EIB CARBON FOOTPRINT METHODOLOGIES

12th June 2017, Jaspers Networking Platform Seminar

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CARBON FOOTPRINTING IN THE EIB

Carbon Footprinting in the EIB

- EIB calculates carbon footprints of projects financed
- Also calculate carbon footprint of own activities (buildings, business travel, etc.) but this is not covered today
- Why do EIB calculate carbon footprints of projects?
  - Absolute and Relative emissions data for projects are published on EIB's public register
  - Report aggregated emissions data annually in the EIB Sustainability Report
  - CF data included in impact reporting on Green Bonds
  - CF data used in economic analysis of projects which incorporates a carbon price (30 EUR/tCO2e increasing to 50 EUR/tCO2e by 2030)
  - In some sectors, CF is used to determine whether we can include a project as mitigation under our climate finance tracking (e.g. hydro, geothermal, biomass)
- EIB apply thresholds for absolute and relative emissions above which footprint is included in annual reporting
- CF data audited for last 3 years as part of EIB's sustainability audit, and for audit of Green Bond Impact reporting

Mainstreaming CF into project appraisal

Project appraisal

- Financial viability
- Technical feasibility
- Economic assessment
- Environmental and social assessment

Carbon Footprint

- Part of the environmental and social assessment
- Data drawn from the economic assessment
- Also impacts economic assessment (carbon price)

Projects included in EIB CF reporting

- Projects that may reach the established thresholds:
  - – 100,000 tonnes CO_2e for absolute emissions

And/or

  - – 20,000 tonnes CO_2e for relative emissions

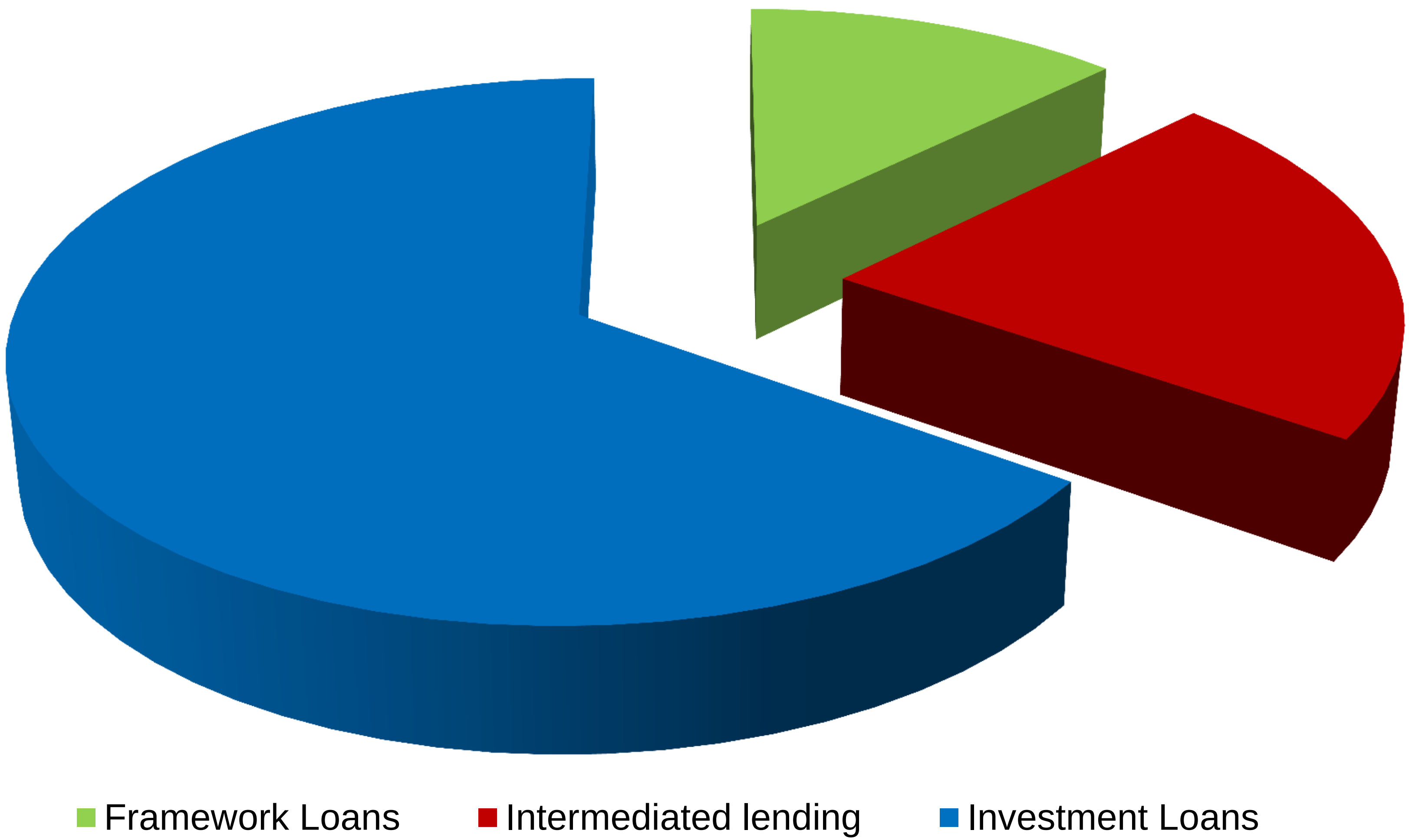
The typical projects assessed and included in the EIB CF exercise are as follows:

- Energy generation projects
- Road & Rail Projects
- Heavy industry projects

- Solid waste and wastewater
- Urban public transport (metro)
- Energy network projects

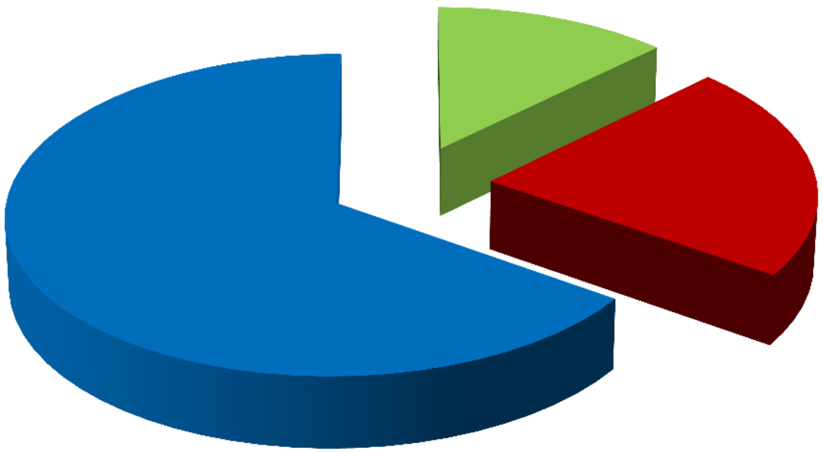
- Education and health services
- Telecoms
- RDI projects
- Traffic control systems

Scope of the CF exercise - signatures

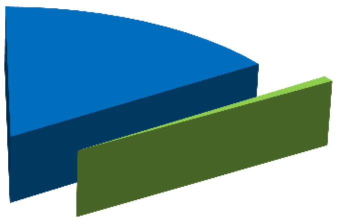


Scope of the exercise – Why Have Thresholds?

Total Portfolio



CFE Portfolio



= approx 95% investment loan emissions

EIB METHODOLOGIES

Introduction to EIB Methodology

- Version 1 developed in 2009
- 3 year pilot phase (2009-2011)
- Undergone a series of revisions. Current version 10.1 published in 2014 is available on the EIB website:

  http://www.eib.org/about/documents/footprint-methodologies.htm
- EIB Methodology is an in-house methodology but based on other international standards and methodologies e.g. IPCC, ISO 14064 parts 1 & 2, WRI GHG Protocol
- Guiding principles – completeness, consistency, transparency, conservativeness, balance and accuracy

Harmonisation Work

- Working with other IFIs to develop harmonised approaches to GHG accounting

International Financial Institution Framework for a Harmonised Approach to Greenhouse Gas Accounting

November 2012

- IFIs have since developed sector specific harmonisation approaches for energy efficiency, renewable energy and transport

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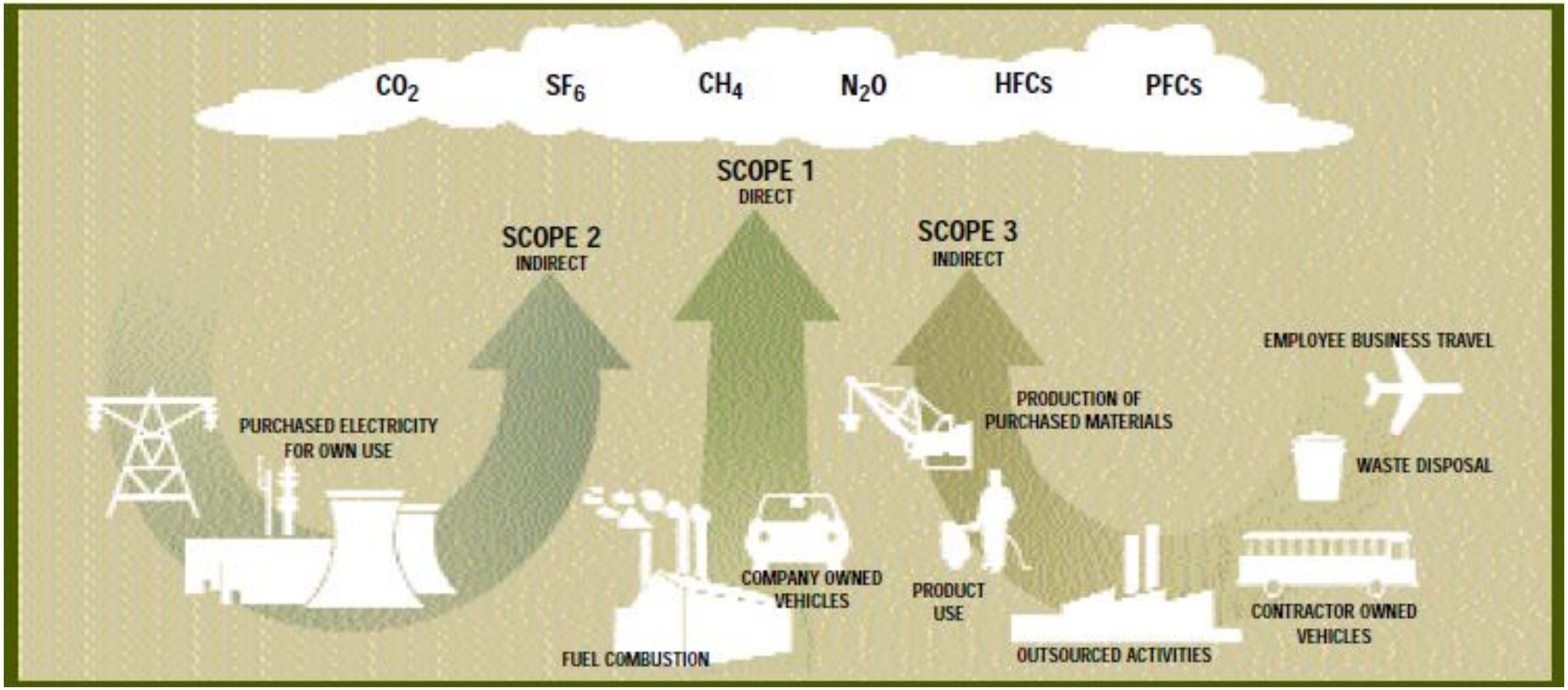
Scope of Reporting



Source: WRI/WBCSD

- Scopes 1 and 2 must be reported
- Scope 3 included in transport infrastructure projects, where emissions from vehicle/rail journeys is a significant source

Absolute Emissions

Absolute emissions (tCO2e)	=	Activity Data (e.g. quantity of fuel, electricity or product)	x	Emissions factor (e.g. tCO2e/unit of fuel or product)

- Project's emissions from a typical year of operation (i.e. not including commissioning/unplanned shutdowns)
- At appraisal, calculate total project emissions even though EIB contributing only a part of the finance (pro-rated in our Annual reporting exercise)
- Emissions Factors – default factors in methodology (from internationally recognised sources), or can use local/project specific factors where considered more accurate

Relative Emissions

Relative emissions = Absolute Emissions – Baseline Emissions

- Baseline:
  - The project baseline scenario (or ‘’without project’’ scenario) is defined as the expected alternative means to meet the output supplied by the proposed project
  - Credible in technical, economic and regulatory terms
- Example: a new conventional thermal power plant is introduced into an electricity network with zero demand growth; without the new plant, the existing power plants connected to the grid (‘the operating margin’) would have continued to meet demand. By contrast, if demand is growing sharply, supply would have been provided in part existing capacity and in part by alternative new generation capacity (‘build margin’) or in part through a regional grid interconnection.

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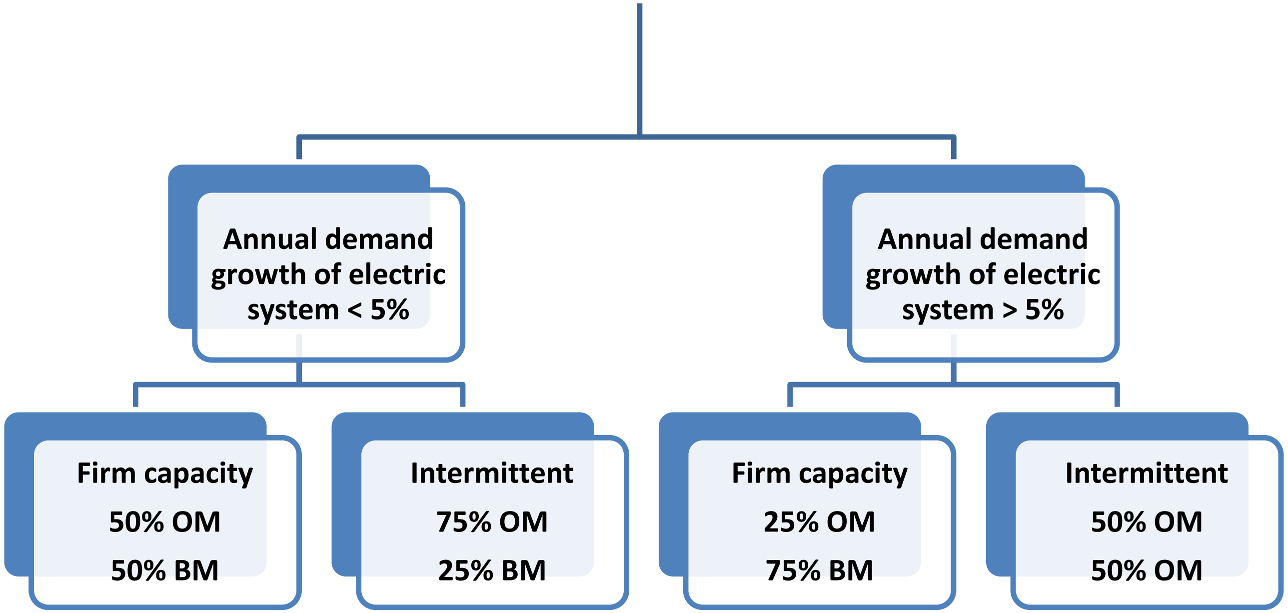
EXAMPLES

Example: Energy Projects

- EFs made up of OM and BM
- Mix determined by demand growth and type of project

Decision Tree for Energy Projects



Example: Wind Energy

New Wind Farms Germany and Brazil

Absolute Emissions = zero

EIB baseline approach: grid connected intermittent RE replaces in part existing fossil fuel capacity + in part forecast incremental build

(75/25 or 50/50)

Example 1: Wind Farm in Germany

- Expected electricity generation = 300 MW * 25% load factor = 660 GWh pa
- Based on the OM factors and BM assumptions as outlined in the Methodologies – split 75/25 in country where demand growth < 5%
- OM = 495 GWh * 704 t CO_2e/GWh = 348.5 kt CO_2e pa
- BM = 165 GWh * 354 t CO_2e/GWh = 58.4 kt CO_2e pa

Absolute = 0

Baseline = 407 kt CO_2e pa

Relative = minus 407 kt CO_2e pa

Example 2: Wind Farm in Brazil

- Expected electricity generation = 660 GWh pa
- Based on the OM factors and BM assumptions as outlined in the Methodologies – split 50/50 in country where demand growth > 5% and BM based on 80% firm RE/nuclear, 5% gas, 10% fuel oil , 5% coal
- OM = 330 GWh * 795 t CO_2e/GWh = 262.4 kt CO_2e pa
- BM = 330 GWh * 121 t CO_2e/GWh = 39.9 kt CO_2e pa

Absolute = 0

Baseline = 302 kt CO_2e pa

Relative = minus 302 kt CO_2e pa

Example: Rail Project – Absolute Emissions

- In-house model is used for calculations as part of cost benefit analysis
- The project concerns the modernization of an existing twin track line for about 140 km running approx. 60 electric powered trains per day.
- Absolute emissions = assumed power consumption (10.5 kWh/train km) x grid emission factor (655 g/kWh) x total train km per year (current demand and growth from induced demand)
- The absolute emission based on these inputs =

  20k tCO2e per average operating year.

Example: Rail Project – Baseline Emissions

- Baseline scenario must consider how output (in this case movement of passengers) would be met without the project
  - 90% demand met from existing rail (little or no impact in terms of GHG emissions)
  - 10% bus and car (higher emissions factors per passenger km than rail in this example)
  - Also takes account of induced traffic from project (increased emissions in absolute compared with baseline)
- Baseline calculated using same approach as absolute using relevant emissions factors for car and bus km
- Baseline = 25k tCO2e per year
- Relative emissions = 20 ktCO2e – 25ktCO2e = <u>- 5ktCO2e</u>

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Example: Building Energy Efficiency

- Thermal rehabilitation project of 95 residential buildings in Romania
- <u>Absolute Emissions</u>
  - Heat consumption based on energy performance certificates issued for previous phase of project
  - Emissions Factor based on 30% gas/70% coal fuel mix for heating
  - 30.20 GWh * 350 tCO_2/GWh = 10.6 $ktCO_2e/yr$
- <u>Baseline Emissions</u>
  - Based on do-nothing i.e. buildings not improved and energy performance is same as pre-project
  - 74.9 GWh * 350 tCO_2/GWh = 26.2 $ktCO_2e/yr$
- Relative emissions = 10.6 – 26.2 = <u>-15.6 kt/CO_2e/yr</u>

Example: Waste Management Project

- Waste to Energy and Anaerobic Digestion plants (UK)

ABSOLUTE EMISSIONS				
Description of source	**Activity data**	**Units**	**Emission factor**	**Absolute Emissions kt CO2e/a**
AD BMW emissions (CH4+N2O)	40	kt/yr	0.021	0.84
WtE MSW emissions (fossil/non-renewable)	256	kt/yr	0.334	85.6
WtE C&I emissions (fossil/non-renewable)	36	kt/yr	0.132	4.7
Auxiliary fuel (gas oil assumed)	730	m3	0.0027	2.0
MT electricity consumption	13.25	GWh/yr	0.551	7.3
AD electricity consumption	1.0	GWh/yr	0.551	0.55
			Absolute Emissions	**101**

BASELINE EMISSIONS				
Description of source	**Activity data**	**Units**	**Emission factor**	**Baseline Emissions kt CO2e/a**
MBT waste treatment (biostabilisation)	280	kt/yr	0.106	29.7
MBT electricity consumption	14	GWH/yr	0.551	7.7
Electricity generation displaced by WtE - OM+BM (CCGT gas)	186	GWH/yr	0.514	95.6
Electricity generation displaced by AD - OM+BM (CCGT gas)	8.8	GWH/yr	0.514	4.5
			Baseline Emissions	**138**
			Relative Emissions	**-37**

Example: Waste Management Project

- CF for Waste Incineration Plant

Absolute CO_2 emissions (from fossil share of waste input)

Municipal solid waste incinerated	256,400	t/y	
MSW Lower calorific value	9.1	MJ/kg	
MSW fossil (non-biomass) combustible share	40	% of energy content	
MSW fossil heat input	259,270	MWh/y	
Fossil CO_2 emissions from MSW	83,872	t/y CO_2	Default emission factor: 91.7 t/TJ
CH_4 emissions from MSW	28	t/y CH_4	Default emission factor: 0.03 t/TJ
N_20 emissions from MSW	4	t/y N_2O	Default emission factor: 0.004 t/TJ
Total CO_{2eq} emissions	**85,617**	t/y CO_2	
Emission factor	**0.334**	t CO_2/t (MSW)	
C&I waste incinerated	35,550	t/y	
IW Lower calorific value	9.4	MJ/kg	
IW heat input	92,832	MWh/y	
Fossil CO_2 emissions from IW	**4,683**	t/y CO_2	Default emission factor: 14.3 t/TJ
Emission factor	**0.132**	t CO_2/t (IW)	

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Example: Wastewater Treatment Plant

- New WWTP where wastewater previously treated in septic tanks

SCOPE 1, 2 or 3 EMISSIONS (AS APPLICABLE)

Description of source	Activity data	Units/yr	Emissions factor* t CO2-eq/unit	Emissions kt CO2-eq/yr
Wastewater treatment CH4 (WWTP)	100.87	tCH4/y	21	2,118.32
Wastewater treatment N2O (WWTP)	6.81	t N2O/y	310	2,112.35
Sludge disposal	12.63	tCH4/y	21	265.17
Electricity consumption	3,960,000.00	kWh/y	0.000317	1,449.89
Other sources (assume 10% of total)	594.89	tCO2e/y		594.89
		(A)	**Absolute Emissions**	**6,540.6**

BASELINE EMISSIONS

Description of source	Activity data	Units/yr	Emissions factor* t CO2-eq/unit	Emissions kt CO2-eq/yr
Wastewater treatment CH4 (Septic tanks)	953.96	tCH4/y	21	20,033.24
Wastewater treatment N2O (Septic Tanks)	7.95	t N2O/y	310	2,464.41
Sludge disposal	0	tCH4/y	21	0
Electricity consumption	0	kWh/y	0.000317	0
Other sources (assume 10% of total)	2,249.77	tCO2e/y		2,249.77
		(B)	**Baseline Emissions**	**24,747.4**
		(A - B)	**Relative Emissions**	**-18,206.8**

Example: Wastewater Treatment Plant

➢ Default EFs for WWT use population served in calculation:

1. Aerobic wastewater treatment without primary sedimentation, with excess sludge thickening and dewatering, sludge disposal on land-fill

CO_2e (t/y) = Pop. Eq. * 0.1104

2. Anaerobic waste water treatment (septic tank)

CO_2e (t/y) = Pop. Eq. * 0.2208

3. Aerobic wastewater treatment without primary sedimentation, with excess sludge aerobic digestion, thickening and dewatering, sludge disposal on land-fill

CO_2e (t/y) = Pop. Eq. * 0.0552

4. Aerobic wastewater treatment with primary sedimentation, with raw sludge aerobic digestion, thickening and dewatering, sludge disposal on land-fill

CO_2e (t/y) = Pop. Eq.*0.0607

5. Aerobic wastewater treatment with primary sedimentation, with raw sludge anaerobic digestion, thickening and dewatering, sludge disposal on land-fill

CO_2e (t/y) = Pop. Eq. *0.0497

Conclusions

- Many developments in EIB carbon footprinting:
  - Methodology developments
  - Development of sector tools
  - Mainstreaming into project appraisal
  - Third party review
- But it is a constantly evolving subject
  - Work ongoing internally and with IFI GHG WG to develop approaches for further sectors (e.g. T&D, bioenergy, agriculture)
- Some common issues in CFs:
  - Baseline selection
  - Boundaries
  - Units/factors/conversions

For info or further questions on this workshop and the activities of the JASPERS Networking Platform, please contact:

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