Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

III.N. Avoidance of HFC emissions in rigid Poly Urethane Foam (PUF) manufacturing

Technology/measure

1. This category is applicable to project activities that avoid the fugitive emissions of HFC gases (Hydroflourocarbons) used as a blowing agent during the production of rigid Poly Urethane Foam (PUF) in a greenfield manufacturing facility. The project activity uses a non-GHG blowing agent such as pentane to replace blowing agents used in the baseline such as HFC-134a, HFC-152a, HFC-365mfc and HFC-245fa.

2. The local regulations do not constrain the facility from using HFC as the blowing agent i.e. the project activity should not be implemented under any legally binding regulations which would signify that the project activity is not a voluntary exercise.

3. The local regulations do not constrain the facility from using Hydrocarbon (e.g. Pentane) as the blowing agent.

4. The project activity complies with all local regulations including all safety related measures. Inflammable blowing agents like Pentane would require explosion-protection facilities and risk management systems. Thus it should be ensured that such systems are in place.

5. The product characteristics remain the same i.e. the PUF produced with non-GHG blowing agent will have equivalent or superior insulating properties than the PUF produced in the baseline using HFC blowing agent.

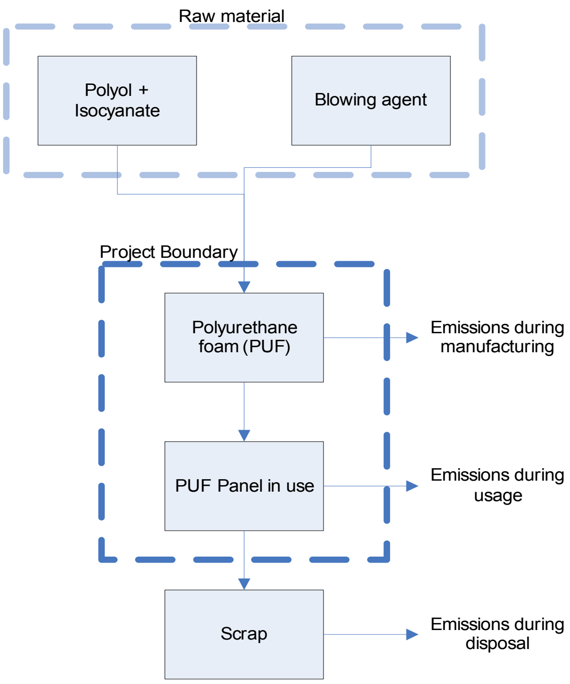
6. This methodology is applicable to domestically sold output of the project activity plant and excludes export of the manufactured PUF.

7. No significant changes in greenhouse gas emissions other than HFC emissions occur as a consequence of the project activity and/or need to be accounted for, except for the possibilities of leakage.

8. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

Boundary

9. The project boundary is the physical and geographical sites where rigid PUF manufacturing takes place and where the PUF usage takes place in the project. The project boundary for the project activity is illustrated below:



Baseline

10. The emissions of the HFC foam blowing agent used in the PUF manufacturing occurs at three phases of the product lifecycle i.e. manufacture, use and decommissioning and/or disposal. As the life of PUF is significant as shown in table 1 and table 2, the disposal emissions of the foam are excluded from calculations.

11. The emission factors for each foam type are to be chosen based on peer reviewed, field researched well documented country specific data where possible. In the absence of availability of country specific data, the IPCC default data from Table.1 and Table.2 shall be used.

Table 1. Default emission factors for HFC-134a AND HFC-152a (foam sub-application)

Sub-Application	Product Life in years	First year Loss (%)	Annual Loss (%)	Maximum Potential End-of-life loss (%)
Polyurethane- Continuous Panel	50	10	0.5	65
Polyurethane- Discontinuous Panel	50	12.5	0.5	65
Polyurethane-Appliance	15	7	0.5	62.5
Polyurethane- Injected	15	12.5	0.5	80
One component Foam (OCF)[a]	50	95	2.5	0
Extruded Polystyrene (XPS)[b]- HFC-134a	50	25	0.75	37.5

Sub-Application	Product Life in years	First year Loss (%)	Annual Loss (%)	Maximum Potential End-of-life loss (%)
Extruded Polystyrene (XPS)-HFC-152a	50	50	25	0
Extruded Polystyrene (PE)[a]	50	40	3	0
Source: Table 7.6 and Table 7.7, Page 7.37, Chapter 7: Emissions of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories				

Table 2. Default emission factors for HFC-245fa/HFC-365mfc/HFC-227 ea (foam sub-application)

HFC-245a/HFC-365mfc Applications	Product Life in years	First Year Loss %	Annual Loss %	Maximum Potential End-of-Life Loss %
Polyurethane-Continuous Panel	50	5	0.5	70
Polyurethane-Discontinuous Panel	50	12	0.5	63
Polyurethane-Appliance	15	4	0.25	92.25
Polyurethane-Injected	15	10	0.5	82.5
Polyurethane-Cont.Block	15	20	1	65
Polyurethane-Disc. Block for pipe sections	15	45	0.75	43.75
Polyurethane-Disc Block for panels	50	15	0.5	60
Polyurethane-Cont. Laminate/Boardstock	25	6	1	69
Polyurethane-Spray	50	15	1.5	10
Polyurethane-Pipe-in-Pipe	50	6	0.25	81.5
Phenolic-Discontinuous Block	15	45	0.75	43.75
Phenolic-Discontinuous Laminate	50	10	1	40
Source: Table 7.6 and Table 7.7, Page 7.37, Chapter 7: Emissions of fluorinated substitutes for Ozone depleting substances, Volume 3, Industrial Processes and Product Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories				

12. The baseline emissions are calculated as the summation of the following:

(a) **HFC emissions during PUF manufacturing**: These emissions are calculated as the total quantity of blowing agent that would have been used for rigid PUF manufacturing times the first year loss rate times the global warming potential of HFC.

(b) **HFC emissions during PUF usage**: These emissions would occur from second year onwards and would be a function of banked foam blowing agent i.e. HFC stored in the cells of the foam materials.

$$BE_{HFC_y} = \left\{ BU_{HFC_y} \times FYL_{HFC} + \sum_{n=2}^{y} BU_{HFC_{y+1-n}} \times AL_{HFC} \times \left(1 - FYL_{HFC}\right) \times \left(1 - AL_{HFC}\right)^{(n-2)} \right\} \times GWP$$

Where:

$BE_{HFC,y}$ -baseline emissions in year y (tCO_2e)

BU_{HFC} -the quantity of blowing agent in tonnes, which would have been used to produce the PUF in the year y

FYL_{HFC} -the first year loss of the blowing agent as obtained from the above table 1 or table 2 (fraction)

AL_{HFC} -the annual loss of the blowing agent as obtained from the table 1 or 2 (fraction).

GWP_{HFC} -the global warming potential of HFC

BU_{HFC} is derived from the monitored quantity of PUF manufactured. The value chosen for the formulation ratio of the foam i.e. mass of blowing agent per unit volume of the PUF shall be justified including reference to the data from the technology supplier and/or data from 2006 IPCC guidelines for national GHG inventories.

Project Activity Emissions

13. Inflammable blowing agents like Pentane would require explosion-protection facilities and risk management systems. Thus it should be ensured that such systems are in place and the emissions on account of those are accounted for as project emissions if it exceeds 5% of the total energy being consumed in the production facility.

Leakage

14. If the PUF manufacturing technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage effects are to be considered.

Monitoring

15. The blowing agent usage is a direct function of the PUF being manufactured, therefore total quantity of rigid PUF being manufactured (in m^3) is monitored on daily basis. The yearly blowing agent usage (BU_{HFC}) would be derived from this data.

Project activity under a programme of activities

The following conditions apply for use of this methodology in a project activity under a programme of activities:

16. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment

should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.