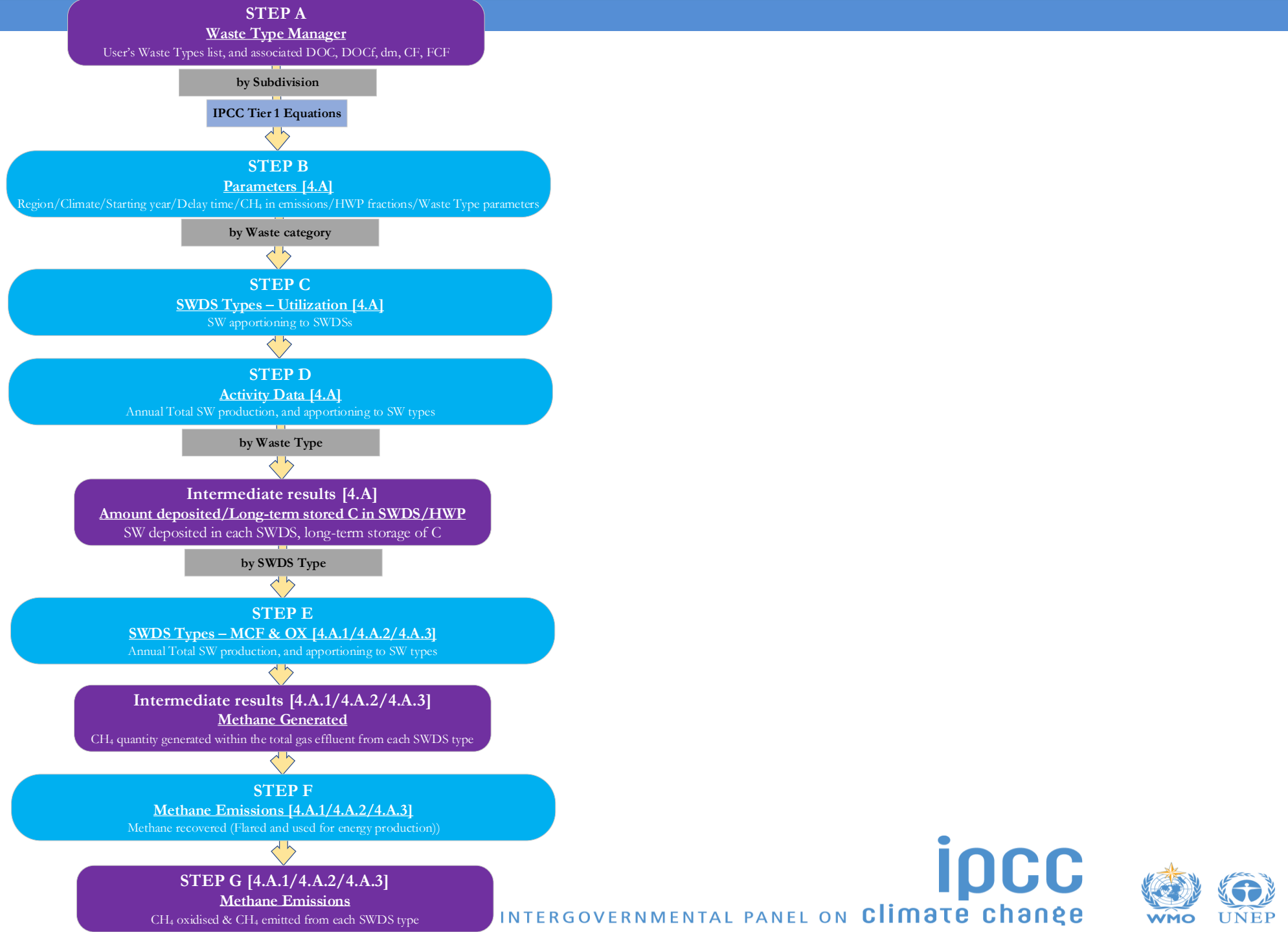
# IPCC Inventory Software

## Training of GHG Inventory National Experts to prepare first Biennial Transparency Report under ETF of the Paris Agreement:

## SWDS

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

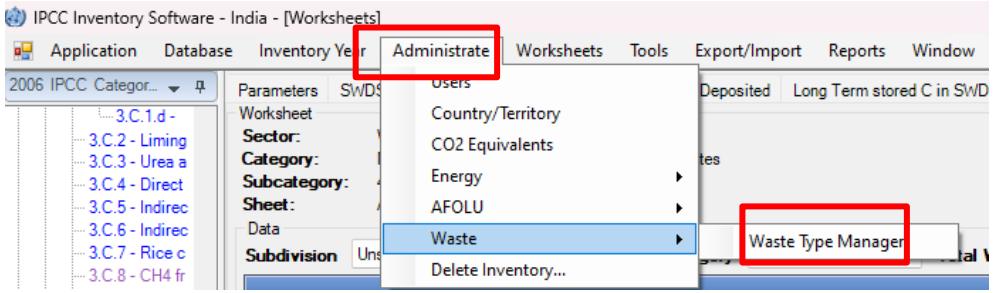

STEP A
Waste Type Manager
User's Waste Types list, and associated DOC, DOCf, dm, CF, FCF
by Subdivision
IPCC Tier 1 Equations
STEP B
Parameters [4.A]
Region/Climate/Starting year/Delay time/CH4 in emissions/HWP fractions/Waste Type parameters
by Waste category
STEP C
SWDS Types – Utilization [4.A]
SW apportioning to SWDSs
STEP D
Activity Data [4.A]
Annual Total SW production, and apportioning to SW types
by Waste Type
Intermediate results [4.A]
Amount deposited/Long-term stored C in SWDS/HWP
SW deposited in each SWDS, long-term storage of C
by SWDS Type
STEP E
SWDS Types – MCF & OX [4.A.1/4.A.2/4.A.3]
Annual Total SW production, and apportioning to SW types
Intermediate results [4.A.1/4.A.2/4.A.3]
Methane Generated
CH4 quantity generated within the total gas effluent from each SWDS type
STEP F
Methane Emissions [4.A.1/4.A.2/4.A.3]
Methane recovered (Flared and used for energy production))
STEP G [4.A.1/4.A.2/4.A.3]
Methane Emissions
CH4 oxidised & CH4 emitted from each SWDS type

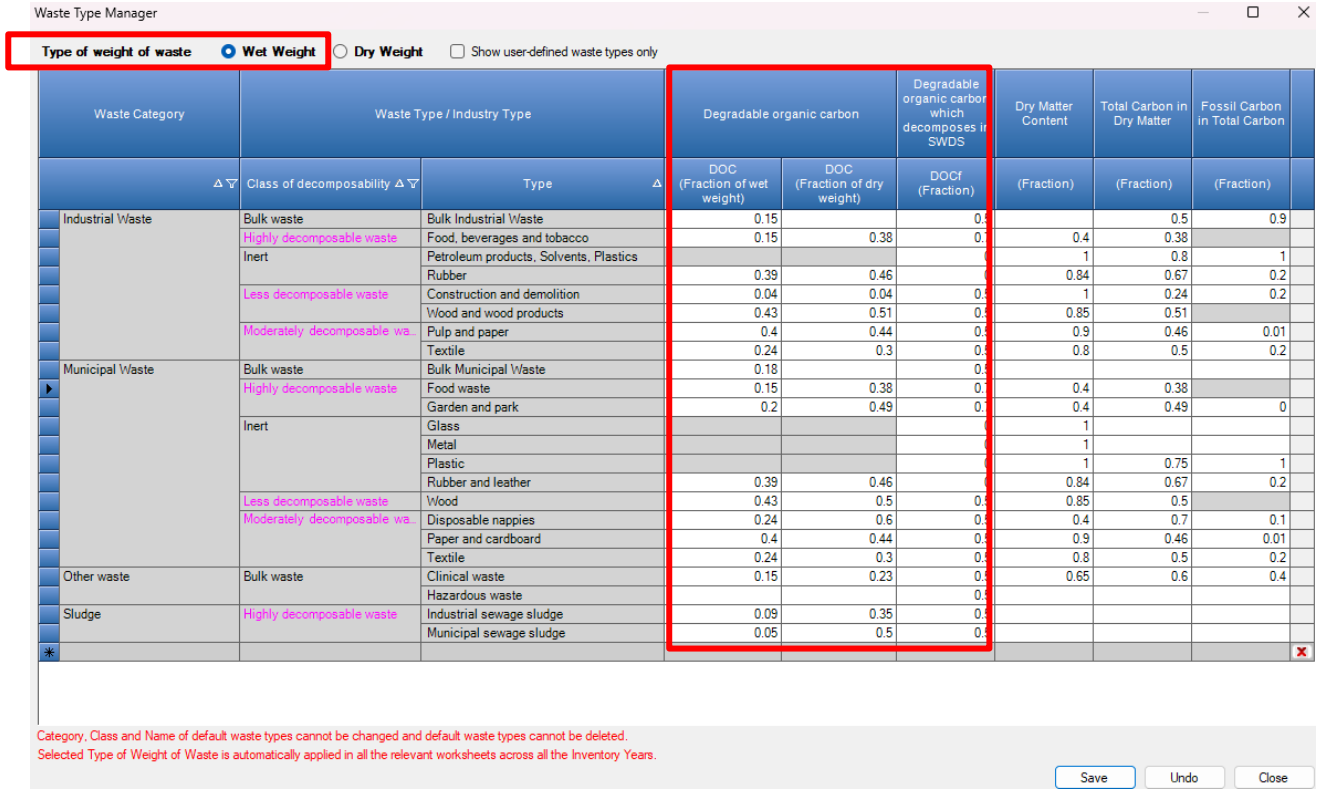
# Step A: Set-up Waste Manager

Applies to all Inventory categories of Waste sector that have solid waste

**To Report to UNFCCC solid waste data shall be in WET WEIGHT**

Users can enter new waste types as well as revise IPCC default values of parameters (*those in the red box apply to SWDS*)



# Step B: Set-up Parameters

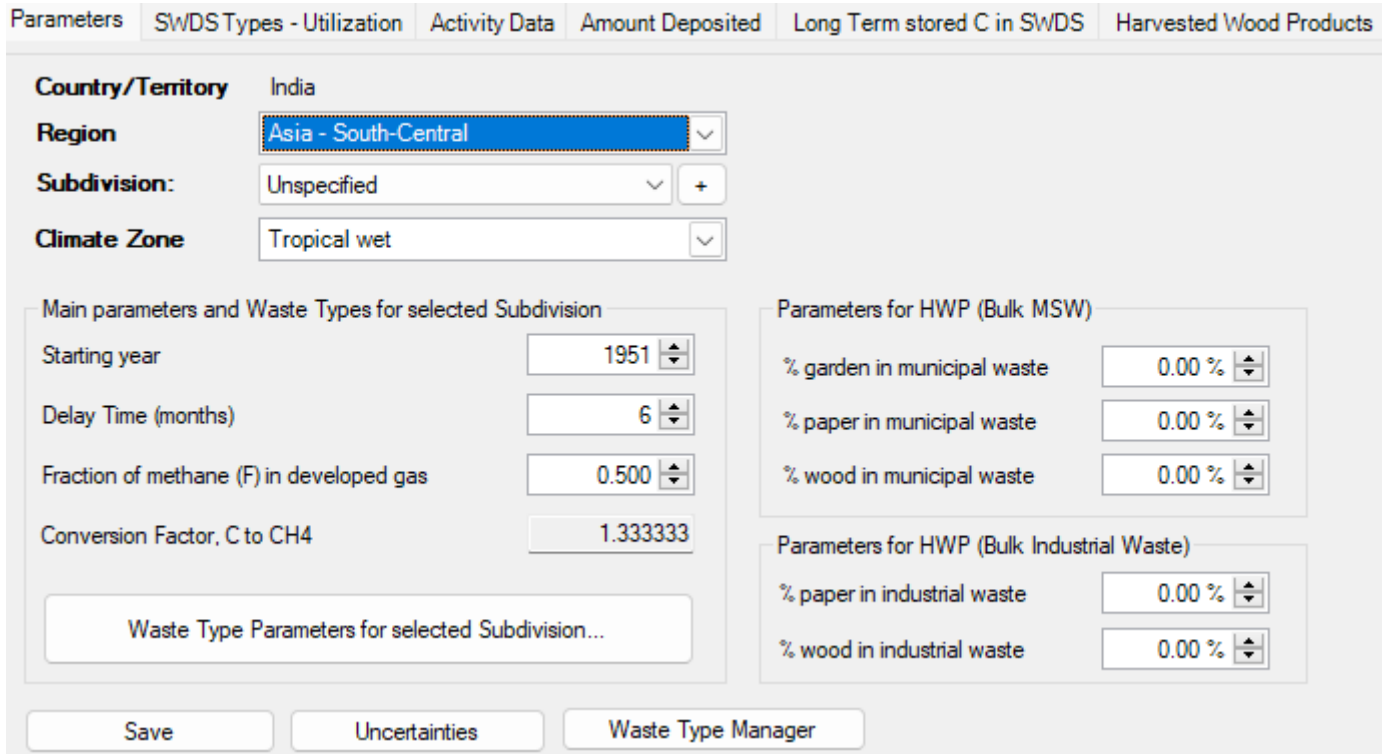
**Region** impacts the selection of IPCC default factors for Allocation of waste to SWDS types

**Climate zone** impacts the selection of IPCC default factors for k (and thus half-life)

*Useful to stratify in subdivisions for different climate zones*

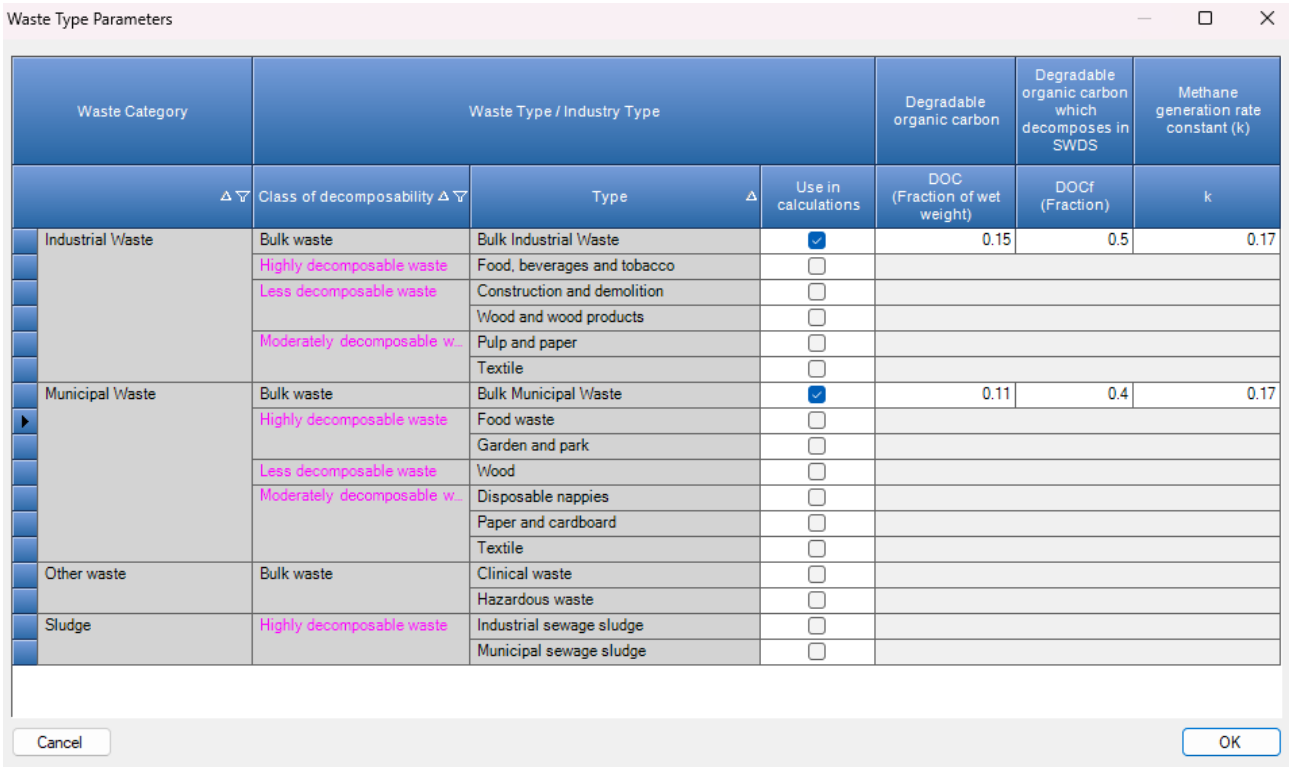
F set as per IPCC default

Delay time?



# Step B: Set-up Parameters

| MSW | IPCC default | User value |
|---|---|---|
| DOC | 0.18 | 0.11 |
| DOCf | 0.5 | 0.4 (or 0.5?) |
| k | 0.17 | 0.17 |



# Step C: SWDS utilization

Parameters | SWDS Types - Utilization | Activity Data | Amount Deposited | Long Term stored C in SWDS | Harvested Wood Products

Worksheet

**Sector:** Waste

**Category:** Methane emissions from Solid Waste Disposal Sites

**Subcategory:** 4.A - Solid Waste Disposal

**Sheet:** SWDS Types - Utilization

2005

Data

**Subdivision** Unspecified **Waste Category** Municipal Waste

| | Unmanaged | | Managed | | | | | Uncategorised | Distribution Check | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Unmanaged – shallow (%) | Unmanaged – deep (%) | Managed – anaerobic (%) | Managed poorly – semi-aerobic (%) | Managed well – semi-aerobic (%) | Managed poorly – active aeration (%) | Managed well – active aeration (%) | Uncategorised SWDS (%) | Total (%) | | | |
| 1951 | 25 | 30 | 25 | | 5 | | | 15 | 100 | | | |

**Magenta columns contain SWDS types from *2019 Refinement* (required for interoperability with UNFCCC CRTs)**

**Does India apply 1 single SWDS only?**

*Useful to stratify in SWDS types*

# Step D: Activity Data *1951-2020*

Data

**Subdivision** Unspecified | **Waste Category** Municipal Waste | **Total Waste** Calculated from Population | **Waste Type Amounts** % of Total Waste going to SWDS

| | | | | | | Composition of waste going to solid waste disposal sites. | | |
|---|---|---|---|---|---|---|---|---|
| Year | Population (Capita) | Waste per capita (kg/cap/yr) | Total Waste (Gg) | % to SWDS (%) | Total to SWDS (Gg) | Bulk Municipal Waste | Inert | Total |
| | A | B | C = A * B * 10^-6 | D | E = C * (D/100) | % of E | % of E | % |
| **1983** | 170,400,000 | 200.75 | 34,207.8 | 70 | 23,945.46 | 100 | 0 | 100 |
| **1984** | 176,100,000 | 200.75 | 35,352.075 | 70 | 24,746.4525 | 100 | 0 | 100 |
| **1985** | 181,800,000 | 200.75 | 36,496.35 | 70 | 25,547.445 | 100 | 0 | 100 |
| **1986** | 187,500,000 | 200.75 | 37,640.625 | 70 | 26,348.4375 | 100 | 0 | 100 |
| **1987** | 193,200,000 | 200.75 | 38,784.9 | 70 | 27,149.43 | 100 | 0 | 100 |
| **1988** | 198,900,000 | 200.75 | 39,929.175 | 70 | 27,950.4225 | 100 | 0 | 100 |
| **1989** | 204,600,000 | 200.75 | 41,073.45 | 70 | 28,751.415 | 100 | 0 | 100 |
| **1990** | 210,300,000 | 200.75 | 42,217.725 | 70 | 29,552.4075 | 100 | 0 | 100 |
| **1991** | 216,000,000 | 200.75 | 43,362 | 70 | 30,353.4 | 100 | 0 | 100 |
| **1992** | 223,000,000 | 200.75 | 44,767.25 | 70 | 31,337.075 | 100 | 0 | 100 |
| **1993** | 230,000,000 | 200.75 | 46,172.5 | 70 | 32,320.75 | 100 | 0 | 100 |
| **1994** | 237,000,000 | 200.75 | 47,577.75 | 70 | 33,304.425 | 100 | 0 | 100 |
| **1995** | 244,000,000 | 200.75 | 48,983 | 70 | 34,288.1 | 100 | 0 | 100 |
| **1996** | 251,000,000 | 200.75 | 50,388.25 | 55 | 27,713.5375 | 100 | 0 | 100 |
| **1997** | 258,000,000 | 200.75 | 51,793.5 | 70 | 36,255.45 | 100 | 0 | 100 |
| **1998** | 265,000,000 | 200.75 | 53,198.75 | 70 | 37,239.125 | 100 | 0 | 100 |
| **1999** | 272,000,000 | 200.75 | 54,604 | 70 | 38,222.8 | 100 | 0 | 100 |
| **2000** | 279,000,000 | 200.75 | 56,009.25 | 70 | 39,206.475 | 100 | 0 | 100 |
| **2001** | 286,000,000 | 200.75 | 57,414.5 | 70 | 40,190.15 | 100 | 0 | 100 |
| **2002** | 295,100,000 | 200.75 | 59,241.325 | 70 | 41,468.9275 | 100 | 0 | 100 |
| **2003** | 304,200,000 | 200.75 | 61,068.15 | 70 | 42,747.705 | 100 | 0 | 100 |
| **2004** | 313,300,000 | 200.75 | 62,894.975 | 70 | 44,026.4825 | 100 | 0 | 100 |
| **2005** | 322,400,000 | 200.75 | 64,721.8 | 70 | 45,305.26 | 100 | 0 | 100 |
| **2006** | 331,500,000 | 200.75 | 66,548.625 | 70 | 46,584.0375 | 100 | 0 | 100 |
| **2007** | 340,600,000 | 200.75 | 68,375.45 | 70 | 47,862.815 | 100 | 0 | 100 |
| **2008** | 349,700,000 | 200.75 | 70,202.275 | 70 | 49,141.5925 | 100 | 0 | 100 |
| **2009** | 358,800,000 | 200.75 | 72,029.1 | 70 | 50,420.37 | 100 | 0 | 100 |
| **2010** | 367,900,000 | 200.75 | 73,855.925 | 70 | 51,699.1475 | 100 | 0 | 100 |
| **2011** | 377,000,000 | 200.75 | 75,682.75 | 70 | 52,977.925 | 100 | 0 | 100 |
| **2012** | 386,100,000 | 200.75 | 77,509.575 | 70 | 54,256.7025 | 100 | 0 | 100 |
| **2013** | 395,200,000 | 200.75 | 79,336.4 | 70 | 55,535.48 | 100 | 0 | 100 |
| **2014** | 404,300,000 | 200.75 | 81,163.225 | 70 | 56,814.2575 | 100 | 0 | 100 |
| **2015** | 413,400,000 | 200.75 | 82,990.05 | 70 | 58,093.035 | 100 | 0 | 100 |
| **2016** | 422,500,000 | 200.75 | 84,816.875 | 70 | 59,371.8125 | 100 | 0 | 100 |
| **2017** | 432,648,000 | 164.25 | 71,062.434 | 80 | 56,849.9472 | 100 | 0 | 100 |
| **2018** | 441,726,000 | 164.25 | 72,553.4955 | 80 | 58,042.7964 | 100 | 0 | 100 |
| **2019** | 450,877,000 | 164.25 | 74,056.54725 | 80 | 59,245.2378 | 100 | 0 | 100 |
| **2020** | 460,086,000 | 164.25 | 75,569.1255 | 80 | 60,455.3004 | 100 | 0 | 100 |

# Step E: MCF & OX

| SWDS | parameter | IPCC default | User value |
|---|---|---|---|
| Managed anaerobic | MCF | 1 | 0.5 (or 0.4?) |
| | OX | 0 | 0 |
| Managed well Semi-aerobic | MCF | 0.5 | 0.5 (or 0.4?) |
| | OX | 0 | 0 |
| Unmanaged shallow | MCF | 0.4 | 0.5 (or 0.4?) |
| | OX | 0 | 0 |
| Unmanaged deep | MCF | 0.8 | 0.5 (or 0.4?) |
| | OX | 0 | 0 |
| Uncategorised | MCF | 0.6 | 0.5 (or 0.4?) |
| | OX | 0 | 0 |

# Steps F/G

| Categories | CO2 | CH4 | N2O |
|---|---|---|---|
| **4 - Waste** | 0.000 | 816.858 | 0.000 |
| **4.A - Solid Waste Disposal** | | 816.858 | |
| 4.A.1 - Managed Waste Disposal Sites | | 0.000 | |
| 4.A.2 - Unmanaged Waste Disposal Sites | | 0.000 | |
| 4.A.3 - Uncategorised Waste Disposal Sites | | 816.858 | |

| Categories | CO2 | CH4 | N2O |
|---|---|---|---|
| **4 - Waste** | 0.000 | 1,061.915 | 0.000 |
| **4.A - Solid Waste Disposal** | | 1,061.915 | |
| 4.A.1 - Managed Waste Disposal Sites | | 245.057 | |
| 4.A.2 - Unmanaged Waste Disposal Sites | | 694.329 | |
| 4.A.3 - Uncategorised Waste Disposal Sites | | 122.529 | |

## From third NC3:

**2019, 59,245 Gg of MSW reached landfills in India, resulting in 791 Gg of Methane**

| Type of emission factor and level of methodological tier employed for GHG estimation | | | | | | |
|---|---|---|---|---|---|---|
| **Gas** | **$CO_2$** | | **$CH_4$** | | **$N_2O$** | |
| **Sector/ Category** | **Method used** | **Emission Factor** | **Method used** | **Emission Factor** | **Method used** | **Emission Factor** |
| E. Production of halocarbons | NO | | NO | | NO | |
| **3. Agriculture** | | | | | | |
| A. Enteric fermentation | NO | | T1, T2 | D, CS | NO | |
| B. Manure management | NO | | T1 | D | T1 | D |
| C. Rice cultivation | NO | | T2 | CS | | |
| D. Agricultural soils | NO | | NO | | T2 | CS |
| F. Field burning of agricultural residues | NO | | T1 | D | T1 | D |
| **4. Land Use, Land Use Change and Forestry (LULUCF)** | | | | | | |
| A. Forest land | T2 | CS | T2 | D, CS | T2 | D, CS |
| B. Cropland | T2 | CS | NO | | NO | |
| C. Grassland | T2 | CS | NO | | NO | |
| D. Settlements | T2 | CS | NO | | NO | |
| E. Wetlands | NE | | NE | | NE | |
| F. Other Land | NA | | NA | | NA | |
| **5. Waste** | | | | | | |
| A. Solid waste disposal on land | NO | | T2 | D, CS | NO | |
| B. Waste-water handling | NO | | T1, T2 | D, CS | T1, T2 | D, CS |
| **Memo item (not accounted in total emissions)** | | | | | | |
| International bunkers | T1, T2 | D | T1, T2 | D | T1, T2 | D |
| $CO_2$ from biomass | T1 | D | NO | | NO | |

T1- Tier 1; T2- Tier 2; T3- Tier 3; CS- Country Specific; D- IPCC Default, NO-Not Occurring, NA-Not Applicable, NE-Not Estimated

# Key Category & Tier

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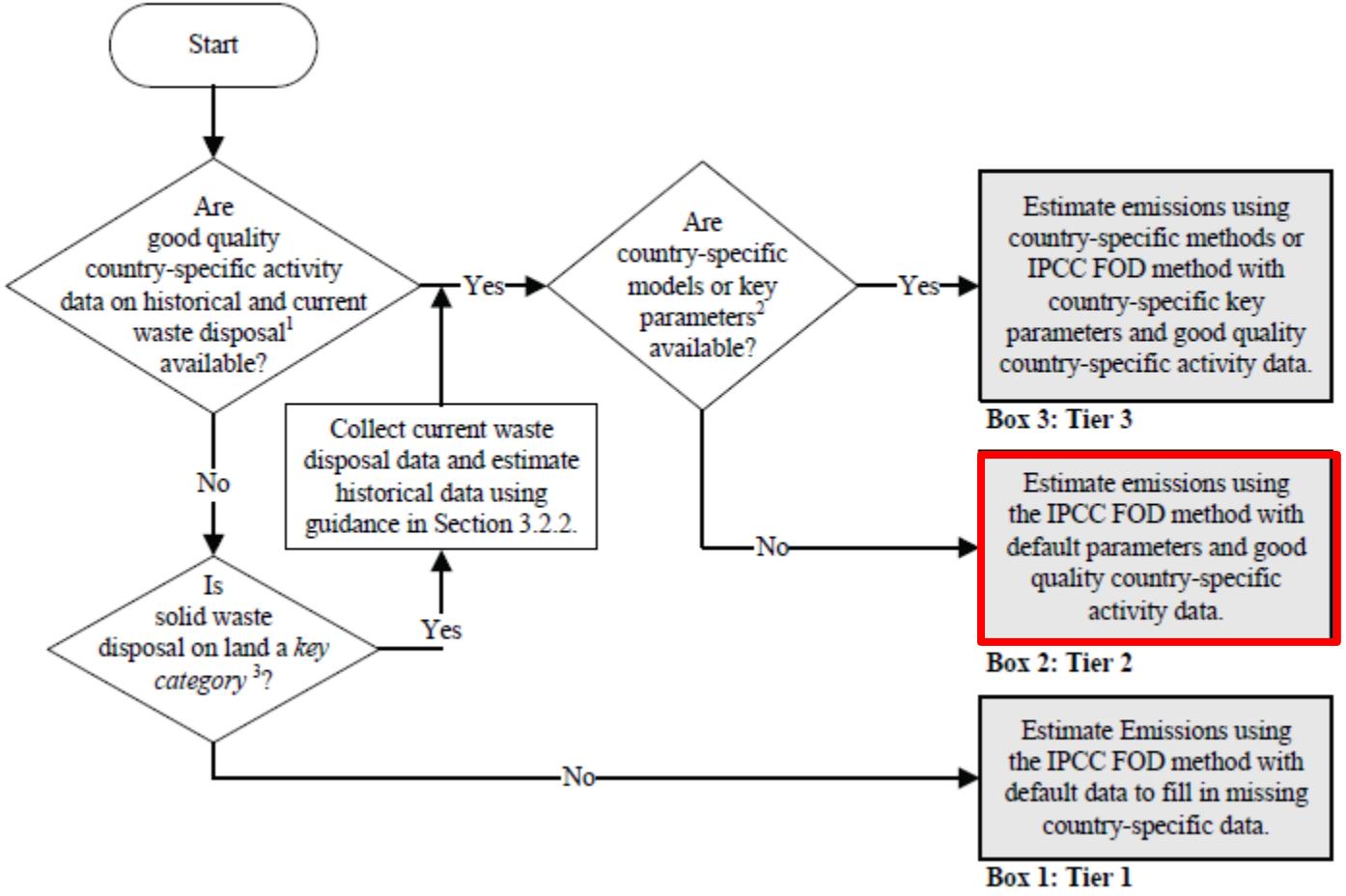
# Key Category & Tier

**Figure 3.1 Decision Tree for $CH_4$ emissions from Solid Waste Disposal Sites**



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