Background Paper

Interlinkages between technology needs assessments and national and international climate policy making processes

I. Introduction

A. Background

1. Development and transfer of technologies for mitigation and adaptation have been recognised as a key pillar of the Bali Action Plan (COP13)[1] It has furthermore been underlined that the identification of these technologies has to be based on countries' national circumstances and priorities.[2]

2. The identification of such nationally determined technology needs is supported under the Convention through technology needs assessments (TNAs). In 2001, COP 7 encouraged *"…developing countries …to undertake assessments of country-specific technology needs, subject to the provision of resources, as appropriate to country-specific circumstances*."[3] In 2008, TNA development was included in the *Poznan Strategic Programme on Technology Transfer* as a key component for "*scaling up the level of investment in technology transfer in order to help developing countries address their needs for environmentally sound technologies.*"[4]

3. Between 2001 and 2008, TNAs were conducted in 94 developing countries, for which the Global Environment Facility (GEF) provided funding. Currently, on behalf of the GEF, the United Nations Environment Programme (UNEP) supports TNAs in 36 developing countries.[5]

4. At its eighteenth session, the COP: [6]

   (a) Recognized that TNAs and their syntheses are a key information source for the work of the Technology Executive Committee (TEC)[7] as well as "*for governments, relevant bodies under the Convention and other stakeholders*";

   (b) Stressed the need for the implementation of TNA results; and

   (c) Agreed that the TNA process "*should be integrated with other related processes under the Convention, including nationally appropriate mitigation actions, national adaptation plans and low-emission development strategies*."

[1] Decision 1/CP.13, *Bali Action Plan*, FCCC/CP/2007/6/Add.1, para 1(d).
[2] Decision 2/CP.17, *Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention*, FCCC/CP/2011/9/Add.1, Chapter V, p.24.
[3] Decision 4/CP.7, pp. 22-30.
[4] Decision 2/CP.14, para 1.
[5] See <http://tech-action.org/>
[6] Decision 13/CP.18, FCCC/CP/2012/8/Add.2, paras 10-13.
[7] As formulated by Decision 1/CP.16, para 121a (FCCC/CP/2010/7/Add.1), among the functions of the TEC is to "*provide an overview of technological needs and analysis of policy and technical issues related to the development and transfer of technology for mitigation and adaptation.*"

5. Chapter III of this paper examines possible interlinkages between the TNA, NAMA, NAP and LEDS processes: how can exchange of information between the processes take place and how can the output of one process be used to support the other processes.[8]

6. Chapter IV explores possible interlinkages between TNAs and other programmes outside the Convention, such as, for example, programmes organized by international organizations for low emission and climate resilient transition support, technology roadmaps, and green growth initiatives, *etc*.

7. Chapter V examines the possible relationship between TNAs and the Technology Mechanism.

8. The paper concludes with a set of key findings (chapter VI).

B. Objective of the paper

9. The objective of this paper is to examine the interlinkages between TNAs and:

(a) Related processes under the Convention, including nationally appropriate mitigation actions (NAMAs), national adaptation plans (NAPs) and national communications,

(b) Other national and international processes outside the Convention that support the planning and implementation of actions for mitigation and adaptation, and

(c) The work of the Technology Executive Committee (TEC) in preparing recommendations on guidance on policies and programmes regarding TNAs and possible interlinkages with related processes under the Convention.

II. Potential interlinkages TNA and NAMA, NAP and LEDS processes

A. Introduction

10. The goal of a TNA is to identify technologies for mitigation and adaptation which also support a country's development objectives.[9] For that the TNA process contains the following key steps:

(a) To identify key priorities based **a country's long term vision** on climate and development,

(b) To identify **strategic sectors or areas** to support these priorities,

(c) To prioritise **technologies and measures** for mitigation and adaptation within these sectors,

(d) To identify **barriers** for development and transfer of these technologies/measures within a country, and

(e) To formulate technology action plans (TAPs) in the form of **projects, programmes or strategies**.

11. NAMA, NAP and LEDS processes basically follow a similar structure, although for these processes a detailed methodology, such as for TNAs, has not been formulated under the Convention. Nonetheless, the focus in a TNA on a country's long term climate and

[8] This paper builds further upon background paper III presented at the UNFCCC workshop on TNAs (Bonn, 1-2 June 2011).

[9] Please see the Handbook on Conducting Technology Needs Assessment for Climate Change.

development vision is comparable with the COP16 Decision that NAMAs need to be "*in the context of sustainable development.*"[10] Similarly, current LEDS case studies consider national development plans and climate policy goals in an integrated manner.[11]

12. Based on the above and experience with NAMAs,[12] NAPs and LEDS, Figure 1 presents an overview of how the key steps in a TNA could be interlinked with these processes. The figure shows that NAMA and NAP processes could use output from different TNA or LEDS stages: *e.g.* projects, policies and programmes or long term strategies.

13. TNAs for adaptation could particularly contribute to the elements of NAPs as identified by COP17:[13] *"In developing NAPs, consideration would be given to identifying specific needs, options and priorities on a country-driven basis,… coordinated with sustainable development objectives, policies, plans and programmes*." These elements are in line with the steps in a TNA.[14]

14. This TNA-based support could complement the support to NAPs that is provided by national adaptation programmes of actions (NAPA). The TEC could possibly support this by rationalising results of TNAs for adaptation and NAPAs for efficient input for NAPs (see chapter V).

[10] Decision 1/CP.16, para 48.

[11] Clapp, Ch., G. Briner and K. Karousakis, 2010, *Low-Emission Development Strategies (LEDS): Technical, Institutional and Policy Lessons*, OECD, IEA, 22 November 2010, COM/ENV/EPOC/IEA/SLT(2010)2. This report contains an overview of recent studies on LCDS conducted in developing countries. Another source of LEDS experience is the work conducted by the LEDS-Global Partnership (http://en.openei.org/wiki/LEDSGP).

[12] 55 Parties have submitted NAMAs to the secretariat (per October 2012). NAMA developments and trends have been examined by: *e.g.* ECN, Ecofys, GIZ and CCAP, 2012. *Annual Status Report on Nationally Appropriate Mitigation Actions (NAMAs) 2012*; Fukuda, K. and K. Tamura, 2012. *From NAMAs to Low Carbon Development in Southeast Asia: Technical, Mainstreaming, and Institutional Dimensions*, IGES Policy Brief, Number 23; Jung, M., N. Höhne, M. Vieweg, K. Eisbrenner, Ch. Ellerman, S. Schimschar, and C. Beyer, 2010, Nationally Appropriate Mitigation Actions – Insights from example development, *Environmental Liability*, vol. 3, pp. 104-114.

[13] Decision 5/CP.17, Annex *Initial guidelines for the formulation of national adaptation plans by least developed country Parties*, FCCC/CP/2011/9/Add.1.

[14] For details of the TNA steps for adaptation, see footnote 9.

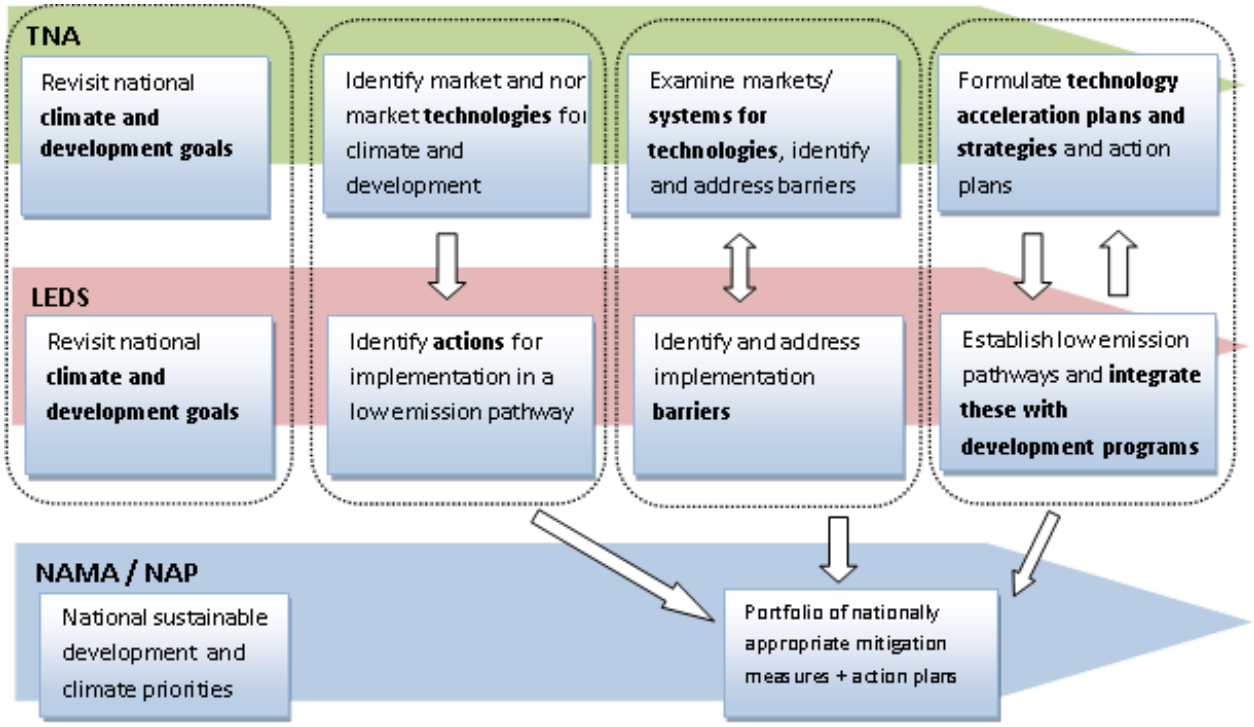

Figure 1. Overview of possible interlinkages TNA, LEDS, NAMA and NAP processes (source: authors)

15. Based on the possible interlinkages shown in Figure 1, Table 1 presents an overview of commonalities and differences between TNA, LEDS, NAMA and NAP processes.

Table 1. Overview of commonalities and differences between processes discussed in this chapter

a. To what extent are TNA, LEDS, NAMA and NAP processes embedded in a country's long term development vision?	
Commonalities	**Differences**
• Common focus on a country's overall sustainable development context • Strategic (sub)sectors and areas identified in a TNA could be used as inputs for LEDS, NAMAs and NAPs • Processes are generally participatory	• Unlike for TNAs, under the Convention no specific methodologies exist for LEDS, NAMAs and NAPs as of yet
b. How are technologies or measures for mitigation and adaptation in the country identified?	
Commonalities	**Differences**
• TNA procedures are in principle suitable for other policy concepts that identify technologies and actions in light of climate policy and sustainable development. • Therefore, TNA technology portfolios and TAPs could be input for LEDS, NAMA, and NAP processes.	• TNAs explicitly focus on technology choices. In LEDS, NAMAs and NAPs prioritisation of technologies is more an implicit step before formulating policy action.
c. What actions are envisaged for low-emission and climate-resilient pathways?	
Commonalities	**Differences**
• There is a common focus on *strategic pathways* with action plans either at the technology or sector and national levels. • NAMA and NAP formulation could possibly benefit from the identification in a TNA of actions for acceleration of technologies for mitigation and adaptation.	• Whereas a TNA focuses mainly on technologies and measures for mitigation and adaptation, LEDS, NAMAs and NAPs could be more overarching and focus on broader mitigation, adaptation and development issues

B. How TNAs could possibly contribute to LEDS, NAMA and NAP processes

16. At the *Experience-sharing workshop on technology needs assessments* (Bangkok, 10-12 September 2012)[15], participants, *inter alia*, discussed possible areas for interlinkages between TNAs, LEDS, NAMAs and NAPs. Below, it is examined how, for these areas, TNAs could contribute to LEDS, NAMAs and NAPs.

17. **Prioritisation of measures**: As has been explained above, the TNA methodology can be used for a detailed prioritisation of measures to be implemented as NAMAs or included in a LEDS or NAP. This supports the process of embedding NAMAs in national **mainstream** processes.[16]

18. A key step in this process is technology familiarisation to ensure that all possible options are considered during the prioritisation. For this, the TNA process includes the on-line technology database ClimateTechwiki[17] and technology guidebooks.[18] Technology familiarisation can also be supported by the information from technology roadmaps (see also para III.B.42 below).

19. **Clarity on scale of implementation:** at the Experience-sharing workshop it was noted that, while several NAMAs have been identified, the scale at which these actions could potentially be implemented within a country is often not clear. For instance, implementation could be at full technical potential, at a scale required for meeting country and/or sector goals, or in the form of a project. TNAs could offer this information as these assume a certain scale of technology implementation (*e.g.*, implementation as project, sector programme, or national strategy).

20. **Clarity on mitigation and adaptation benefits:** Part of a TNA, during technology prioritisation and formulation of TAPs, is to estimate how a technology contributes to climate change mitigation and adaptation. This includes an assessment (with sensitivity analysis) to handle uncertainties and data limitations.

21. **Identification of actions to accelerate development and transfer of technologies and/or mitigation and adaptation measures:** In a TNA, stakeholders analyse how the development and transfer of priority technologies can be accelerated in the country. This is done by exploring gaps and barriers in the enabling environment (*e.g.* markets, legal and regulatory context, public engagement and international collaboration) for prioritised technologies and by identifying actions to solve these gaps and barriers.

22. The actions thus identified can be characterised in terms of: why is an action important, how should it be done, who would be responsible for the action, when would the action need to be implemented, how much would it cost, what are monitoring, reporting and verification requirements, *etc*.

23. These actions taken together help create an **enabling environment** in a country for technologies for mitigation and adaptation, which can be used for:

(a) Technology implementation projects,

(b) Sector-level technology programmes, and/or

[15] FCCC/SBSTA/2012/INF.7, *Report on the experience-sharing workshop on technology needs assessments*.

[16] The aspect of mainstreaming NAMAs in national country priorities has, among others, been highlighted by Fukuda, K. and K. Tamura, 2012. *From NAMAs to Low Carbon Development in Southeast Asia: Technical, Mainstreaming, and Institutional Dimensions*, IGES Policy Brief, Number 23.

[17] http://climatetechwiki.org. The site contains over 150 technology descriptions for mitigation and adaptation with practical information about a technology's: operational requirements, status, market potential, contribution to sustainable development, and costs. Currently, UNDP, jointly with REEEP, UNEP Risoe Centre, ECN and JIN, are expanding the site to an online clean technology platform with information about projects, finance, capacity support, *etc*.

[18] See footnote 5.

(c) A national strategy for technology development and transfer with action plans.

(d) Each of these outputs could be considered inputs for a NAMA, NAP and LEDS.

24. In addition to relationships with LEDS, NAMAs and NAPs, the Experience-sharing workshop also highlighted how TNA activities could be linked to **National Communication processes**. For example, the project "Preparation of Third National Communication to the UNFCCC and Strengthening Institutional and Analytical Capacities on Climate Change" in India is a stand-alone national project including TNA activities.[19]

25. Another example are the sectorial TNAs included in the project "Establish Measurement and Verification System for Energy Efficiency in China" by the World Bank.[20]

C. How implementation of TNA process and results could be supported by LEDS, NAMA and NAP processes

26. In the former section, interlinkages have been discussed in terms of how TNAs could support NAMA, NAP and LEDS processes. However, as was highlighted by participants at the TNA Experience-sharing workshop, TNA processes could also benefit from NAMA, NAP and LEDS processes, as follows:

27. Setting **targets**: In a TNA technologies are selected against countries' priorities. Linking TNA processes with NAMA, NAP and/or LEDS processes could imply that longer term visions developed in these processes can be used as a reference in the TNA decision making too. This would also enhance consistency across processes in terms of embedding decisions in national priorities.

28. **Ensuring high-level attention and recognition:** The TNA Experience-sharing workshop highlighted the challenge of ensuring that TNA documents receive appropriate attention and are recognized by high-level public and private decision makers. Given that particularly NAMAs and NAPs have received high level policy attention and recognition, establishing clear process-wise and policy level interlinkages with these processes could enhance the high-level political recognition of TNAs.

29. **Exchanging data and knowledge:** TNAs could be complicated by lack of data (especially on costs) or limited exchange of data between country institutes. Interlinkages with other processes could support collaboration on data collection, avoid 'data competition' between processes and help rationalize existing data and other (human) resources across the processes. This would streamline similar but not identical processes and avoid or reduce 'institutional congestion'[21]

30. **Financing and implementing TNA results:** A key obstacle with respect to implementation of TNA identified technologies and TAPs is lack of financing and, related to that, attracting investors. Should TNA outputs be considered as NAMAs or under NAPs, funding and investment support allocated to NAMAs and/or NAPs would also, indirectly, support implementation of TNA results.

D. Conclusions

31. The role of TNAs under the Convention is to support innovation towards low emission, climate resilient societies in Non-Annex I countries. Based on this work, TNA results can be used as inputs for NAMA, NAP and LEDS processes through exchange of data, outputs and recommendations.

[19] FCCC/SBSTA/2012/INF.7, para 12; GEF Scientific and Technical screening of the Project Identification Form (PIF)
[20] GEF Scientific and Technical screening of the Project Identification Form (PIF)
[21] See also footnote 16.

32. Next to TNAs' possible contribution in terms of providing inputs to NAMAs, NAPs and LEDS, harmonisation of processes could also support the acceleration of implementing TNA results, *e.g.*:

(a) Data can be allocated more efficiently to the harmonised process steps,

(b) TNA outputs could receive increased recognition by high-level public and private decision makers, which would then also support implementation of TNA outputs.

33. Finally, establishing interlinkages between TNAs, NAMAs, NAPs and LEDS would help a country rationalize the outputs from these processes. Non-harmonised processes could result in duplications and 'blind spots' or it could result in a patchwork of, potentially conflicting, messages to policy makers, financial entities, capacity building supporters and other stakeholders.

34. The findings in this chapter on interlinkages between TNA and NAMA, NAP and LEDS processes have been summarised in Figure 2.

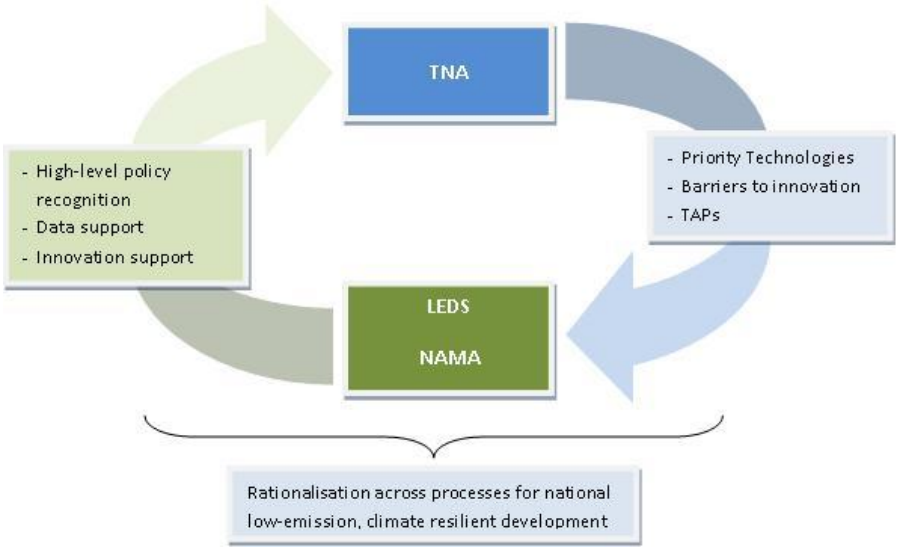

Figure 2. Possible impact of interlinkages between TNA, NAMA, NAP and LEDS processes (source: authors)

III. Interlinkages between TNA and other national and international processes

35. Next to interlinkages with processes under the Convention, TNAs could also interact with country-driven and international processes for mitigation and adaptation. This chapter discusses three examples of such processes and how these could benefit from and/or support TNAs: Low-Emission Climate-Resilient Development Strategies (LECRDS, managed by UNDP), Technology Roadmaps and Green Growth initiatives.

A. Low-Emission Climate-Resilient Development Strategies

36. The **UNDP LECRDS** process shows an example of how a TNA process could be harmonised or even integrated with work on low emission and climate resilient strategies.[22] The third step in an LECRDS deals with identifying options for mitigation and adaptation

[22] UNDP (2011). *Preparing Low-Emission Climate-Resilient Development Strategies, A UNDP Guidebook — version 1, Executive Summary*

and for this the updated TNA handbook is recommended, next to UNDP's *Toolkit for Designing Climate Change Adaptation Initiatives.*

37. A possible difference between the TNA and LECRDS processes is that stakeholders in a TNA could be more technology oriented than LECRDS stakeholders who could have a more generic green growth or development focus, such as poverty alleviation, energy security, employment generation, sustainable consumption and production, *etc*.

38. In a harmonised approach, it could be considered that for the overall LECRDS process core stakeholder groups are formed. For specific work under the TNA part of the LECRDS these core groups could be broadened with sector specialists with a technology focus.

B. Technology Roadmaps

39. Although there is no common definition of **technology roadmaps**, they can be described *"as a coherent basis for specific technology development and transfer activities, providing a common (preferably quantifiable) objective, time specific milestones and a consistent set of concrete actions; developed jointly with relevant stakeholders, who commit to their roles in the TRM implementation."*[23]

40. Roadmaps naturally start from a specific technology or from a target sector. For instance, the roadmap reports submitted to the secretariat and analysed for this chapter[24] have been prepared for particular technology groups (carbon capture and storage technologies, renewable energy options), sectors (chemical, refrigeration, air conditioning and foam blowing) or countries.

41. While both technology roadmaps and TNAs have a technology focus, TNAs start from a country's national climate and development priorities and work towards priority technologies. Roadmaps, instead, focus on a particular technology (or sector) and a strategic pathway with actions for the implementation of this technology.[25]

42. Based on the experience with TNAs and technology roadmaps, the following can be concluded:

(a) TNAs could help technology roadmaps to become more strongly embedded in a country's national priorities and planning and inform decision makers for which priority sectors technology roadmaps would be most relevant;

(b) Technology roadmaps could offer technical insights on the scale at which prioritised technologies can be applied in the country and the associated institutional, financial and market system requirements for that;

(c) Technology roadmaps could help TNA stakeholders become more familiar with possible technology options, including technology evolutions over time (see also para II.B.18 above);

(d) Technology roadmaps could provide a structure for transferring the results of a TNA and TAP into action, with milestones and timelines for policy formulation;[26] and

(e) Technology roadmaps could support TNAs to acquire stronger recognition by business leaders.[27]

[23] Londo, H.M, E. More, R. Phaal, L. Würtenberger, and L. Cameron, 2013. *Background paper on Technology Roadmaps (TRMs), Technology Executive Committee*, fifth meeting, 25 March 2013.

[24] http://unfccc.int/ttclear/jsp/CallInputs/RM.jsp

[25] Londo et al, 2013, see footnote 23, para. 11. In para. 86-88, Londo et al, 2013, also explain why interlinkages with TNAs are mainly expected for mitigation technologies as the number of adaptation roadmaps is currently relatively small.

[26] Londo et al, 2013, see footnote 23, para. 15, list item 6.

43. The possible interlinkages between TNAs and technology roadmaps are illustrated in Figure 3.

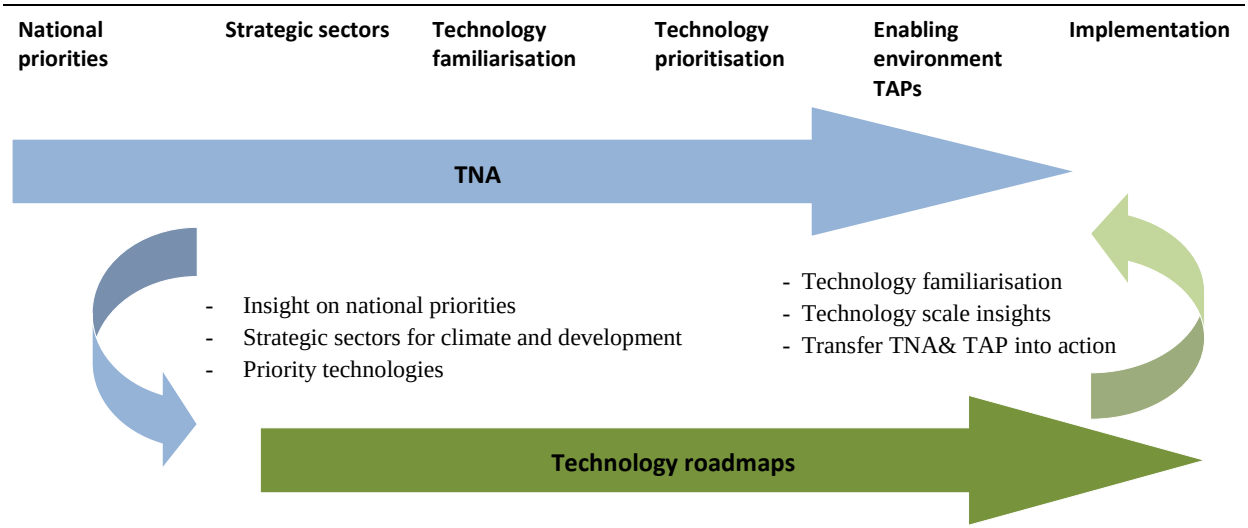

Figure 3. Illustration of possible interlinkages between TNA and technology roadmaps (source: authors)

C. Green Growth Plans

44. A third example of a national or international process with which TNA processes could be interlinked is that of **Green Growth**. Current green growth research projects and implementation plans[28] have in common that they aim at reinforcing economic growth paths with a conservation of natural capital by supporting efficient use of natural resources and making pollution more expensive.

45. Green growth plans have several similarities with TNA, NAMA, NAP and LEDS processes, but they do not necessarily have climate change as a natural starting point. Therefore, green growth plans could enhance the embedding of these climate-related processes in national economic, environmental and social priorities.

46. Also here stronger interlinkages between green growth and climate change-related processes would streamline simultaneously conducted processes (and reduce 'institutional congestion'[29]) and avoid duplications. For instance, several green growth programmes currently develop tool kits and perform analyses that are also conducted in, *e.g.*, TNA Project countries.[30]

47. At the same time, and similar to the conclusion in chapter III, should a green growth process in a country have high-level political and business support, establishing a relationship between TNA and green growth processes would increase the likelihood of TNA results being implemented in the country.

48. Recently, the Green Growth Best Practice (GGBP) initiative has started, which is a global network of practitioners and policy makers that identifies and shares proven

[27] Recent submissions on roadmaps to the secretariat show a strong involvement of, *inter alia*, business organisations (World Business Council on Sustainable Development and Business Council on Sustainable Energy) and intergovernmental organisations (IRENA). See footnote 24.
[28] See for overviews of these, World Bank, 2012. Inclusive Green Growth; OECD, 2012. Towards Green Growth.
[29] See footnote 16
[30] See footnotes 28 and 5.

practices of green growth planning and implementation from around the world.[31] GGBP has identified three audience groups for its results:

(a) Planners and facilitators (responsible for planning and coordination);

(b) Analysts (responsible for analysis and framing, identifying green growth options, *etc*.); and

(c) Policy makers and policy analysts (responsible for policy design and implementation, *etc*.)

49. From current green growth work TNA could benefit through increased insights on how:

(a) To mainstream low emission and climate-resilient planning into national, sectoral and sub-national planning processes;

(b) TNA-identified actions, including policy instruments, for acceleration of technology development and transfer would interact with other planned or ongoing policies; and

(c) Negative policy instrument interactions (*e.g*. result of a policy instrument is partly offset by impact of another instrument) can be prevented or mitigated.

D. Conclusion

50. In conclusion, TNAs offer experience, techniques and tools to support national and international climate-relevant or -related processes not implemented under the Convention. The UNDP LECRDS illustrates this by having the TNA Handbook as part of its methodology.

51. TNAs support technology-focused processes, such as technology roadmaps, in achieving a stronger embedding in countries' national priorities. At the same time, TNAs could benefit from these processes through access to specific technology-related knowledge and recommendations for technology development and transfer within different country contexts.

52. Interlinkages with processes without a primary climate focus, such as green growth plans, support TNAs in mainstreaming climate-technology actions in countries' overall economic, social and environmental priorities and ongoing or planned non-climate processes.

IV. Potential relationship between the TNA process and the Technology Mechanism

A. Possible interlinkages between the Technology Executive Committee and TNAs

53. Among the functions of the TEC is to "*provide an overview of technological needs and analysis of policy and technical issues related to the development and transfer of technology for mitigation and adaptation.*"[32] This function could be supported by the TNA outputs as described in chapter III, such as: portfolios of prioritised technologies, insights in barriers within technologies' enabling environment, and identified capacity-building and finance needs.

[31] http://ggbp.org/

[32] Decision 1/CP.16, para 121a (FCCC/CP/2010/7/Add.1).

54. However, concluding general lessons from TNAs on **mitigation and adaptation needs** is an important challenge, since for technology transfer "*the country context is important … as it determines the current enabling environment for the technologies, including the specific cultural and business habits, language, trust, networks and capacity available for successful transfers*."[33]

55. The challenge for the TEC, therefore, is to derive, to the extent feasible, **homogenous lessons across** heterogeneous **TNA reports**. Not only do, as explained above, countries differ with respect to their technology and capacity needs and related policies, but technologies are also in different stages of development. On top of that, TNAs assess needs for mitigation *and* adaptation. Figure 4 illustrates this TEC challenge for a hypothetical TNA example (showing, for instance, how generic lessons across adaptation areas and countries can be drawn).

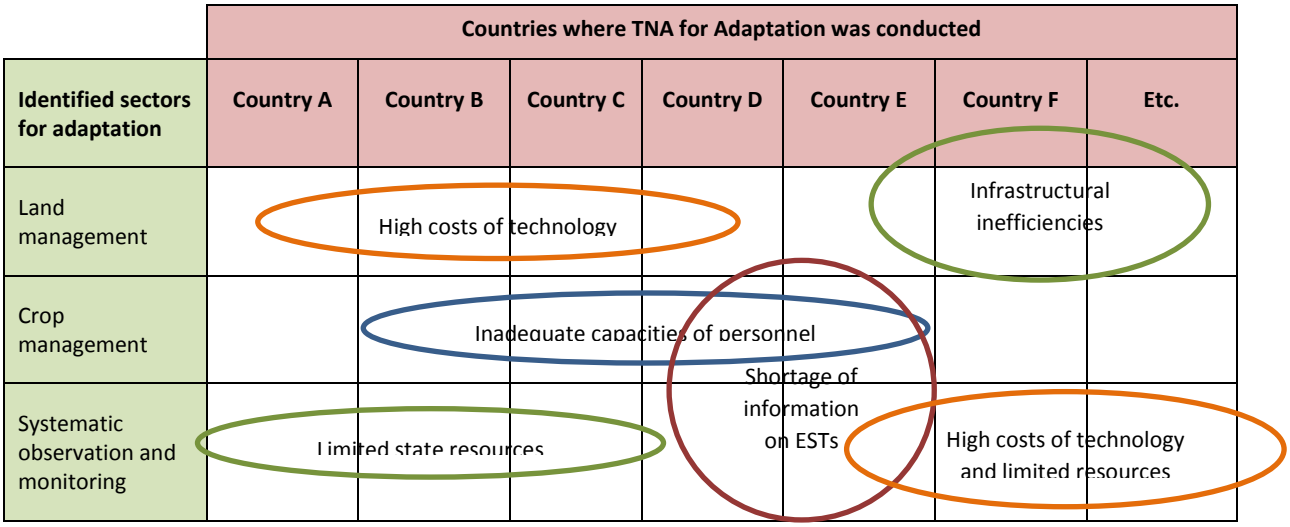

Figure 4. Hypothetical example with generalised conclusions on barriers for adaptation identified across TNAs for adaptation (source: authors)

56. In addition, generalising across country-specific TNA outputs could help the TEC to obtain **a global or regional picture** of, *e.g.*:

(a) Technology needs for households and/or communities in, *e.g.*, Small Island Developing States;[34]

(b) Recommended actions to address the technology barriers in a region;[35] and

(c) Proven practices for implementing TNA outputs and improving the enabling environment for technology development and transfer which could be useful information for other countries.[36]

57. There are several ways to present synthesised information.[37] Figure 4 shows one example and Figure 5 presents a purely hypothetical example of synthesized **regional investment needs** in one subsector. These are specified for technologies at the household and/or community level ('small scale') and those applied on a larger scale ('large scale'), as well as commercially available technologies in comparable market contexts ('short term')

[33] Gaast, van der W.P. and K.G. Begg, 2012. *Challenges and Solutions for Climate Change*, Springer, ISSN 1865-3529, p.20. See also, the UNFCCC secretariat's Second Synthesis Report on Technology Needs
[34] Potentially supporting the TEC function as described in Decision 1/CP.16, para 121a.
[35] Potentially supporting the TEC function as described in Decision 1/CP.16, para 121e.
[36] Potentially supporting the TEC function as described in Decision 1/CP.16, para 121g.
[37] In accordance with the TEC's functions as described in Decision 1/CP.16, para 121a-g.

or technologies that are in the process of deployment in the market or in an R&D stage of development ('long term'). Investment needs are visualised by the size of the buttons.

58. This synthesized TNA information could also help the TEC to obtain insights in **capacity needs** for technology development and transfer in (sub)sectors and regions and how, *e.g.*, training programmes can be tailored towards these needs. This could contribute to a shared vision on tackling particular barriers in a coordinated manner as opposed to solving them individually in each country.[38]

59. A similar broader picture can be obtained of (regional) **finance needs** for accelerating development and transfer of priority technologies for mitigation and adaptation. This information could possibly form inputs for the Finance Mechanism under the Convention (*e.g*. Global Climate Fund) and financial support programmes outside the Convention.[39]

60. The above insights could support formulating **policy recommendations on technology development and** transfer **to the COP**. Moreover, as TNAs directly link technology choices to national development priorities in developing countries, the TEC could obtain a clearer insight from TNAs on, *e.g*., poverty alleviation, increased energy security of supply and improved health conditions in relation to climate policy objectives.

61. Finally, although the TNA process under the Convention acknowledges the difference between prioritisation of technologies for mitigation and adaptation, experience with TNAs has shown that more methodological support may be required for preparing technology portfolios and TAPs for **adaptation**. For instance, cost calculation for adaptation options are generally considered more difficult (and less tangible) than for mitigation options, which is also caused by the often non-market nature of adaptation options.[40] The TEC could possibly explore these specific needs for adaptation and advice on improving the TNA process accordingly.

[38] See Decision 1/CP.16, para 121 (e).

[39] For a detailed overview of such programmes, see the guidebooks prepared by UNEP Risoe Center on accessing international funding for climate change adaptation and mitigation: http://tech-action.org/publications.asp

[40] See for an example, section 2.4 in the report "*Technology Needs Assessment for Climate Change Mitigation and Adaptation for Montenegro - National Strategy and Action Plan Final*"

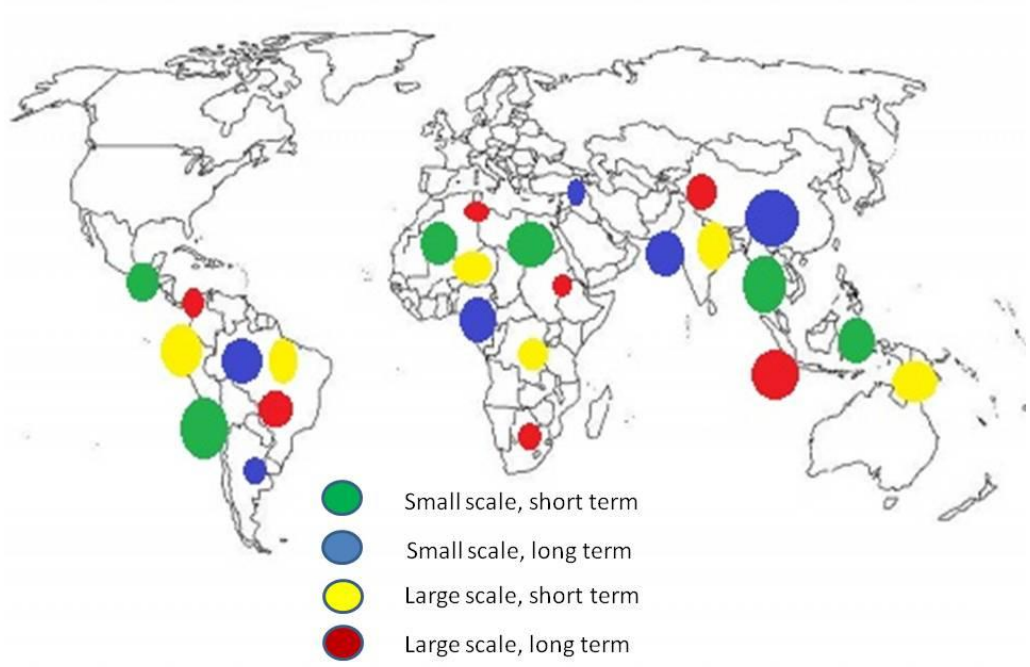

Figure 5. Hypothetical example of climate technology investments at subsector level for different regions (source: Van der Gaast and Begg 2013[41]).

B. Possible interlinkages between the Climate Technology Centre and Network and TNAs

62. With a view to the functions of the Climate Technology Centre and Network (CTCN),[42] several potential interlinkages with TNAs can be identified in two directions:

(a) The CTCN providing support to developing countries in conducting TNAs and enhancing the implementation of TNA outputs in the form of technology projects, programmes or strategies;[43] and

(b) Using synthesis of technology needs to inform the design of the CTCN and its evolution over the time in terms of changing countries' technology needs.[44]

63. Arrangements to make the CTCN fully operational were made at COP18.[45] It has been decided that UNEP, as leader of a consortium of partner institutions, will host the CTCN for an initial term of five years.

64. In addition to the above interlinkages between TNA processes and the work of the CTCN, it could be added that the organisation which now hosts the CTCN is also implementing (via the UNEP Risoe Centre) the TNA Project (supporting 36 developing countries in conducting and/or updating their TNAs). This might enable the CTCN to efficiently consider TNA results and lessons and explore how it could address these.

[41] See footnote 33, chapter 4.
[42] Decision 1/CP.16, para 123.
[43] Decision 1/CP.16, para 123 (a) i-iii.
[44] For a more detailed explanation of these interlinkages, see the reference in footnote **Error! Bookmark not defined.**.
[45] Decision 14/CP.18.

65. Some of these suggestions on interlinkages between CTCN work and TNA processes may overlap with the possible relationship between TNAs and TEC activities as described in the previous section. However, whereas the TEC might have a stronger focus on common technology, finance and capacity needs for mitigation and adaptation across countries, CTCN's focus may be more strongly on country-specific needs and support requests. Both the TEC and CTCN consolidated information from TNA reports might be included in their joint annual report.[46]

C. Conclusion

66. Figure 6 summarizes the possible interlinkages between TNAs (and other processes discussed in chapters III and IV) and the Technology Mechanism. It suggests that, at the country level, (harmonised) processes identify options for mitigation and adaptation and actions for their enabling environment. To avoid duplication, these options and actions could be rationalised at the country level (*e.g.* possibly as part of a TNA or a LEDS).

67. These country strategies and plans for mitigation and adaptation could then form input for, *inter alia*, the TEC and the CTCN in support of an integrated approach for efficient country support for accelerated low emission and climate resilient innovation.[47]

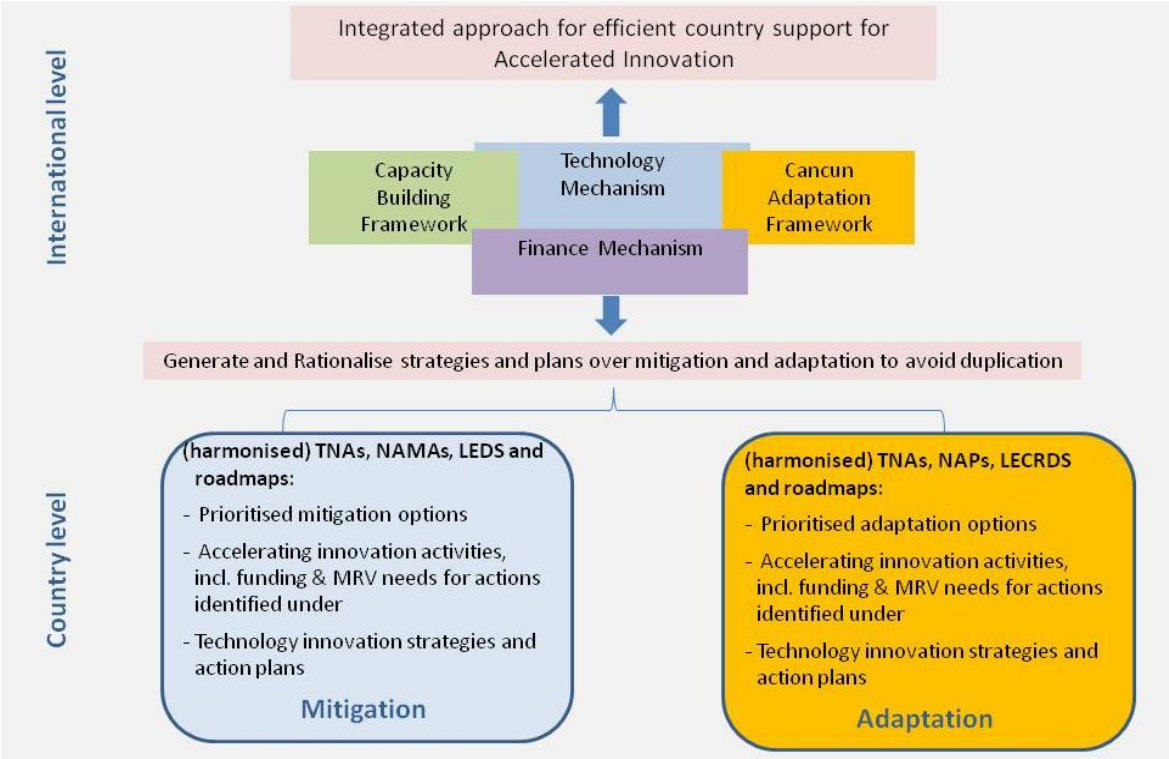

Figure 6. Interlinkages between mitigation and adaptation actions in countries and role of Technology Mechanism (source: Van der Gaast and Begg 2013[48])

[46] Decision 2/CP.17.
[47] The diagram also includes, for the sake of completeness, the possible roles of the Capacity Building Framework, Finance Mechanism and the Cancun Adaptation Framework under the Convention in this process.
[48] See footnote 33, chapter 4.

V. Key findings

68. TNAs can be a **rich source of information** for governments, relevant bodies under the Convention and other stakeholders as it supports **low-emission and climate-resilient innovation processes** and can support **NAMA** and **NAP** processes, in terms of:

(a) Embedding selection of mitigation and adaptation options in countries' economic, environmental and social priorities;

(b) Prioritising technologies and measures for mitigation and adaptation that could be considered NAMAs or included in NAPs; and

(c) Formulating TAPs for acceleration of technology development and transfer which could form inputs for NAMA- and/or NAP-based strategies.

69. Harmonizing NAMA, NAP and LEDS processes with TNAs could:

(a) Strengthen **high-level recognition of TNAs** by high-level public and private sector decision makers in developing countries;

(b) Streamline similar but not identical processes within countries by streamlining **data** collection and exchange (*e.g.* between ministries); and

(c) Support **rationalisation** of actions across TNA, NAMA, NAP and LEDS processes so that duplications and blind spots can be avoided.

70. Harmonisation of TNAs and national and international processes outside the Convention, such as LECRDS, technology roadmaps and green growth, could support, *inter alia*:

(a) Mainstreaming of climate-technology actions, as identified in TNAs and technology roadmaps, in countries' overall economic, social and environmental priorities and ongoing or planned non-climate processes (such as green growth plans), including a stronger recognition of these actions by policy makers and business leaders;

(b) Familiarising TNA stakeholders with unknown climate technologies (*e.g*. based on technology roadmap information); and

(c) Transferring results of TNAs and TAPs into action with milestones and timelines.

71. The TEC could generate homogeneous lessons from the heterogeneous, country-specific TNA reports as a **key information source for prioritising its activities under the Technology Mechanism**. This work is supported by the secretariat's TNA synthesis reports.

72. Based on completed TNAs, the TEC and CTCN could support countries in improving their enabling environments for **development and transfer of TNA priority technologies at desired scales**. This could support private (*e.g*. financial and business communities), public and multilateral institutes in preparing finance and capacity building programmes and allocating support actions.

73. TNA processes on adaptation would particularly support the TEC's activities on identifying and solving barriers in frequently identified sectors for adaptation such as, for instance, land management, crop management and systematic observation and monitoring.