lahlou, Morocco, provided an overview of TNAs for adaptation in the water sector in Morocco. She said adaptation strategies must use technologies that aim to effectively manage water demand, and enhance and protect water resources. She noted that a multi-criteria analysis had been used to identify and prioritize technologies for

rainwater harvesting, flood warning, inflatable dams, artificial aquifer recharge, seawater desalination and disposal of toxic cyanobacteria in drinking water treatment units.

Lahlou highlighted common barriers, including high costs, lack of national expertise, lack of public-private partnerships, lack of partnership between industries and research and development institutions, lack of coordination among the relevant stakeholders, and insufficient public awareness.

**Mitigation TAP: Energy sector:** This section was moderated by Secou Sarr, ENDA. Elhadji Diagne, Senegal, presented on TNAs for climate change in the energy sector, and highlighted prioritized technologies involving renewable energy and energy efficiency in buildings and industry. He identified project ideas for the prioritized sector, including construction of two 40 megawatt biomass plants connected to the grid, rural electrification using mini-photovoltaic (PV) hybrid plants, construction of a 60 megawatt wind farm in the region of Saint-Louis, and electrification of communal facilities in rural areas using PV technology.

Lea Kai presented on a TNA in the power sector in Lebanon, highlighting identified technologies including: combined heat power to replace 10% of electricity used for space heating; combined-cycle gas turbine to replace two major power plants currently running on diesel; reciprocating engines; and plans to replace all private generators. Kai highlighted barriers including outdated regulatory frameworks, weak institutional structures, and liability insurance requirements. She said measures to address these include tariff restructuring, financial incentives and institutional reforms.

On project ideas, she mentioned pumped-storage hydropower plants and hybrid diesel/PV generation units that can synchronize PV systems with a diesel generator to allow the system to operate without batteries.

**ASIA and CIS: Adaptation TAP: Water Sector:** Mokbul Morshed, AIT, moderated the session. Widiatmini Sih Winanti, Indonesia, presented two priority ideas in the country's TAP: rainwater harvesting through reservoirs; and projection of water needs through water resources modeling. She highlighted the challenges of water scarcity both in terms of quantity and quality, degradation of existing water resources, and changes in rainfall patterns.

On rainwater harvesting, she said the objective was to extend water availability for agriculture in dry areas. She highlighted the need to overcome barriers including reluctance of banks to lend for reservoir construction, uncertain capital costs for acquiring land for construction, and lack of coordination among water resource management institutions, including at the local level.

On water resources modeling, she highlighted water needs in the Citarum watershed in West Java, which covers 300,000 hectares of agricultural land and several large cities, including Jakarta and Bandung. She envisaged that the modeling capability would support strategic planning for the watershed over timeframes up to 2015, 2050 and 2100.

Quach Tat Quang, Viet Nam, presented two priority ideas in the country's TAP: rainwater collection systems for residents in the mountainous area of northern Viet Nam; and analysis of the impacts of climate change on water resources and water quality. He anticipated that rainwater harvesting would

meet daily household needs and promote behavior change in water use, while the analysis of water resources would enable integrated river basin management in the medium to long term.

**Mitigation TAP: Energy Sector:** Charles Marpaung, AIT, moderated the session. Sakda Sittikruear, Thailand, presented five project ideas in the country's TAP: use of smart grids; energy generation from landfill and other waste; energy-efficient combustion in the industrial sector; carbon capture and storage; and second-generation biofuels. Elaborating on these project ideas, he discussed: replacement of steam boilers with more efficient technology in factories; installation of smart meters in homes; and hi-tech production of lignocellulosic biofuels using waste straw and stalks, projected to achieve 90% emission reductions, compared with first-generation biofuel reductions of 20-70%.

Andhika Prastawa, Indonesia, presented three project ideas in the country's TAP, all of them related to PV: development of domestic PV industry; establishment of a testing laboratory to maintain national standards of PV products; and development of research and development capacity in the PV industry to enable quality improvements. He demonstrated high solar energy potential in Indonesia and cited government efforts to reach an electrification ratio of 95% by 2025, showing that this source of greenhouse gas emissions can shrink through use of renewables, and that solar energy can also serve the 6% of households that will still not be on the grid.

**Adaptation TAP: Food and Agriculture Sectors:** Prabhat Kumar, AIT, moderated the session. Asira Chirawithayaboon, Thailand, presented five project ideas in the country's TAP, all of them related to biotechnology. He suggested: support for Thailand as a training hub for development of rice varieties in the Mekong region; international collaboration between the public and private sectors in the Association of Southeast Asian Nations (ASEAN) for a papaya biotechnology network; development of relevant courses at an academic institution; establishment of a seed germplasm bank; and technology transfer through partnerships.

Quach Tat Quang, Viet Nam, presented three project ideas: research to create high-yield rice varieties that are drought-resistant and tolerant of salinity; a conversion model to redevelop rice land as orchards; and planning for conversion of triple-crop rice cultivation cycles to double-crop cycles that incorporate duck-raising and aquaculture of fish and shrimp. He highlighted Viet Nam's role as the world's second-largest rice producer, and envisaged that adaptation could include cultivation of some upland cereals and other more profitable crops,

**Mitigation TAP: Agriculture, Forestry and LULUCF Sectors:** Rajendra Shrestha, AIT, moderated the session. Widiatmini Sih Winanti presented three project ideas to be jointly implemented as a collaborative learning programme: carbon measurement and monitoring; mapping of peatlands; and peatland water management. On carbon measurement and monitoring, she highlighted the objective of providing a complete, updated information system on forest carbon stocks. Shrestha mentioned activities including coordination of all government ministries and other stakeholders, and on-the-job training of staff in the use of the carbon measurement model. On peatlands, she envisaged a complete, updated and unified mapping that would provide data, including spatial information, at sub-national levels. On water management, she said the

objective was to carry out effective water management for low-carbon peat management on plantations and irrigated farmland, among other areas.

Quach Tat Quang presented project ideas in agriculture and forestry: development of bio-energy in the livestock sector; management of irrigation to improve irrigation efficiency in the Red River Delta and Cuu Long (Mekong) Delta; and rehabilitation of mangroves. Regarding bio-energy development, he said the objective was to improve farmers' livelihoods and wellbeing, and reduce pollution, by adopting technology for anaerobic manure digestion to produce biogas fuels.

On irrigation, Quang highlighted the potential to improve rice yields and build staff technical capacity. He suggested that some of these aims could be promoted through concessional loans for farmers, funds for training and education, and loan and tax incentives, among other measures. On mangrove rehabilitation, he mentioned the need to combat degradation of mangroves and further develop aquaculture.

**LATIN AMERICA AND THE CARIBBEAN: Mitigation TAP: Energy Sector:** Francisco Sancho presented on the TNA in energy conservation and efficiency in Costa Rica, explaining that it is a technological package for the implementation of conservation and efficiency measures including efficient boiler engines, lighting, water heaters, air conditioners and efficient refrigerators. He explained that the goal is to reduce carbon emissions by 330,752 tons over a 20-year period.

On barriers to energy conservation and efficiency, Sancho cited lack of political will to implement the rational energy use law, an outdated national energy conservation programme, as well as market barriers including: reduced market for clean technologies; relatively low tariffs; and financial systems developed without a financial product for energy efficiency. He highlighted measures to create a framework for overcoming barriers including creating an environmental certification for conservation and energy efficiency, and promoting an education programme on energy efficiency and conservation. He discussed ideas for projects to support: policy formulation; private sector engagement through standard-setting and incentives; and development of a strategy to create financial products and raise awareness of the financial sector.

**Adaptation TAP: Agriculture Sector:** Francisco Sancho discussed TNA in the agriculture and livestock sector in Costa Rica. He highlighted barriers including reduced budget capacity, lack of tax incentives and an underdeveloped financial system. Sancho noted that market barriers discourage the formation of agriculture enterprises and create a dependence on intermediaries. On policy, legal and regulatory barriers, he highlighted economic incentives to reduce agricultural areas, lack of promotion of sustainable agricultural production, weak control over pesticides, and lack of unified comprehensive legislation. On institutional and organizational barriers, he discussed limited skills, lack of capacity across the supply chain, low investment in research and development, and lack of media involvement and education.

On measures to create the framework for overcoming barriers, Sancho highlighted: promoting and using environmentally friendly technologies; establishing a programme to implement the Soil Conservation Act; promoting tax incentives for farmers for sustainable production; reducing dependence on intermediaries; and differentiating and

recognizing property derived from sustainable production. On project ideas he mentioned studies of the sector's mitigation potential and how to link them to the sustainable production programme.

**Adaptation TAP: Water Sector:** Joanna Kámiche Zegarra, Peru, presented two project ideas for the TAP for the water sector: strengthening the National Programme of Terrace Recovery through standardization and dissemination of terrace recovery technologies, promotion of profitable crops, capacity building and accessing finance; and implementing a programme for wastewater treatment in selected cities through technical activities and awareness raising.

She proposed overcoming barriers through: addressing market failure by standardizing technologies and providing incentives for action; developing national technology plans; strengthening social organizations and identifying local needs; ensuring adaptation of needed technology; enhancing cross-sector coordination; and training to improve human resource capability to evaluate and select needed technology.

**REPORT BACK:** Subash Dhar, UNEP, moderated this session which presented feedback from regional group discussions.

**Agriculture Sector:** George Owusu Essegbey, Ghana, presented feedback on the process of developing TAPs in the agriculture sector. He noted that participants had emphasized the importance of adaptation, while presentations from Thailand, Viet Nam, Morocco, Lebanon and Costa Rica showed diversity in agricultural practices.

On difficulties experienced in setting targets, Essegbey highlighted: issues of scale, noting that the margin of error increases with the scaling up of interventions from the local to the national level; problems with obtaining data to guide target setting due to the inclusion of multiple locations; and the need to allow for countries' varying priorities and development aims.

On specificity of measures, Essegbey observed that variation in agro-ecosystems affects specificity, and that much depends on the country and its context, as well as on the availability of accurate data. On the cost and timing of measures, he highlighted that lack of data is a major challenge in effective costing of measures, and stressed the need for feasibility studies and pilot efforts before scaling up. He said group discussions had identified some common activities: training of farmers; training of technicians; increasing research and development efforts; organizing awareness and marketing campaigns; and updating institutional arrangements, noting that these influence the cost of measures undertaken.

On the actors involved in implementation, Essegbey identified public institutions responsible for agriculture and finance, private sector actors including farmers and others in the agriculture value chain, civil society organizations, and development partners such as donor agencies.

**Water Sector:** Lea Kai presented feedback from the group discussions on the process of developing TAPs in the water sector, recalling presentations from Peru, Viet Nam, Indonesia and Mali. She highlighted that the groups had similar goals of increasing water availability, improving water management and improving analytical tools, with activities spanning rainwater harvesting, terrace management, reservoir building, wastewater and desalination treatment, groundwater recharge, and small-scale dam construction, as well as improving irrigation systems and establishing flood warning.

Kai noted that difficulties with setting targets had to do with the lack of national water strategies or programmes, the challenge of quantifying the "vulnerability reduction potential" of technologies and other measures, lack of coordination among water resources institutions, and the high price of modeling software. She said that smaller projects could set targets with greater ease, based on the numbers of anticipated beneficiaries and other indicators.

Regarding specificity of measures, Kai commented that: specificity was only found in measures based on pilots or small-scale projects; many proposed measures were general ones such as capacity building and establishment of financial mechanisms, some of which were proposed to complement larger national strategies; and priority setting was a challenge.

On cost and timing of measures, Kai noted that costs vary based on the scale of the project and its geographic location, adding that estimates are made based on experts' judgments when data is unavailable. On stakeholder involvement, she said participants had discussed that it was sometimes unclear when government decision makers and NGOs should be involved, and that questions remain about what should be the role of stakeholders in implementing TAPs, how to organize monitoring and follow-up, and how to integrate TAPs into other established programmes.

**Energy Sector:** Rehab Hassan, Sudan, reported on discussions on the TNA-TAP process in the energy sector, noting that common themes highlighted included: ambition of the technology in relation to the available budget; that the methodology should take account of barriers; and the role of political will.

On difficulties in setting targets, Hassan discussed relating targets to existing national programmes or to the main problems confronting the sector. She also highlighted lack of cooperation and investment, problems with multi-criteria analysis in the absence of consensus among stakeholders, the impact of tariffs for renewable energy, and difficulties with ranking procedures.

On the specificity of measures, Hassan noted that measures to create an enabling environment are considered necessary but not enough to obtain the expected results. On cost and timing of measures, she noted that it is difficult to estimate the cost of technologies, highlighting that the available budget is limited. On actors, she said the issue is timing their involvement and identifying when to do the action and why, adding that identified actors included ministries of finance, energy and industry, local communities, and civil society.

Subash Dhar, URC, summarized common themes, mentioning targets and linkages to current national plans. On measures, he noted that lack of data for estimating costs is a major problem, given the wide variation within and across countries.

#### **MODULE IV: FROM PLANS TO ACTIONS - DEVELOPING PROJECT PROPOSALS CAPABLE OF ATTRACTING FUNDING**

This session took place on Wednesday, 12 September, and included: an introduction to financing; a presentation on the UNEP/URC guidebook on financing mitigation and adaptation; and a presentation of project ideas, tips and pitfalls.

Manfredi Caltagirone, URC, introduced the session on financing and moderated the discussion. Subash Dhar presented two guidebooks on financing mitigation and adaptation, explaining that they are intended to provide

guidance on the diversity of available funding sources available and on writing project ideas and proposals to interest potential financiers.

Dhar highlighted that there is also diversity in terms of financing instruments and underscored the importance of understanding which agencies are likely matches for project proposals. He added that most funding has been directed towards mitigation efforts rather than adaptation, and that further guidance is available from a UNFCCC guidebook and other texts.

Abdul Salam, AIT, presented on “Project Ideas: Tips and Pitfalls,” introducing several templates for presentation and evaluation of project ideas. He outlined that a proposal should present information on: the background and context of the project; the objectives of the project and the anticipated effects, supported by quantitative information as far as possible; the relationship of the project to the country’s sustainable development priorities and activities; the main benefits of the project and its beneficiaries; new partnerships that will be generated; feasibility; sustainability replicability; budget and other resource requirements; the main activities; monitoring and evaluation; risk factors; and responsibilities of key stakeholders and agencies.

Salam presented examples of templates for submitting project information from the Clean Development Mechanism (CDM), the Global Environment Facility, the European Union, the US Agency for International Development, and the Energy Environment Partnership, as well as some tools for preparation of proposals, including the Logical Framework Approach. He identified potential pitfalls including: failure to identify root causes of a problem and to link proposed activities to them; unrealistic funding requirements; and failure to quantify project benefits.

Discussion among participants focused on targeting of project proposals to specific donors, depth of economic information required, co-financing requirements, and accessing of funding to cover the transaction costs of developing proposals.

#### **MODULE V: TRAINING SESSIONS LED BY THE UNFCCC SECRETARIAT**

This session took place on Wednesday, 12 September, and included: an introduction to preparing and presenting project proposals for financing; group exercises; and a moderated roundtable discussion.

Bert van der Plas, UNFCCC Secretariat, introduced the module, noting the complexity of proposal preparation. He said the session would focus on accessing funding sources by preparing bankable project proposals.

**GROUP EXERCISES:** Introducing the session, Peter Story, Climate Technology Initiative Private Financing Advisory Network, highlighted typical problems including untargeted, incomplete or unbalanced proposals, which are typically “long on technology and short on financials,” and poor risk analysis.

Participants then took part in group exercises applying a seven-question building block approach:

- What: in terms of product, service, technology, and client;
- Where: relating to location, market, operating and regulatory conditions;

- Who: in relation to the actors, the project champion or owner, and the enablers or sponsors, as well as team approval bodies and stakeholders;
- Why: the rationale for the project - financial, social, environmental, market growth, and whether benefits can be quantified; and
- How: regarding an operational plan for implementation, taking into consideration budget for capital and operating costs, as well as milestones and schedules.

**ROUNDTABLE DISCUSSION:** Antonio Pflüger, TEC, moderated the discussion and introduced the four panelists. Opening the discussion, he identified public and market-driven sectors of relevance to climate-related technological investments.

Pflüger emphasized the need for investment security, highlighting that governments and regulators need to offer attractive “framework conditions” to encourage such investment. He said the role of governments could include: providing legislation and regulation; removing barriers that do not make sense in relation to particular technologies; enforcing legislation; building infrastructure; and providing stable conditions for investment security, while the private sector could work with governments on education, training, job creation, and research and development.

Pflüger highlighted the role of the International Energy Agency’s Energy Technology Network in linking research, technology and policy requirements for low-carbon development and accelerating transfer of knowledge, also highlighting the importance of harmonized benchmarking and standards, the lack of which can act as a barrier to technology transfer. He invited panelists to provide input on: moving from concepts to investment projects; what policy messages should be directed to policy makers; and what role the UNFCCC can play.

Patrick Nussbaumer, UN Industrial Development Organization (UNIDO) presented on efforts to package project ideas to donors, and highlighted UNIDO’s technical cooperation on capacity building and institutional development. He called on participants to consider different models of financing beyond a project-by-project approach, noting that donors and project developers incur transaction costs. He recommended giving a high priority to policy coordination between ministries, noting that there is more work to be done to ensure that the new climate financing mechanism is fully operational.

Peter Storey highlighted the need to work “at scale,” highlighting his organization’s consideration of ways to cluster projects, in order to achieve scale. He distinguished between development of new technology, which employs venture capital, and the commercialization stage, which requires scale and the possibility for replication. He called on governments to provide a clear and stable policy environment on issues such as energy mix targets and feed-in tariffs, and to ensure appropriate legislation and enforcement.

Allan Dale Gonzalez, Full Advantage, represented private sector concerns and a global association, the World Alliance for Decentralized Energy. He highlighted the need for cash flow analysis and investment analysis as part of risk assessment, to address concerns about whether investors can make a profit from technology.

Gonzalez recommended that governments should build the confidence of investors, noting that private sector confidence in relation to carbon markets has diminished. He further recommended efforts to stabilize pricing of carbon credits and related policies, and to ensure continuity of climate change initiatives and policies, for example relating to future of the Kyoto Protocol.

Mozharul Alam, UNEP, presented on his organization's role in supporting countries to design and implement projects. He noted that UNEP is promoting scale by working with the Asian Development Bank and other financial institutions to provide soft loans and partial guarantees. He recommended promoting the cost-effectiveness of climate-related investments, and avoiding trade-offs between short-term and long-term objectives.

Participants further identified the need to push for the CTCN to become operational, calling on governments to be clear on the role and benefits of the private sector, and for the private sector to consider not only financial returns in their analysis of projects, but also the social and environmental variables.

In closing, Jorge Rogat thanked the UNFCCC Secretariat and the team from AIT for their collaboration, and Sivanappan Kumar, AIT, extended appreciation to all partners. The workshop closed at 5:55 pm.

## UPCOMING MEETINGS

**UNU-WIDER Conference on Climate Change and Development Policy:** The UN University (UNU)-World Institute for Development Economics Research (WIDER) conference on "Climate Change and Development Policy" aims to reflect the diverse range of perspectives on how to balance climate and development objectives. The conference will evaluate how research can inform development policy and identify existing knowledge gaps, focusing on both low-carbon development (mitigation) and climate-resilient strategies (adaptation). **dates:** 28-29 September 2012 **location:** Helsinki, Finland **contact:** Anne Ruohonen **email:** anne@wider.unu.edu **www:** [http://www.wider.unu.edu/events/2012-conferences/Climate-change-2012/en\\_GB/28-09-2012/](http://www.wider.unu.edu/events/2012-conferences/Climate-change-2012/en_GB/28-09-2012/)

**African Sustainable Energy Finance Summer Academy:** The Sustainable Energy Finance Academy, held within the new framework of the Frankfurt School – UNEP Collaborating Centre for Climate and Sustainable Energy Finance, will provide a comprehensive framework on renewable energy and energy efficiency financing in Nairobi, Kenya, with a special emphasis on renewable energy in Africa. **dates:** 21-26 October 2012 **location:** Nairobi, Kenya **contact:** Summer Academy Team **phone:** +49-069-154008-692 **fax:** +49-069-154008-4692 **email:** summeracademy@fs.de **www:** [http://www.frankfurt-school.de/content/en/consulting/ias/summer\\_and\\_winter\\_academies/sustainable\\_energy\\_finance\\_nairobi.html](http://www.frankfurt-school.de/content/en/consulting/ias/summer_and_winter_academies/sustainable_energy_finance_nairobi.html)

**Climate Investment Funds Partnership Forum and Associated Meetings:** The Climate Investment Funds (CIF) and European Bank for Reconstruction and Development are co-hosting the CIF 2012 Partnership Forum, as well as associated meetings. The Forum will be preceded by Pilot Country meetings for all CIF programmes (the Clean

Technology Fund, the Forest Investment Program, the Pilot Program for Climate Resilience, and the Program for Scaling-Up Renewable Energy in Low Income Countries) and a Private Sector Forum. **dates:** 30 October to 7 November 2012 **location:** Istanbul, Turkey **contact:** CIF Administrative Unit **email:** cifevents@worldbank.org **www:** <http://www.climateinvestmentfunds.org/cif/event-partnership>

**UNFCCC COP 18:** COP 18 and the eighth session of the Conference of the Parties serving as the Meeting of Parties to the Kyoto Protocol, among other associated meetings, are scheduled to take place in Doha, Qatar. **dates:** 26 November to 7 December 2012 **location:** Doha, Qatar **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **email:** secretariat@unfccc.int **www:** [http://unfccc.int/meetings/doha\\_nov\\_2012/meeting/6815.php](http://unfccc.int/meetings/doha_nov_2012/meeting/6815.php)

**TEC Side Event at COP 18:** The Chairs of the UNFCCC TEC will hold a side event to present on the TEC work plan, progress to date and key messages to the COP. **date:** 29 November 2012 **location:** Doha, Qatar **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **email:** secretariat@unfccc.int **www:** <http://unfccc.int/ttclear/jsp/index.jsp>

**Fifth meeting of the TEC:** The fifth meeting of the TEC will be convened in late February or early March 2013. Prior to TEC 5, a workshop to address adaptation technologies will take place. **dates:** TBD **location:** Bonn, Germany **contact:** UNFCCC Secretariat **phone:** +49-228-815-1000 **fax:** +49-228-815-1999 **email:** secretariat@unfccc.int **www:** <http://unfccc.int/ttclear/jsp/TECMeeting.jsp>

## GLOSSARY

AIT	Asian Institute of Technology
CIS	Commonwealth of Independent States
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
LEDS	Low-emission development strategy
LULUCF	Land use, land-use change and forestry
NAMA	Nationally appropriate mitigation action
NAPA	National adaptation programme of action
NDE	Nationally designated entity
TAP	Technology Action Plan
TNA	Technology Needs Assessment
TEC	Technology Executive Committee
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
URC	UNEP Risø Centre