WR Methodological Module

Estimation of emissions from fossil fuel combustion (E-FFC)

I. SCOPE, APPLICABILITY AND PARAMETERS

Scope

This module provides a step-wise approach for estimating emissions from fossil fuel combustion in Wetland Restoration (WR) projects.

Applicability

This module is applicable for estimating fossil fuel combustion emission sources related to Wetland Restoration (WR) such as project activities that include moving sediment within the project boundary. Fossil fuel combustion emission sources shall be included if determined to be significant using module T-SIG.

Parameters

This methodology produces the following parameters:

Parameter	SI Unit	Description
$E_{FC,i,t}$	t CO_2-e	Emission from fossil fuel combustion in stratum *i* in year *t*

II. PROCEDURES

Emissions can be estimated by the amount of fuel consumed.

$$E_{FC,i,t} = \sum_{a=1}^{A} \left(Fuel_{a,i,t} \times EF_a \right) \quad (1)$$

Where:

$E_{FC,i,t}$	Net CO_2-e emissions of Fuel Consumption in stratum *i* in year *t*; t CO_2-e
$Fuel_{a,i,t}$	Amount of Fuel of type *a* consumed in stratum *i* in year *t*; terrajoule (TJ)
EF_a	Emission factor of Fuel type *a*; t CO_2-e/TJ
a	1,2,3,…A fuel types (e.g. diesel, gasoline, etc.)

The amount of fuel of a particular kind combusted in year *t* ($Fuel_{a,t}$) can be estimated as:

$$Fuel_{a,i,t} = Liters_{Fuel_{a,i,t}} \times Density_{Fuel_a} \times NCV_{Fuel} \div 10^6 \quad (2)$$

Where:

$Fuel_{a,t}$ Amount of Fuel type *a* consumed in stratum *i* in year *t*; TJ

$Liters_{Fuel\ a,t}$ Quantity of Fuel of consumed in stratum *i* in year *t*; ltr

$Density_{Fuel\ a}$ Density of Fuel type *a*; kg/ltr

$NCV_{Fuel\ a}$ Net Calorific Value of Fuel type *a*;TJ/Gg

In section III, default values are provided for all parameters not monitored. However, it is recommended and encouraged to use country-specific NCVs and EFs where available.

III. DATA AND PARAMETERS NOT MONITORED (DEFAULT OR MEASURED ONE TIME)

Data /parameter:	EF_a
Data unit:	t CO2-e/TJ
Used in equations:	1
Description:	Emission factor
Source of data:	Table 1.4 Chapter 1 Volume 2 of IPCC, 2006.
Measurement procedures (if any):	Default emission factors are presented in the table below. Table: Road transport default CO_2 emission factors.[a]

Fuel Type	Default effective CO_2 emission factor (t CO_2/TJ)
Motor gasoline	69.3
Gas/Diesel Oil	74.1
Liquefied Petroleum Gases	63.1
Kerosene	71.9
Lubricants	73.3
Compressed Natural Gas	56.1
Liquefied Natural Gas	56.1

[a]Values represent 100% oxidation of fuel carbon content.

The emission factors assume that 100% of the carbon content of the fuel is

	oxidized during or immediately following the combustion process (for all fuel types in all vehicles) irrespective of whether the CO_2 has been emitted as CO_2, CH_4, CO or NMVOC or as particulate matter.
Any comment:	May need to be updated when the baseline is revisited

Data /parameter:	$Density_{Fuel\ a}$
Data unit:	Kg/ltr
Used in equations:	2
Description:	Density of Fuel type
Source of data:	Table A3.8 Page 181 of the Energy Statistics Manual of OECD/IEA, 2004.
Measurement procedures (if any):	Densities for relevant petroleum products as presented in table A3.8 Typical Density Values for Selected Petroleum Products

Fuel Type	Density (kg/ltr)	Liters per ton
Motor gasoline	0.7407	1350
Gas/Diesel Oil	0.8439	1185
Naphtha	0.6906	1448
Aviation gasoline	0.7168	1350
Aviation Turbine fuel	0.8026	1246
Other kerosene	0.8026	1246

Any comment:	May need to be updated when the baseline is revisited

Data /parameter:	NCV_a
Data unit:	GJ/tonne
Used in equations:	2
Description:	Net Caloric Value per Fuel Type
Source of data:	Table A3.8, page 181, IEA Statistics Manual, OECD/IEA, 2004; and, Table 1.2, Chapter 1, Volume 2, IPCC 2006 Inventory Guidelines
Measurement procedures (if any):	Default NCVs are presented in tables below.

Fuel Type	Density (kg/ltr)	NCV (GJ/t)[a]

Motor gasoline	0.7407	44.75
Gas/Diesel Oil	0.8439	43.38
Naphtha	0.6906	45.34
Aviation gasoline	0.7168	45.03
Aviation Turbine fuel	0.8026	43.92
Other kerosene	0.8026	43.92

[a] 1000 GJ = 1 TJ

Table: Default NCVs (excerpt from table 1.2, Chapter 1, Volume 2, IPCC, 2006 inventory Guidelines)

Fuel type (English description)	Default Net Caloric Value (NCV) (TJ/Gb)[b]
Crude Oil	42.3
Orimulsion	27.5
Natural Gas Liquids	44.2
Motor Gasoline	44.3
Aviation Gasoline	44.3
Jet Gasoline	44.3
Jet Kerosene	44.1
Other Kerosene	43.8
Gas/Diesel Oil	43.0
Bio-gasoline/bio-diesel	27.0
Other liguid biofuels	27.4

[b] TJ/Gb = GJ/t

Any comment:	For more NCVs for other fuels, see the original data sources. May need to be updated when the baseline is revisited.

IV. DATA AND PARAMETERS MONITORED

Data /parameter:	$Liters_{Fuel,a,i,t}$
Data unit:	liters
Used in equations:	1
Description:	Quantity of Fuel of type *a* consumed in stratum *i* in year *t*
Source of data:	Records of fuel consumed
Measurement procedures (if any):	In the absence of direct fuel consumption data, each major fuel type used by various equipment can be estimated from data on the expenditure on fuel (on the basis of receipts/fuel acquired). Records / monitoring shall be continuous and consumption/mileage shall be

	divided by equipment type/vehicle type. Where estimation of fossil fuel combustion is elected as an emission source, fossil fuel use by the project both inside and outside the project boundary shall be recorded and considered as project emissions.
Any comment:	*Ex-ante* an estimate shall be made of fuel consumption based on projected usage. If fuel use does not differ significantly by stratum or if records are kept at the project level then stratification is not necessary.