

Agenda item 4.1 (b)

Paragraph 29 of the annotated agenda

TOOL XX: Repository of default values

CDM EB 113

Bonn, Germany, 8 to 11 March 2022



Background

- **EB111 mandated** the secretariat and the Meth Panel to:
 - a) **Recommend a new methodological tool containing a repository of data/parameters** that are common among different methodologies; and
 - b) **Update the default factors** in methodologies that are found to be not conservative in accordance with the latest science.
- **MP 86 identified the potential scope** of the new tool and agreed to conduct a road test with
 - a) Methodologies that apply the diesel generator emission factor and the kerosene emission factor for off-grid applications;
 - **Covered under this work**
 - b) Methodologies that apply the concentration of methane in biogas or in landfill gas.
 - **Covered under a separate work**



Purpose

- To respond to the **mandate to a new methodological tool** containing a repository of data/parameters.



Key issues - scope

- Current values of CO2 Emission Factor (EF) for off grid Diesel generating systems and kerosene usage for lighting applications at household level are from sources that are dated;
- Following methodologies refer to these EFs;

AMS-I.A: Electricity generation by the user;

AMS-I.B.: Mechanical energy for the user with or without electrical energy;

AMS-I.F: Renewable electricity generation for captive use and mini-grid;

AMS-I.L.: Electrification of rural communities using renewable energy;

AMS-III.AR.: Substituting fossil fuel based lighting with LED/CFL lighting systems;

AMS-III.AW.: Electrification of rural communities by grid extension;

AMS-III.BB.: Electrification of communities through grid extension or construction of new mini-grids;

AMS-III.BL.: Integrated methodology for electrification of communities



Key issues – Current CO2 EF values for DG sets

- AMS-I.F. provides default values depending on the **size of DG and load factor**. These values appear to have been sourced from *RETScreen International's PV 2000 model*.

Cases	Mini-grid with 24 hour service	(a)Mini-grid with temporary service (4-6 hr/day); (b)Productive applications; (c)Water pumps	Mini-grid with storage
Load factors [%]	25%	50%	100%
<15 kW	2.4	1.4	1.2
>=15 <35 kW	1.9	1.3	1.1
>=35 <135 kW	1.3	1.0	1.0
>=135<200 kW	0.9	0.8	0.8
> 200 kW	0.8	0.8	0.8



Key issues – CO2 EF of DG sets

- Sec and MP reviewed **fuel consumption** and **emission factor** from different sources (e.g. DG suppliers / manufacturers, other market mechanisms such as JCM, other published literature)
- JCM (currently 0.63 t CO₂/MWh to 0.80 t CO₂/MWh in Palau, could improve to 0.533 t CO₂/MWh in future)
- ICF India study of 82 DG models(based on design efficiency and 75% loading, 0.8 t CO₂/MWh for <50 kW improving to 0.7 t CO₂/MWh for >300 kW)
- Other manufacturer specifications and studies on DG performance taken into account (e.g. SE4ALL study in Nigeria)
 - a) Emissions and sp. fuel consumption (SFC) worsen substantially at 25% load or below for all capacity ratings, e.g., a 500 kVA set is observed to have 20% better SFC at 75% than at 25% loading;
 - b) Larger generators are more efficient (e.g. 800 kVA consumes 12% less fuel as compared to 50 kVA for each kWh);

Reference to above referred literature found in: Annex 3 MP 87 report (<https://cdm.unfccc.int/Panels/meth/index.html>)



Proposed solutions - CO2 EF of DG sets

- For CO2 EF of DG set – In-line with analysed data

Cases	Mini-grid with 24 hour service	(a)Mini-grid temporary (4-6 hr/day); (b)Productive applications; (c)Water pumps	with service	Mini-grid with storage
Load factors [%]	25%		50%	100%
<15 kW	1.0		0.9	0.8
>=15 <35 kW	1.0		0.8	0.8
>=35 <135 kW	1.0		0.8	0.8
>=135<200 kW	0.9		0.8	0.8
> 200 kW	0.8		0.8	0.8



Key issues – CO2 EF of kerosene usage

- Currently some methodologies **consider suppressed demand** for energy services with a **basic level of service for lighting for each household at 55kWh /year and for electricity 250 kWh / year;**
- Pressure kerosene lamp considered instead of wick kerosene lamp that was actually used, provides a similar lighting service as the two CFLs consuming 55 kWh.
- Kerosene pressure lamps consume 0.08 litres of kerosene / hour resulting in 146 litres / year or 0.375 tCO2/year / household.

User Tranche	Current EF
First tranche (up to 55 kWh)	6.8 tCO2/MWh (i.e. 374 kg CO2 / household / year)
Second tranche (55 to 250 kWh)	1.3 tCO2/MWh
Third tranche (>250 kWh)	1.0 tCO2/MWh



Key issues – CO2 EF of kerosene usage

- Literature review showed a wide range of kerosene consumption pattern ranging from 3 to 30 litre per month i.e. 90 to 900 kgCO₂ / household /year.

Source	Coverage	liters/year	kg Co ₂ /year
Mills (2005)	All developing countries	132	339
Lighting Africa (2010)	Review of 28 surveys from across the globe	60 (range: 36 to 360)	154 (92 to 920)
CDM Project 2279	Rural India	131	336
CDM Project 2699	Rural India	83.8	215
Cambodia (UNDP 2008)	Rural households in Cambodia	15-23	38 – 59
Tanzania CDM	Sumbawanga Region in Tanzania	36-60	92 – 154
Uganda (Harsdorff and Bamanyaki 2009)	Unelectrified rural households	38	97



Key issues – CO2 EF of kerosene usage

- Lighting Africa report estimates a household will emit **150 kg CO2 / year based on 5 litre / month (i.e. 2.5 kgCO2 / litre / year)**;
- The report draws its **conclusions on market research** on off-grid populations in 5 African countries



Proposed solutions - CO2 EF of kerosene usage

User Tranche	Proposed EF value
First tranche up to 55 kWh	2.72 tCO ₂ /MWh (i.e. 150 kg CO ₂ / household / year) to replace the current 6.8 tCO ₂ /MWh (i.e. 374 kg CO ₂ / household / year)
Second tranche > 55 kWh	0.8 tCO ₂ /MWh to 1.0 tCO ₂ /MWh to replace the current 1.0 tCO ₂ /MWh to 1.3 tCO ₂ /MWh (Based on DG system capacity and the load as per CO ₂ EF for DG system)



Procedure to update the default values

- MP will **update the default values** included in the tool **every 3 years**;
- Analysis of the default values will be initiated at least **365 days prior** to their expiry date;
- MP shall **review relevant literature / information** pertaining to the default values
- Recommendation on the **continuation or update to default values** will be submitted for consideration by the Board.
- **Stakeholders may propose addition of default values** in this tool following the relevant requirements of the “Procedure: Development, revision and clarification of baseline and monitoring methodologies and methodological tools”.
- **Board may include additional default values** in this tool at any point in time (i.e. MP may recommend additional parameters subject to mandate from the Board).



Subsequent work and timelines

- MP87 **agreed to seek public inputs** on the draft tool. **No inputs received;**
- MP will **revise the methodologies** listed to include a reference to this tool.
- MP will **submit the revised methodologies for the consideration of the Board** at a future meeting.
- MP recommends that the Board approve the new tool.



Recommendations to the Board

- **MP recommends the Board adopt this new tool**, to be made effective at the time of the Board's approval.

