Treatment of increase in future anthropogenic emissions of host country

Background

1. The SSC WG noted that the CDM Executive Board (the Board) had tasked the working group for a recommendation in the context of paragraph 35 of *Decision 2/CMP.5 Further guidance relating to the clean development mechanism* that *encouraged* the Board to further explore the possibility of including in baseline and monitoring methodologies, as appropriate, a scenario where future anthropogenic emissions by sources are projected to rise above current levels due to specific circumstances of the host Party.

2. The SSC WG further noted that while paragraph 47 of the *Decision 3/CMP.1 Modalities and procedures for a clean development mechanism* requires that the baseline shall be defined in a way that CERs cannot be earned for decreases in activity levels outside the project activity or due to force majeure, paragraph 46 stipulates that the baseline may include a scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party.

The scope of the analysis

3. Baselines are constructed on the basis of assumptions about the future and are by nature counterfactual i.e. on successful implementation of CDM projects, baseline will never occur. The SSC WG recognizes that the CDM is an offset mechanism, i.e. equivalent amount of emissions reduced under the CDM is emitted in an Annex I country, as well as the SSC CDM requirements for both simplified and conservative determination of emission reductions. With these considerations, existing small-scale methodologies already use a variety of approaches to define baseline levels of activity; in some cases assuming the same level of activity (e.g. product quality or hours of residential lighting) or varying levels of activity (e.g. changes in industrial production output). However, in instances where it is assumed that the same level of activity occurs in the baseline scenario as well as in the CDM project scenario the activity level is usually determined through historic data.

4. Some recent reports[1] note that as a result, particularly in the context of LDCs/SIDs and economically restricted regions of developing countries, over reliance on historical data results in very low emission baseline scenarios with consequent disregard for the latent demand for energy and other services (e.g. transport, waste treatment) that exist. It is also noted that an assumption of continued supply of low/poor quality services throughout the 7 or 10 years of crediting period, as these countries/regions develop, may not align well with the development aims of CDM. In addition, such low baseline levels may result in such insignificant levels of emission reduction estimates from renewable energy and energy efficiency projects that carbon credit revenue has a marginal or negligible impact.

5. The SSC WG interpreted that 'specific circumstances of the host Party' included infrastructure constraints (infrastructure underdevelopment) and income constraints (poverty) of the households and communities targeted for CDM intervention.[2] With its analysis limited to those situations, the SSC WG identified the below situations where rise of future anthropogenic emissions by sources above current levels may merit consideration in determining baselines:

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[1] For example '10 Years of Experience in Carbon Finance-Insights from working with carbon markets for development & global greenhouse gas mitigation' by the World Bank.

[2] That is energy or other services are in a state where current levels of access– before CDM intervention – are inadequate because of income or infrastructure constraints, thus not reflecting real demand for energy or other services by energy poor households.

- Where services to meet the basic human needs (e.g. basic housing, lighting, cooking, transport, or waste treatment) was previously completely unavailable;
- Where a service was previously available to an inadequate level (e.g. as in the situation where due to low income, inefficient kerosene lamps in inadequate numbers are used for curtailed duration of hours in households to only partially meet the lighting demands);
- Where a service is currently provided with a resource that is assumed to result in no emissions. For example, the burning of dung (which is considered to be a renewable biomass) in cookstoves to meet cooking energy needs of the households is considered to be in the lowest rung in the energy ladder indicating highest level of poverty and lowest level of cleanliness, efficiency and convenience for household cooking energy supply. Whereas, almost any other fuel in this energy ladder would result in emissions, such as kerosene, and other issues (e.g. health impacts).

Consideration of the issue in CDM methodologies

6. A select number of CDM methodologies (e.g. methodologies for grid connected zero emission renewables such as AMS-I.D and ACM0002, methodologies for off grid standalone renewables such as AMS-I.A, and methodologies for building energy efficiency such as AMS-III.AE) include the consideration of increase in future anthropogenic emissions.

7. Grid connected renewable energy generation methodologies include a simplified **combined margin**[3] approach for the grid emission factor to balance many aspects (e.g. accuracy, feasibility, consistency, transparency and credibility) in addition to treatment of increase in future anthropogenic emissions i.e. baseline is determined by considering the choice and/or timing of new power plants that would be added to the grid **(build margin)** and the operation of the existing power plants in the grid **(operating margin)** with which grid electricity would have been generated in the absence of the project activity. Relative simplicity and feasibility for consistent application across the regions/projects with transparent and reliable data has lead to considerable success with the application of combined margin under the CDM[4]while development/application of methods for other applications e.g. off grid renewable energy has remained a challenge. And recent reports suggest considerable potential in these areas.[5] AMS-I.A for off grid applications does include scenarios for future emissions increase[6] however there may be a need to further elaborate the generic methods included.

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[3] Combined margin is an umbrella term for any method that accounts for project's effects on both what is built and what operates in the future.

[4] It should be noted that grid connected renewable energy methodologies AMS-I.D and ACM0002 together account for nearly half of all CDM projects in the CDM pipeline.

[5] See Table 3. Transitions to Renewable Energy in Rural (Off-Grid) Areas on page 47 of Renewables 2010 Global Status Report, REN21 Renewable Energy Policy Network for the 21st Century (also included in annex 1 of this document).

[6] AMS-I.A. Electricity generation by the user for application in off grid locations states that the energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy, estimated using one of the following three options:

- Estimate of average annual individual energy consumption observed in closest grid electricity systems among rural grid connected consumers belonging to the same group of renewable energy technologies. If energy consumption is metered, the average energy consumed by consumers (potential over sizing of the power capacity installed or energy generated by the CDM project activity shall not be reflected in the baseline and emissions reduction

Options to address future emissions increase

8. In tackling with the issue of rise in future anthropogenic emissions, the SSC WG considered that it is important to address the following questions:

- What would be the level of attained energy or other services or the rate of growth of services that would be justifiable for setting baselines?
- What would be means to determine it?
- Would application of international, national or regional standard be appropriate for example to establish the comfort levels or minimum energy provisions?
- Can calibrated models be applied and under what circumstances?

9. As seen in the context of a project displacing kerosene lighting with LED lamps, on a lamp-for-lamp basis, a high-quality LED lighting system can produce ten to one-hundred times the light levels as the baseline flame-based lantern. This applies to a small "task" area being lit. If users then aspired to extend that higher lighting level throughout their homes the implied pent-up demand grows again many fold. The amount of lighting fuel required to replicate this expanded level of service would amount to geometric proportion increase of current usage, i.e. several hundred fold increase. Ascribing all of this growth in demand to LED lighting systems would be an unrealistic scenario, because when an end-user became well enough off to purchase such large amounts of kerosene, they would likely be switching to other means such as the electric grid. It should be noted that there is a "ladder" of fuel-based lighting choices, and levels of use, up which a household will progress as it achieves higher income and/or as the price of lighting fuel falls. For example, a user could upgrade from a wick to kerosene to pressurized lantern, while increasing the number of lanterns and hours of use. The upper limit is the point at which the user is well enough off to switch to grid-based electricity. Similarly experience shows that increasing prosperity of households moves them up on the ladder of cooking energy technology, i.e. households move from solid fuels to liquid fuels and then on to gaseous fuels and electricity as the aspirations for cleanliness, efficiency and convenience in meeting cooking energy needs tends to increase as the prosperity increases i.e. progression is from use of crop waste/dung to wood to charcoal/coal to kerosene to LPG/natural gas to electricity.

10. Therefore, it may be necessary to couple a measure of increase in demand with a maximum cap conservatively determined so as not to create a situation that could never have been met with the baseline technology such as fuel-based lighting. A standardized independent testing to capture equipment service level/lifetime/failure rates and de-rating of performance may also be required.

11. A model that predicts the growth rate of the quantity of energy required may also serve the purpose under certain circumstances. However, theoretical models should be calibrated against primary data, gathered on or near the site to ensure accuracy and conservativeness. For example to determine the space heating required in a dwelling it would be important to determine when the service is required (season, time of the day etc.) and at what temperatures. Transparently and conservatively determined input parameters for indoor and outdoor temperatures over time, heat loads inside the dwelling, the fabric (type and

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calculation. For this reason, the energy value taken into account shall be the energy consumed);

- The estimated annual output of the renewable energy technologies;
- A trend-adjusted projection of historic fuel consumption in situations where an existing technology is replaced.

thickness), orientation, colour, placement of windows and doors, and other attributes of the structure, air changes, wind rates and solar radiation, etc. would also be required.

12. National and international standards/codes would also be a useful source, however modalities of application would need to be analysed further.

Conclusions

13. Considering the above perspectives, the SSC WG is of the opinion that it is better to address the issue of increases in future anthropogenic emissions in the context of specific methodologies (for specific technologies and applications) versus developing a general policy that would apply to all methodologies. The group considered that a general policy would lead to a requirement for many clarifying exceptions and therefore may not be advisable.

14. Furthermore, as discussed above elements for addressing the issue are already included in some of the methodologies that the Board has approved and provided for application for many years now e.g. AMS-I.A. Thus, the opinion of the SSC WG is that it should further continue considering the issue of future increases in emissions (baselines) in the context of other activities that the Board has requested the SSC WG to focus on e.g. development of default conservative operating parameters.

15. Therefore, unless otherwise guided by the Board, the SSC WG will continue working in order to address the issue of increased future emissions in its recommendations by including possibilities for higher levels of activities/service in the project case as compared to pre project scenario (with a cap) in specific methodologies only in situations where infrastructure constraints and income constraints are apparent or evidenced.

Annex 1

Table 3. Transitions to Renewable Energy in Rural (Off-Grid) Areas

Rural Energy Service	**Existing Off-Grid Rural Energy Sources**	**Examples of New and Renewable Energy Sources**
Lighting and other small electric needs (homes, schools, street lighting, telecom, hand tools, vaccine storage)	Candles, kerosene, batteries, central battery recharging by carting batteries to grid	• Hydropower (pico-scale, micro-scale, small-scale); • Biogas from household-scale digester; • Small-scale biomass gasifier with gas engine; • Village-scale mini-grids and solar/wind hybrid systems; • Solar home systems
Communications (televisions, radios, cell phones)	Dry cell batteries, central battery recharging by carting batteries to grid	• Hydropower (pico-scale, micro-scale, small-scale); • Biogas from household-scale digester; • Small-scale biomass gasifier with gas engine; • Village-scale mini-grids and solar/wind hybrid systems; • Solar home systems
Cooking (homes, commercial stoves and ovens)	Burning wood, dung, or straw in open fire at about 15 percent efficiency	• Improved cooking stoves (fuel wood, crop wastes) with efficiencies above 25 percent; • Biogas from household-scale digester; • Solar cookers
Heating and cooling (crop drying and other agricultural processing, hot water)	Mostly open fire from wood, dung, and straw	• Improved heating stoves; • Biogas from small- and medium-scale digesters; • Solar crop dryers; • Solar water heaters; • Ice making for food preservation; • Fans from small grid renewable system
Process motive power (small industry)	Diesel engines and generators	• Small electricity grid systems from microhydro, gasifiers, direct combustion, and large biodigesters
Water pumping (agriculture and drinking water)	Diesel pumps and generators	• Mechanical wind pumps; • Solar PV pumps; • Small electricity grid systems from microhydro, gasifiers, direct combustion, and large biodigesters

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