

# **IFI Approach to GHG Accounting for Energy Efficiency Projects**

November 2015

## **Overview:**

This note sets out a common approach of accounting for net greenhouse gas GHG emissions of energy efficiency (EE) projects in accordance with the International Financial Institution (IFI) Framework for a Harmonised Approach to Greenhouse Gas Accounting<sup>1</sup>.

## **Scope:**

This document, developed by a Technical Working Group (TWG)<sup>2</sup> of IFIs, provides guidance for net (against a baseline) emissions accounting for EE projects and/or EE project components, including as defined in the joint MDB-IDFC principles document under the categories " low carbon and energy efficient generation" and "energy efficiency projects" respectively<sup>3</sup>.

The proposed approach is primarily focused on accounting for the reduction of energy intensity induced by investments in the rehabilitation, retrofitting and/or replacement with more efficient technologies at the recipient facility<sup>4</sup>. Where the project design and operation considers efficiency gains from demand-side measures, including process and behaviour change, these impacts can also be taken into account in the calculations. The proposed approach is also applicable to the rehabilitation or retrofitting of renewable energy plants<sup>5</sup>.

For the purposes of this note, to be considered as energy efficiency investment, a project must be expected to reduce the energy or carbon intensity<sup>6</sup> at the recipient facility.

A characteristic of EE rehabilitation/retrofit projects is that they frequently involve an increase of production and/or an extension of the facility's lifetime. This note defines a methodology that takes into account these characteristics as well.

The impacts of the project on GHG emissions will be calculated by comparing the forecasted post-investment emissions with a pre-investment baseline scenario. The difference between the baseline and the project emissions constitutes the GHG emissions and/or emissions reductions referred to as net emissions accounting for the purposes of this note.

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<sup>1</sup>[http://www.worldbank.org/content/dam/Worldbank/document/IFI\\_Framework\\_for\\_Harmonized\\_Approach%20to\\_Greenhouse\\_Gas\\_Accounting.pdf](http://www.worldbank.org/content/dam/Worldbank/document/IFI_Framework_for_Harmonized_Approach%20to_Greenhouse_Gas_Accounting.pdf)

<sup>2</sup> The TWG for this methodology includes technical specialists from ADB, AfDB, AFD, EBRD, EIB, GEF, GIB, NIB, NEFCO, IDB, IFC, and WB, with support from the UNFCCC secretariat; to be widened to include more IFIs as work progresses. This note will be reviewed and updated periodically by the IFIs.

<sup>3</sup> <http://www.worldbank.org/content/dam/Worldbank/document/Climate/common-principles-for-climate-mitigation-finance-tracking.pdf> ; <https://www.idfc.org/Press-And-Publications/other-publications.aspx>

<sup>4</sup> 'Facility' is used to denote the operations, site, equipment, etc., that is the subject of the IFI-financed project.

<sup>5</sup> Applicable renewable energy technologies are defined in the "IFI Approach to GHG Accounting for Renewable Energy Projects".

<sup>6</sup> Some projects may result in fuel switching. In such cases, the emissions factors for the fuels replaced are used.

Assumptions on the project's energy use and energy intensity (MWh or GJ) are based on information collected during the appraisal conducted by each IFI for its environmental, technical and/or investment due diligence.

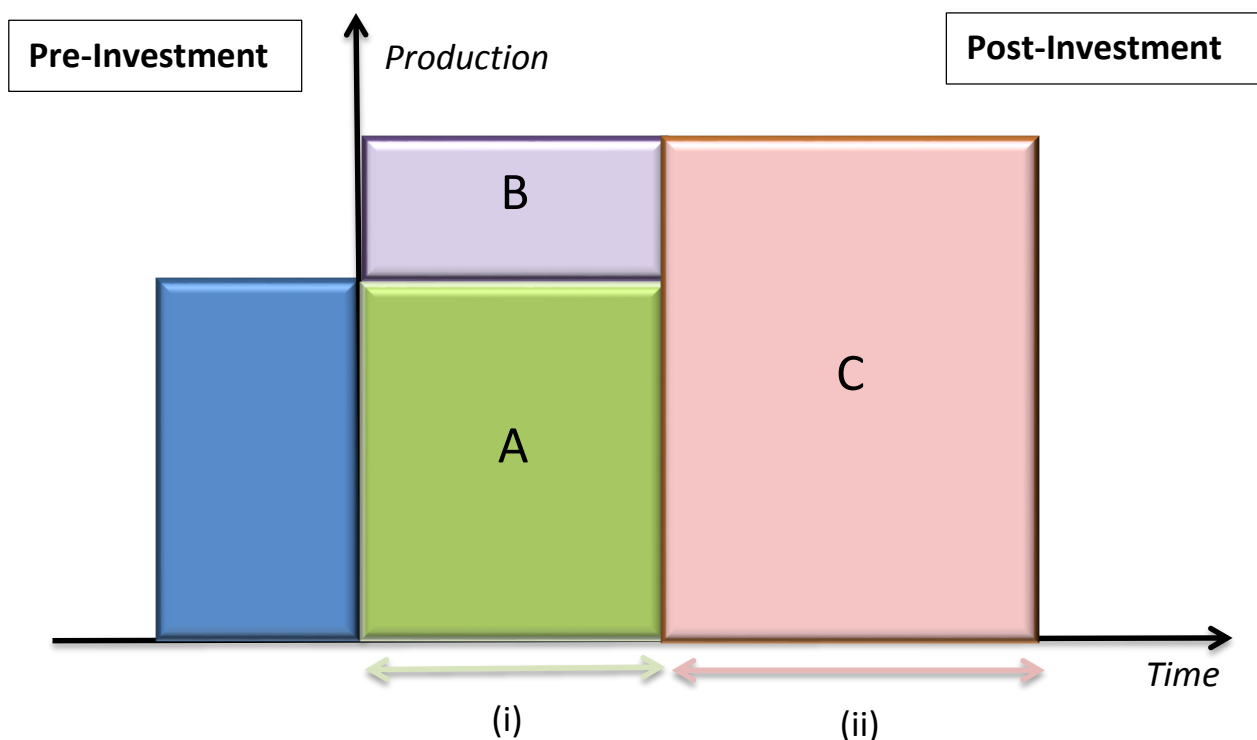
Project GHG emissions from construction, other upstream and downstream activities, leakage, and the rebound effect can be excluded as per the Framework,<sup>7</sup> unless these are deemed as significant and assessed in the project appraisal.

**Representative Year:**

Greenhouse gas emissions are calculated on an annual basis for a representative year at the expected average output of the post-investment facility. In some cases it is not possible to point out a single representative year, for example, when the project lifetime exceeds the lifetime of the pre-investment facility. In that case two or more representative years may be chosen, each with its own baseline, and a weighted average will be calculated for the emissions.

**Baselines:**

The baseline should be viable for the expected project lifetime. Equipment that is evidently operationally unviable (e.g. at the end of equipment life, or expected to cease operating due to high costs or other market barriers, or not conforming to legal requirements), do not constitute an acceptable baseline.



<sup>7</sup>Retrieve from:  
[http://www.worldbank.org/content/dam/Worldbank/document/IFI\\_Framework\\_for\\_Harmonized\\_Approach\\_to\\_Greenhouse\\_Gas\\_Accounting.pdf](http://www.worldbank.org/content/dam/Worldbank/document/IFI_Framework_for_Harmonized_Approach_to_Greenhouse_Gas_Accounting.pdf)

In the above diagram, area “A” represents the pre-investment production, area “B” represents the increased production compared to the pre-investment production during the expected remaining lifetime of the pre-investment facility and area “C” represents the production beyond the pre-investment facility lifetime.

For projects where the pre-investment and post-investment production levels are broadly equivalent, the actual emissions at the pre-investment facility prior to the investment can be used as a baseline, but only until the end of the expected lifetime of the pre-investment facility. In the above diagram, area “A” represents this production.

For projects where the investment is expected to result in an increase of production, the output of the retrofitted/rehabilitated facility should be sub-divided into the following components:

- i) Output of the pre-investment facility during its remaining technical/economic life (A); and
- ii) Additional output related to increased capacity and extended operating life (B+C).

The additional output would typically displace production from new capacity that would have been built in the country or elsewhere, or displace existing production. The baseline to be used for the displaced production may be based on a no project scenario; or alternatively the baseline emissions are calculated based on a similar level of service or output provided by the project. This could be based on a benchmark for energy efficient sources of existing production or for efficient new technologies or a combination of the two<sup>8</sup>.

For the purposes of simplification, the baseline for “B” may be represented by a benchmark comprised of existing sources of energy efficient production. The baseline for “C” should in principle comprise energy efficient new technologies; or a relevant benchmark of the most energy efficient existing technologies may be used<sup>9</sup>.

The IFI will document the choice of baseline and any supporting assumptions. IFIs that are reporting project or portfolio emissions data are encouraged to also disclose the associated assumptions and methodology.

For the refurbishment of renewable energy generation plants, the baseline is defined as follows: 1) if the pre-investment facility has reached the end of its technical life, the baseline methodology defined by the “IFI Approach to GHG Accounting for Renewable Energy Projects” note for new electricity production should be applied; and 2) if the pre-investment facility has significant remaining economic life, the emissions factor of the pre-investment facility is applied to A, and the emissions factors defined by the “IFI Approach to GHG Accounting for Renewable Energy Projects” note for new electricity production is applied to the sum of B and C.

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<sup>8</sup> For projects involving the production or avoidance of grid electricity the baseline for the grid electricity could be defined by the renewable energy OM/BM methodologies (see IFI Approach to GHG Accounting for Renewable Energy Projects).

<sup>9</sup> As a result, where the increase in production has a carbon intensity that is lower than the facility’s pre-investment level, but higher than a recognised benchmark, the increase in production should be treated as net increase in emissions.

In those cases where a project is replacing specific production, the IFI should transparently document and share the baseline used for this production with the TWG.

### **Sector-specific Considerations:**

- *Power plants:* For project that involve retrofits/rehabilitation or efficiency improvements to power plants the baseline determined in line with the above principles can comprise the combination, of a) continuation of current situation related to energy production in the existing facility for the equipment being replaced, modified or retrofitted for the expected remaining lifetime of the existing equipment; b) a combined margin for emissions<sup>10</sup> in the receiving electricity grid applied to the incremental increase in level of service expected from the project; and c) a combined margin for emissions<sup>11</sup> in the receiving electricity grid applied to the generation produced during the additional lifetime.
- *Industrial projects:* UNFCCC standardised baselines should be used when available.
- *Buildings* – For retrofits/rehabilitation of existing buildings, baselines could be based on pre-investment building conditions or prevailing building standards or a combination of the two.

### **Boundaries:**

Boundaries for GHG calculations should be used according to the following principles:

- Project GHG emissions are calculated on the basis of energy use and fuel combustion at the point of project intervention and investment, e.g. installation boundaries (e.g. a facility or a building) or component boundaries (e.g. process equipment like a boiler). For facilities comprising multiple, independent processes, the boundary can be defined at this sub-process level, if the sub-process does not affect other sub-processes and has measurable inputs, outputs, and energy use.
- Where the project appraisal quantifies the impact of the investment on emissions outside the project boundary (e.g. the broader market or on the electricity grid or distribution system), then those impacts need to be factored into the calculation of project GHG emissions as leakage.
- Baseline scenarios and calculations can have boundaries that are installation/component-based or system-based component-based (e.g. electricity grid or distribution system).

### **Emission Factors:**

In the calculation, the energy consumption (or production) of the project is multiplied by relevant emission factors in t CO<sub>2</sub>e/MWh or t CO<sub>2</sub>e/GJ as applicable, or the fuel emission factor for a captive power plant or a third-party combined heat and power plant.

For simplification, the emission factor for reduced electricity consumption from the grid is defined as for grid-based RE electricity, with a weighting of 50% Operating Margin (OM) and 50% Build Margin (BM)<sup>12</sup>.

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<sup>10</sup> The combined margin is defined by the “IFI Approach to GHG Accounting for Renewable Energy Projects” for new electricity production can be used as the baseline for B and C.

<sup>11</sup> Ibid.

<sup>12</sup> Over time, the TWG in coordination with the UNFCCC, will consider future modifications of the weights applied between OM and BM to account for additional factors, such as countries with high or low demand growth. Until more definitive guidance is available on weighting in countries with high demand growth, the IFI should transparently document and share with the TWG any alternative weighting proposal for a specific country.