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Scaling-up Climate Change Mitigation Efforts

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I. Introduction

1. In recent years, the case for scaling up mitigation efforts discussed in terms of Gigatons of needed reductions in greenhouse gas emissions per year or tens of billions of dollars of required annual investments for deployment of commercially available low carbon technologies and systems has been widely accepted. The question that now faces the international community is how to achieve this – and how fast.

2. Current efforts to mitigate climate change primarily stem from the Kyoto Protocol of the UNFCCC, along with growing voluntary efforts in different parts of the world. Kyoto mechanisms have made important contribution to mitigation efforts through bottom up approach of learning-by-doing. To enable scale up of mitigation efforts, it is necessary to build on the current scientific knowledge, technologies and experience from the project-based mechanisms to develop simplified methodological approaches for large-scale mitigation programs.

3. To achieve efficacy in scale up efforts, different approaches are likely to be appropriate for different countries and interventions. These approaches could include a combination of interventions such as taxes, efficiency standards and labels, market-based cap and trade schemes and could be defined by host countries in relation to the specific country circumstances, technology, and institutional capacity.

4. This paper shares the experience gained from the Kyoto mechanisms, outlines potential opportunities for scaling up mitigation efforts, discusses potential approaches for quantification of impacts and proposes issues for discussion.

II. The Project-by-Project Approach

5. Carbon offset projects[1] measure the reduction of greenhouse gases in comparison with the baselines, in accordance with 'business-as-usual' trends, for specific sources of emissions. This concept is used in the projects of Joint Implementation (JI) and the Clean Development Mechanism (CDM) of the Kyoto Protocol and also in registry-based systems and voluntary standards.

6. Allowance based cap-and-trade systems and trading under Art.17 of the Kyoto Protocol establish a baseline (or cap) as an emissions limit, which allows covered sources, from covered sectors, to sell emission allowances if their emissions are below the pre-defined limit, and, conversely, make them liable to buy allowances (or emission reductions) if they exceed the limit. As a result, cap-and-trade systems build the overall reduction target into a specific allocation of allowances to all covered sources. These systems are viewed as cost-effective, but they have the drawback of the initial distribution of allowances that are difficult to determine.

[1] Based on Heister, J., "Approaches to Methodologies in Carbon Finance Programs, concept note for CPF Implementation"

7. The CDM has, to date, provided significant experience with methodologies for offset projects using a bottom-up approach for methodology development combined with a rigorous review and approval process. The CDM has demonstrated that offset-based mitigation efforts can work in an international context and for a variety of project types and technologies. However, it has also become apparent that the process of creating new methodologies and applying an approved methodology to a proposed project is expensive and time consuming.

8. In response to calls for improvements to the CDM, significant progress has been made. The CDM has developed the concept of a Program of Activities (PoA). This concept is based on the idea that a program is a replication of the same or similar discrete activities to which a project-by-project methodology can be applied. While CDM PoA approach allows for scale-up of carbon offset projects, it restricts the scope of the activity to the use of one methodology for a PoA with all the requirements of a project-by-project approach. The simplification introduced by the PoA pertains more to procedures than to the analytical and methodological aspects.

9. Beyond this, scale up efforts require methodological approaches that emphasize the emission reduction trends and transformational impact rather than tracking each ton of emission reduction. It is important to note that a well-designed program and methodological approach can have the same credibility and infer the same environmental integrity on the emission reductions that is achievable under the project-based mechanisms. Programs, broadly defined, could become good vehicles to tackle sectors, sub-sector or system-wide emissions.

III. Scaling-up mitigation efforts

10. A wider-scale system of program-based emission reductions would ideally require options for outlining procedures for baseline standardization and simplification of methodologies required to scale up mitigation efforts in a cost-effective way. *Scaling up* will best occur through purposeful aggregated programs.

11. Aggregation is widely practiced in investment-focused programs. Lines of credit, establishment of cooperatives, sector-specific financing programs and local government support are all examples of channelling funds to achieve a common objective. The key difference is the scale, technological scope and the nature of the aggregator. Most investment programs are managed by financial institutions and focus on disbursement and technical due diligence, than on monitoring of emission reduction. Broadly, aggregation can be categorized as *vertical* and *horizontal*. [2]

12. *Vertical* aggregation represents a multiplicity of similar actions in a given sector, or sub-sector. For example, these could be large scale lighting retrofit or high efficiency

[2] Based on Murray Ward, et al., draft paper on "Policy instruments and approaches for scaling up investment in climate change mitigation activities", prepared for the World Bank (with Jose Alberto Garibaldi, Kate Hampton, Niklas Hohne, Martina Jung, and co-authors Alex Bakir and Steven Gray)

appliance or vehicle improvement programs; or conversions to better technologies in industrial sectors such as cement or brick making; or investments in renewable electricity generation or fossil-based power technologies that support carbon capture and storage; or energy efficiency and fuel switching programs for industrial boilers; or equipment replacement programs. The main coordinating actors behind these aggregations could be central, regional or local governments. They could also be energy utilities or associations of the industries concerned, or multinational companies in specific industries. This opportunity is relevant for a single industry as well as to large companies and government agencies.

13. *Horizontal* aggregations represent a multiplicity of actions coordinated by an agency across a range of sectors, or sub-sectors. Such possibilities include municipal or regional government programs that involve multiple actions targeting several areas, for example initiatives targeting buildings, transport and urban forestry. A program run by a city government could encompass all activities in its area of jurisdiction, with direct interventions in its own activities and regulatory and incentive-based initiatives that facilitate the participation of private sector and the general public.

14. The scale of aggregation determines both international and domestic contexts for effective engagement of investment and policy frameworks in climate mitigation efforts. This is also a pre-requisite for ensuring measurable and results oriented implementation. A crucial characteristic of an aggregated *program approach* is to enable alliances between domestic public and private agencies, financial instruments and multilateral or domestic based policy instruments. As the effectiveness of program approaches and development finance depend on government policies, aggregation would enable dialogue and negotiation between different stakeholders and opportunities to harness synergies.

15. In most cases, there are certain natural aggregators, mandated either by law, such as government agencies or by their stakeholders, such as industry associations. These natural aggregators exist in almost all countries, though with differing degrees of technical capacity, institutional support and financial capability. The fastest way to scale-up activities effectively is to find such aggregators, identify mutual interests and build their capacity. This could involve providing them assistance in gaining the required mandate, either by law or through stakeholder consensus. A strong financial incentive, such as a strong carbon price backed with technology support and financial intermediation are expected to serve as incentives.

16. The wide-ranging literature on climate mitigation opportunities provides potential approaches to climate mitigation scale-up efforts. Research by the International Energy Agency and the IPCC working groups also identify least-cost mitigation options. Areas such as demand side energy efficiency improvement offer immediate opportunities for scale up. Researchers from Princeton University have developed a concept of ‘stabilization wedges’ that focus on potential mitigation options, in several areas including, transport, fuel switching, renewable energy, efficient power

generation and heating etc., also see examples below. Each component, or wedge, is estimated to have potential to reduce one Giga-ton of carbon per year in 2054.

17. While the implementation of a global programs targeting single technological intervention or sector will have its own environmental impacts, a combination of efforts in sectors and countries could yield significant mitigation results. Examples of specific mitigation programs could include,
    - Manufacturers
        - Double the efficiency of passenger cars world-wide from 30 to 60 mpg by optimizing car size and power;
        - Ensure high-quality of Compact Fluorescent Lamps (CFLs) by assisting manufacturers to upgrade or retool facilities.
    - Joint government and private sectors
        - Using best available technology in all new and existing buildings, through design and equipment efficiency improvements;
        - Establishment of efficiency and performance standards or benchmarks and targets for phasing out lower standards.
    - City and municipal government
        - Reduce distance travelled by all passenger vehicles in half by promoting efficient public transport options and encouraging holistic urban planning and design;
        - Reduce carbon intensity of urban area by improving energy efficiency of municipal services.
    - National government
        - Raise efficiency of power plants from 40% to 60%, through renovation, modernization of electricity generation, transmission and distribution;
        - Enforce a system of efficiency standards and labels, with accelerated, dynamic phase-out of lower efficiency equipment.

IV. Quantifying impacts of the mitigation efforts

18. Like all credit based mechanisms, it is necessary with *all mitigation efforts* to establish a baseline, and then measure, report and verify performance against this. The 'metric' of this baseline needs to be measurable so as to conservatively represent reduction in emissions or enhanced sequestration. This becomes challenging, as efforts move away from project level to a broader level. Given that the largest potential for mitigation is in developing countries, the performance metric could be framed in terms of energy intensity to ensure that it does not cap improvements in the quality of life of people in developing countries.

19. Criteria for developing the metric and a corresponding measurement tool will include desirability of achieving a large-scale transformation of the economy/sector, at optimum level of transaction costs. The complexity of the tool with regard to implementation can be distinguished by criteria like the capacity needed at government level and private-sector levels to develop baselines and requirements for data, monitoring, reporting and verification.

20. It is also important to incorporate the sustainable development and non-GHG, local environmental benefits, as these are crucial in the developing country context. The transport sector is a perfect example of a strong scaling-up opportunity that is constrained due to difficulty in quantification of diverse sources of emissions, the combination of policies and technologies required to mitigate emissions and the exclusion of related environmental and social benefits.

21. As diverse emissions sources contribute to uncertainty and variability of reductions, the methodologies for large scale programs will have to develop standardized procedures that permit use of default values to promote simplification and to be cost-effective. Standardized, aggregate scale, methodologies could produce a reasonably accurate assessment of emission reductions as individual source variations in a diverse portfolio of sources can cancel out.

22. The main building blocks of a mitigation program could be quantification of benefits, stakeholder capacity and implementation mechanisms. As mitigation efforts are scaled-up, implementation mechanisms achieve economies of scale but complexities in quantification of impacts and capacity of stakeholders assume significance and capacities will have to be strengthened through national and international initiatives.

23. Compared to stakeholder capacity concern, the methodological concern may be easier to address. There are different approaches for quantifying the impact of different types of aggregators and technology mix. An aggregator could utilize direct measurement techniques (e.g., metering of activities) or adopt default values based on technical and scientific data (e.g., deeming the impact of the activity) or a judicious and conservative combination of the two. In this context, the work on establishing an urban inventory of climate impacts and mitigation options is notable. This inventory attempts to categorizes and quantify activities of a city or municipality into direct and indirect sources of emission and emission reduction. In a similar way, development of village baselines, covering typical energy use of average households in a climate and geographic area could simplify quantification efforts needed for mitigation programs.

24. The CDM Executive Board recently approved a small-scale methodology, based on deemed savings approach[3] for demand side efficient lighting projects. This methodology is unique in its simplification of monitoring requirements by building safeguards into the project design and implementation stages to ensure environmental integrity. This is the first methodology that looks beyond an individual activity, i.e., replacement of a single incandescent lamp with a compact fluorescent lamp, and allows the use of technical parameters and default values to conservatively estimate emission reductions.

25. As programs involve several stakeholders, an important aspect would be determination of a baseline envelope for programs at the aggregate level, with an indicative baseline for individual activities. Simplified and robust approaches to

[3] Ranade, Monali et. al, draft paper on "Deemed Savings Approach for CDM and CPF"

baseline assessment and targeting interventions for mitigation hold key to ensuring the environmental integrity of the individual activity.

26. An approach could be to shift the focus from ‘what is’ and ‘what would have been’ to “what is required”. If the greatest mitigation benefit accrues to equipment of the highest available efficiency, the program could be designed to support the deployment of the same. It is also possible to identify categories of activities, with high sustainable development and carbon mitigation benefits such as renewable energy systems and household appliances. Such generalizations will immensely support scaling-up of mitigation efforts.

V. Points for discussion on way forward

27. Scaling-up of mitigation efforts is a realistic opportunity. Resources to achieve the scale up could be easier to mobilize once methods and approaches to design, implementation and quantification of impacts are defined.

28. There exists significant experience within the UNFCCC framework in quantifying national GHG inventories, through the National Communication efforts and in quantifying project level individual GHG measurement, through CDM and JI. What is required is to create a framework that harnesses specific GHG mitigation opportunities using natural aggregators at appropriate scales.

29. It is important to build on the current scientific knowledge, technologies and experience to encourage the development of simplified methodological approaches for large-scale mitigation programs.