UNITED NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/SB/2009/2/Summary
26 May 2009

Original: ENGLISH

SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
Thirtieth session
Bonn, 1–10 June 2009

Item 4 of the provisional agenda
Development and transfer of technologies

SUBSIDIARY BODY FOR IMPLEMENTATION
Thirtieth session
Bonn, 1–10 June 2009

Item 7 of the provisional agenda
Development and transfer of technologies

Recommendations on future financing options for enhancing the development, deployment, diffusion and transfer of technologies under the Convention

Report by the Chair of the Expert Group on Technology Transfer*

Summary

This note provides an executive summary of the final report by the Chair of the Expert Group on Technology Transfer on future financing options for enhancing the development, deployment, diffusion and transfer of technologies under the Convention (FCCC/SB/2009/2).

* The document was submitted after the due date owing to the timing of the Expert Group on Technology Transfer meeting, held from 13 to 14 May 2009.

Executive summary

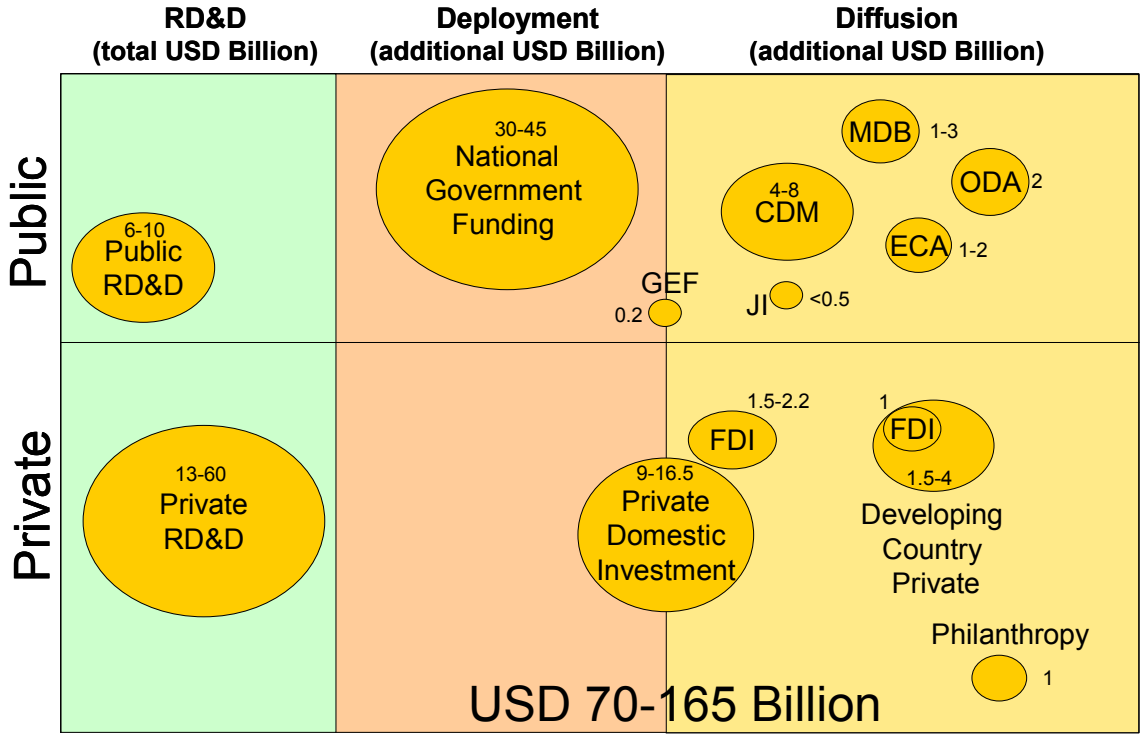
1. The Conference of the Parties, by its decision 3/CP.13, annex II, requested that the Expert Group on Technology Transfer (EGTT) identify and analyse existing and potential new financing resources and relevant vehicles in supporting the development, deployment, diffusion and transfer of environmentally sound technologies in developing countries. The EGTT was also requested to prepare a report with recommendations on future financing options necessary for enhancing technology development and transfer under the Convention for consideration by the subsidiary bodies at their thirtieth sessions.

2. A challenge faced by studies in this area is that information on the financial resources currently available for the development, deployment, diffusion and transfer of technologies for mitigation and adaptation is uncertain. For the present study, lists of technologies for mitigation and adaptation, classified by stage of technological maturity, were compiled. They are presented in annexes I and II to the final report, document FCCC/SB/2009/2.

3. There are no agreed definitions of the costs of technology research, development, deployment, diffusion and transfer. The definition used in this report is the full cost of activities during the research and development (R&D) and demonstration stages plus the additional cost of the new technology during the deployment and diffusion stages. The cost of technology transfer is defined as the total costs of enhancing participation in research, development and demonstration; building the capacity needed to install, operate, maintain and improve the technology; and creating an environment that enables the use of the technology by removing barriers to its adoption in the recipient country.

4. Estimates of the financing resources currently available for technology research, development, deployment, diffusion and transfer are classified in this report by stage of maturity of the technology for which they are intended, whether the resources are from the public or private sector, and whether they are under or outside the Convention. The estimates for mitigation technologies, shown in figure 1, are between USD 70 and 165 billion per year. For technologies for adaptation, R&D is focused on tailoring the technology to the specific site and application; it therefore forms part of the project cost. Current spending on adaptation projects in developing countries is about USD 1 billion per year.

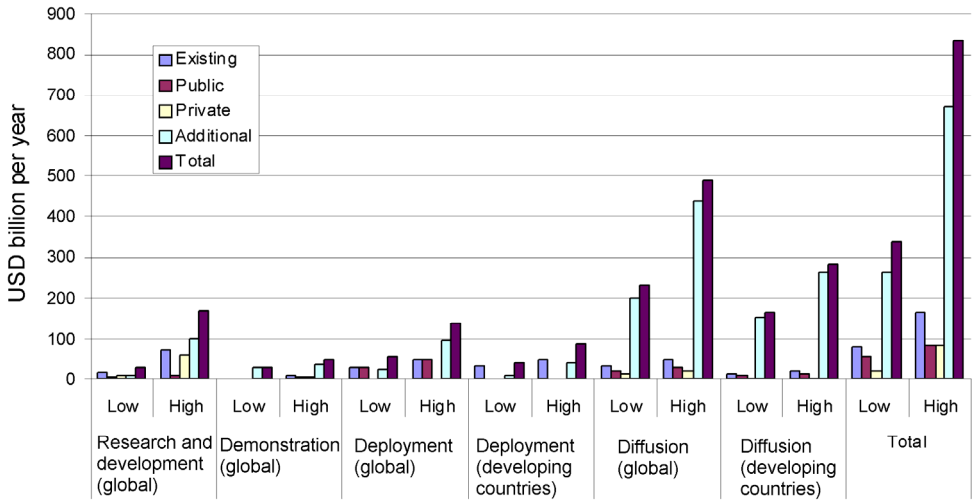
Figure 1. Estimates of current financing for mitigation technologies



Abbreviations: CDM = clean development mechanism, ECA = export credit agency, FDI = foreign direct investment, GEF = Global Environment Facility, JI = joint implementation, MDB = multilateral development bank, ODA = official development assistance, RD&D = research, development and deployment.

5. Several estimates are available of the additional financing that will be needed for research, development, demonstration, deployment and diffusion of mitigation technologies in order to stabilize levels of greenhouse gases in the atmosphere. The estimates are sensitive to the baseline and mitigation scenarios used and indicate that current financing for mitigation technologies needs to increase by USD 262–670 billion annually until 2030 (to a total of USD 332–835 billion annually) as shown in figure 2. These increases are consistent with current R&D targets and priorities for developed countries and regions with large R&D budgets.

Figure 2. Estimates of annual financing needs for mitigation technologies up to 2030, by source and stage of technological maturity



6. Most R&D and technology transfer for technologies for adaptation is likely to be included in the adaptation project spending. Estimates of the future spending needs for adaptation range from tens of billions to hundreds of billions of United States dollars per year.

7. Current financing support for technology transfer is likely to amount to less than USD 2 billion per year. Only one partial estimate of the additional financing resources that are needed for technology transfer has been found: USD 1.9 billion over five years.

8. The economic and social benefits of investing in climate change technologies – reduced costs of mitigation and adaptation, reduced pollution and health costs, greater productivity, energy security, economic development and job opportunities – are likely to be greater than the cost of making those technology investments.

9. Despite the uncertain figures, the following broad patterns of financing are clear:

(a) The financing resources for technologies for mitigation and adaptation make up only a small share (probably less than 3.5 per cent) of the resources devoted globally to all technology development and transfer;

(b) Most of the financing resources (probably over 60 per cent) for the development and transfer of climate technologies are provided by businesses;

(c) Most of the remaining resources (about 35 per cent of the total) are provided by national governments;

(d) Technology development is concentrated in a few countries/regions (about 90 per cent) – the United States of America, the European Union, Japan and China;

(e) Although R&D is becoming more international, there is no international funding mechanism and there is limited coordination for such activities;

(f) Only about 10–20 per cent of financing resources are used for the development and transfer of technologies to developing countries;

(g) Current financing resources need to be increased significantly.

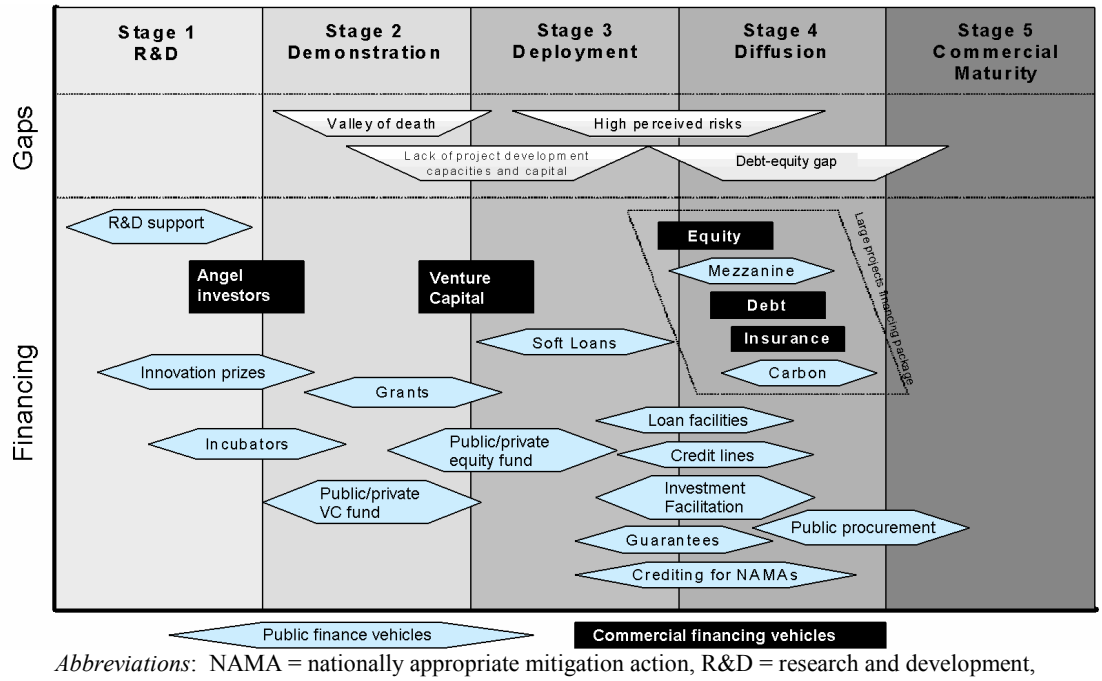
10. The mitigation technologies identified are well covered by the R&D programmes of countries and regions with large R&D budgets. Most of the technologies are relatively mature, having reached the deployment, diffusion or commercially competitive stages. The distribution of technologies for adaptation is roughly similar to the distribution of estimated adaptation spending by sector.

11. About 60 per cent of the mitigation technologies are identified by one or more developing countries in a technology needs assessment (TNA). The Global Environment Facility (GEF) and the clean development mechanism (CDM) have each supported about 30 per cent of the technologies. GEF support has been relatively uniform across sectors, with the exception of forestry, where very little GEF funding has been committed, and across the deployment, diffusion and commercially mature stages. CDM projects have concentrated on industry, renewable energy and waste management, and on technologies at the diffusion stage.

12. National adaptation programmes of action (NAPAs) and TNAs identify almost completely different sets of technologies for adaptation. NAPAs identified 96 of the technologies for adaptation compiled in this study and TNAs identified 84, but only 15 out of the 165 technologies for adaptation were identified by both NAPAs and TNAs.

13. There are many barriers to the financing and development of technologies. These barriers differ by stage of technological maturity for both public and private finance, and so too, therefore, do the appropriate financing vehicles. In other words, the means of providing financing for technology development are particular to each stage of technology maturity. The financing vehicles suited to each stage of technological maturity are illustrated in figure 3.

Figure 3. Financing vehicles by stage of technological maturity

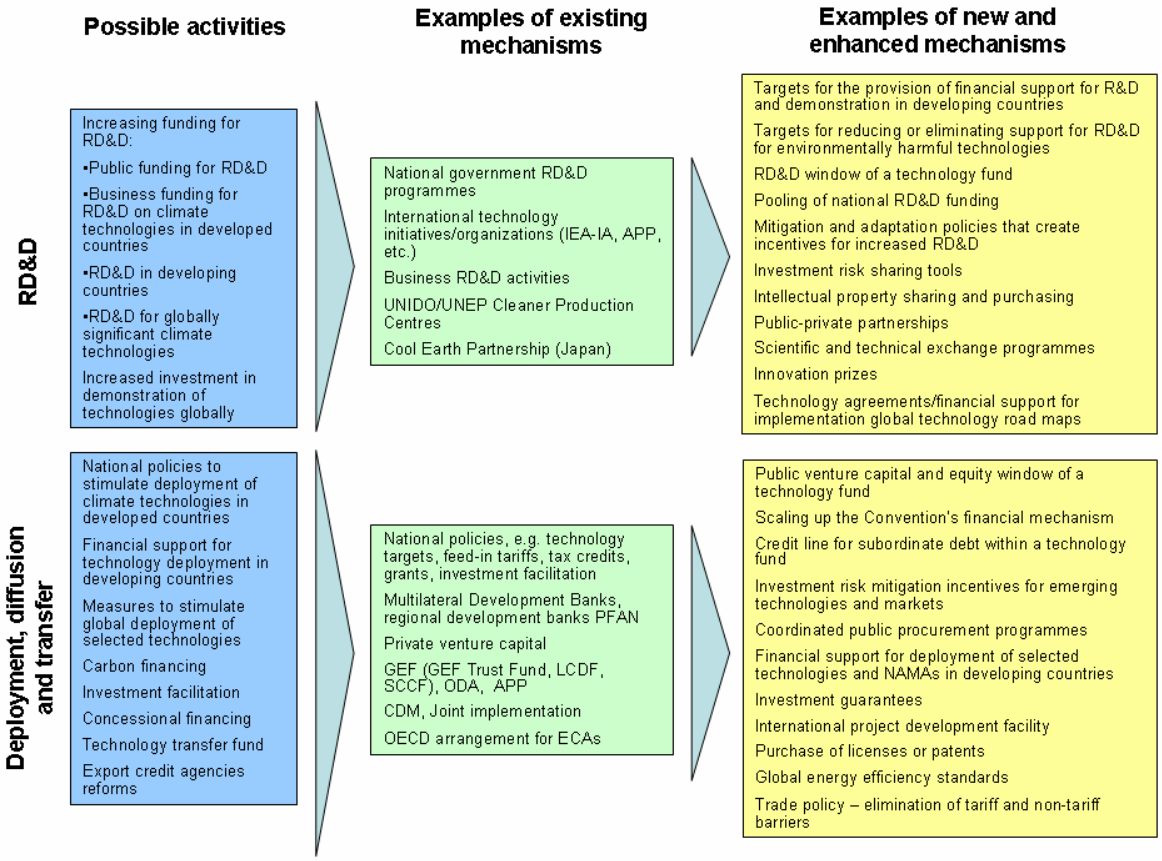


Abbreviations: NAMA = nationally appropriate mitigation action, R&D = research and development, VC = venture capital.

14. Parties, intergovernmental organizations, experts and non-governmental organizations have suggested a wide range of possible new financing sources and vehicles to enhance technology research, development, deployment, diffusion and transfer. This includes proposals on how to raise additional

financing resources and on how best to deploy new resources to enhance technology development and transfer. An overview of possible activities, examples of existing mechanisms and examples of new and enhanced mechanisms to enhance financing of technology R&D, demonstration, deployment, diffusion and transfer is provided in figure 4.

Figure 4. Activities and examples of possible international mechanisms to enhance financing of technology research and development, demonstration, deployment, diffusion and transfer



Abbreviations: APP = Asia-Pacific Partnership on Clean Development and Climate, CDM = clean development mechanism, ECA = export credit agency, GEF = Global Environment Facility, IEA-IA = International Energy Agency implementing agreements, LDCF = Least Developed Countries Fund, MDB = multilateral development bank, NAMAs = nationally appropriate mitigation actions, NAPA = national programme of action, ODA = official development assistance, OECD = Organisation for Economic Co-operation and Development, PFAN = Private Financing Advisory Network, RD&D = research, development and deployment, SCCF = Special Climate Change Fund, TNA = technology needs assessment, UNEP = United Nations Environment Programme, UNIDO = United Nations Industrial Development Organization.

15. The existing mechanisms under the Convention and the Kyoto Protocol:

(a) Make up a small share (probably less than 5 per cent) of the total financing resources available for the development and transfer of climate technologies;

(b) Provide very limited support for technologies at the demonstration and deployment stages;

(c) Provide support for about half of the technologies that developing countries need;

(d) Do not coordinate support of technologies, resulting in poor coverage of certain technologies, such as those in the transportation sector;

(e) Do not explicitly provide resources for technology transfer, but do contribute to technology transfer in other ways.

16. The challenge is to stimulate the development of a continuously changing list of hundreds of mitigation technologies and technologies for adaptation that are at different stages of technological maturity and each have their own needs for further development. Those technologies need to be adapted for and transferred to about 150 developing countries, each with its own needs for specific technologies and the enabling environments to support those technologies.

17. The challenge for the Convention is to ensure that the technology development and transfer needs to stabilize atmospheric concentrations of greenhouse gases (GHGs) and adapt to climate impacts are met. This cannot be done without a significant increase in the financing resources devoted to development and transfer of climate technologies. Most of the financing resources are likely to continue to come from business and national governments in a limited number of countries. They will engage in domestic and international activity, including transfer of technology to developing countries. International institutions, including mechanisms under the Convention, will continue to account for only a small part of the total funding.

18. Elements that might comprise international mechanisms to implement activities needed to scale up technology R&D, demonstration, deployment, diffusion and transfer have been assembled into three indicative, non-mutually exclusive options. They reflect a continuum of possible options rather than preferred alternatives; numerous intermediate options are possible. The options are limited to international mechanisms because businesses, not-for-profit institutions and other entities will continue to operate independently, although their activities may be influenced by national policies and international activities. All options assume that:

(a) Governments encourage and support R&D and demonstration;

(b) Government implement policies to limit GHG emissions to create markets for mitigation technologies.

19. The options have common elements, including the amount and source of financing, interaction with emission market instruments, barrier removal, coordination between Convention mechanisms and between institutional arrangements within and outside the Convention, enabling environments and capacity-building activities, integrating climate change mitigation and adaptation into other national and international policy areas, international collaborative approaches to R&D, innovative financing options and risk management tools, the role of governments and national policies, and engaging the private sector.

20. The technology mechanisms included in a post-2012 agreement will need to reflect other aspects of an agreement, including any new or revised trading or crediting mechanisms, and the financing resources available. It is assumed that any option can reach the scale of financing needed for mitigation technologies and technologies for adaptation, although it would require significant scaling up in all options.

21. The three options described in this report are:

- Option A: enhancement of existing and emerging technology financing arrangements;
- Option B: a decentralized or centralized comprehensive new international technology financing scheme;

- Option C: limited new technology financing and coordination arrangements with sectoral activities.

22. Under option A, technology R&D, demonstration, deployment, diffusion and transfer would be scaled up by enhancing existing and emerging financing arrangements, including the GEF, the CDM, joint implementation, the Adaptation Fund and national, bilateral, regional and multilateral financial sources. Most of the existing and emerging financial arrangements would continue to be implemented by institutions outside the Convention. Those institutions would decide which activities and mechanisms to offer, and on what scale and how best to deliver them. Parties would assist implementing institutions in raising the funds they require. Financial contributions to these institutions by developed countries would be recognized under Article 11, paragraph 5, of the Convention. Institutional arrangements could be established under the Convention to identify gaps and needs for technology financing and to work with the relevant institutions to address these gaps and needs.

23. Under option B, a new international technology financing scheme would be established under the Convention with a mandate to scale up collaborative action on technology development and transfer, covering all stages of technological maturity. It would play a significant catalytic role in supporting the efforts of developing countries in the research, development, deployment, diffusion and transfer of technologies for mitigation and adaptation. The required funds would be raised through the Convention. The new international technology financing scheme would involve a range of substantial yet targeted financing instruments and funding windows, functioning in conjunction with the carbon market, nationally appropriate mitigation actions, NAPAs and national adaptation strategies.

24. The new international technology financing scheme could have a decentralized or a centralized activity implementation structure. As a **decentralized** structure, it would be a small institution with capabilities similar to those of an equity fund, allocating money to various institutions or national governments for agreed activities and evaluating the results achieved. As a **centralized** structure, it would require the creation of a substantial new institution under the Convention, similar in size and capability to a Bretton Woods institution, which would have the same functions as the decentralized version, but these would be implemented 'in house'.

25. Option C would be a combination of enhanced coordination of technology development activities, new, yet limited, technology financing arrangements under the Convention and sectoral approaches. The funds raised through the Convention would be used to support developing country participation in international research, development and demonstration, NAMAs in developing countries, technology action/transfer plans or low-emissions development strategies and a wide range of facilitating actions to support the development of selected technologies. These activities would be coordinated with other technology financing activities within and outside the Convention, including NAPAs and adaptation activities, and sectoral approaches. The activities to support technology development could be based on recommendations from expert advisory panels. Sectoral approaches could take the form of, for example, sectoral crediting, voluntary industry agreements or technology-oriented agreements. There would be fewer operational responsibilities, and hence less funding under the Convention, than under option B. There would be more active coordination and funding under the Convention than with option A.

26. This continuum of options could be drawn upon by Parties to configure a coherent programme to scale up financing for enhanced technology R&D, demonstration, deployment, diffusion and transfer as part of a post-2012 agreement.

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