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## **Best practices in technology needs assessments**

### **Technical paper\***

#### *Summary*

This technical paper compiles and synthesizes good practices in technology needs assessments (TNAs), specifically in conducting, reporting and implementing these studies, and provides case studies from completed TNAs for specific steps in the TNA process. It addresses the questions of how countries have carried out their TNAs and which strategies have proved most effective, with a focus on experiences, lessons learned and challenges that have emerged from this process (specifically from conducting, reporting and implementing TNAs).

Based on the analysis of these issues and taking into account the discussions at the workshop to share best practices in conducting TNAs held from 27 to 29 June 2007 in Bangkok, Thailand, as well as the questionnaire survey carried out during that workshop, the paper also provides recommendations for improving the TNA process.

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\* This technical paper was commissioned by the secretariat of the United Nations Framework Convention on Climate Change and was prepared by Ermira Fida (Albania) and Rasack Nayamuth (Mauritius).

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## I. Introduction

### A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-fifth session, requested the secretariat, in collaboration with the Expert Group on Technology Transfer (EGTT), to prepare a paper on good practices with conducting technology needs assessments (TNAs).<sup>1</sup>
2. At the same session, the SBSTA requested the secretariat to organize a workshop to share best practices with Parties not included in Annex I to the Convention (non-Annex I Parties) working on TNAs in collaboration with the EGTT, the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the Global Environment Facility (GEF) and the Climate Technology Initiative (CTI).<sup>2</sup> The workshop (hereinafter referred to as the workshop on best practices) was held from 27 to 29 June 2007 in Bangkok, Thailand and its report is contained in document FCCC/SBSTA/2007/6.
3. The SBSTA, at its twenty-sixth session,<sup>3</sup> requested the secretariat to make available to Parties a paper on good practices in conducting TNAs based on outcomes of the workshop on best practices, the TNA synthesis report (FCCC/SBSTA/2006/INF.1), recently completed TNAs and other relevant documents. It also requested the secretariat to make this paper available for reference at the workshop organized by the secretariat on exchange of experiences and good practices among non-Annex I Parties in preparing national communications and on cross-cutting issues (hereinafter referred to as the workshop on national communications) to be held from 20 to 22 September 2007 in Cairo, Egypt, and to the SBSTA for consideration at its twenty-seventh session.
4. At the same session, the SBSTA endorsed the work programme of the EGTT for 2007, which includes an activity to finalize this paper, taking into consideration feedback from the workshop on best practices, and make available it to Parties conducting TNAs.<sup>4</sup>

### B. Objectives and intended audience of the paper

5. The overall objectives of the paper are:
  - (a) To compile and synthesize good practices from the TNAs completed so far by Parties;
  - (b) To (1) help countries that have yet to conduct the TNA process, either on a stand-alone basis or as part of their national communication, to easily find means to encourage technology transfer and (2) ensure that lessons learned from the Parties that are more advanced with this process can be more widely shared;
  - (c) To help those countries that want to update the TNA to better identify problems and gaps and improve the quality of their studies;
  - (d) To inspire the discussions and serve as a source of information for the participants at the workshops on best practices and national communications.
6. This paper is intended to complement the UNDP handbook *Conducting Technology Needs Assessment for Climate Change* (TNA handbook)<sup>5</sup> and to be used along with it. Furthermore, the paper

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<sup>1</sup> FCCC/SBSTA/2006/11, paragraph 80 (a) (i).

<sup>2</sup> FCCC/SBSTA/2006/11, paragraph 80 (a) (ii).

<sup>3</sup> FCCC/SBSTA/2007/4, paragraph 32 (a).

<sup>4</sup> FCCC/SBSTA/2007/L.9, annex II.

<sup>5</sup> <<http://ttclear.unfccc.int/ttclear/html/TNAGuidelines.html>>.

may provide useful input for the future revision of this handbook, as requested by the SBSTA at its twenty-sixth session.

7. The paper may be valuable to the non-Annex I Parties that have yet to conduct their TNA or that may wish to update their TNA reports. It may also be useful to stakeholders involved in the TNA process or international organizations and/or donor countries that are interested in the process of technology transfer. A draft version of the paper was distributed as a working document to the participants of the workshops on best practices and national communications to stimulate and guide their discussions.

### **C. Scope and approach of the paper**

8. This technical paper provides a background to TNAs, an overview of the current status of their implementation, and guidance on conducting TNAs and reporting their results in the form of ‘good practices’. It primarily addresses the questions of how countries have carried out their TNAs and which strategies have proved most effective, with a focus on experiences, lessons learned and challenges that have emerged from this process (specifically, from conducting, reporting and implementing TNAs).

9. The paper also provides an overview of the steps in the TNA process,<sup>6</sup> with a view to identifying the barriers to conducting these steps and opportunities to overcome them (see figure 1). Steps are provided for both thematic areas – climate change mitigation and adaptation – by taking into account commonalities and differences between technologies to mitigate greenhouse gas (GHG) emissions and to adapt to the adverse effects of climate change. It compiles and synthesizes good practices and provides case studies from completed TNAs for a specific step, issue or sector. Based on the analysis of these issues and taking into account the discussions at the workshop on good practices as well as a questionnaire survey on good practices in TNAs that was carried out during the workshop, the paper provides recommendations on ways and means for improving the TNA process.

10. The paper takes into consideration current guidance on conducting and reporting TNAs, the previous work of the secretariat on this matter, including the relevant documents prepared by the secretariat, and national and regional experiences in TNAs. It also takes into account: (1) the recommendations of the EGTT for enhancing the implementation of the technology transfer framework that were endorsed by the SBSTA at its twenty-fourth session; (2) the annual report of the EGTT for 2006;<sup>7</sup> and (3) the template on cross-cutting issues in national communications prepared by the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) in collaboration with the EGTT (see annex I). The final version of the paper was revised in light of comments on the draft version received from participants of the workshop on best practices and from EGTT members and of the results of the survey.

11. The good practices have been compiled and synthesized from:

- (a) The stand-alone TNA reports of 34 non-Annex I Parties that received funding from the GEF under the Additional Financing for Capacity-building in Priority Areas, also known as Phase II and/or “top-ups”. Table 1 lists the Parties and the TNA reports covered by this paper;
- (b) Presentations on national experiences and lessons learned and discussions during breakout sessions from the workshop on best practices;

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<sup>6</sup> The steps are: selection of target area; initial review of sectors and options; setting of criteria; selection of key sectors; prioritization of technologies; identification of barriers; identification of measures to address barriers; identification of capacity-building needs; description of the role of stakeholder participation; identification of next steps; and development of project proposals.

<sup>7</sup> FCCC/SBSTA/2006/INF.8.

- (c) The questionnaire survey conducted during the workshop on best practices;<sup>8</sup>
- (d) Interviews with coordinators of TNAs.

12. In order to identify good practices, a set of evaluation criteria was identified for each step of the TNA process, in particular for the main stages considered in the paper: conducting the TNA and reporting and implementing its findings. The criteria used, chosen bearing in mind the issues that are considered of key importance for an effective and successful TNA, were:<sup>9</sup>

- (a) Adequacy and correct selection of the approaches, methodologies and tools to be applied according to the national circumstances;
- (b) Scope of the study and priority areas and sectors to be covered;
- (c) Links to sustainable development and other development goals;
- (d) Level of stakeholder involvement;
- (e) Level and completeness of barrier analysis;
- (f) Level or comprehensiveness of reporting of the results;
- (g) Potential for follow-up: arrangements and next steps for implementation of the results;
- (h) Quantitative estimation of initial investment and running costs for proposed projects;
- (i) Number of practicable projects identified from the TNA process;
- (j) Number of TNA projects implemented and/or under implementation;
- (k) Optimum use of resources and cost-effectiveness;
- (l) Replicability; tools for knowledge management and dissemination.

13. The structure of chapters III and IV of the paper follows the three main stages of the TNA process as identified in paragraph 12 above. Chapter III also includes a section on issues that cut across all stages.

14. Good practices are then identified for the key steps, issues or sectors of each stage, using the following structure:

- (a) A short overview of the issue or step under consideration with a focus on its objectives, taking into account the provisions of the TNA handbook;
- (b) An analysis of how the issue or step has been addressed by countries that have conducted TNAs and of the lessons learned;
- (c) Identification of good practices illustrated with case studies, if available;
- (d) A summary of good practices in bullet-point form for a proper consideration of the respective issue or step.

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<sup>8</sup> The questionnaire included 48 questions aimed at further clarifying issues identified during the desk review of the 34 TNA reports, such as good practices for engaging stakeholders, most appropriate methods for prioritizing technology needs, information to be included in the TNA report, and good practices for developing and implementing action plans.

<sup>9</sup> Revised in light of workshop presentations and discussions and the survey results.

#### **D. Definition of best and good practices**

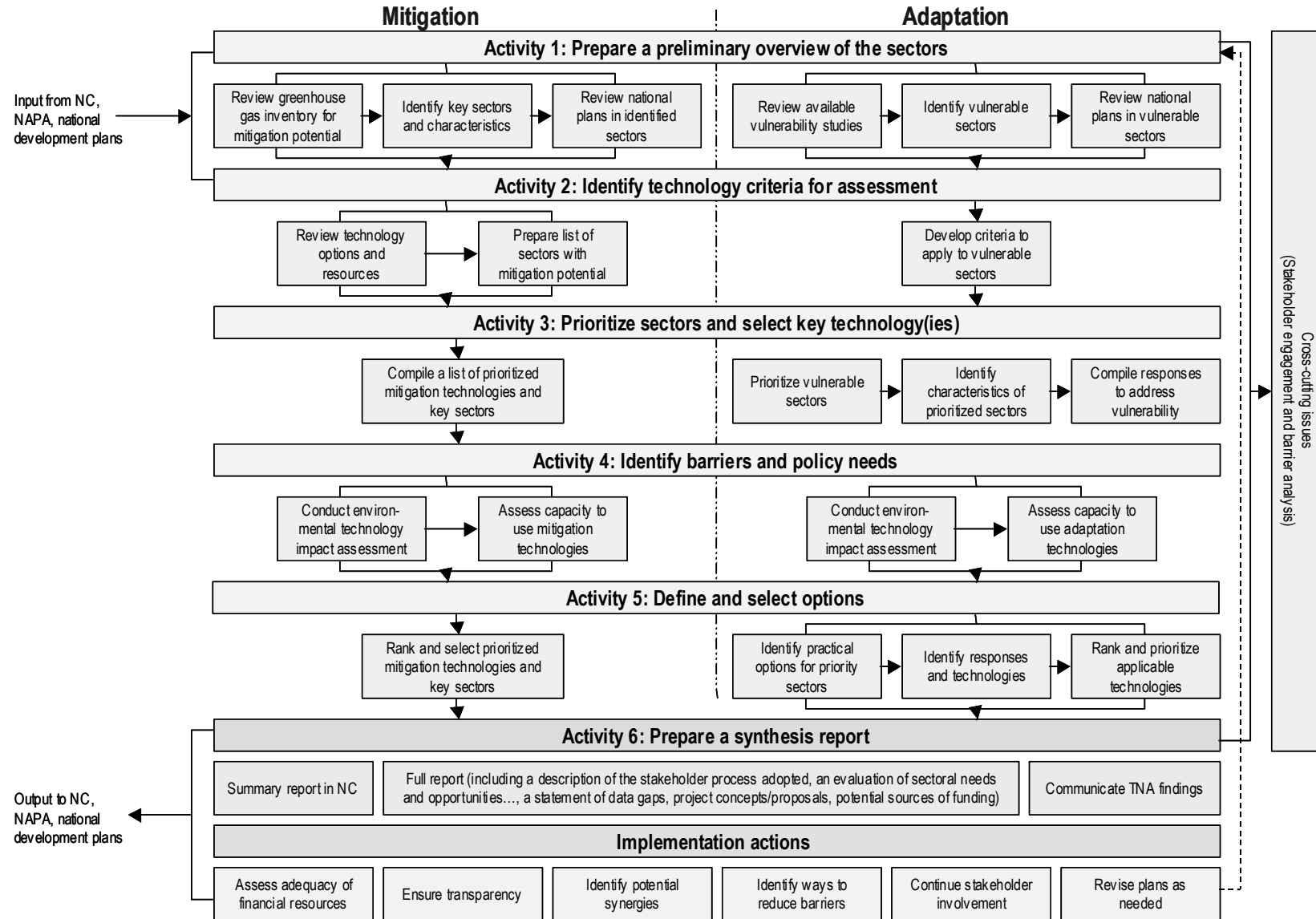
15. A best practice is a management idea which asserts that there is a technique, method, process, activity, incentive or reward that, through experience and research, has been proven to be more effective at delivering a particular outcome and leading to a desired result than any other technique, method, process, etc. The idea is that with proper processes, checks and testing, a desired outcome can be delivered with fewer problems and unforeseen complications.

16. At the workshop on best practices in policies and measures among Parties included in Annex I to the Convention held in Copenhagen, Denmark, in April 2000, participants agreed that the concept of 'good practice' appears to be more relevant in the international context than the concept of 'best practice', which could be, to a large extent, country specific. This is because it was considered unlikely that best practices for policies and measures that are effective in one country are as effective in another.

17. Consequently, the concept of good practice seems to be more appropriate when analysing processes that are highly dependent on national circumstances and country needs such as TNAs, and this terminology will be used in the technical paper.

18. **Good practices**, as defined for the TNA process discussed in this paper, are therefore the most efficient (i.e. require the least amount of effort) and effective (i.e. achieve the best results) ways of conducting a TNA and reporting and implementing its results, based on repeatable procedures that have proved themselves over time for large numbers of users. A key element worth mentioning here is the concept of establishing clear objectives upfront in the process. For example, establishing a common, agreed vision on the final TNA product.

**Figure 1. Representation of the technology needs assessment process**



Source: *Conducting Technology Needs Assessments for Climate Change* (the UNDP handbook). Gross R, Dougherty W and Kumarsingh K. 2004. New York: UNDP. Abbreviations: NC = national communication, NAPA = national adaptation programme for action.



## II. Background and status of technology needs assessments

### A. Background and related work

19. Article 4, paragraph 5, of the Convention states that developed countries “shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies (ESTs) and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention”. In this context, technology transfer is designed to assist developing countries in responding to climate change through the diffusion and use of appropriate climate change mitigation technologies and technologies for adaptation to climate change.

20. The Conference of Parties (COP), by its decision 4/CP.4, urged non-Annex I Parties to submit their prioritized technology needs, especially those relating to key technologies to address climate change. The decision 2/CP.4 directed the GEF to provide funding to developing countries to assist with this process of technology needs assessment.

21. As part of the technology transfer process, a framework for technology transfer was developed and adopted by all Parties at the seventh session of the COP. Technology needs and needs assessments make up one of the five key thematic areas of this framework. The COP, by its decision 4/CP.7, established the EGTT, with the objective of enhancing the implementation of Article 4, paragraph 5, of the Convention, including, inter alia, by analysing and identifying ways to facilitate and advance technology transfer activities and making recommendations to the SBSTA.

22. A summary of the main activities carried out under the technology needs and needs assessments theme of the technology transfer framework is given in box 1.

#### **Box 1. Summary of the main activities carried out on technology needs assessments**

April 2002: A meeting was held by the secretariat in consultation with the EGTT with representatives from governments, experts drawn from the UNFCCC roster of experts and representatives from relevant international organizations to identify methodologies for conducting TNAs.

May 2002: A workshop was convened jointly by UNDP and the secretariat in Seoul, Republic of Korea, for country experts and multilateral organizations to discuss methodologies and issues related to the TNA process. A survey was conducted by UNDP with the countries undertaking TNAs.

July 2004: Drawing on the results of the survey mentioned above, UNDP made available to Parties the TNA handbook, produced in collaboration with the CTI, the EGTT and the secretariat.

September 2002–October 2003: The CTI, in collaboration with UNDP, organized three regional workshops to field-test and further develop the TNA handbook. The CTI also provided support to Bolivia, Ghana, Malawi and the Southern Africa region for carrying out TNAs.

October 2005: A workshop was held by the secretariat in Bonn, Germany, in consultation with the EGTT and the CTI, on innovative options for financing the results of TNAs.

May–December 2005: UNDP and UNEP presented results of their analysis of completed TNAs (13 TNAs analysed by UNDP, five TNAs analysed by UNEP) at several meetings.

April 2006: A synthesis report was prepared on TNAs completed by non-Annex I Parties (synthesis report) (document FCCC/SBSTA/2006/INF.1), presenting information on technology needs for mitigation and adaptation to climate change contained in 23 TNAs and 25 initial national communications. It highlights priority technology needs identified in various sectors to reduce greenhouse gas emissions and facilitate adaptation to the adverse impacts of climate change.

May 2006: An analysis of the synthesis report and of progress achieved within the technology transfer framework led to the identification by the EGTT of a set of actions for enhancing the implementation process.

23. An analysis of the TNA synthesis report prepared by the secretariat and of progress achieved within the technology transfer framework led to the identification by the EGTT of a set of actions for enhancing the implementation process. The EGTT finalized its recommendations, contained in the document FCCC/SBSTA/2006/INF.4, which was endorsed during SBSTA at its twenty-fourth session. The recommendations relating to the TNAs that are guiding the current work on this matter were as follows:

- (a) To encourage non-Annex I Parties that have not yet undertaken or completed their TNAs to do so as soon as possible, and to make these reports available to the secretariat for posting on the UNFCCC technology information clearing house (TT:CLEAR);
- (b) To encourage non-Annex I Parties to provide updated information on their technology needs in their second national communications and other national reports and to make them available to the secretariat;
- (c) To request the secretariat to prepare a synthesis report(s) of the information mentioned in (a) and (b) above for consideration by the SBSTA;
- (d) To request the GEF and its implementing agencies, other intergovernmental organizations, international financial institutions, the CTI and Parties that are in a position to do so, to provide capacity-building for non-Annex I Parties to conduct, report and use TNAs;
- (e) Not later than 2009:
  - (i) The secretariat, in collaboration with the EGTT, UNDP, UNEP and the CTI, update the TNA handbook before SBSTA 28, taking into account experience and lessons learned indicated in the synthesis report, cross-referencing the work on innovative financing and technologies for adaptation, and widely disseminate the updated handbook to Parties through TT:CLEAR and other means in different United Nations official languages;
  - (ii) The EGTT, with the assistance of the secretariat, prepare a report on good practices for conducting TNAs in collaboration with UNDP, UNEP and the CTI for consideration by the SBSTA, and disseminate it to relevant stakeholders and practitioners;
  - (iii) To make available the results of TNAs, related experience and lessons learned in the TNA process and sharing them at national and international levels through the network of technology information centres, including through the organization of workshops by the secretariat in collaboration with relevant international organizations and initiatives;
- (f) The secretariat to provide regular updates on progress of the implementation of the results of technology needs identified in TNAs, including success stories for consideration by the SBSTA at its subsequent sessions, as appropriate;
- (g) To invite the EGTT to cooperate closely with the other expert groups constituted under the Convention, especially the CGE, with the aim of coordinating activities relating to TNAs and national communications.

24. TNA reports (see table 1) were prepared as stand-alone documents. However, in the “Guidelines for the preparation of national communications from Parties not included in Annex I to the

Convention”,<sup>10</sup> non-Annex I Parties are encouraged to provide in their national communications information on activities relating to technology transfer of, and access to, ESTs and know-how, the development and enhancement of indigenous capacities, and measures relating to enhancing the enabling environment for development and transfer of technologies. Parties could also include information on their prioritized technology needs.

25. Given this, and aiming to improve the quality of national communications from non-Annex I Parties, the CGE prepared, in collaboration with the EGTT, a template for reporting on cross-cutting issues in national communications which addresses the issue of technology needs assessment.

26. The template (see annex I) was considered by the Subsidiary Body for Implementation (SBI) at its twenty-sixth session,<sup>11</sup> and the SBI invited non-Annex I Parties to use it, on a voluntary basis, to provide other information considered relevant to the achievement of the objective of the Convention. The SBI also invited UNDP, UNEP and other international organizations to consider the CGE reports on the template, its training strategy and ways to improve on the reporting of projects when providing assistance to non-Annex I Parties in the process of preparation of national communications.<sup>12</sup>

### **B. Current status of the technology needs assessment process**

27. In response to a request by the COP under decision 2/CP.4, the GEF has provided assistance to 94 non-Annex I Parties through Additional Financing for Capacity-building in Priority Areas. Out of these, 80 are being implemented by the UNDP and 14 by UNEP. Some 34 TNA reports have been submitted to the secretariat and are already available on the UNFCCC website.<sup>13</sup>

28. The COP, by its decision 3/CP.12, further requested the GEF to provide funding up to USD 50,000 to those non-Annex I Parties that have not yet conducted their TNAs but wish to do so as part of their second national communications. Through this decision, the COP also requested the GEF to provide such funding to those non-Annex I Parties that have conducted their TNAs but need to update them also as part of their second national communications, in addition to the amount approved for the preparation of their second national communications.

29. The TNAs span a relatively long period of time, with the first one dating far back to 1998 and the most recent ones submitted in 2007. Several Parties are presently undertaking their assessments. TNAs have been completed by Parties classified as least developed countries, small island developing States (SIDS) and developing countries from all geographical regions of the world. They thus provide a good insight into how Parties have dealt with this key theme of the technology transfer framework. Table 1 indicates the Parties and the TNA reports covered by this paper.

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<sup>10</sup> Decision 17/CP.8, annex, paragraph 42.

<sup>11</sup> FCCC/SBI/2007/3.

<sup>12</sup> FCCC/SBI/2007/L.13.

<sup>13</sup> <<http://ttclear.unfccc.int/ttclear/jsp/index.jsp?mainFrame=../html/TNAStudies.html>>.

**Table 1. Technology needs assessments included in the technical paper**

Country	Group <sup>a</sup>	Region	Support		Report		
			UNDP	UNEP	Language	Year	Number of pages
Albania		Europe	●		E	2004	187
Armenia		Europe	●		E	2003	101
Azerbaijan		Asia and the Pacific	●		E	2001	58
Bolivia		Latin America and the Caribbean	●		S	2002	200
Burundi	LDC	Africa	●		F	2002	31
Botswana		Africa	●		E	2004	112
Chile		Latin America and the Caribbean	●		S	2003	56
China		Asia and the Pacific	●		E	1998	29
Comoros		Africa			F	2007	43
Côte d'Ivoire	LDC	Africa			F	2002	82
Croatia		Europe	●		E	2005	94
Democratic Republic of Congo	LDC	Africa	●		F	2007	167
Dominican Republic	LDC	Latin America and the Caribbean	●		S	2004	24
Ecuador		Latin America and the Caribbean	●		S	2002	37
Georgia		Europe	●		E	2002	208
Ghana		Africa	●		E	2003	110
Haiti	LDC,SIDS	Latin America and the Caribbean		●	F	2003	69
Indonesia		Asia and the Pacific	●		E	2001	299
Kenya		Africa		●	E	2005	231
Lebanon		Africa	●		E	2002	155
Lesotho	LDC	Africa		●	E	2005	66
Malawi	LDC	Africa	●		E	2003	105
Macedonia		Europe	●		E	2004	17
Mauritius	SIDS	Africa		●	E	2004	158
Niue	SIDS	Asia and the Pacific		●	E	2003	44
Paraguay		Latin America and the Caribbean	●		S	2004	61
Republic of Moldova		Europe	●		E	2002	175
Senegal	LDC	Africa		●	F	2007	136
Tajikistan		Asia and the Pacific	●		E	2003	36
United Republic of Tanzania	LDC	Africa		●	E	2007	223
Turkmenistan		Asia and the Pacific		●	E	2007	112
Uzbekistan		Asia and the Pacific	●		E	2001	135
Viet Nam		Asia and the Pacific		●	E	2005	165
Zimbabwe		Africa		●	E	2004	92

*Abbreviations:* E = English, F = French, LDC = least developed country, S = Spanish, SIDS = small island developing State, UNDP = United Nations Development Programme, UNEP = United Nations Environment Programme.

<sup>a</sup> Source: United Nations list of country groupings and sub-groupings for analytical studies of the United Nations World Economic Survey and other reports <<http://unpan1.un.org/intrdoc/groups/public/documents/un/unpan008092.pdf>>.

### III. Synthesis of good practices by steps in the technology needs assessment process

#### A. Conducting technology needs assessments

##### 1. Managing the technology needs assessment process

30. Conducting a TNA involves a set of managerial tasks<sup>14</sup> such as deciding on the methodological approach to be applied, assessing data and information needs, establishing the expert teams, establishing a network to collect and share data and the necessary information on technologies, adopting rules and procedures for writing reports, developing and securing ongoing involvement of stakeholders, etc.

31. The TNA process should be planned and designed in a proper manner so as to ensure optimal and efficient use of available human and financial resources. Setting up a national team is a key aspect

<sup>14</sup> The term management is used in its traditional meaning, which involves planning, supervising and making arrangements for the implementation of a set of activities.

of the TNA management process and is equally important for countries undertaking the TNA process for the first time and those updating and/or improving their TNA.

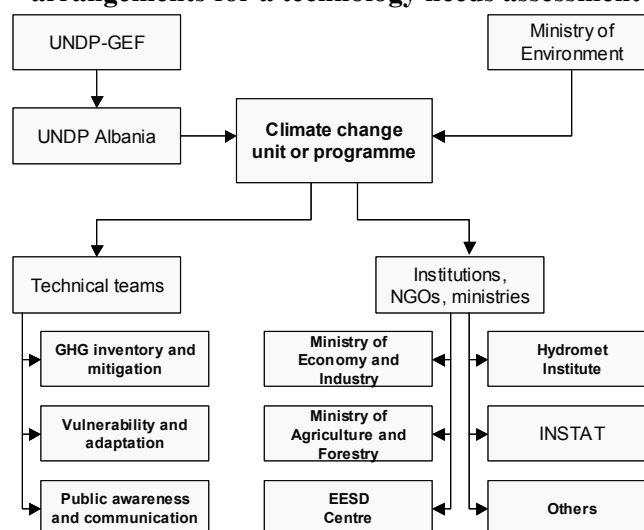
32. Since the majority of TNAs carried out so far have been funded by the GEF,<sup>15</sup> the institutional arrangements followed, in the majority of cases, the standard procedures for implementation of GEF Enabling Activities projects. These entail setting up national teams led by a coordinator, identifying a lead national agency or institution and engaging various technical agencies or institutions and other actors. The TNAs were carried out based on a workplan of activities following the guidance provided for such projects by the logical framework. However, only a few TNA reports described the arrangements made for conducting the TNA, such as holding scoping workshops, preparing TNA terms of reference for the teams undertaking the TNA or drawing up lists of the stakeholders involved.

33. Figure 2 shows the approach taken by Albania for making institutional arrangements for the TNA process carried out under the top-up phase.

34. A review of the TNA reports shows that, in many cases, the focus and other considerations regarding key sectors and technologies have been defined without a proper strategic analysis or a comprehensive involvement of stakeholders. In most cases stakeholders were only involved either through a national workshop at the beginning of the assessment process or through a questionnaire survey or interviews. Thus, for example, it appears inefficient that some countries decided to focus on all sectors for GHG mitigation technologies rather than select key ones or that countries which are highly vulnerable to climate change decided to focus on the thematic area of mitigation when adaptation should have been defined as a priority for achieving the Millennium Development Goals (MDGs).

35. A successful TNA process requires the initial setting up of a multidisciplinary country team, led by a knowledgeable coordinator with an appropriate administrative and technical background and experience in the climate change process. National experiences suggest that such an approach is effective in involving from the inception phase on all relevant parties and keeping them engaged up to the implementation phase.

**Figure 2. Example from Albania of a flow chart for making the institutional arrangements for a technology needs assessment**

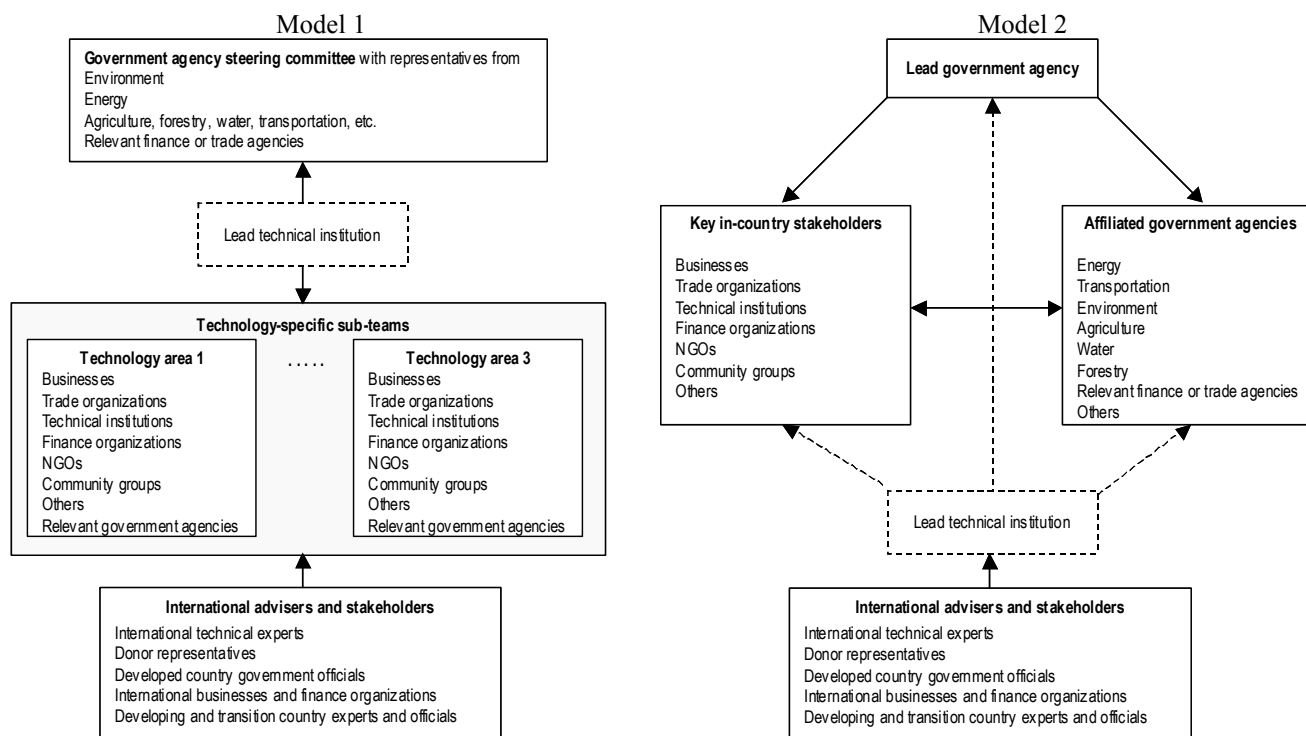


*Abbreviations:* EEDS = Energy and Environment for Sustainable Development, GEF = Global Environment Facility, GHG = greenhouse gas, INSTAT = Institute of Statistics of Albania, NGO = non-governmental organization, UNDP = United Nations Development Programme.

<sup>15</sup> Countries such as China, Brazil, Mexico, Ghana and the Republic of Korea conducted the TNA within bilateral assistance programmes.

36. Involving the teams already engaged in the preparation of the national communication and/or other climate change reports, such as national GHG inventories and GHG mitigation and vulnerability and adaptation studies, has proved to be a good practice. Should the country update the TNA report, the engagement of those team members that were involved in the previous TNA is instrumental to the success of the new assessment.

**Figure 3. Two successful models for establishing a technology transfer cooperative team**



37. It is a good practice to take into account technology needs in direct conjunction with national development plans. In this regard, experts from national development planning authorities as well as experts from sectoral ministries which cover the most critical mitigation and adaptation areas should be invited to join the team of experts.

38. Two models for building technology cooperative teams are shown in figure 3. Both models have proved to be successful in ensuring effective and ongoing cooperation among relevant stakeholders. The composition of such a team depends on an individual country's circumstances. However, one common element of these teams has been the central role of government in coordinating and focusing the team's activities towards the achievement of national development and economic goals.

39. The coordinator, in collaboration with the team, must identify and agree on the activities, deliverables and final outputs of the TNA process. He or she must draw up jointly with the other team members at the beginning of the process a list of the stakeholders to be engaged and consulted during the process and the areas where they can contribute. Once overall objectives, expected deliverables and final outputs are identified and agreed upon, the coordinator can allocate responsibilities within the detailed project workplan, setting a time frame and milestones on the basis of the human and financial resources available.

40. An inception workshop or meeting is needed for a good start and an effective TNA process, ideally after the identification of the team and the stakeholder group. Participants should meet to, inter alia:

- (a) Present the objectives of the TNA;
- (b) Explore links and synergy with other relevant activities, projects, programmes and national strategies;
- (c) Identify other stakeholders that may have been inadvertently missed out initially;
- (d) Discuss and agree on a communications strategy and on communication and awareness-raising tools;
- (e) Discuss and reach consensus on a broad approach and method to suit both mitigation and adaptation for use by the sectoral teams;
- (f) Review and validate the workplan of activities;
- (g) Review the existing guidance and relevant documents for conducting TNAs, including the experiences and lessons learned from other countries.

41. Agreeing on a clear set of rules and procedures that may be developed prior to starting the work has shown to be very effective for the TNA process. The rules and procedures may contain but are not limited to the following:

- (a) Guidelines on the structure and contents of the report;
- (b) Guidelines for referencing data sources, information sources, etc. This is important for documentation purposes to ensure quality, consistency and overall efficiency when the TNA report is updated;
- (c) Guidelines on archiving information. An information storing system is important as the TNAs are intended to build upon data and information collected by other activities and generated and processed during the TNA.

42. Finally, it is a good practice to identify the various institutions that are the repositories of data and information needed for the TNA. Collaborative arrangements with such institutions are highly important. The collaboration may be arranged under a legal basis through memorandums of understanding or other type of contractual agreement. Data confidentiality issues may be considered as well.

43. Part of the effective management of conducting a TNA is a mechanism for capturing and disseminating the lessons learned during the process. Use of communication and awareness-raising tools, aiming in particular at securing stakeholder involvement, is highly recommended.

44. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 2.

**Box 2. Good practices in managing the technology needs assessments process**

- Nominate as coordinator of the TNA process a knowledgeable person with appropriate managerial and technical skills in climate change and technology issues;
- Hold an inception workshop to present the objectives and expected deliverables and refine any arrangements, as needed;
- Set up a multidisciplinary cooperative team comprising stakeholders from different areas such as experts previously involved in the national communication process, high-level representatives from relevant ministries and institutions and sectoral experts;
- Develop and agree with the team a detailed workplan with clear objectives, activities, deliverables and final outputs;
- Develop a set of rules and procedures for write-ups and the final report;
- Structure and agree on an approach that will involve all relevant stakeholders from the earliest stage, make their responsibilities clear and maintain engagement with the stakeholders throughout the assessment and implementation process;
- Identify institutions that are the repositories of data and information needed for the TNA and sign arrangements for sharing the data;
- Apply and integrate communication and information tools throughout the TNA process.

2. Methodological approaches to conducting technology needs assessments

45. The methodological approach for technology needs assessment consists of the set of activities and steps undertaken to conduct such an assessment. The selection of a methodology to perform a study depends on the methodologies available, their flexibility to accommodate specific conditions, and the availability of the data and information to be used in the assessment.

46. Several studies have considered, either explicitly or implicitly, the TNA process, although none of them dealt solely with the TNA except for the TNA handbook published in 2004 as a living document with the aim of providing guidance on how to conduct the TNA in both thematic areas of GHG mitigation and adaptation. This lays out the key steps, decisions, methods and resources needed for conducting TNAs, taking into consideration the fact that national circumstances and needs vary. This approach ensures the flexible nature of the handbook.

47. Many of the TNAs were undertaken and completed before the publication of the TNA handbook. They were therefore conducted without methodological guidance, using improvised methods. However, the analysis of the TNA reports shows that the TNAs did, to a large extent, follow an assessment process closely resembling the one outlined in the handbook.

48. Most of the TNA process conducted by Parties took the following steps:

- (a) Overview of sectors, including associated national institutional arrangements;
- (b) Identification of criteria for assessing technologies;
- (c) Prioritization of key sectors and selection of key technologies;
- (d) Identification of barriers, capacity-building and policy needs;
- (e) Definition and selection of options.

49. All steps carried out during the TNA are important. However, the identification of criteria for assessing technologies and the selection of key technologies are particularly important steps which



involve a variety of methodologies and analytical tools. These methodologies and analytical tools will be discussed in more detail in chapters III and IV below.

50. The similarities in the process adopted by the majority of countries and that recommended in the TNA handbook can be explained as follows:

- (a) In the absence of methodological guidance, countries undertaking TNAs have been referring to approaches cited in the reports produced by different organizations such as UNEP,<sup>16</sup> the CTI<sup>17</sup> and the Intergovernmental Panel on Climate Change (IPCC),<sup>18</sup> although these reports have not been focusing on the TNA itself. As a result many countries have been addressing technology transfer in general, including issues relevant to needs assessment;
- (b) The methods adopted or improvised by countries served as a reference point for the compilation of the TNA handbook. The handbook drew upon relevant sources (e.g. the CTI, UNEP and the IPCC) and feedback received from countries undertaking TNAs, and upon discussions, recommendations and country presentations made in relevant workshops.

51. In the majority of the TNA reports there is no section on the methodological approach taken and relatively few details are provided. However, the above findings and conclusions on methodology are synthesized from an in-depth analysis of these reports and of country experiences reported at relevant workshops organized by the secretariat, UNDP and UNEP.

52. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 3.

**Box 3. Good practices in the methodological approach to conducting technology needs assessments**

- Use the most recent guidance on methodologies for conducting the TNA;
- Draw upon disseminated good practices, experiences and lessons learned by other countries that are more advanced in the TNA process;
- Adapt the selected methodology to national circumstances (there is no ‘one-size-fits-all’ methodology);
- Make use of technical assistance activities provided for TNAs.

### 3. Selection of areas and sectors covered

53. Defining thematic areas (e.g. mitigation, adaptation or both) and sectors to be considered in the TNA requires a preliminary assessment of the current status of sectors and technology options. The preliminary assessment process consists of data gathering and a review exercise that must be undertaken before carrying out a detailed technology evaluation. It need not necessarily involve the collection of new data and information or new research. Rather, an effective preliminary assessment should provide a broad overview of the sectors where there is greatest scope for rewarding actions.

<sup>16</sup> Feenstra J et al. 1998. *Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies*. Amsterdam: UNEP.

<sup>17</sup> CTI. 2002. *Methods for Climate Change Technology Transfer Needs Assessments and Implementing Activities: Developing and Transition Country Approaches and Experiences*. Available at: <[http://ttclear.unfccc.int/ttclear/pdf/TNA/CTI/Tech%20Transfer%20Guidelines-12%20\\_final\\_.pdf](http://ttclear.unfccc.int/ttclear/pdf/TNA/CTI/Tech%20Transfer%20Guidelines-12%20_final_.pdf)>.

<sup>18</sup> Metz B et al. 2000. *Methodological and Technological Issues in Technology Transfer*. Cambridge: Cambridge University Press.

54. An important step for such an assessment is the identification of sources of information. Good sources are national communications, other vulnerability and adaptation assessments, mitigation studies, energy planning studies and national and/or sectoral development plans and programmes. The TNA handbook recommends a simple review of a range of options to prioritize sectors where more detailed work will be undertaken using the following factors:

- (a) Current circumstances of key sectors – technologies in use, GHG emissions and financial conditions;
- (b) Potential to reduce emissions and/or enhance adaptive capacity;
- (c) Brief review of climate-friendly technology options (low-carbon and adaptation technologies) and resources available.

55. The TNA synthesis report found that the majority of Parties that have conducted a TNA have also conducted a preliminary assessment. All Parties focused their TNA on sectors that had already been identified in their initial national communication (INC) as having potential for GHG reduction and/or adaptation to climate change. All of them (except for one Party) considered mitigation options, with a focus on the energy sector.

56. In some cases, national circumstances and findings from the national communication have been highlighted as the reasons for focusing on mitigation and/or adaptation. Most of the TNA reports, however, lack explicit explanations as to why the Party has focused on a certain targeted area and/or sector. In a few cases the TNA reports cite restricted financial and technical resources as the main reason for the limited focus of the study (either of thematic area or sector).

57. Box 4 presents the considerations taken into account by the TNA teams of Albania and Armenia when making the preliminary assessment of areas and sectors to be covered in their TNA.

58. It is a good practice to carry out a systematic preliminary assessment to define the areas and sectors for assessment at the initial stage of the TNA. This allows countries to begin to assess what is likely to deliver maximum benefit at minimum cost in the short term. It also allows Parties to assess promising options for the longer term or in sectors that may become important in future. Involvement of the stakeholders in this preliminary assessment phase is crucial as they will later validate the assessment; it also contributes to keeping them informed and engaged during the rest of the process.

59. National experiences show that conducting such a preliminary assessment reduces the risk of:

- (a) Identifying the wrong sectors and as a consequence identifying inappropriate technology needs and not engaging the right stakeholders;
- (b) Spending resources on data gathering in certain sectors without a clear understanding of their relevance or importance;
- (c) Assessing technologies without a picture of how they meet the country's needs.

60. The number of sectors identified by countries depends on national circumstances; however, lessons drawn from successfully conducted studies and the TNA handbook recommend that not more than two to three sectors be prioritized.

**Box 4. Preliminary assessment of the areas and sectors to be covered in a technology needs assessment: two case studies from Albania and Armenia**

**Albania**

Sectors with substantial GHG emission potential were considered for mitigation, while the coastal zones sector was considered for adaptation owing to its vulnerability and its links to agriculture, forestry, water resources, health, tourism and settlements.

Albania conducted a preliminary overview of the sectors by taking the following steps:

*Mitigation*

1. Overview of the sector: sector profile; legal framework; policy framework;
2. Overview of the work done under Albania's INC: GHG inventory and GHG mitigation;
3. Take stock of the technologies currently in use;
4. Overview of technology options.

*Adaptation*

1. Profile of the targeted area (coastal zones): overview of the vulnerability studies in the targeted area; overview of national plans/programmes in the targeted area;
2. Overview of the work done under Albania's INC with a focus on the coastal area: vulnerability and adaptation section;
3. Stocktaking of the technologies currently in use;
4. Overview of technology options.

**Armenia**

The preliminary assessment conducted by Armenia involved the following:

1. Evaluation of the GHG emissions for the period 1990–2000;
2. Overview of the vulnerable sectors identified in Armenia's INC;
3. Analysis of trends in different sectors:
  - Policy and regulatory basis;
  - Baseline situation;
  - Projects planned and under implementation;
  - International donor assistance frameworks (World Bank, United States Agency for International Development and Technical Assistance to the Commonwealth of Independent States);
  - Sector specific technology needs.
4. Analysis of the information on carbon capture technologies, creation of a database and evaluation of their local applicability;
5. Barrier analysis.

The TNA of Armenia as a result focused on both thematic areas: GHG mitigation (sectors with high reduction potential) and adaptation (highly vulnerable sectors).

61. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 5.

**Box 5. Good practices in selecting areas and sectors covered in technology needs assessments**

- Conduct a preliminary assessment and an overview to prioritize sectors;
- Conduct an overview of sources of data, and information and gaps in data;
- Select a limited number of priority sectors (two to three);
- Select the priority sectors in line with those identified as key sectors for mitigation and vulnerable sectors for adaptation in national communications and national adaptation programmes of action;
- Build upon national circumstances and development needs and previous studies such as national communications or/and climate change relevant studies in the prioritization of sectors;
- Design and implement a process to involve stakeholders in the preliminary assessment and sector prioritization.

#### 4. Selection and prioritization of technology needs

62. The technology prioritization process involves the thematic areas and sectors identified as having the most potential for mitigation and/or adaptation, the technology options and resources available and policies in place to support their adoption. Technology options identified in key sectors are prioritized according to the following general criteria:

- (a) Contribution to achieving development goals;
- (b) Contribution to climate change (GHG mitigation and adaptation);
- (c) Market potential.

63. During the selection and prioritization process, weights and importance factors are assigned to these criteria as well as to country specific sub-criteria. This is a policy decision, affected by national priorities and circumstances and based on social, environmental and economic considerations. There is a significant need for contributions to this process, documented with data and objective assessments, such as:

- (a) Independent expert assessments and judgements;
- (b) Government and policymaker assessments and judgements;
- (c) Consultations and validations of broader stakeholder groups such as industry, the private sector, non-governmental organizations (NGOs), vulnerable communities, academia, etc.

64. Once the priority sectors and technologies have been identified, technology options can be selected to address short- and long-term needs. This process involves a further screening of candidate technologies based on the results of barrier analysis. This barrier analysis, along with stakeholder consultation, is a cross-cutting activity and will be discussed in chapter III D below.

65. In selecting priority areas, countries may identify 'win-win' or 'no-regret' options, which are technologies that meet objectives in other areas as well as climate change and are available at low cost. This is possible because there are a variety of technologies that offer lower costs, higher efficiency and better environmental performance than established alternatives but are not widely adopted owing to various barriers that inhibit their uptake.

66. In most of the TNA reports a list of the preliminary technology options for mitigation and/or adaptation is given, taking into consideration a variety of factors such as national circumstances, expert judgement and stakeholder consultations. The technologies identified have been assessed on a set of selected criteria. In some TNA reports the criteria considered are not indicated explicitly. Most participants in the workshop on best practices preferred to prepare exhaustive lists of candidate technologies and wait for the prioritization process to identify the best option. Some participants preferred to limit these lists to those technologies that have the best chance of being transferred. Technologies that may become attractive in the long term are rarely considered in TNAs.

67. The majority of the TNAs considered the general criteria mentioned in paragraph 61 above. In addition, sub-criteria based on national priorities and development needs were considered. For example the 'contribution to development goals' criteria involved issues such as food security, health, job creation for the poor, social acceptability, local environment and even the extent to which the technology could contribute to MDGs including gender (see the Albania case studies in box 6). Quantitative evaluations of the technology's emission reduction potential and assessments of the reduction in climate associated risk to vulnerable systems were made to estimate the technology's contribution to GHG mitigation and adaptation to climate change. Many countries also assessed the market potential of technologies by

analysing the capital and operational costs of commercially available technologies. Box 6 presents the criteria used by Albania, China<sup>19</sup> and Croatia for establishing their technology priorities.

**Box 6. Criteria used to select priority technologies: three case studies from Albania, China and Croatia**

**Albania**

*Contribution to the achievement of most of the MDGs:*

- Job and wealth creation for the poor;
- Food security;
- Health improvements;
- Capacity-building (human, institutional, physical and environmental);
- Environmental sustainability;
- Improvement of economic and industrial efficiency;
- Gender equality and empowerment of women.

*Social acceptability and suitability for national conditions:*

- Market potential;
- Capital and operational costs relative to alternatives;
- Commercial availability;
- Reliability and potential scale of use.

*Contribution to combating climate change:*

- GHG emissions reduction potential;
- Adaptation potential.

**China**

*Global and local environmental concerns:*

- Greenhouse gas (GHGs) mitigation;
- Improvement of local environmental quality.

*Technological concerns:*

- Mature degree of technologies;
- Advanced degree of technologies;
- Reliability of technologies;
- Penetration of technology application;
- Easiness of wider use of technology.

*Economic concerns:*

- Internal rate of return (IRR) and the effect of pricing and fiscal policies on the IRR;
- Payback period;
- Mitigation and adaptation costs.

*Social concerns:*

- Social efficiency: necessity of technology transfer;
- Broader links with other sectors and groups;
- Employment and poverty alleviation.

**Croatia**

*Contribution to climate change response goals (category I):*

- Potential to reduce GHG emissions and/or to enhance carbon dioxide sinks (I1);
- Indirect effects on reduction of other air pollutants (I2);
- Conservation of energy (I3).

*Implementation potential (category II):*

- Commercial readiness (II1);
- Availability of the technology (II2);
- Applicability of the technology (II3).

*Development benefits (category III):*

- Capacity-building (production and know-how) (III1);
- Job creation (III2);
- Food security (III3);
- Change of economic structure based on country's export strategy (III4).

68. The analysis of the TNA reports found that a variety of methods and tools have been used by countries in the technology prioritization process. Each of these methods and tools has strengths and weaknesses and therefore, the selection of the best tool is country specific. The TNA reports suggest that in the majority of cases, the tools are used to help in the decision-making process rather than drive it. The methods and tools commonly applied by countries include but are not limited to the following:

- (a) Multi-criteria analysis. Some countries also used sensitivity analysis in order to reduce the uncertainty of the assessment (see the Croatia case study in table 2);
- (b) Analytical hierarchy process. The top ranked technologies were usually selected as priority technologies for implementation (see the China case study in box 7);

<sup>19</sup> The TNA of China was carried out in 1998 under bilateral cooperation assistance.

- (c) Cost–benefit and risk–benefit analyses;
- (d) Probabilistic simulation and dynamic programming through scenario combination;
- (e) Categorization of priority technologies in terms of “low”, “medium” and “high” priority;
- (f) Questionnaire surveys, interviews and workshops with stakeholders, drawing priorities based on the answers provided by stakeholders.

69. In many cases, priority technologies are based on priorities established in national policies and programmes relating to energy and the environment or simply listed by sector and sub-sector without any explanation of “why” and “how” they have been selected. In general, the same methodology has been applied for assessing both mitigation and adaptation technology options. In some cases, the process of selecting and prioritizing technologies was constrained by a lack of information, especially on the cost of technologies considered.

70. Countries vary in how they have documented the steps in the assessment between weighting selection criteria and selecting priority technologies. Many countries describe in detail their methodologies for prioritizing technological options; some of them even provide the final matrices of evaluation. However, the methodologies were not always consistently applied to all sectors or comprehensively followed. For example, some countries describe their methodologies only for the energy sector, even though their TNAs also addressed other sectors.

71. Many countries have identified win-win measures which deliver both climate and development benefits. Examples include domestic and industrial appliances, where energy efficiency can be improved considerably; wastewater treatment; and technologies for adaptation in the water resources and agriculture sectors that can reduce the impact of water shortages on agricultural production.

72. The lessons learned from the successful TNAs highlight the importance of integrating TNAs in the development goals of the country. This is considered by Parties to be mutually beneficial, as it contributes to the integration of climate change concerns into national planning and policies.

73. Involving all categories of stakeholders in the process of weighting selection criteria results in an effective and transparent technology assessment. The experiences of Parties suggest there is no other activity in the TNA process where stakeholder involvement is more important.

74. It is a good practice to consider also investing in the development and/or demonstration of technologies that are not currently win-win but promise to contribute to combating climate change and other goals in the longer term. Another good practice is to develop a plan to review the list of priority technologies in the light of the dynamic changes in existing technologies and development of future technologies.

75. Tables 2 and 3 and box 7 present examples of the technology selection/prioritization process from China, Croatia and Mauritius following the criteria used by each Party as indicated in box 6.

76. In the TNA of Croatia the selection process ranked five technologies as follows: (1) wind power plants; (2) biomass heating plants; (3) insulation improvement and energy efficiency in buildings and construction; (4) biomass cogeneration plants; and (5) increase in biodiesel use.

**Table 2. The technology selection process: case study from Croatia**

MEASURE	CRITERIA <sup>a</sup>												TOTAL
	category I				category II				category III				
	I1	I2	I3	I4	II1	II2	II3	III1	III2	III3	III4		
<b>ENERGY SECTOR</b>													
<b>a) Power generation sector</b>													
1	Savings in power transport and distribution	1	1	2	1	3	4	4	2	2	2	1	2.00
2	Wind power plants	5	5	5	3	3	5	3	3	3	2	2	3.75
3	Small hydro power plants	2	1	2	3	3	5	3	4	3	2.5	2	2.67
4	Biomass in cogeneration plants	4	3	3	3	3	5	3	4	3	4	2	3.38
<b>b) Industry</b>													
1	Motor drives regulation	1	1	1	3	3	4.5	4	2.5	2	2	2	2.23
2	Cogeneration plants	2	1	2	4	3	5	4	3	3	2	2	2.73
3	Low-temp. heat generation efficiency increase	2	2	4	2	3	3.5	3.5	2.5	2	2.5	2	2.63
4	High-temp. heat generation efficiency increase	2	2	2	1	3	3.5	3.5	2.5	2	2	2	2.27
<b>c) Transport</b>													
1	Interurban passenger transport	1	1	1	3	2	4	4	2	2	2	1	2.00
2	Urban passenger transport	1	1	1	3	2.5	4	3	2	2	2	1	1.97
3	Freight transport	1	1	1	3	2	5	4	2	2	2	1.5	2.11
4	Increase in biodiesel use	3	2	3	3	3	4.5	4	4	4	4	4	3.37
<b>d) Services and residential</b>													
1	Demand side management measures	1	1	1	5	4	4.5	4.5	3	2	2	2	2.60
2	Solar energy use increase	2	2	3	5	3	4	3	3.5	3	2	3	3.00
3	Geothermal energy use increase	1	1	1	4	2	3	2	3	2	2	2	2.00
4	District heating and cogeneration use Increase	2	2	2	4	3	5	3	3	3	2	2	2.77
5	Insulation improvement and energy efficiency in buildings and construction	4	4	4	1	4	4	4	4	3	2	3	3.42
6	Biomass in heating plants	4	4	3	3	3	5	3	4	3	3.5	3	3.53
<b>WASTE</b>													
1	Thermal processing of waste with energy utilization	4	3	3	3	3	4	3	4	3	2	2	3.16
<b>INDUSTRIAL PROCESSES</b>													
<b>a) Nitric acid production</b>													
1	Non-selective catalytic reduction	5	3	3	4	2	4	4	2	2	2	2	3.14
<b>b) Cement production</b>													
1	Increase in energy efficiency of the clinker production process	2	3	3	3	3	5	4	3	2	2	2	2.90
2	Switching to fuel with lower carbon content	3	3	3	3	2	5	3	2	1	2	2	2.70
3	Decrease of clinker percentage in cement	3	3	3	3	2	3	3	2	1	2	2	2.54
4	Use of waste as alternative fuel	3	3	3	3	3	4	4	3	2	2	2	2.95
<b>AGRICULTURE</b>													
1	Improvement in application of organic and mineral fertilizers aimed at N <sub>2</sub> O emission reduction	3	3	3	3	3	3	3	3	2	4	2	2.93
2	Reduction in CH <sub>4</sub> emission by decreased fermentation	2	2	1	3	2	3	3	2	2	4	2	2.29
3	Anaerobic fermentation related to decomposition of organic manure and biogas generation	3	4	3	3	2	3	3	3	2	4	2	2.96
4	Carbon storage in agricultural soil	4	2	2	4	1	2	2	3	2	4	2	2.59
<b>FORESTRY</b>													
1	Reforestation of productive bare forestland	4	2	1	4	3	5	4	3	2	3	2	2.99
2	Increase in forestland surface to be cared by thinning	3	2	1	3	3	5	4	2	2	3	2	2.68
3	Including of complete second age class forests (all the forests 20-40 years of age) into the thinning	3	2	1	3	3	5	4	2	2	3	2	2.68
4	Planting pioneer wood species on the degraded forests	2	2	1	3	4	4	3	2	2	3	2	2.48
5	Improvement in wood utilization efficiency and increase in harvesting	3	2	1	3	3	4	4	3	2	2	2	2.61

Source: Republic of Croatia, 2005. *Technology Needs Assessment Report*.

<sup>a</sup> See box 6 for the definition of these criteria. The relative weights associated to these criteria are provided in Table 3.4-1 of the TNA report of Croatia.

77. The criteria and candidate adaptation technologies in the agriculture sector in Mauritius are presented in the table 3. The top five technologies were aimed at: (1 and 2) increasing water use efficiency by extending the irrigation network and composting; (3) applying new agricultural techniques; (4) trash blanketing; and (5) introducing more performing systems.

**Table 3. The technology selection process: case study from Mauritius**

Criteria	Technology										
	Introduce more performing systems	New agricultural techniques	Minimum/no tillage	Increase water use efficiency	Extend irrigation network	Rationalize fertilizer use	Composting	Green cane harvesting	Trash blanketing	Drought/heat tolerance	Land use change
<b>Development benefits</b>											
GDP growth	4	3	1	3	4	2	3	2	1	2	1
Wealth creation	4	3	1	3	4	2	3	2	1	2	2
Job creation	1	3	1	1	2	1	3	1	1	1	1
Social acceptance	4	3	3	2	2	3	4	4	4	4	2
Capacity-building	1	4	2	4	3	2	3	1	1	2	1
<b>Market potential</b>											
Capital to finance	1	3	4	2	2	4	3	2	4	2	2
Affordability	1	2	4	2	2	3	3	2	4	2	2
Investment sustainability	4	3	3	4	4	3	4	2	4	3	3
Durability	5	3	3	3	4	2	4	3	4	3	3
Commercial availability	3	3	3	4	4	3	4	3	3	2	2
<b>CC/environment protection</b>											
Low GHG emissions	1	1	3	1	1	3	3	3	3	1	1
Minimal harm on environment	2	3	3	2	4	3	3	3	3	2	2
Waste resource recovery	2	1	2	1	4	1	3	3	3	1	1
Adaptation potential	4	4	2	4	3	1	2	1	2	3	2
<b>Total/score</b>	<b>37</b>	<b>39</b>	<b>35</b>	<b>36</b>	<b>45</b>	<b>34</b>	<b>45</b>	<b>32</b>	<b>38</b>	<b>30</b>	<b>25</b>

Source: Republic of Mauritius. 2004. *Technology Needs Assessment and Maintenance and Enhancement of Capacities for Climate Change Activities*.

### Box 7. The technology selection process: case study from China

Expert judgement was used to develop the following list of 19 technological options which were then validated by stakeholders:

1. High efficiency boilers;
2. Large thermal power generation (300–600 MW);
3. Cogeneration;
4. High efficiency electric motors;
5. Green lighting;
6. Energy-saving buildings;
7. Coal-bed methane recovery and utilization;
8. Biomass gasification;
9. Wind energy;
10. Solar thermal heating;
11. Biogas;
12. Waste heat and energy recovery;
13. Hybrid renewable energy for villages (wind and photovoltaic);
14. High efficiency cooking stoves;
15. Alternative fuel transportation for urban regions;
16. Small-scale hydropower;
17. Natural gas combined cycle power generation;
18. Central heating;
19. Waste gas recovery.

A matrix containing technologies and selection criteria (see box 6) was distributed as a questionnaire to domestic experts. They were asked to rate how each technology scored against each criterion. For simplicity, an equal weight was assigned to each criterion. About 20 experts responded to the questionnaire. Finally, a comprehensive statistical analysis was conducted, and the five highest scoring technologies were identified as follows: (1) thermal power generation; (2) high efficiency electric motors, (3) high efficiency boilers; (4) wind energy; and (5) coal-bed methane recovery and utilization.

78. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 8.



**Box 8. Good practices in the selection and prioritization of technologies**

- Define a wide range of criteria for selecting technologies in a limited number of key sectors/areas;
- Conduct a comprehensive consultation process with stakeholders for criteria setting and weighting and prioritization of technologies;
- Conduct a barrier analysis for the selected/prioritized technologies;
- Develop a plan to review the priority technologies in the light of future developments and changes.

**5. Identification of next steps**

79. Once priority sectors and technologies have been identified, barrier assessment conducted and stakeholders engaged (the last two activities are discussed in chapter III D on cross-cutting issues), countries must then identify a set of next steps for implementing the findings of the TNA, which will in turn affect the whole technology transfer exercise.

80. Not all countries have included in their TNA reports their plans for next steps. In some reports, it is difficult to distinguish between next steps and measures to remove barriers. The majority of Parties that did report on next steps for the respective technologies presented them in the form of project proposals provided in annexes. A number of countries reported next steps in the form of implementation plans or programmes for technology transfer (this issue is discussed in chapter III C) and/or broad actions aimed at improving access to information on the technologies, awareness-raising, communicating the TNA findings and improving human capacity.

81. The project proposals vary in quality and content. Not all of them include the same level of information. The majority consist of project concepts or ideas rather than full proposals. There has been no template available to countries for defining the set of issues to be considered in a project concept or idea. Therefore countries have designed for themselves the layout of a project concept template and provided that in the TNA report.

82. Success stories drawn from countries' experiences, show that project concepts must include certain information such as: a justification for the project, the motivation, general and specific objectives, a time frame with activities, inputs and deliverables, a list of stakeholders, barriers to be overcome, capacity-building needs, awareness programmes and training, viability of the investment, internal rate of return (IRR) of investment, GHG reduction potential and/or adaptation capacity, details of the technology supplier and a list of likely beneficiaries.

83. The publication *Preparing and presenting proposals: A guidebook on preparing technology transfer project proposals for financing* (the practitioners' guide) launched by the secretariat in December 2006 could serve as good guidance for forming project idea or concepts in the TNAs, whether for the initial TNA or an update. It also provides useful guidance to develop these project ideas or concepts into detailed project proposals that meet the standards and basic requirements of project developers and the international finance community. Table 4 compares the initial project information recommended to be reported for a project proposal by the practitioners' guide and the guidance for national communications.

**Table 4. Comparison of guidance on the information that should be included in project proposals**

Project proposal content checklist in guidebook on preparing technology transfer projects for financing <sup>a</sup>	Category	Guidelines in UNFCCC reporting guidelines for national communications <sup>b</sup>	
		Public sector funded projects	Private sector funded projects
Date			
Name of project or enterprise	What?		Project description (e.g. sector, technology/strategy, location)
Location	Where		
Champion's contact information	Who?		
Product or service	What?		
Technology	What?		
Customers / clients	To whom?		
Current status	How?		
Project size, expected schedule and cost, divided between planning, construction or pre-operation and operation	How?	Project cost	Project cost
		Options for co-financing	Options for co-financing
		Incremental or additional cost analysis (all adaptation projects; many mitigation projects will also need to perform an incremental or additional cost analysis)	
Current needs and request		Conformity with country's overall policies	
		List of barriers that will be addressed	
Market conditions			Brief summary of the market for the product
Operating conditions			
Regulatory conditions (including all required approvals)	Where?		
Owners and sponsors	Who?	Type of implementing agency (e.g. public, private)	Type of implementing agency (e.g. public, private)
Team			
Stakeholders			Level of government ownership or involvement
Governance and management structure (decision-making, authority and responsibility)			
Implementation steps and plan	How?		
Cash flow and schedule details			
Impacts and returns	Why?	Project's rate of return or cost-effectiveness ratio (mitigation projects)	Project's rate of return
Sensitivity analysis	What if?		
Risks and measure to handle			
		Project objective(s)	
		Expected GHG reductions/sequestration (metric tonnes of carbon dioxide equivalent (CO <sub>2</sub> eq), mitigation projects)	Expected GHG emission reductions
		Sources for further information on the project	Sources for further information on the project

Abbreviation: GHG = greenhouse gas.

<sup>a</sup> *Preparing and presenting proposals: A guidebook on preparing technology transfer projects for financing.*

<sup>b</sup> Ways to improve the reporting of projects identified in national communications from Parties not included in Annex I to the Convention (FCCC/SBI/2007/7).

84. A synthesis of country experiences that may serve as good practices is given in box 9.

**Box 9. Good practices in identifying next steps after completing technology needs assessments**

- Develop and implement a plan to communicate findings of the TNA;
- Carry out the follow-up stage of the TNA process with well-designed project proposals that address the priority technologies selected;
- Ensure adequate resources (human, financial and technical) are mobilized for the design of project concepts and/or proposals;
- Adopt the guidance of the practitioner's guide for preparing project proposals;
- Pay special attention to the financial and economic aspects of projects such as internal rate of return of the investments and other returns (environmental and social).

**B. Reporting, analysing and synthesizing the results of technology needs assessments and communicating their findings**

85. Compiling the TNA synthesis report is an important part of the TNA process. The main objective is to communicate detailed information on the data used for the TNA (and their sources), the methodology adopted and the findings from the various steps of the process. The report may also include information on arrangements made for undertaking the TNA, gaps in data, barriers to or constraints on conducting such as assessment, and uncertainties, if applicable.

86. TNA awareness-raising and communication activities are important and need to be seen as the beginning of an ongoing process. Reporting on these activities should be carefully considered from the initial planning phase of the TNA. It may serve as a road map of an ongoing process that must be integrated into wider strategies for furthering the process, such as technology transfer and also integration of climate change issues into national planning. Box 10 presents the recommended content of a TNA synthesis report.

**Box 10. Recommended contents of a technology needs assessment synthesis report**

- Executive summary;
- Objective of the TNA and its relevance to national development priorities;
- Methodological approach to conducting the TNA;
- A description of the institutional arrangements made for the TNA and stakeholder involvement;
- An overview of sectors, including GHG emissions and the potential for GHG reduction and/or adaptation to the adverse effects of climate change;
- A preliminary overview of climate change technologies, broken down by sector where appropriate;
- A statement on gaps in data and constraints on data gathering, and measures adopted to correct them;
- Description of the criteria and process used for technology evaluation (to include development, climate change and market considerations as described in Chapter III A);
- An overview of the assessment of technologies according to the agreed criteria;
- A list of priority sectors and key technologies for preliminary action;
- A review of key barriers and steps to overcome them, with reference to existing plans and programmes;
- A description of follow-up arrangements (in the form of an implementation plan if appropriate or project ideas, notes, concepts and/or proposals);
- A list of stakeholders and a programme for continued stakeholder engagement (may be provided in an annex);
- Matrices of evaluation (may be attached as annexes);
- A list of references.

87. A good TNA report can serve as a means to efficiently document the knowledge associated with conducting a TNA. When developed for the first time it can serve as reference material to be used for a future update of the TNA.

88. All countries that have carried out a TNA have prepared a report, despite having little or no guidance on reporting. Reporting has been guided either by the secretariat, the GEF and its

implementing agencies or by the TNA handbook or still other available guidance materials. Furthermore, according to the operational procedures for the GEF Additional Financing for Capacity-building in Priority Areas, TNA reports are considered as follow-up activities of national communications, thus not requiring the official submission of the TNA report to the secretariat. Despite this, the TNA reports have been collected and analysed by implementing agencies (e.g. UNDP and UNEP) and most of them are available on the website of the National Communications Support Programme (NCSP) of the GEF, UNDP and UNEP and on TT:CLEAR.

89. Almost all of the TNA reports reviewed describe the assessment process by step or activity then address cross-cutting issues, but the level of detail, the way that information is provided and the length of the reports all vary. However, all countries used graphs, charts, matrices and/or maps to display the results. Also, all of the TNA reports provide information on national circumstances, especially on the status of the economic sectors for which technologies have been assessed and their contribution to GHG emissions reduction and/or adaptation to the adverse effects of climate change evaluated. Countries made reference to GHG mitigation scenarios and climate scenarios in support of climate change.

90. The majority of the TNA reports lack a section on institutional arrangements for conducting the TNA and reporting thereon as well as a section on the methodological approach used for conducting the TNA and the tools used for the prioritization of technologies. Some countries provide clear descriptions of the criteria used for sector and technology selection and have even attached copies of the evaluation matrices within the report or provided these as annexes. Other countries that provide information on the criteria used do so sparingly or only mention them (and/or applied them) in one sector (e.g. energy). Some countries do not explicitly provide a description of the stakeholders or their involvement in the TNA process. In those reports where barrier analysis is discussed, the level and method of reporting barrier analysis varies. Some countries have reported on sectoral barriers whereas others have reported on barriers pertaining to the selected technologies and/or barriers at project level. All countries that covered technology needs for both mitigation and adaptation reported them in two separate chapters.

91. In the absence of general guidance on the compilation of TNA synthesis reports, two good practices have emerged: to consider the experience of and lessons learned by those countries that have completed their TNA reports already; and to follow the UNFCCC reporting guidelines for national communications<sup>20</sup> and adapt them for compiling TNA reports.

92. The compilation of an executive summary of the TNA report, in some cases published as a stand-alone document written in a memo style, has proved to be useful. In particular, it may serve as a basis for raising awareness among governmental officials, other Parties concerned and the financial community of the findings of the TNA.

93. Archiving and documenting the information collected, processed and synthesized for the TNA is a good practice, as it will help to improve the quality of future results and reports over time. This practice has drawn on experience from the national communication process, especially the GHG inventory exercise.

94. Considering TNA reporting as an open process in which the authors benefit from comments and feedback from several stakeholders and experts (national and international) has shown to be a good practice in terms of quality assurance. That is, taking this approach, which has also proved helpful in the national communication process, has been found to ensure higher accuracy, transparency and consistency

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<sup>20</sup> Decision 17/CP.8, annex, "Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention" and "Reporting on climate change: user manual for the guidelines on national communications from non-Annex I Parties"

<[http://unfccc.int/files/essential\\_background/application/pdf/userman\\_nc.pdf](http://unfccc.int/files/essential_background/application/pdf/userman_nc.pdf)>.

of data, information, analysis and estimates. Sharing the TNA reports between country teams and inviting comments and feedback are other good practices.

95. Publication and dissemination of the TNA report (ideally through a proper communication plan or strategy) has shown to be a very efficient way for making publicly available the findings of the TNA, especially to and the private sector and other inventors. Organizing a launching ceremony for the report or disseminating it via airmail or email (the latter by providing a link to the address where it may be downloaded) are good practices in terms of sharing information, experiences and lessons learned. Some countries have distributed hard copies of their report at relevant forums such as meetings of the COP or the subsidiary bodies, or workshops organized by the secretariat or UNEP.

96. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 11.

**Box 11. Good practices in the compilation of technology needs assessment reports**

- Take note of the experiences and lessons learned from countries that have completed their TNA process and submitted their report;
- Adapt the UNFCCC guidelines available for reporting the findings of national communications and their application, as appropriate for the compilation of the TNA report;
- Disseminate the TNA report and/or its executive summary to interested stakeholders and Parties;
- Document and archive the data and information collected, processed and synthesized for the TNA report;
- Share the TNA report for comments and feedback from relevant stakeholders and experts (national and international), including sharing it with TNA teams of other countries.

**C. Implementing the findings of technology needs assessments**

97. The selection of the priority technologies is followed by preparing an implementation plan to apply the TNA findings. This process involves a set of steps for the successful transfer of the technologies (hard or soft) from their source to the final recipient (or practitioner if it is an idea, concept or practice).

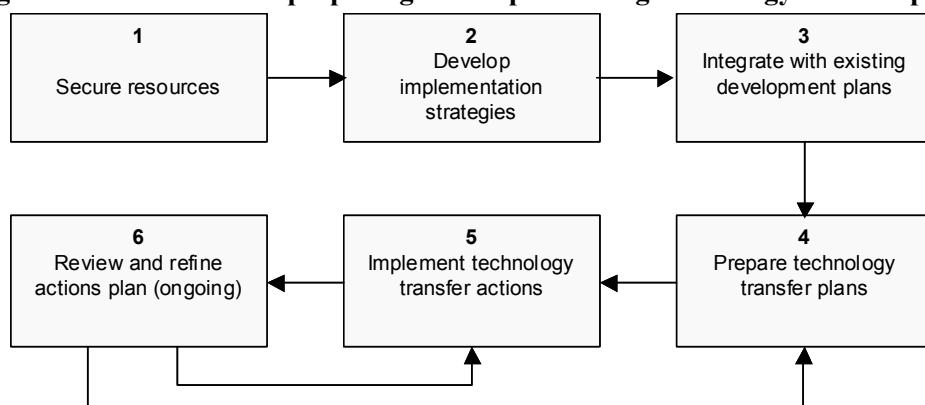
98. A critical component of a successful implementation process is ensuring the full and effective engagement of appropriate stakeholders. There are also other issues to be addressed in this stage such as the availability of adequate resources for acquiring the technology (especially important for hard options) and creation of an environment conducive to the smooth flow of technologies to the final recipients and users. As they decide on the steps of the implementation plan for the transfer of technologies, countries will be able to identify barriers to their realization and capacity-building needs that will have to be addressed. The eventual outcome may be the preparation of a project proposal document for funding purposes for technologies requiring heavy investment.

99. There may be significant differences between technology implementation plans for mitigation and for adaptation. Mitigation technologies are mostly hard technologies that are relatively easily transferred once the major stumbling block of funding is cleared. In addition, mitigation technologies are usually related to the services sector, which is better regulated than adaptation technology sectors. In contrast, very often the end users of adaptation technologies are the general public and the poorest communities, whose relatively low and unreliable capacities for repayment are strong deterrents to financiers. Moreover, recipients of adaptation technologies frequently have limited absorption capacity. Countries should take these issues into consideration when preparing implementation plans for adaptation; preparing implementation plans for mitigation is an easier process.

100. The synthesis of the TNAs submitted so far indicated that very few Parties have developed comprehensive implementation plans with extensive coverage of all these issues. However, almost all Parties identified barriers to technology transfer and measures to address them. This process varied among Parties, with some performing the exercise for the individual technologies prioritized and others performing sectoral and national analysis. As for the nature of the barriers identified, economic and market barriers are most common, followed by barriers related to information and awareness. Also identified are regulatory, technical and institutional barriers and barriers related to policy or human capacity.

101. As no single ‘recipe’ exists for transferring technologies, it is a good practice to prepare an implementation plan that accommodates all technologies prioritized while paying due attention to the specific nature of each one. This leads to more precision in the identification of steps, barriers and capacity-building needs as well as in other activities such as awareness-raising and information communication. This stage is not covered in detail by the TNA handbook. Rather, it is covered by the CTI guidebook cited in paragraph 50 (a) above. This guidebook provides a flow chart for preparing and implementing technology transfer plans, as provided in figure 4. Each step of the procedure comprises a non-exhaustive series of activities described in paragraphs 101–108 below, which have been presented for the purposes of this paper in order to identify good practices in this process.

**Figure 4. Flow chart for preparing and implementing technology transfer plans**



Source: Adapted from CTI. 2002. *Methods for Climate Change Technology Transfer Needs Assessments and Implementing Activities: Developing and Transition Country Approaches and Experiences*.

102. *Securing financial resources*: This step calls for working sessions to be held with representatives from donor organizations and the private sector as a means of raising new resources within the country. Organizing brainstorm sessions with all stakeholders concerned to identify the best means of capturing the required financial resources has proved to be an effective approach towards securing resources. Potential stakeholders in the process include local financing agencies such as banks and private companies and relevant international donor or lending agencies such as the World Bank, UNDP, the European Union and the United States Agency for International Development (USAID). A comprehensive list of funding sources based on the priority technologies identified is an important starting point to this step.

103. The conclusions of the two workshops organized by the secretariat on options for innovative financing of technology transfer (held in Montreal, Canada, in 2004 and Bonn, Germany, in 2005) underlined an increasing engagement of the private sector in the implementation of TNA findings. The lessons learned include (1) finance is available – there is not a shortage of money; (2) some projects are not at all suitable for private sector financing; (3) there are many projects that could, however, access financing with the right guidance and structuring; (4) there is a shortage of good financing/project proposals that meet the standards and criteria of private sector financing communities; and (5) an early

stage filter mechanism during the TNA process would be beneficial to sort projects into broad financing groups: private sector; private and public sectors; and public sector.

104. *Development of an implementation strategy*: In this step, the principal activities would consist of the following:

- (a) Identifying barriers to and constraints on technology transfer and analysing them;
- (b) Identifying the widest possible group of stakeholders who have a role to play in technology transfer, from source of technology to end user, and involve them in the consultation process;
- (c) Agreeing on actions to be undertaken to remove the barriers identified and possibly assigning the role of dealing with barrier removal to responsible institutions.

105. Possible stakeholders in technology transfer may be government officials, funding agencies, international institutions and donors, promoters of technologies, owners of relevant intellectual property, suppliers, users, community groups and NGOs. Possible barriers may be economic and market barriers, lack of awareness, policy barriers and lack of regulatory mechanisms, lack of institutional, human and technical capacity, poor infrastructure, cultural barriers, distorted trade regimes and political stability, among others.

106. *Integration with existing development programmes*: To improve their effectiveness, implementation plans need to be integrated within existing national and international development programmes. This will guarantee the support of government and will avoid duplication of work between the TNA and similar activities carried out under other multilateral environment agreements (MEAs), since activities under one programme can partially cater for another. For example, improving irrigation efficiency through the shift to higher performing systems to reduce energy use and GHG emissions will also contribute to adaptation to scarce water resources.

107. *Preparation of technology transfer plans*: The form that the technology transfer plan takes depends on the technology, the promoters and the beneficiaries in question. It may be in the form of project proposals or simply a set of actions for soft technologies such as the transfer of research findings or practices for adaptation. It is thus critical to guarantee the participation of the most appropriate and effective institutions in the drafting of the implementation plan. Project proposals, especially for bankable projects, will require a multidisciplinary team to produce documents sound enough to be submitted to funding agencies.

108. *Implementation of technology transfer actions and ongoing review and refinement of actions*: The final two steps, taken together, consist of the effective physical implementation, review and refinement of projects or activities to promote adoption of ideas or practices. Activities have to be followed up and monitored to ensure that they are carried out according to the plan. There may be a need at this stage to set up a committee to monitor and evaluate progress. The plan must present clear activities and stipulate for each one a time frame, milestones, indicators, deliverables or outputs and the responsibilities of the stakeholders involved. Concurrently, refinements may be made to the initial plan and new actions developed in order to solve unforeseen problems that arise so as to ensure successful technology transfer. Identification of stakeholders concerned and establishment of a committee for follow-up to ensure that the original objectives are being met are recommended.

109. Information on the successful implementation of technologies prioritized in TNAs may help other Parties to streamline their actions or give Parties that have yet to produce their TNAs something to build upon. Ways and means of improving the implementation of TNAs have to be identified. Parties could provide this information for inclusion in a database or share it through regional and international

networks (which would need to be set up). Box 12 illustrates two examples of how Mauritius has implemented projects prioritized in its TNA.

**Box 12. Implementation of mitigation and adaptation projects prioritized in a technology needs assessment: two case studies from Mauritius**

**Bagasse/coal electricity cogeneration plant of 86 MW (CT Sav, Mauritius)**

- Mitigation option identified in national climate change action plan (NCCAP) in 1998;
- Mitigation option integrated in energy policies including independent power producers;
- Requests for proposal requested to meet medium-term energy demands;
- Power purchase agreement signed;
- Proposal developed and funding sourced;
- Replacement of inefficient, obsolete technology with the latest technology to increase conversion efficiency of sugar cane biomass (bagasse);
- Concurrently, equipment for the industrial process of sugar manufacture upgraded to reduce energy consumption, thus increasing the share of energy being exported to the grid;
- Funding: equity shared by a local private corporate company and loans from international banks;
- Certified emission reductions traded through the Prototype Carbon Fund;
- Project operational June 2007.

**Extension of irrigation facilities (Northern Plains Phase II)**

- Adaptation measure identified in NCCAP in 1998;
- Major barrier of water unavailability;
- Government commissioned a Midlands Dam in 2003;
- Project concept developed in stages to alleviate financial burden;
- Government funded the major step of bringing water from the dam to the perimeter;
- Stakeholder consultations held with the small growers;
- Project developed and funding sourced;
- Rain-fed sugar cane over about 100 ha to be irrigated;
- The increased productivity in sugar cane production will result in more biomass being available to be burned for electricity generation, thereby displacing the use of fossil fuel;
- Funding under bilateral agreements with Government taking the contingency;
- Growers pay a water dues to Government for refunding loan;
- Project commissioned in 2006.

110. A synthesis of the good practices drawn from national country experiences and lessons learned is given in box 13.

**Box 13. Good practices in implementing the findings of technology needs assessments**

- Develop an effective and integrated implementation plan with activities, time frames, milestones and responsibilities in order to address the findings and recommendations from the TNA;
- Develop a comprehensive list of potential donors;
- Draw on synergies with relevant ongoing programmes;
- Set up a mechanism to engage stakeholders during the implementation phase;
- Revise the plan to accommodate changes in national development policy and the funding priorities of donors.

**D. Good practices in cross-cutting issues in technology needs assessments**

1. Stakeholder consultation

111. The TNA is intended to be a transparent, country-driven process, which calls for the involvement of the widest possible group of stakeholders in in-depth consultations. Securing adequate stakeholder participation requires a clear, structured and long-lasting framework that involves all relevant parties at an early stage. Such an arrangement makes their responsibilities clear and ensures their engagement throughout the assessment and implementation process.

112. Effective TNA, technology transfer and development activities will be more successful if, as far as is possible, stakeholders are kept engaged and involved. Failure to engage stakeholders can result in a number of problems such as a loss of the insights that stakeholders often provide, and as a result:



- (a) A failure to consider the full range of options;
- (b) Misrepresentation or omission of some sectors, options or opportunities;
- (c) Difficulties in undertaking the TNA (for example because of the consequent lack of specialist knowledge);
- (d) Difficulties in implementing the recommendations of the TNA, as the stakeholders required for implementation may misunderstand or object to the proposed actions;
- (e) A lack of feedback during implementation, which reduces a country's capacity to learn from and improve on its efforts.

113. All the success stories and good practices identified at all stages of the TNA process had a mechanism to ensure adequate and effective involvement of and consultation with stakeholders from the very beginning of the process. Key stakeholders include policymakers, technocrats, NGOs, academia, sectoral experts, the private sector and civil society representatives. The stakeholders that add most value are sectoral experts.

114. It is important to note that in many instances it has proved to be a good practice to work with two groups of stakeholders: a core group of direct participants and a wider group of affected and interested parties. It is therefore important to distinguish activities that will require direct and detailed input from these two groups, as follows:

- (a) **The core group** would deal with the most substantive issues of the TNA process such as management, resource assessment, technology costing and preparation of reports and other materials. It may prove effective to set up, during preliminary consultations, sub-teams or sectoral working groups to push ahead in specific areas;
- (b) **The wider group of affected and interested parties** would participate in consultation and engagement activities, such as workshops, public hearings and consultation papers.

115. The involvement of stakeholders, especially those stakeholders who will be the beneficiaries or end users of technologies, has shown to be essential to ensuring that ill-suited technologies are not prioritized. Thus, in-depth involvement of all stakeholder groups identified as having a role in any of the stages of the technology transfer process is recommended. Such an approach will enable the identification of the most appropriate technologies, as well as identification of barriers to their successful transfer and possible actions to overcome those barriers for inclusion in the implementation plan.

116. Most of the TNA reports mention stakeholder involvement but how this was secured during the process is very often not explicitly reported. The methods of involving stakeholders that were reported consists of, as discussed in chapter III A, holding inception workshops and/or final TNA report presentation workshop, or conducting a questionnaire survey. In most cases a list of stakeholders who have participated in the exercise has been provided. Consultation with stakeholders at the grassroots level is barely reported, even if the transfer of selected technologies concerns them directly as recipients.

117. Box 14 provides a successful example from Armenia of stakeholder engagement and partnership building. The stakeholders were involved in the TNA from the initial selection of the priority sector and technology onward, and took part in the project formulation, resource mobilization and its implementation.

### **Box 14. Example from Armenia of stakeholder engagement in a technology needs assessment**

#### *Background information*

Armenia carried out its TNA within the frame of the initial national communication. The study included a comprehensive assessment of the potential for mitigation of GHG emissions. The municipality heating sector was selected as a priority owing to its high potential for GHG emissions reduction, among other reasons. A project proposal was formulated during the period 1999–2001. The project proposal, submitted for GEF financing under the third cycle of the resource allocation framework (RAF), addressed not only the feasibility of and main barriers to the suggested measures, but also the issues of involving national authorities so that they take ownership of project outputs and creating trustful relations with the donor community.

The main national counterparts of the Ministry of Nature Protection, identified as the executing agency of the project, were the Ministry of Urban Development, the Ministry of Energy and Yerevan Municipality. The project steering committee, serving as an advisory and policy-guiding body, was involved from the inception phase on.

During the project formulation phase, a successful partnership was established between UNDP, the World Bank and USAID through which co-funding resources, additional to those provided through the GEF, were guaranteed. Specifically, the following resources were allocated: World Bank (USD 1 million), USAID (USD 7 million), the Government of the Netherlands (EUR 570,000) and the Government of Armenia (USD 300,000, in kind).

#### *Full-size project implementation stage*

This UNDP/GEF funded project (2005–2009) is aimed at reducing the GHG emissions released from the current heat and hot water supply systems in Armenian cities. It also has evident environmental and social benefits at the local level. Drawing on the links established between the governmental institutions, local authorities and private sector, the project used the following tools for achieving its objectives:

- Signing memorandums of understanding with (1) Yerevan Municipality, with the aim of reconstructing district heating systems in Yerevan to reduce GHG emissions and other air polluting substances and; (2) private investors to provide technical assistance for eliminating barriers in the regulatory framework and conducting feasibility studies in the selected sites;
- Cooperating with the Armenian Renewable Energy and Energy Efficiency Fund chaired by the Prime Minister. The environmental and economic justifications for rehabilitation of municipal heat supply systems were presented to attract private investment;
- Using the European New Neighbourhood Action Plan policy framework, which provides a means to justify the introduction of combined cycle heat and power generation technologies.

The Government decree on “Heating System Rehabilitation Pioneer Projects based on Combined Heat and Power Plants” adopted in 2006 is one of the main achievements resulting from this project. Due to this effort, a significant amount of private investment worth USD 40 million has been leveraged for the rehabilitation of heat supply for 391 multi-apartment residential buildings (70,600 inhabitants) in two targeted districts.

Currently, the project team is closely cooperating with private investors, the Municipality, the Ministry of Energy and the Public Services Regulating Commission to ensure smooth implementation of the investment projects.

118. A synthesis of the good practices drawn from national experiences and lessons learned is given below in box 15.

### **Box 15. Good practices in stakeholder engagement**

- Set up a mechanism to ensure adequate and effective stakeholder involvement and consultation from the very beginning of the process;
- Identify two groups of stakeholders: a core group to deal with substantial issues and a wider group to deal with validation of findings and other TNA deliverables through workshops, consultations and brainstorming sessions, questionnaire surveys, etc.
- Convene regular meetings to identify a large group of stakeholders;
- Design a communications and outreach framework for the wide involvement of stakeholders.

## 2. Barrier analysis

119. Barriers exist at each stage of the TNA process. They are technology, sector and country specific. Identifying and understanding them and the ways they can be effectively addressed and

removed is of key importance to an effective TNA process. For example, barriers exist at various levels: the barriers may relate to policies, regulation, financial availability, markets, education and awareness, institutional, technical and human capacity among others and in some cases they are specific to technologies themselves. At all levels they can be identified only by the stakeholders.

120. It is important to identify and analyse barriers to technology transfer by priority sector and for priority technologies identified in the TNA. Some barriers, especially those encountered when conducting the TNA, have to be removed to ensure selection of the most appropriate technologies for further action, whereas removal of barriers to a clear and proper reporting of the results can only enhance the crucial step of final successful transfer.

121. In the successful TNAs identified, adequate barrier analysis was performed at each stage of the process and barrier analysis was addressed as a cross-cutting issue right from the beginning. The role of stakeholders in the analysis was crucial.

122. The analysis of the TNA reports shows that countries have not identified barriers for successfully conducting the technology assessment. Rather, the majority of countries have identified barriers to technology transfer and measures to address them. The information is very often not clearly reported for facilitating follow-up actions. Some Parties identified barriers in a general manner as opposed to identifying specific barriers to the transfer of individual technologies selected. Although some barriers may apply across the board, others specifically hinder the successful transfer of certain technologies.

123. Taking a comparative approach to the identification of barriers by considering the experiences of countries whose circumstances are similar but that are more advanced in the TNA process has shown to be very effective. This approach consists of (1) an in-depth analysis of the barriers identified by other countries and (2) subsequent validation and adoption of those barriers for the Party's own TNA. This latter stage involves consultation with stakeholders and experts, taking into account that some barriers are generic, some are technology specific and some are country specific.

124. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 16.

#### **Box 16. Good practices in barrier analysis**

- Identify barriers during each stage of the TNA process with a focus on the priority sectors and technologies;
- Identify barriers by considering the experience of other countries and validate and adopt those barriers by consultation with stakeholders and experts, taking into account that some barriers are generic, some are technology specific and some are country specific.

### **3. Gathering technology information**

125. Having adequate information on technologies available on the market is a strong prerequisite for a good needs assessment and for successful technology transfer. The successful transfer of a technology is strongly related to national circumstances and only detailed information on available technologies would enable the assessment team to determine their suitability and plan correctly for their eventual adoption.

126. Developing countries need accurate and regular information on climate change response technologies as well as a mechanism for disseminating it on a regular basis to the stakeholders involved.

127. Some of the basic information required about technologies includes initial investment costs, market potential, degree of maturity in the local context, technical characteristics in relation to the

capabilities of project end users and maintenance requirements. It is particularly important when considering soft technologies for adaptation to have information on how easy they could be mastered and applied by all segments of the population of the IPCC, including local communities.

128. All of the TNA reports contain a list of technologies, assessed but only a minority provide explanations of the sources of information on the technologies. The feedback received from the workshop on best practices revealed that countries either have drawn the list of technologies from the Third Assessment Report and the special report *Methodological and Technological Issues in Technology Transfer* of the IPCC<sup>21</sup> or have shared between themselves the list of the technology options, which was then adopted locally in consultation with stakeholders. This means of information dissemination has proved to be a good practice.

129. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 17.

#### **Box 17. Good practices in technology information**

- Draw on experiences of other countries and/or relevant IPCC reports to gather information for identifying technology options and adapt it to national circumstances in consultation with stakeholders;
- Use TT:CLEAR and other information clearing houses and websites to access information on TNAs, technology options and project preparation.

#### 4. Public awareness and communication

130. Failing to raise public awareness of climate change issues as well as of existing climate-friendly technologies during the TNA process may make it difficult to transfer certain technologies; namely, soft technologies and products of direct consumption where end users are members of the public.

131. Relating awareness-raising activities to a technology to be transferred may help to increase that technology's effectiveness. Greater public awareness of climate change would assist in the transfer of such technologies as energy-efficient appliances and would be particularly helpful for the transfer of management practices in agriculture, forestry, land use and raising livestock. Awareness campaigns may also increase the effectiveness of stakeholders who have restricted access to education and information.

132. The majority of the TNA reports highlight the need for enhanced activities to raise awareness within different segments of the population. None of the TNA reports indicates a national action plan or strategy for awareness-raising and communication to specifically promote and help the process of technology transfer. However, a very few cases highlight actions taken to address the technology transfer issue within the broad national awareness and communication strategy, which has proved to be very effective.

133. All countries considered in this paper have published the results of their TNA process in a report and disseminated it in several ways such as launching it at a workshop, distributing it via email or air mail, or making it available on a national climate change website where it exists, the website of the NCSP and TT:CLEAR. There are, however, many countries that prepared a report only in a local language, did not submit the report to the secretariat or have not yet prepared a report.

134. A synthesis of the good practices drawn from the country experiences and lessons learned is given below in box 18.

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<sup>21</sup> As cited in footnote 9 above.

**Box 18. Good practices in public awareness**

- Identify public awareness and communication needs along the whole technology transfer chain;
- Design a public awareness and communication strategy for climate change to address technology transfer, among other issues;
- Disseminate and share the TNA report via several channels.

**5. Capacity-building**

135. It is vital for the core group (as defined in paragraph 111 above) undertaking the TNA as well as sectoral teams to assess whether adequate capacity exists for carrying out the different stages of the technology transfer process.

136. Insufficient capacity may prove to be a serious barrier to the process and need to be addressed at the appropriate time to ensure successful technology transfer. It would be advisable for Parties to clearly identify capacity-building needs for the different steps of the TNA process and propose measures for addressing them.

137. The need for capacity-building is identified and expressed in rather general terms in most of the TNA reports. Capacity-building needs vary among Parties but are principally related to human resources. Other areas where a lack of capacity has been identified include finance, markets, information and awareness, policy, regulation, institutions and technology.

138. The TNA process has proved to be a learning by doing process that has helped countries to significantly develop their national capacities to identify technology needs. Sharing experiences with other countries in different ways throughout the TNA process has proved to be an effective tool for capacity-building. One means of sharing experiences are the forums and workshops organized by the secretariat, UNDP, UNEP, the United Nations Industrial Development Organization (UNIDO), the CTI and others. Exchange visits between national teams, particularly within a geographical region, and/or sharing feedback comments on draft TNA reports is a proven good practice which has helped not only towards capacity-building but also towards improving the quality of TNAs.

139. A synthesis of the good practices drawn from national experiences and lessons learned is given in box 19.

**Box 19. Good practices in identifying capacity-building needs**

- Identify capacity-building needs for each stage of the TNA and revise them, where possible, to ensure a smooth and successful assessment;
- Arrange exchange visits with other national teams, ideally within the same geographical region, and/or share feedback comments on the draft TNA report.

**6. Research and development**

140. Research and development (R&D) is a vital component of successful technology transfer, as very often technologies have to be modified or updated prior to their diffusion in order to make them more suited to national circumstances. In some cases, R&D is imperative for a technology option to be successful. This is true for technology options using more adaptive crop varieties or animal species in the agriculture sector. Moreover, research can contribute to the development of new technologies that are better able to meet the local needs.

141. A synthesis of the good practices drawn from national experiences and lessons learned is given below in box 20.

**Box 20. Good practices in identifying research and development activities**

- Identify R&D needs along with the technologies prioritized;
- Design an R&D programme including opportunities for regional or international cooperation and submit them to the relevant authorities for implementation;
- Promote participatory research to enhance the flow of technologies.

**7. Information sharing and networking**

142. Access to information (internally and externally) can only be beneficial to the implementation of the TNA findings. Useful existing technologies are not always known to promoters, potential beneficiaries and recipients. Thus, ways and means of enhancing the flow of information should be sought. Networking is presently proving very useful but its continued usefulness rests upon the ability and capacity of stakeholders at the end of the chain in non-Annex I Parties to connect to the system. Information sharing activities may have to be linked to awareness and communication programmes in order for information eventually to reach the targeted audience.

143. TT:CLEAR already constitutes a large amount of information on the technology transfer framework. Information is also shared through CD-ROMs and various other means by the secretariat. Results of a survey (FCCC/SBSTA/2004/INF.8) conducted by the secretariat indicated that the majority of the respondents found TT:CLEAR useful and relevant to their work. Most respondents also found the information to be of good to excellent quality and well organized.

144. The implementation of the technology framework has been significantly advanced and now that 34 Parties have completed their TNAs, it would be advisable to organize all available information into a 'one stop shop' for all stakeholders concerned with the framework. Availability of information, especially on the status of implementation and the success of technologies transferred, could prove helpful to further enhancement of the process. Project developers, financiers, policymakers and planners may also find it useful to use such information in their activities, which would in turn promote the implementation of the framework for technology transfer. Moreover, Parties in the process of undertaking their TNA or planning to do so may build upon this information to enhance their work.

145. None of the TNA reports provides information regarding the method of sharing information and networking during the TNA process. However, this information has been extensively shared by Parties either through different forums such as workshops or training sessions organized by the secretariat, UNDP, UNEP, UNIDO, the CTI and others, or directly with other countries, in most cases using the networks set up within the frameworks of other climate change programmes (global, regional or sub-regional). Both practices have proved effective.

146. A synthesis of the good practices drawn from experiences and lessons learned is given in box 21.

**Box 21. Good practices in information sharing and networking**

- Take stock of existing information sharing systems and networks that stakeholders can access and use within the framework of the TNA process;
- Build on the experiences of other countries that are more advanced in information sharing and networking, adopting their approaches according to national circumstances;
- Identify gaps in and constraints on effective information sharing and networking, and address them as part of the national awareness-raising and communication strategy for climate change.

#### **IV. Common difficulties faced and preferred good practices**

147. This chapter of the paper summarizes the common challenges and difficulties faced during the TNA process and is meant to complement the section that identifies challenges and difficulties in the TNA synthesis report prepared by the secretariat. It also proposes a ranking of good practices based on the analysis of the responses to the questionnaire survey carried out during the workshop on best practices with a view to identifying which of the good practices summarized in chapter III above are favoured most by Parties and other actors.

148. The chapter draws on views of Parties and other actors involved in the TNA process gathered from:

- (a) The outcomes of breakout sessions that were held at the workshop on best practices on: conducting TNAs; reporting, synthesizing and analysing the results of TNAs and communicating their findings; and implementing the findings of TNAs (identified below as information provided by participants);
- (b) The questionnaire survey that was carried out during the workshop to gather information on what could constitute good practices in TNAs (identified below as information provided by respondents). The detailed results of this survey can be found in annex II;
- (c) The round table on enhancing access to financing resources held during the workshop.

##### **A. Common difficulties and preferred good practices in conducting technology needs assessments**

149. The discussions during the workshop and the findings of the survey suggested that most difficulties encountered in conducting TNAs relate to selecting the target area (mitigation, adaptation or both), identifying barriers to technology transfer and identifying capacity-building needs. Some participants indicated that the resources available for conducting TNAs are not sufficient and that the level of resources available has a bearing on the coverage of key mitigation and vulnerable sectors, the number of technologies assessed and the involvement of stakeholders.

150. With regard to the prioritization of technology options, in many cases the challenge is how to perform an in-depth assessment of candidate technologies with a wide range of stakeholders who are well informed.

##### *Preferred good practices*

151. The survey results suggest that good practices in conducting TNAs in order of importance are: perform a barrier analysis; conduct stakeholder consultations or include stakeholders in the TNA process; gain access to information; prioritize technologies; prioritize sectors; select technologies; hold inter-ministerial discussions for mainstreaming technology needs; make institutional arrangements; choose criteria with the full consultation of stakeholders; and involve the private sector.

152. The favoured approaches to engaging stakeholders in all steps of the TNA process are to organize workshops with their participation, followed by establishing the TNA core team and holding interviews with stakeholders. The preferred methods for prioritizing technology needs are multicriteria analysis and cost–benefit analysis.

### **B. Common difficulties and preferred good practices in reporting, synthesizing and analysing the results of technology needs assessments and communicating their findings**

153. Most participants noted that the preparation of a TNA report is not a simple task. The contents and level of detail of the report will depend on: the type of the report (e.g. whether it is a stand-alone report or part of the national communication); whether the report needs to be endorsed by the Government and/or submitted to the COP through the UNFCCC; and the funds available for conducting the TNA. In this context participants stressed the importance of a good report, which is the key to the implementation of TNA findings, and noted that the funds available for the second national communication will not be sufficient to conduct the TNA and produce such a report.

#### *Preferred good practices*

154. Respondents found that the most important information to be reported is the key sectors and technologies selected, followed by project ideas, concepts and proposals, and the implementation plan.

155. With regard to synthesizing and analysing TNA findings, the overwhelming majority of respondents found the TNA synthesis report prepared by the secretariat useful. A majority of participants found frequency analysis (e.g. how many countries identified a particular technology as priority) to be a useful tool for summarizing findings of TNAs.

156. With regard to communicating TNA findings, participants recommended, in addition to making TNA reports available on TT:CLEAR, developing a communication strategy for disseminating findings of TNAs. The four activities considered important to communicating the findings of TNAs were rated closely in the following order of importance by participants: establishing a national database on TNAs; preparing a summary report for the national communication; developing and implementing a TNA communication strategy; and organizing periodic meetings with the stakeholders.

157. The most favoured good practices in updating TNA findings are, in order of preference: monitor the implementation of TNAs; incorporate them in national communications; maintain the working groups for follow-up actions; disseminate the information to stakeholders and/or policymakers; and widen the scope of the assessment to include more in-depth studies on adaptation.

### **C. Common difficulties and preferred good practices in implementing the findings of technology needs assessments**

158. Only a small minority of the respondents reported that they find preparing the implementation plan a relatively simple task, while very few participants reported success in implementing some of the concrete project ideas, concepts or proposals identified and reported in their TNAs.

159. Participants reported encountering difficulties in implementation in the following areas, ranked from most to least difficult: ensuring transparency; maintaining stakeholder involvement; revising plans as needed; identifying potential synergies; identifying ways to reduce barriers; developing implementation strategies; securing resources; and assessing the adequacy of financial resources.

160. A general concern was expressed by participants regarding the availability of adequate financial support for continuation of the TNA process and implementation of its findings.



*Preferred good practices*

161. The financial sources that have proved most effective for implementing the findings of TNAs are bilateral cooperation, the GEF and private sector funding, clean development mechanism (CDM) projects, regional development banks and World Bank funding, voluntary CDM and other carbon markets.

162. Good practices for preparing the implementation plan were identified by most participants. The favoured ones follow in order of preference: secure funding for implementing TNA findings; integrate TNA findings into national plans; remove barriers; build capacity; keep the working group in place for continued action; improve the capacity of the country to absorb new technologies; secure stakeholder involvement and resources; ensure private sector participation; develop adaptation projects; and concentrate on only a few projects.

163. Of the good practices in promoting policies and measures to reduce barriers to technology transfer that were provided by respondents, the following were ranked highest: integrate the whole process within government plans and policies; build national capacity to absorb new technologies; ensure co-functioning of working groups; establish steering committees and councils; promote laws on renewable energy; incorporate climate change in the current policies of developing countries; ensure intra-government coordination; involve stakeholders; invest in projects developed and submitted in TNAs; provide the technology need information to policymakers; and address cultural barriers.

164. The preferred measures of participants for addressing needs for capacity-building identified in TNAs are to organize more frequently the usual capacity-building activities such as workshops, meetings, conferences, training courses and learning programmes. Participants also recommended learning by doing project development activities and institutionalization of capacity-building.

165. Financial advisory networks such as the Private Financing Advisory Network (PFAN) of the CTI can play a role in enhancing the implementation of TNA results by identifying gaps that need further elaboration and providing assistance in the networking process. Participants recommended PFAN as a positive and scalable model. The likely benefits to implementation of such networks as identified by respondents are described in annex II.

## **V. Issues for further consideration**

166. This section summarizes ideas for improving TNAs and possible further action. It draws on views of Parties and other actors involved in the TNA process, as described in chapter IV above.

### **A. Ideas for improvement and future action in conducting technology needs assessments**

167. Further work is needed to integrate and mainstream TNAs into governmental sectoral and/or national policies on poverty reduction or sustainable development based on clear objectives set at national and international levels.

168. Most participants agreed that the TNA process should include development of project proposals and that further work is needed to develop such project proposals. Information available to Parties on markets and climate-friendly technologies continues to be inadequate.

169. Approaches and methodologies used to conduct TNAs are well known and there just requires some elaboration of the steps for technologies for adaptation to cater, for example, for uncertainties in climate change scenarios and sea level rise. Parties should also pay more attention to adaptation when updating their TNAs.

170. The findings of the survey and the discussions in the breakout groups suggest that although existing guidelines for conducting TNAs are useful, they should be updated. The TNA handbook needs

some refinements on how to identify capacity-building needs and the procedures for implementing TNA findings. Furthermore, good practices should be further compiled and made available to Parties.

#### **B. Ideas for improvement and future action in reporting, synthesizing and analysing the results of technology needs assessments and communicating their findings**

171. A majority of respondents agreed that the existing guidance for preparing the TNA report should also be further refined and updated. Further work is required to improve reporting of the chief areas of information identified by respondents (as described in paragraph 153 above).

172. Suggestions made by respondents on ways and means to increase the number of TNA reports submitted to the secretariat vary widely. Funding of TNAs or identified projects is the preferred option, followed by capacity-building, essentially through workshops, more technical assistance, cooperation and support from consultants from countries with good TNAs, preparation of stand-alone reports, and encouraging multilateral organizations to support the TNA process. Other suggestions are described in annex II.

173. Further details that need to be considered when summarizing findings of TNAs are detailed technology sub-groups, grouping by economic development, specific group of countries (e.g. the SIDS) and regional grouping.

#### **C. Ideas for improvement and future action in implementing the findings of technology needs assessments**

174. A majority of the respondents find the existing guidance for preparing the implementation plan (the step known as implementation action) useful and most of them agreed with the idea that this guidance should be further refined and updated. Survey responses and the other sources of information analysed also suggest possible future activities in implementation for the main actors involved in TNAs.

175. Governments could assess the adequacy of financial resources for implementing the findings of TNAs; prioritize, organize, and provide clarity and focus on, various technologies defined in TNAs; assess market needs; promote partnerships; and increase public awareness.

176. The GEF and its implementing agencies could integrate the findings of TNAs in their programmes to support the efforts of Parties in mitigating and adapting to climate change. Concerning project implementation, GEF could play a more proactive role of the GEF in giving guidance on implementing the findings of TNAs.

177. Development banks and financing institutions could provide training in preparing project financing proposals to financial institutions and project developers. Multinational banks could support the implementation of TNA findings through financing instruments such as a clean energy investment framework. Other suggestions are described in annex II.

178. The EGTT has played an effective role in the production of a series of useful products for various user groups such as the practitioners' guide and a brochure on technologies for adaptation.<sup>22</sup> The EGTT should continue to focus on its role of promoting, conducting outreach and identifying gaps in technology transfer activities and should facilitate the implementation of TNAs. Most respondents provided roles the TNAs could have in shaping the future work of the EGTT, in particular with regard to focus on particular technologies/sectors. While some respondents suggested the EGTT has served its purpose and should wait for feedback, others suggested that the EGTT should review its objectives in the light of the present status of the work on the technology transfer framework and set new ones, do more

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<sup>22</sup> <<http://ttclear.unfccc.int/ttclear/jsp/index.jsp>>.

work focused on technologies for adaptation and work towards improving access to information and information sharing.

179. Regarding the availability of adequate financial support for continuation of the TNA process, solutions may include guidance from the COP to make funds available to carry out or update TNAs; COP guidance on conducting TNAs and reporting on findings; instruments to enable and/or enhance implementation of TNA findings; and a decision by the COP to invite the donor community to consider the TNA findings under their assistance frameworks.

Annex I**Template for reporting activities relating to technology transfer in national communications**

<b>Key considerations<sup>a</sup></b>	<b>Information</b>
Brief description of existing or planned national policies, legal and institutional framework(s) to facilitate the implementation of decision 4/CP.7 in areas such as: technology needs and needs assessments; technology information; enabling environments; capacity-building; and mechanisms for technology transfer.	
Brief description of identified priority activities related to capacity-building, enabling environments, investment, technology assessments and any other relevant information to advance the implementation of Article 4, paragraph 5, of the Convention at the local, national and regional levels.	
Brief summary of the process, key outcomes and funding of the technology needs assessment conducted.	
Brief description of pilot programmes, if any, on technology transfer relating to climate change, including an estimation of required external funding, and modalities to obtain such funds. What are the lessons learned in implementing these pilot programmes?	
Brief description of existing and planned climate-related technology transfer programmes/projects supported by bilateral and multilateral agencies, and international organizations.	
Brief description of the role of the various stakeholders, particularly the private sector and research and development institutions, in the process of technology transfer.	
Brief description of the success/failure of technology transfer, including possible hindrances that limit such transfer, citing examples and lessons learned.	
Brief description of the technology and technology enabling activities that have been identified through the national adaptation programmes of action process as necessary to facilitate immediate adaptation.	
Briefly describe linkages between technology transfer activities, programmes and projects with national development planning processes.	

<sup>a</sup> For further information, see source: FCCC/SBI/2007/3.

## Annex II

### **Findings of the questionnaire survey on good practices in technology needs assessments**

#### **A. Introduction and purpose**

1. This annex summarizes the results of the questionnaire survey on good practices in technology needs assessments (TNAs) conducted during the workshop on good practices in conducting TNAs held from 27 to 29 June 2007 in Bangkok, Thailand. The questionnaire survey<sup>1</sup> was distributed to all 86 participants. Twenty responses were received, 19 from participants from Parties not included in the Annex I to the Convention (non-Annex I Parties) and one from a participant from a Party included in Annex I to the Convention (Annex I Party).

2. The survey process and resulting analysis presented in this annex aim at: (1) assessing the usefulness of the United Nations Development Programme (UNDP) handbook *Conducting Technology Needs Assessment for Climate Change*<sup>2</sup> (TNA handbook) with regard to conducting the TNA, reporting and communicating the TNA findings, and implementing the findings; and (2) identifying the areas that need improvement.

#### **B. Survey methodology**

##### 1. Survey design

3. The survey questionnaire was designed with the objective of gathering information from participants for use as input to the paper on good practices with conducting TNAs to be submitted to the Subsidiary Body for Scientific and Technological Advice at its twenty-seventh session. It was designed in such a way as to cover the steps to be followed for a successful and effective TNA and was subdivided into four sections: (1) eight questions asked for statistical purposes; (2) 13 questions on conducting TNAs; (3) 13 questions on reporting and communicating findings; and (4) 14 questions on implementing TNA findings. Almost all replies consisted of the participant ticking the right answer or option. This approach was taken so that participants would not find the survey time-consuming or cumbersome.

##### 2. Sampling methodology

4. No special methodology was developed as the survey was conducted among participants of the workshop that were in one way or the other stakeholders of the technology transfer framework. The participants from non-Annex I Parties represented countries at various economic development stages. Most non-Annex I Parties represented had already completed their TNA, with a minority of them drawing from established guidance, namely the TNA handbook. They were thus considered a representative sample for meeting the objective of identifying good practices in conducting TNA.

##### 3. Survey limitations

5. The major limitation of the survey is the number of responses received. A higher rate of participation would have provided a wider range of answers, especially with regard to what respondents consider good practices and how the TNA handbook could be improved.

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<sup>1</sup> The survey questionnaire is available at: <<http://ttclear.unfccc.int/ttclear/html/WshpBangkokPresentations.html>>.

<sup>2</sup> <<http://ttclear.unfccc.int/ttclear/html/TNAGuidelines.html>>.

### C. Survey findings

#### 1. Information about survey respondents

6. Of the 86 participants who attended the workshop, 23 per cent (20) participants from 19 Parties responded to the survey. Sixteen were from non-Annex I Parties, including five from small island developing States (SIDS) and four from least developed countries,<sup>3</sup> and one from an Annex I Party. Three respondents did not specify their country of origin.

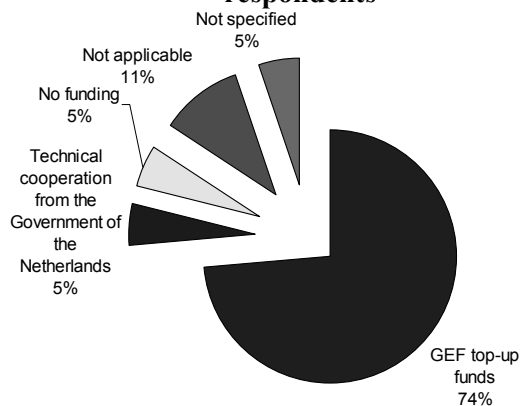
7. Of the respondents, 80 per cent (15) reported that his or her Party has completed and submitted its TNA report, three are in progress and one has yet to start the TNA. All TNAs conducted so far have been completed, but only 13 out of the 15 have been submitted to the secretariat (see table 1).

**Table 1. Status of technology needs assessments as reported by respondents**

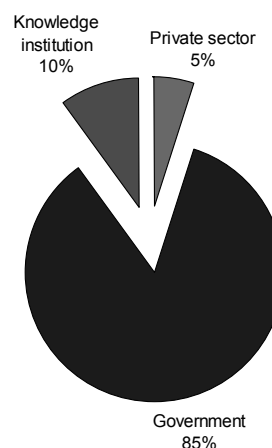
Response	Conducted	Completed	Submitted
Yes	15	15	13
No	1	4	6
In process	3		
<b>Total</b>	<b>19</b>	<b>19</b>	<b>19</b>

8. Reported information indicates that the TNAs of the majority of Parties (14) were undertaken with financial assistance from the Global Environment Facility (GEF). One Party used funding from bilateral technical cooperation with the Netherlands and one did not rely on external funds. One Party did not specify the funding source and the question was not applicable to two Parties (see figure 1).

**Figure 1. Source of financial assistance for the technology needs assessment as reported by respondents**



**Figure 2. Representation of organization among the survey respondents**



9. For the TNA, seven Parties received technical assistance from UNDP, four from the United Nations Environment Programme (UNEP), two from the Climate Technology Initiative (CTI) and one through the bilateral technical cooperation with the Netherlands. One Party did not resort to technical assistance, three Parties did not report thereon and the technical assistance aspect was not applicable to one Party that had not yet embarked on the TNA.

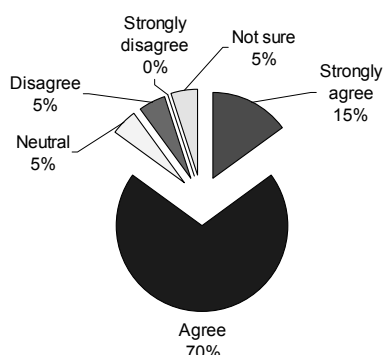
<sup>3</sup> Responses were provided by representatives of Armenia, Belize, Bolivia, Comoros, Dominican Republic, Ghana, Namibia, Japan, Malawi, Mauritius, Peru, Philippines, Seychelles, the United Republic of Tanzania, Uzbekistan, and Viet Nam.

10. The majority of respondents (85 per cent) have been involved in TNA and of these, 16 (80 per cent) were government representatives. Regarding the type of organization they represented, 85 per cent of the respondents were from government (17), two were from knowledge institutions and one was from the private sector (see figure 2).

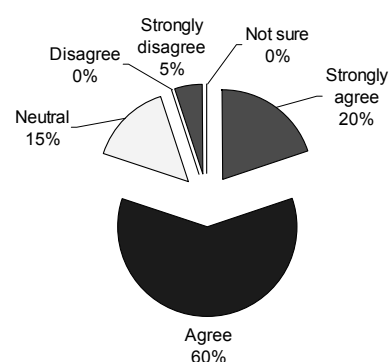
## 2. Conducting technology needs assessments

11. Most respondents (85 per cent) found the existing guidance for conducting TNAs useful, with 15 per cent (3) strongly agreeing and 70 per cent (14) agreeing (figure 3). A majority (16 out of 20) of the respondents believed that the guidance for conducting TNAs should be updated and one strongly disagreed (see figure 4).

**Figure 3. Survey responses to the statement “I find existing guidance for conducting TNAs useful”**



**Figure 4. Survey responses to the statement “I think the guidance for conducting TNAs should be updated”**

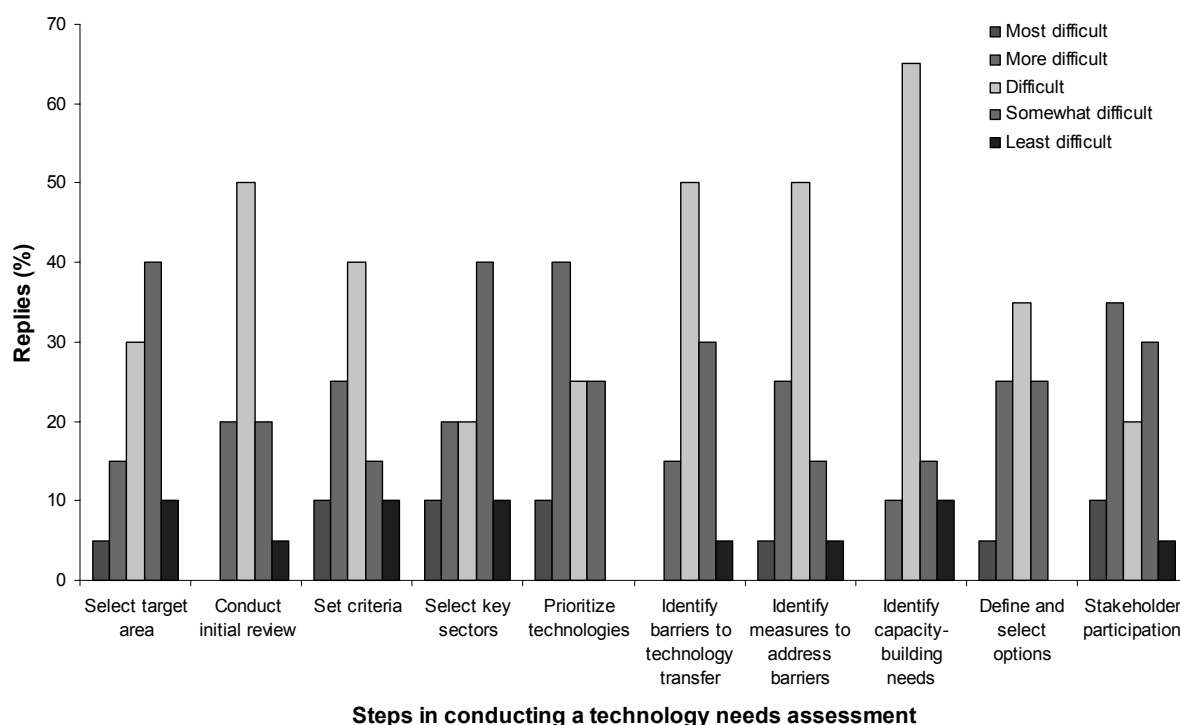


12. Only one respondent found the quality of market information available in his country for TNAs excellent. Seven (35 per cent) found the information availability to be good, eight (40 per cent) found it fair and the remaining four (20 per cent) qualified it as poor.

13. Concerning the steps for conducting the TNA identified in the TNA handbook, participants were requested to rank the level of difficulty encountered when completing each step by grading each one from 1 to 5, with 1 being most difficult, 2 more difficult, 3 difficult, 4 somewhat difficult and 5 least difficult. The answers were analysed by totalling the grades allocated by each respondent and ranking the steps using the total obtained. The steps were ranked as follows, from, most difficult to least difficult: select target area (10); identify barriers to technology transfer (8); identify capacity-building needs (8); select key sectors (7); conduct initial review (6); set criteria (4); identify measures to address barriers (4); stakeholder participation (3); prioritize technologies (2); and define and select options (1).

14. Although for each individual step, responses pertaining to the level of difficulty varied between respondents, the distribution curve followed a Gaussian shape (see figure 5). Most of the responses were allocated levels 2, 3 and 4 with the maximum varying between the steps. This lack of commonality between the responses may be attributed to the wide differences between countries in terms of level of socio-economic development, importance of economic sectors and the significance of those sectors for climate change mitigation and adaptation. Irrespective of step and from the 197 responses out of the possible 200, the highest number of responses (77) was attributed level 3 followed by 51 for level 4, 46 for level 2, 12 for level 5 and 11 for level 1.

**Figure 5. Respondents' perception of the difficulty level associated with the steps in conducting a TNA**



15. To identify the activities that participants consider the most important for conducting a TNA, respondents were asked to choose up to three activities from a list of seven. The activities most frequently identified were the selection of key sectors and technologies, which was nominated 17 times (28 per cent of all nominations), and balancing technology criteria for assessment, which was nominated 12 times (20 per cent of all nominations) (see table 2).

**Table 2. Nominations by respondents of the most important activities for conducting TNAs**

Response	Number	Per cent
Compile and supplement technology and market information	5	8
Select key sectors and technologies taking into consideration national development plans, national communications and NAPAs	17	28
Balance technology criteria for assessment between contribution to development goals, addressing climate change, environmental protection and market potential	12	20
Prioritize sectors and select comprehensive list of key technology(ies)	7	12
Identify barriers and policy needs for all these sectors and technologies	7	12
Identify capacity-building needs to enhance technology absorption capacity	7	12
Define and select options (a limited number of priority technologies)	5	8

16. The two models proposed for establishing technology transfer cooperative teams were found equally convenient by the participants (see figure 3 of the main document).

17. Of the 53 responses received on the question of which approach is most appropriate for engaging stakeholders in all steps of the TNA process, 20 voted for holding workshops (38 per cent), 14 (26 per cent) voted for establishing a core team and 10 (19 per cent) voted for holding interviews. The use of



questionnaires, media presentations and documents, and a scoping paper are considered less appropriate approaches, receiving three, four and two votes respectively.

18. In response to the question of which is the most appropriate method for prioritizing technology needs, some respondents chose more than one option, so that a total of 28 responses were received from the 20 participants. All the responses were included in the evaluation. Multicriteria analysis and cost–benefit analysis are the two most favoured methods, accounting for 10 (36 per cent) and eight (29 per cent) of the responses respectively. The modelling technique received no nominations. Table 3 lists the responses in detail.

**Table 3. Nominations by respondents of the most appropriate method for prioritizing technology needs**

Method	Number	Per cent
Multicriteria analysis	10	36
Analytical hierarchy process	2	7
Cost–benefit analysis	8	29
Risk–benefit analysis	1	4
Modelling (e.g. electricity system expansion)		
Ranking (low, medium, high)	1	4
Questionnaire survey	3	11
Group decision	3	11
Other (please specify)		

19. Most of the respondents, 70 per cent or 14 out of 20, expressed the need for a sensitivity analysis of the prioritized technologies. Of those 14 respondents, only five said their Party had conducted sensitivity analysis in its TNA.

20. A total of 27 responses were received regarding the kinds of barrier that should be identified: three respondents identified three kinds of barrier; one responded identified two kinds and 16 respondents identified one kind. Country specific barriers were rated as most important in 14 responses (52 per cent), followed by sectoral barriers in seven responses (26 per cent) and individual technology barriers in six responses (22 per cent).

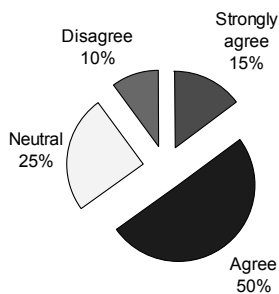
21. Twelve responses were received on the question of identification of good practices in conducting a TNA. Four respondents identified both barrier analysis and stakeholder consultations or inclusion in the TNA process as good practices. Three respondents identified gaining access to information and two prioritization of technologies. Prioritization of sectors, selection of technologies, inter-ministerial discussions for mainstreaming technology needs, institutional arrangements, choice of criteria with the full consultation of stakeholders, and involvement of the private sector all received one nomination each as a best practice. One participant found the survey questionnaire a good practice for conducting TNAs.

22. Twenty-two suggestions were received from 15 Parties on the issue of possible measures to improve how TNAs are conducted. Integrating and mainstreaming TNAs into governmental sectoral and or national policies for poverty reduction or sustainable development was identified in four cases, followed by project implementation. Concerning the latter, a more proactive role of the GEF in giving guidance for implementing TNA was recommended. Updating TNAs to include greater consideration of adaptation, stakeholder consultations and prioritization/selection criteria was identified in two cases. Other possible measures, namely the availability of good practice guidance, funding, setting clear objectives at national and international levels, clarifying the status of TNAs and submission of reports and the improvement of guidelines were nominated once each.

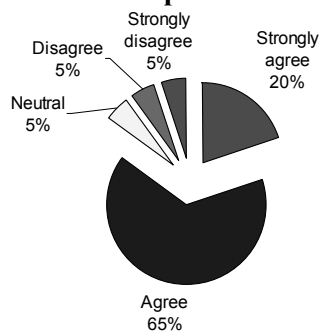
3. Reporting and communicating technology needs assessment findings

23. A majority of respondents (65 per cent) either strongly agreed or agreed that the existing guidance for preparing the TNA synthesis report is useful. Five respondents expressed neutrality while two disagreed (see figure 6).

**Figure 6. Survey responses to the statement “I find existing guidance for reporting and communicating TNAs findings useful”**



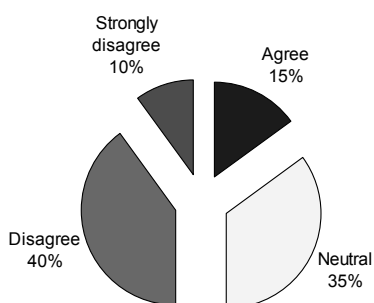
**Figure 7. Survey responses to the statement “I think the guidance for reporting and communicating TNAs findings should be updated”**



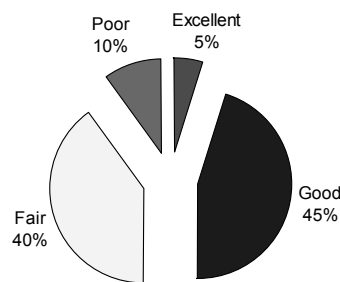
24. Most (85 per cent) of the respondents either strongly agreed or agreed that the guidance for reporting and communicating TNAs should be further refined and updated. One person disagreed, one strongly disagreed and one was not sure (see figure 7).

25. Ten respondents (50 per cent) either disagreed or strongly disagreed that preparing a report on the TNA is a relatively simple task; only three respondents agreed (see figure 8).

**Figure 8. Survey responses to the statement “I find preparing a report on the TNA a relatively easy task”**



**Figure 9. Survey responses to the statement “I find the quality of the information reported in TNAs to be...”**



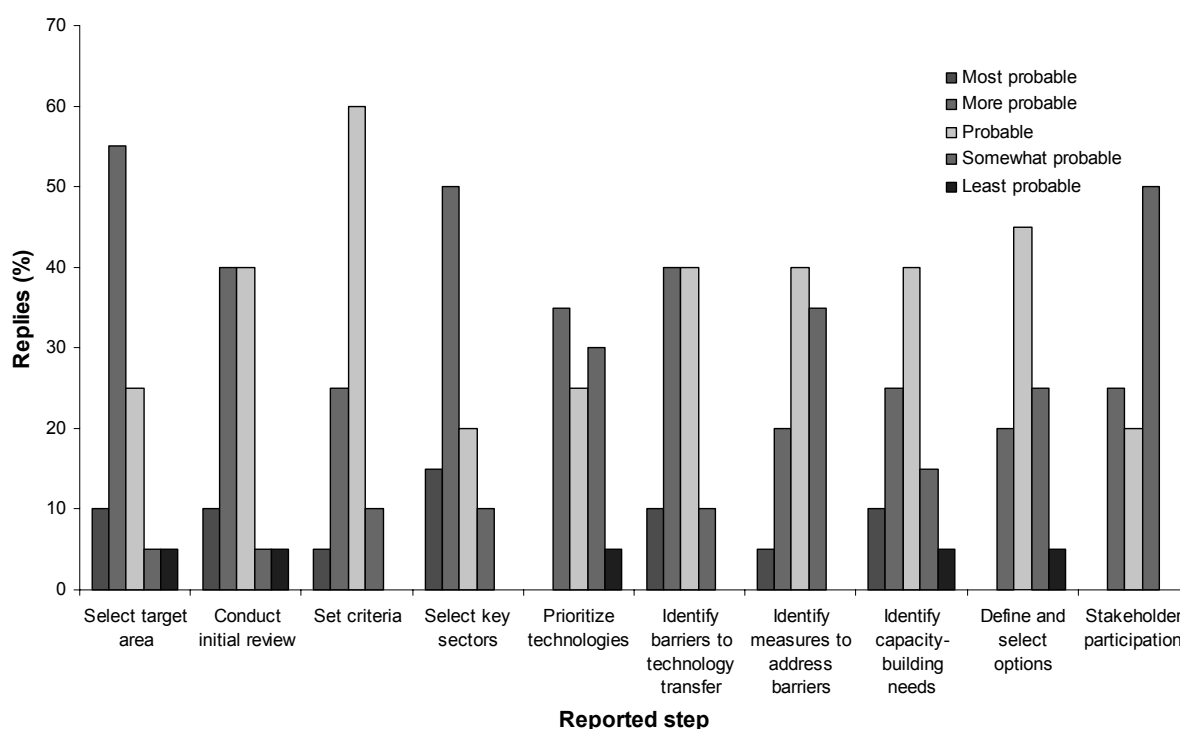
26. Nine (45 per cent) and eight (40 per cent) of respondents found the quality of information reported in TNAs to be good and fair respectively. One person found it excellent and two poor (see figure 9).

27. To determine participants’ opinion on the quality of reporting in TNA synthesis reports, respondents were asked to estimate the likelihood of information being well reported for each of the identified steps conducting a TNA by grading each step from 1 to 5, with 1 being most probable, 2 more probable, 3 probable, 4 somewhat probable and 5 least probable. The answers were analysed by totalling the grades allocated by each respondent and ranking the steps using the total obtained. The steps were ranked as follows, from least likely to be well reported to most likely: stakeholder participation (10); identify measures to address barriers (9); define and select options (8); identify barriers to technology

transfer (5); prioritize technologies (5); identify capacity-building needs (4); set criteria (3); conduct initial review (2); select target area (2); and select key sectors (1).

28. Respondent’s perception of the probability of information being well reported for each step of the TNA process varied: most responses were positive with the exception of the stakeholder participation step. Most of the responses were allocated rank 1 to 3, with the maximum number of responses varying between the activities. Irrespective of step 195 responses were given out of a maximum of 200. The highest number of responses (71) was attributed rank 3, followed by 67 for rank 2, 39 for rank 4, 13 for rank 1 and 5 for rank 5 (see figure 10).

**Figure 10. Respondents’ perception of the probability of information being well reported for each step of the TNA process**



29. When asked what is the most important information regarding a TNA to be included in its synthesis report, may respondents chose more than one option, so that 68 responses were obtained instead of 20. Information on the key sectors and/or technologies selected was considered the most important to report on in 14 responses (21 per cent), followed by information on project ideas, and concepts and proposals (12 responses or 18 per cent) and information on implementation plans (10 responses or 15 per cent). Table 4 lists the responses in detail.

30. Suggestions made by participants on ways and means to increase the number of TNA reports submitted to the secretariat differed widely. Of the list of options presented to the respondents, funding of TNA studies or identified projects was chosen by seven respondents, followed by capacity-building to conduct the TNA (four respondents), essentially through workshops. Technical assistance/cooperation and securing support from consultants from countries with good TNAs were each chosen by two respondents. The following options were each chosen once: preparation of stand-alone reports, engaging responsible multilateral organizations to initiate the TNA process, reporting TNAs in national communications, updating the report every six months, and clarifying the advantages of Parties that submitted a report. Two participants did not answer this question.

**Table 4. Nomination by respondents of the most important information regarding a TNA**

Information	Number	Per cent
On methodological approach used for conducting TNA	8	12
On key sectors/technologies selected	14	21
On barrier analysis	9	13
On project ideas/concepts/proposals	12	18
On technology transfer community	5	7
On potential sources of funding	6	9
On implementation plans	10	15
On data gaps	3	4
Other (please specify)	1	1

31. The four activities considered important for communicating the findings of TNAs were rated quite closely by respondents, who selected more than one option in many cases. Thus the 20 respondents gave 46 answers. The number of nominations varied from nine to 13 for the proposed activities, while one response under Other nominated the integration of the outcome of TNA into existing national programmes (see table 5).

**Table 5. Nominations by respondents of the most appropriate method for prioritizing technology needs**

Activity	Number	Per cent
Establishing a national database for TNAs	13	28
Preparing a summary report for the national communication	11	24
Developing and implementing a TNA communication strategy	12	26
Organize periodic meetings with the stakeholders	9	20
Other (integrating outcome of TNA into existing national programmes)	1	2

32. Identified good practices for updating the findings of TNAs varied widely but be classified under 15 broad headings. Four activities were identified twice, namely monitoring the implementation of TNAs, incorporation of their findings in national communications, maintaining the working groups for follow-up actions and disseminating the information to stakeholders and/or policymakers. The remaining good practices identified are to widen the scope of the assessment to include more in-depth studies on adaptation, integrate TNAs into national plans, improve on the shortcomings based on good practices, revisit the study, develop project proposals, enhance stakeholder consultations, identify the gaps in data and address them, undertake new studies, report annually to a sectoral steering committee and use, review and new guidelines for TNA preparation. Six participants did not respond to the question.

33. The vast majority of respondents (90 per cent) found the synthesis report on technology needs identified by non-Annex I Parties (FCCC/SBSTA/2006/INF.1) useful. One respondent did not find it useful and one did not specify.

34. Sixteen out of the 20 participants (80 per cent) found conducting frequency analysis (e.g. how many countries have identified a particular technology as priority) to be a useful tool for summarizing findings of TNAs. Three respondents disagreed with this and one did not reply.

35. Respondents were asked to choose from four proposals for further detail that needs to be considered when summarizing TNA findings. Some respondents chose more than one proposal, leading to 29 responses being received. Of the four types of details proposed, detailed technology sub-groups was chosen nine times (31 per cent of responses), grouping by economic development eight times (28 per

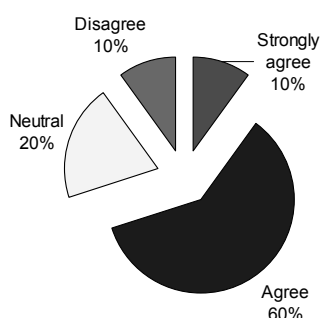
cent), specific group of countries (e.g. SIDS) seven times (24 per cent) and regional grouping five times (17 per cent).

36. Seven out of the 20 respondents did not answer the question how to improve the TNA synthesis report prepared by the secretariat. Of the responses that were received, four nominated the suggestion of summarizing technology needs by region. The need for more focus on adaptation technologies followed with two responses. Other suggestions are: link TNAs with commitments of non-Annex I Parties; improve guidance for TNAs; synthesize information from all TNAs available; take into consideration the specificities of the SIDS; provide information on priority technologies by Party and not only by technology group; provide more details on technology subgroups; provide a description of the technologies selected; and synthesize information by sector (e.g. energy and non-energy sectors).

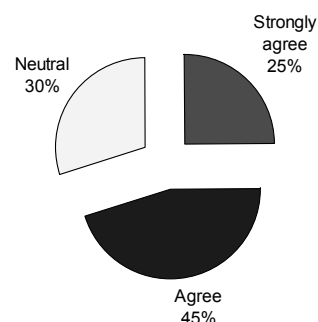
4. Implementing technology needs assessment findings

37. A majority of respondents (70 per cent) either strongly agreed or agreed that the existing guidance for preparing the implementation plan (implementation action) is useful. Of the remaining respondents, 20 per cent were neutral and 10 per cent disagreed (see figure 11).

**Figure 11. Survey responses to the statement “I find existing guidance for implementing TNAs findings useful”**



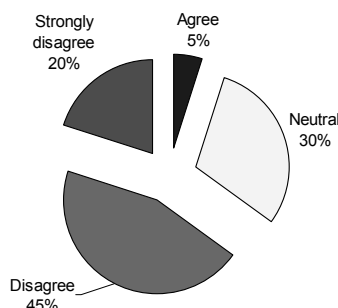
**Figure 12. Survey responses to the statement “I think the guidance for implementing TNAs should be updated”**



38. Fourteen of the 20 respondents (70 per cent) either strongly agreed or agreed that this guidance should be further refined and updated. None of the respondents disagreed as the remaining 30 per cent were neutral (see figure 12).

39. Only one respondent (5 per cent) agreed that preparing the implementation plan is a relatively simple task. The vast majority (65 per cent) disagreed, 20 per cent of them strongly (see figure 13).

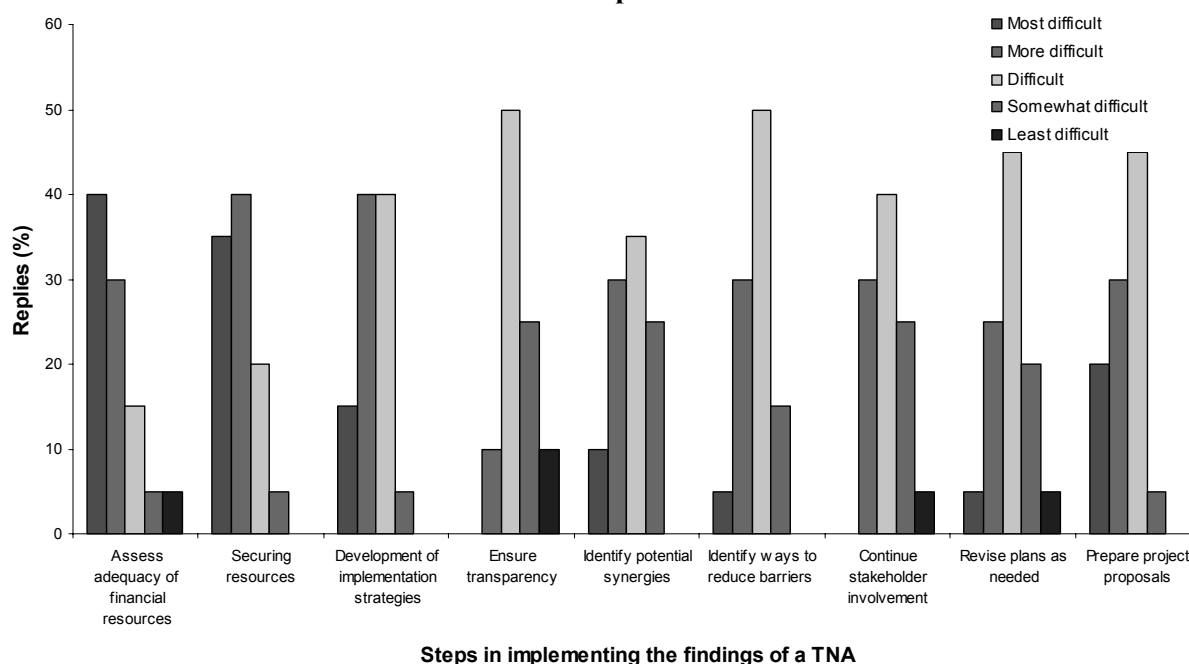
**Figure 13. Survey responses to the statement “I find preparing the implementation plan a relatively simple task”**



40. Concerning the difficulties encountered in implementing the findings of the TNA, participants were requested to rank the level of difficulty for completing each activity by grading each one from 1 to 5, with 1 being most difficult, 2 more difficult, 3 difficult, 4 somewhat difficult and 5 least difficult (see figure 14). The answers were analysed by totalling the grades allocated by each respondent and ranking the steps using the total obtained. The steps were ranked as follows, from most difficult to less difficult: ensure transparency (9); continue stakeholder involvement (8); revise plans as needed (7); identify potential synergies (5); identify ways to reduce barriers (5); development of implementation strategies (3); prepare project proposals (3); securing resources (2); assess adequacy of financial resources (1).

41. Respondents' experience of the difficulty in implementing findings from each step of a TNA varied between respondents. Most of the responses were allocated level 2 and 3 followed by 1 and 4 with the maximum varying between the activities. These differences between the responses may be attributed to the wide differences in countries particularities in terms of level of socio-economic development, importance of economic sectors and their relation with climate change and biophysical characteristics. Irrespective of step and out of the possible 180 responses, the highest number of responses (68) was attributed level 3 followed by 53 for level 2, 26 for levels 1 and 4, and 5 for level 5. No response was obtained in two cases.

**Figure 14. Respondents' experience of the difficulty in implementing findings from each step of a TNA**



42. When asked what are the most effective means of implementing TNA findings, many respondents chose more than one option, so that a total of 51 responses were received. Bilateral cooperation was considered the most effective means in 12 responses (24 per cent), GEF funding in 11 responses (22 per cent) and private sector funding in 10 responses (20 per cent). Clean development mechanism (CDM) projects, regional development banks and World Bank funding were each chosen five times (10 per cent of responses). Only one respondent chose the means of other carbon markets. One respondent proposed voluntary CDM and one chose Other, without specification.

43. Good practices in preparing the implementation plan (next steps) of a TNA were identified by 14 of the 20 respondents. The most common one related to funding (four responses), followed by mainstreaming/integrating into national plans and removing barriers (two responses each). The other responses identified the practices of capacity-building, keeping the working group in place for continued

action, improving capacity of the country to absorb new technologies, securing stakeholder involvement and resources, ensuring private sector participation, developing adaptation projects and concentrating on a few projects only. Table 6 lists the responses in detail.

**Table 6. Nominations by respondents of the most effective means for implementing the findings of TNAs**

<b>Means</b>	<b>Number</b>	<b>Per cent</b>
Private sector funding	10	20
Clean development mechanism projects	5	10
Global Environment Facility funding	11	22
Bilateral cooperation	12	24
Regional development banks	5	10
World Bank funding	5	10
Other carbon markets	1	2
Other (please specify)	2	4

44. Only 16 respondents of the 20 provided good practices in promoting policies and measures needed to reduce the barriers to technology transfer identified in TNAs. The most common one was in mainstreaming and integrating the whole process into government plans and policies (six responses). All other practices were mentioned only once. They are: building national capacity for absorption of new approaches/environmental benefits, ensuring co-functioning of working groups, setting up steering committees and councils, promoting laws on renewable energy, incorporating climate change issues into the current policies of developed countries, intragovernment coordination, stakeholder involvement, investing in projects developed and submitted in TNAs, providing technology needs information to policymakers and addressing cultural barriers.

45. A majority (90 per cent) of respondents proposed actions that could address the needs for capacity-building identified in TNAs. Nine responses referred to the usual capacity-building channels such as workshops, meetings, conferences, training courses and learning programmes. Learning by doing and institutionalization of capacity-building were each identified twice. The remaining options, each identified once, are: provision of funds, improving capacity to monitor climate change, research, training of trainers, better identification of precise needs, attending World Bank capacity-building projects, enhancing stakeholder participation and creating technology networks.

46. Only 35 per cent of respondents reported that their Party has been successful in implementing some of the concrete project ideas, concepts or proposals identified and reported in the TNAs. A higher proportion (45 per cent) reported that the Party has had no success, and the remainder (20 per cent) did not specify. Of seven who reported success, three did not indicate how implementation has been achieved. One reported that the project is under implementation. The answer from the fifth that "some TNA have been considered as a test for decision-making in policy formulation and development in our department" is not considered relevant. The two explanations that were provided by the two remaining respondents were: "Indirectly all technologies are being transferred through the government policies" and "Enabling environments for renewable energies".

47. Seventeen respondents provided information on efficient ways to continue stakeholder involvement and revise plans as needed. Five recommended maintaining the activities ongoing after the TNA is completed through various means such as national climate committees, core teams, continued consultations, workshops and interviews. Communication of information was suggested by two respondents, as was making stakeholders feel that they own the projects. Other respondents advocated the national communications process, review workshops, having good, responsible experts, maintaining stakeholder involvement, enrolling stakeholders as consultants and public awareness.

48. To determine participants' opinions on the role that financial advisory networks such as the Private Financing Advisory Network (PFAN) of the CTI could play in enhancing the implementation of TNA finding, respondents were asked to rank the likelihood four PFAN activities being effective using a scale of 1 to 5 with 1 being most probable, 2 more probable, 3 as probable, 4 as somewhat probable and 5 least probable. From the 71 responses out of the possible 80, the views expressed were mostly positive for all four options. Overall 33 responses considered it more probable that the activities would be affective, 25 considered it most probable, nine probable and four somewhat probable. None considered it least probable.

49. All participants allocated a rank of 1, 2 or 3 to the option "Advice and guidance"<sup>4</sup> with 80 per cent selecting either most probable or more probable. Technical assistance, contact breaking and introductions, and money/financing (directly from PFAN) members were chosen as being most or more probable in 80 per cent, 60 per cent and 70 per cent of the responses respectively.

50. Sixteen respondents suggested 17 ways in which TNAs could shape the future work of the GEF and its implementing agencies. The responses differed between countries but most were related to funding or using TNAs as a basis for development of country and/or regional projects. The other suggestions were: removal of barriers, help in decision-making on country and/or regional projects/technologies, information base for research and development projects, serve for bidirectional appraisal and better define results/projects with government, information base for development and elaboration of adaptation/mitigation programmes and facilitate implementation of technologies.

51. Nineteen responses were received on the question of what role development banks and financial institutions could play in implementing the findings of TNAs. Nearly half of these respondents (48 per cent) suggested that these organizations could provide funding for implementation, while 15 per cent and 10 per cent of the responses nominated project development and project implementation, respectively. Other roles suggested only once are: collaborating with the private sector, buying down intellectual property rights for technologies, providing appropriate resources for implementation, formulating policies and legal measures relating to climate change issues, selecting specific projects and undertaking economic and risk analysis of those projects. One respondent proposed that development banks could play the role of a trainer for involving financial institutions.

52. Fifteen respondents suggested 17 ways in which TNAs could shape the future work of the expert group on technology transfer (EGTT), in particular with regard to its focus on particular technologies or sectors. Three respondents did not reply to the question and the remaining two believed that EGTT has served its purpose and should wait for feedback now. In three cases, two respondents made the same proposals, namely that the EGTT should review its objectives in the light of the present status of technology negotiations and set new objectives within the technology transfer framework, do more work focused on technologies for adaptation and work towards improving access to information and information sharing. Other ideas suggested only once are: developing financing schemes, serve as guidance, help implement proposals, develop guideline, serve for future discussions on technology needs, guide and support projects for all countries, have regular workshop and training sessions, facilitate implementation by identifying gaps, determine the approach to technology transfer, promote collaboration and identify key sectors for tackling climate change.

#### **D. Main findings of the survey**

53. The questionnaire survey was well appreciated by the participants. Most of the respondents were representatives of Parties that have completed their TNAs and submitted their reports with financial

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<sup>4</sup> Advice and guidance on overall project commercial structure and design; financing structure; sourcing and procurement of finance; technical and engineering advice; achievement of conditions precedent troubleshooting.



assistance from the GEF and technical assistance from the CTI, UNDP or UNEP. In most cases, the respondents were involved in conducting his or her Party's TNA as a government representative.

54. The main findings of the survey are:

*Conducting TNAs*

- (a) The existing guidance for conducting TNAs is useful but should be updated. Information available to Parties on technologies continues to be inadequate;
- (b) Difficulties are encountered in the steps identified in the TNA handbook. The most important activities for conducting TNAs are selecting key sectors and technologies and balancing technology criteria for assessment;
- (c) The most appropriate approach to engaging stakeholders in all steps of the TNA process is to hold workshops. The preferred methods for prioritizing technology needs are multicriteria analysis and cost–benefit analysis. Country specific barriers are the most important barriers, followed by sector and individual technology barriers;
- (d) Good practices identified in order of importance in conducting TNA are: perform a barrier analysis; conduct stakeholder consultations and include stakeholders in the TNA process; gain access to information; prioritize technologies; prioritize sectors; select technologies; hold inter-ministerial discussions for mainstreaming technology needs; make institutional arrangements; choose criteria with the full consultation of stakeholders; and involve the private sector;

*Reporting and communicating TNA findings*

- (e) The existing guidance for preparing the TNA synthesis report is useful but should be further refined and updated. Preparing a report on the TNA is not a simple task but nevertheless, the quality of information reported in TNAs is generally good;
- (f) The most important information to be reported is the key sectors and technologies selected followed by project ideas, concepts and proposals and implementation plans. Ways and means to increase the number of TNA reports submitted to the secretariat and activities considered important for communicating the findings of TNAs were proposed;
- (g) The most frequently identified good practices for updating the findings of TNAs are: monitoring the implementation of TNAs; incorporating their findings in national communications; maintaining the working groups for follow-up actions and disseminating the information to stakeholders and/or policymakers;
- (h) The TNA synthesis report prepared by the secretariat is useful and may be improved by including more details as well as information that should be reported to improve the synthesis of information from TNAs for consideration under the UNFCCC process;

*Implementing TNA findings*

- (i) The existing guidance for preparing the implementation plan is useful and should be further refined and updated. Preparing the implementation plan is not a simple task;
- (j) The most frequently identified good practices for preparing the implementation plan (next steps) of TNAs are: funding; mainstreaming/integration into national plans; removing barriers; capacity-building; and keeping the working group in place for continued action;

- (k) The most frequently identified good practices for promoting policies and measures needed to reduce barriers to technology transfer are: mainstreaming and integrating the whole process into government plans and policies; building national capacity for absorption of new technology; ensuring co-functioning of working groups; and setting up steering committees and councils;
- (l) Only a few Parties have succeeded in implementing some of the concrete project ideas, concepts or proposals identified in TNAs;
- (m) Financial advisory networks such as PFAN can play an important role in enhancing the implementation of TNA findings;
- (n) Roles that TNAs could play in the future work of the EGTT, the GEF and its implementing agencies as well as the roles that development banks and financial institutions could play in implementing the findings of TNAs are proposed.

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