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OECD/IEA FORUM ON CLIMATE CHANGE

Application of Climate-Friendly Technologies in Developing Countries: The Role of International Collaboration

This document was written by the International Energy Agency. It is intended as background for discussion of agenda item 4.

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APPLICATION OF CLIMATE-FRIENDLY TECHNOLOGIES IN DEVELOPING COUNTRIES: THE ROLE OF INTERNATIONAL COLLABORATION¹

Summary

Collaboration amongst the actors involved in activities related to the application of climate-friendly technologies in a particular developing country, is likely to be an effective means of improving those activities and accelerating the application of those technologies. Collaboration in this area could help to avoid overlaps and duplication of technology co-operation efforts and simplify a developing country's relationships with a wide range of actors engaged in technical co-operation.

Some recent initiatives might provide effective models for putting such collaboration into practice. The IEA, in co-operation with the OECD, is developing the proposal for Technology Co-operation Agreements. These would provide a forum for the exchange of experience and information and for prioritising and initiating voluntary, flexible collaborative activities. A pilot activity for the Technology Co-operation Agreements, on best practice in coal power generation in China, has been initiated by the IEA's Working Party on Fossil Fuels.

The US Country Studies Program has begun a pilot programme to develop Technology Co-operation Frameworks with several developing countries. These frameworks set out a "roadmap" of climate-friendly technology. The process of developing the frameworks indicates that the networking activity involved in this effort contributes to institutional capacity development and policy co-ordination within the developing country.

Introduction

1. Application of best practices and of proven and advanced "hardware" technologies (for simplicity, "technologies" will be used to refer both to best practices *and* hardware) will undoubtedly make a major contribution to reducing emissions of greenhouse gases. Their potential contribution over the next century could be even greater in developing countries than in OECD Member countries, if industrialisation continues to be strong in many developing countries and gathers pace in the remainder.
2. Effective application of technologies can be broken into four steps:
 - (i) Creating awareness of climate change and the potential role for technology as a response;

¹ This document was prepared by the International Energy Agency and has not received official clearance from the other Directorates noted in this common document "cote."

- (ii) Developing capacity for the absorption and adoption of climate-friendlier technologies;
- (iii) Obtaining information and assessing technologies;
- (iv) Implementing technology.

Step 2 is primarily concerned with the general capacity development (e.g. of human resources and infrastructure) that is, it underpins steps 3 & 4. Step 4 is very specific to any particular process of production or consumption of goods or services in the economy. Successful final application of a technology often occurs through companies, where *management* of technology is, therefore, a critical factor.²

3. Many actors are involved in capacity development and technology co-operation activities that can assist application of climate-friendlier technologies. Some of these activities are designed specifically for this purpose, such as certain Global Environment Facility programmes and projects.

4. Other activities are designed to meet different goals. Bilateral and multilateral development agencies are primarily concerned with issues such as economic development and local environmental protection, while economic Ministries of OECD Member countries often use technology co-operation activities as a means of creating commercial links and of helping developing countries to become stronger trading partners. Private firms investing directly in a developing country, e.g. in a manufacturing facility, generally concentrate on applying skills and technologies which are very specific to their facility, but occasionally they will support activities of more widespread benefit, either out of a sense of social responsibility, to ensure good relations with the community, or because of other secondary benefits to the firm itself, such as improving the supply of skilled labour and the quality of local supplier firms. There are increasing pressures on all of these actors to consider the impacts of their activities on greenhouse gas emissions. Opportunities exist for them to promote and apply climate-friendlier technologies without compromising their primary objectives.

5. Session 4 of the Forum on Climate Change will explore whether greater collaboration among these various actors could accelerate the successful application of climate-friendlier technologies, and how this collaboration could be organised.

An IEA/OECD proposal for stimulating collaboration: Technology Co-operation Agreements

6. The International Energy Agency (IEA) is currently assessing the contribution that the IEA/OECD might make to organising such collaboration, through the proposed *Technology Co-operation Agreements (TCA)*. The IEA's long-standing programme of international collaborative "Implementing Agreements" on energy technology R&D and related information dissemination provides a model for the development of these proposals (for more details see the Appendix to this paper).

7. A TCA could, at its simplest, be a forum for exchange of experience among all those actors with a significant role in technology co-operation activities relevant to application of climate-friendly technologies in a particular country. Participants could choose to share views and information on their own existing and planned activities, including assistance with policy formulation and institutional reform,

2. Rene van Berkel, Framework for positive measures to encourage climate relevant technology transfer and collaboration, Monograph, University of Amsterdam, October 1997.

technology assessments, training, project appraisals and evaluation. Identification of common fields of activity would in turn suggest priority areas for collaboration. Collaborative activities involving sub-groups of participants in the TCA forum, and private sector partners, could then be built around those priority areas. (By contrast, the focus of an existing IEA Implementing Agreement is typically a generic energy technology, e.g. wind power, within which participants identify narrower areas for collaborative research, e.g. turbine blade materials.) The TCA proposal offers a tool for international, multi-actor collaboration that is *flexible* and *voluntary* - features that have been essential for the success of the IEA's collaborative energy technology R&D programme.

8. Some possible advantages of the TCA proposal are:

- *avoiding duplication and overlap*: by providing a forum for pooling of technology co-operation efforts of various actors;
- *engaging industry*: through individual well-defined activities specified by the participants themselves;
- *respecting commercial confidentiality*: the voluntary nature of activities ensures that all parties are in agreement on what information can, and cannot, be shared with other participants or outsiders;
- *ensuring that a public role is justified*: by requiring that a range of IEA/OECD countries and/or international development organisations agree that there is a need for each individual activity and that purely commercial activities of private firms and consultants would not meet the needs of the developing country;
- *streamlining of a developing country's activities*: through simultaneous interaction with a wide range of actors, who, in turn, become more aware of each other's activities.

9. One possible advantage of collaboration through the IEA and OECD is that we are NOT funding organisations. We do not have programmes of our own in this area, setting us apart from the actors amongst whom we would seek to stimulate collaboration. (Similarly, the IEA itself has never had its own R&D programmes and is never a direct signatory to "IEA" research agreements. We have no decision-making power in the controlling bodies of these agreements. We act solely as facilitators for others to collaborate. This has allowed us to concentrate on how to make collaboration work effectively.)

A pilot activity: Best practice in coal power plants in China

10. In advance of any decisions by the IEA/OECD on the merits of setting up TCAs with individual developing countries, the IEA, through its Working Party on Fossil Fuel technologies (WPFF), has initiated a TCA *pilot activity* on Best Practices in Coal-Fired Power Plants in China. Several IEA Member countries who are already working with, or planning to work with Chinese partners in this field have indicated that they are willing to collaborate. One of the first actions is likely to be a joint audit of power plant performance in a particular region of China. Some IEA Member countries have indicated that they will engage experts from their electric utilities in this task. The IEA WPFF has approached a utility in Shanxi Province to be the Chinese partner for this pilot activity. Bilateral donors, multilateral organisations such as the World Bank, the Global Environment Facility, the Asian Development Bank and APEC, and industry groups, such as the E7 group of electric utilities will be invited to participate in the pilot activity, including the detailed definition of potential areas for collaboration.

U.S. Technology Co-operation Frameworks: Developing Networks in Client Countries

11. Collaborative technology co-operation activities could benefit institutions in a developing country by strengthening domestic expert networks, inter-agency co-ordination and the capacity to assist with application of climate-friendly technologies. The recent U.S. initiative on Technology Co-operation Frameworks (an activity of the US Country Studies Program, led by the U.S. Agency for International Development, USAID) is providing examples of these potential benefits.

12. USAID has been working with six of its client countries to develop priorities for accelerated application of climate-friendlier technologies. This trial programme aims to develop Technology Co-operation Frameworks which provide a “roadmap” to those climate-friendlier technologies (especially renewable energy and energy-efficient technologies) which might make the greatest contribution to mitigating greenhouse gas emissions. Each country can then use its roadmap in identifying priority areas and projects for donor support..

13. Development of the technology roadmaps has drawn on networks of expertise in each country and in some cases has stimulated the development of these networks. These networks have made connections across many public and sometimes private bodies in the client countries and have been useful in helping communication and understanding within the countries. However, the networks are, in a sense, an unintended benefit of creating the Technology Co-operation Framework technology roadmaps. There is no guarantee that they will continue to be effective after the roadmaps have been completed. There may be advantages in preserving these networks, and stimulating the creation of such networks in other countries, to allow knowledge of the potential for climate-friendly technologies to develop further. In this regard, it is likely that these networks correspond closely to the set of local participants who would ideally be involved in any IEA/OECD Technology Co-operation Agreement. The IEA/OECD TCAs might therefore add value to the U.S. effort, and similar efforts of other agencies, by providing a means of institutionalising such networks.

Issues for further exploration

14. The exploratory efforts outlined above raise many questions concerning the potential of collaboration on the application of climate-friendly technologies:

- What are the main advantages of collaboration for the various actors involved in technology co-operation activities?
- Which are the most promising opportunities for such collaboration ? Some suggestions include: capacity development including assistance for policy formulation, technology assessments, training, project appraisals and evaluation.
- What might be the barriers to private sector involvement? (Issues include: commercial confidentiality; the need for long-term commitments to capacity development.)
- What roles might international organisations, such as the IEA/OECD, and others play in facilitating collaboration between the various actors?
- How might collaborative efforts contribute to the activities of the UNFCCC and the Clean Development Mechanism?

APPENDIX

Benefits of, and lessons from, international energy technology collaboration through the IEA

15. The IEA has for the last twenty years provided the “Implementing Agreement” structure as a mechanism for voluntary, flexible, user-led collaboration that adds value to national public and private sector energy technology-related R&D, demonstrations and information dissemination.

16. International collaboration has allowed IEA Member countries, and increasingly non-IEA Member countries, to:

- avoid duplication and overlaps;
- share costs;
- pool non-financial resources;
- spread risks and
- avoid unproductive research paths.

17. Current IEA collaboration takes place within 43 Implementing Agreements, many of them with multiple sub-tasks. Taken as a whole, the IEA collaborative effort involves participation by the governments (or their designated representatives) of 24 IEA Member countries and 10 non-IEA Member countries: Brazil, China, Egypt, Israel, Mexico, Poland, Russia, South Africa, Korea and Venezuela.

18. The only constraints on the possible fields for collaboration are a set of *guiding principles* which require that collaborative activities should further the goals of the IEA itself. The scope of an Agreement in a particular area (e.g. wind turbine development, or heat pumps) is defined by IEA Member countries with an active interest in that technology area, most often through discussions among research and economic ministries or technical institutions, but also increasingly with initial involvement of private companies. The parties to these early discussions usually go on to participate formally in the final agreement.

19. Activities that take place under the umbrella of the Agreements can be:

- *task-shared*, where each participant agrees to carry out some activities which form a part of the work plan of the agreement, or
- *cost-shared*, where each participant contributes to a common fund which is then used to have research activities carried out on behalf of the members of the agreement, usually at a research institute in a participating country.

In addition, there are several agreements which are primarily *information* centres, e.g. the IEA Clean Coal Centre. These act as clearing houses, and also analyse technical information in a particular sector.

20. Individual activities within an agreement can involve a subset of the participants. For example, in the Coal Combustion Sciences agreement, ten IEA Member countries participate, plus Mexico. All

eleven countries participate in “Annex I” of the agreement: this is a task-shared work programme. However, only three countries participate in Annex II: a cost-shared work programme, which sub-contracts basic combustion research to the International Flame Research Foundation, in the Netherlands.

21. The importance of the IEA’s experience lies in the lessons we have learned about how to stimulate effective international collaboration. First of all, we put a strong emphasis on *flexibility* -

- flexibility in the *nature* of the collaboration: i.e. sharing tasks or sharing costs through a common fund, or simply exchanging information
- flexibility in the *scope* of the work being undertaken: activities are not dictated centrally by the IEA, although there is a process of strategic review whose purpose is to identify new opportunities for collaboration
- flexibility in the *participants*: i.e. ministries, technical institutes and companies can participate, subject to the agreement of their governments, and multilateral organisations can participate through direct agreement with the IEA’s Governing Board.

Added to that flexibility is the fact that participation is purely *voluntary*: no one can force a country or entity to collaborate in a field in which they have no great interest.

22. The interplay of flexibility and voluntary participation allows international collaboration through the IEA to be, to a large extent, *self-organising* and *self-regulating*. New agreements, or tasks within agreements, are created by building coalitions of common interest in which potential participants automatically find a balance between the benefits they expect to obtain from the collaboration, and their own contribution of resources.