IPCC Inventory Software: Waste Sector

Remote Training on the IPCC Inventory Software for National Greenhouse Gas Inventories for the Latin America and Caribbean Regions

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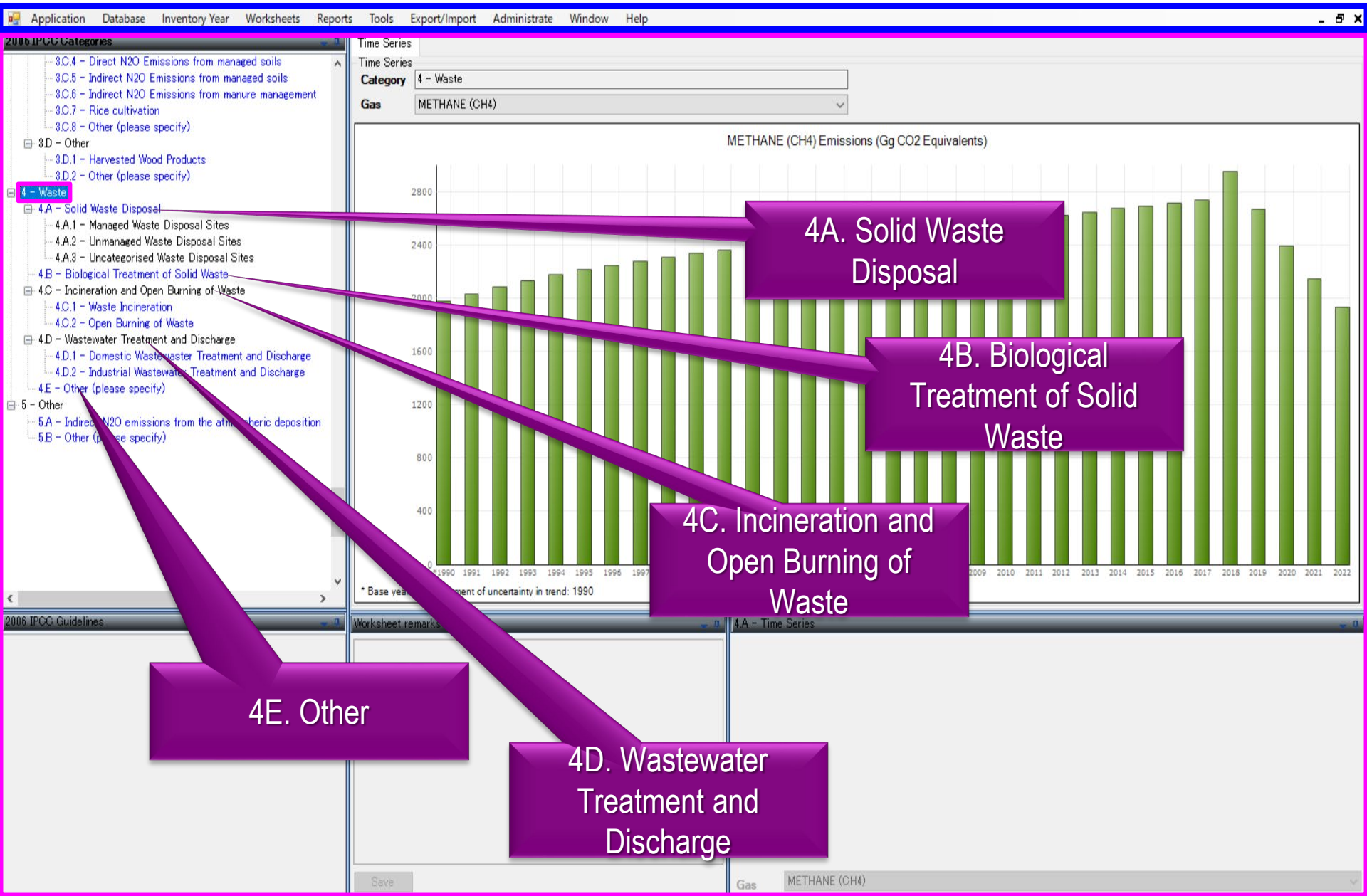
Waste Sector

- Volume 5 of the *2006 IPCC Guidelines* provides methodological guidance for estimation of CO_2, CH_4 and N_2O emissions from Waste sector:
  - Solid waste disposal (4A)
  - Biological treatment of solid waste (4B)
  - Incineration and open burning of waste (4C)
  - Wastewater treatment and discharge (4D)
- Typically, CH_4 emissions from solid waste disposal sites (SWDSs) are the largest source in Waste sector
- Biogenic CO_2 emissions are not included in Waste sector
- All greenhouse gas (GHG) emissions from waste-to-energy should be estimated and reported under Energy sector

IPCC Inventory Software



IPCC Inventory Software (ver.2.83): Major Updates

- Subnational disaggregation at a category level
- Implements Tier 3 equation in the *2006 IPCC Guidelines* (Volume 5) and methods in the *Wetlands Supplement* (Chapter 6)
  - Default values are incorporated but gives users the flexibility to use their own country-specific data and information
- Improvements in worksheet structure and layout - more streamlined user interface

Note: Some fixes have been already identified so there will be some changes in Waste sector worksheets of the software.

Solid Waste Disposal: First Order Decay (FOD) Method

- Decomposition of organic materials in waste under anaerobic condition produces significant amount of CH_4
- Waste disposal practices in SWDSs vary in the control, placement of waste and management of the site
  - Methane correction factor (MCF) reflects the way waste is managed and the effect of site structure and management practices on CH_4 generation
- Methodology in the *2006 IPCC Guidelines* for estimating CH_4 emissions from SWDS is based on FOD method
  - Degradable organic component in waste at landfills decays slowly throughout a few decades
  - A "running total" of the amount of degradable organic carbon (DOC) decomposable in the disposal site, taking account of the amount deposited each year and amount remaining from previous years, is used to calculate CH_4 emissions each year
  - A simple spreadsheet model (IPCC Waste Model) to assist countries in using the FOD method https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html

Solid Waste Disposal: FOD Method

- Three tiers for estimation of CH_4 emissions
  - Tier 1: Mainly default activity data (AD) and default parameters
  - Tier 2: Some default parameters but requires good quality country-specific AD on current and historical waste disposal at SWDSs
  - Tier 3: Good quality country-specific AD and the use of either the FOD method with (1) nationally developed key parameters, or (2) measurement derived country-specific parameters.
- Key parameters: half-life, and either CH_4 generation potential (L_o) or DOC content in waste and fraction of DOC which decomposes (DOC_f)
- Requires data on historical disposals of waste
  - Amount of municipal solid waste (MSW) can be estimated from population and per capita waste generation data (Tier 1)

Solid Waste Disposal: CH_4 Emissions

- CH_4 emissions in year *T* from SWDS (Gg)

$$CH_4 Emissions = \left[\sum_x CH_4 generated_{x,T} - R_T \right] * \left(1 - OX_T\right)$$

T : inventory year

x : waste category or type/material

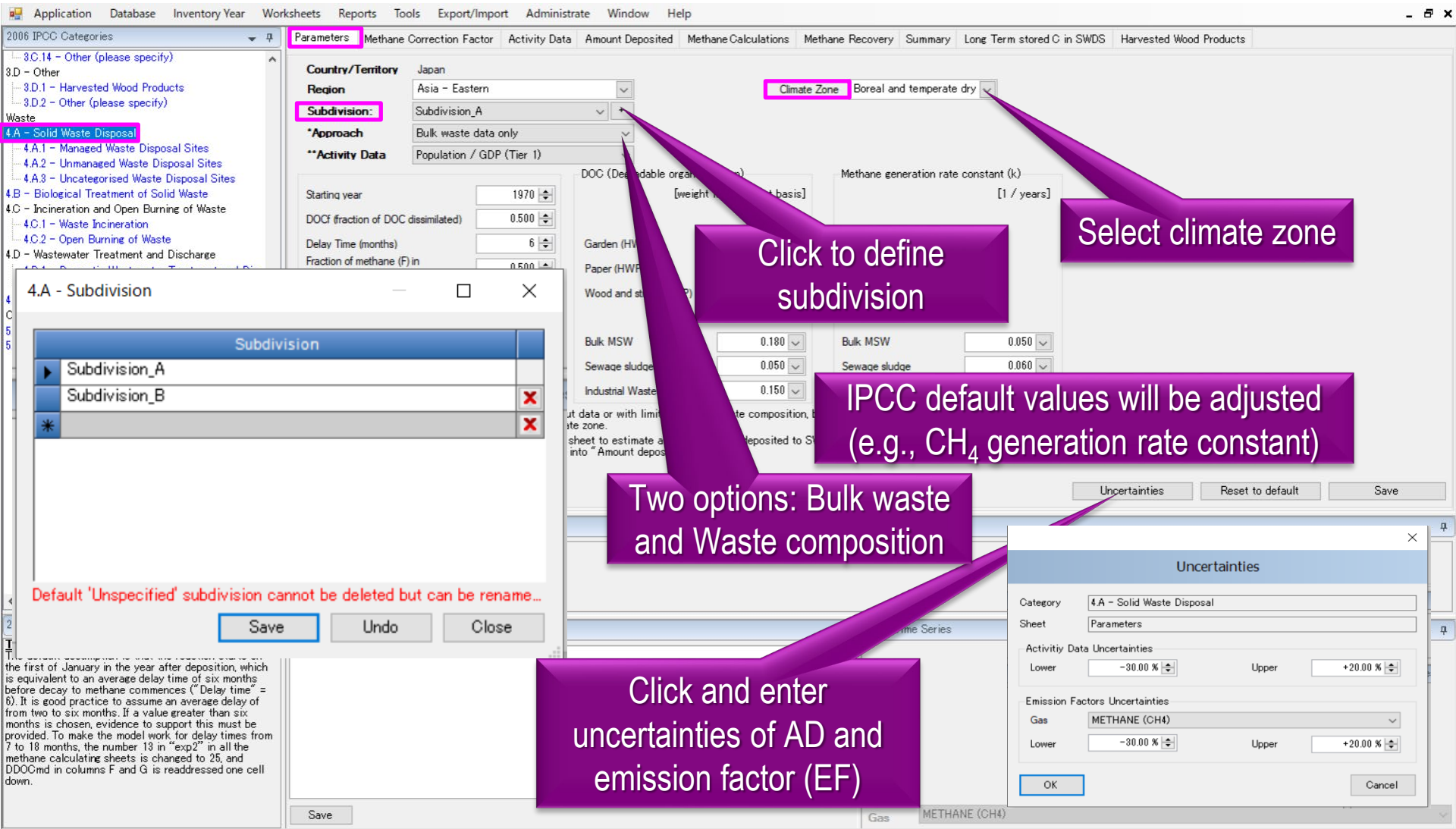
RT : recovered CH_4 in year T, Gg

OX_T : oxidation factor in year T, fraction

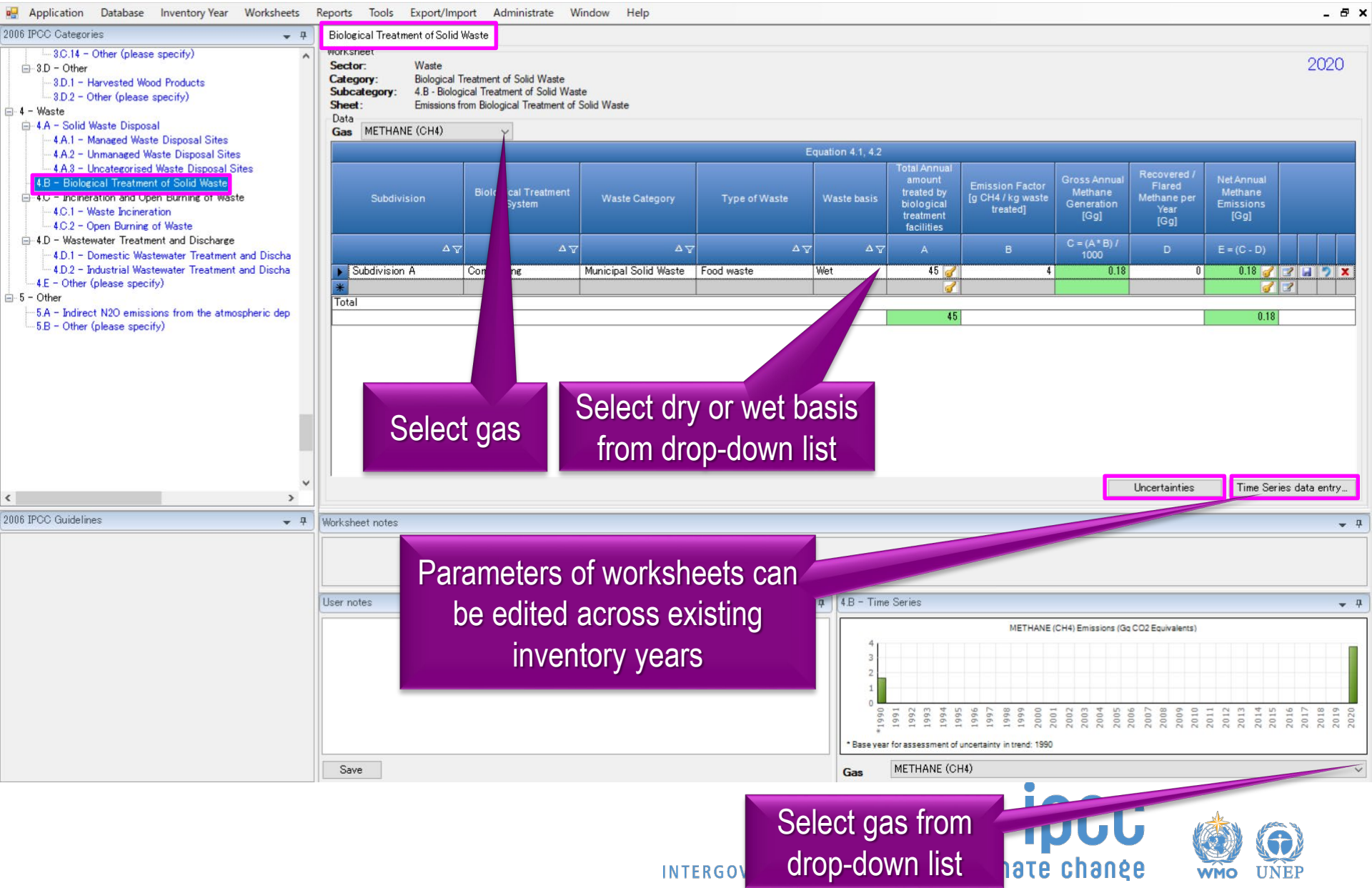
- CH_4 generated is estimated based on the amount of Decomposable Degradable Organic Carbon *(DDOCm)* which is the part of the organic carbon that will degrade under the anaerobic conditions in SWDS

Solid Waste Disposal

- Subdivision allows estimation of emissions at subnational level (e.g., regions by climate zone)

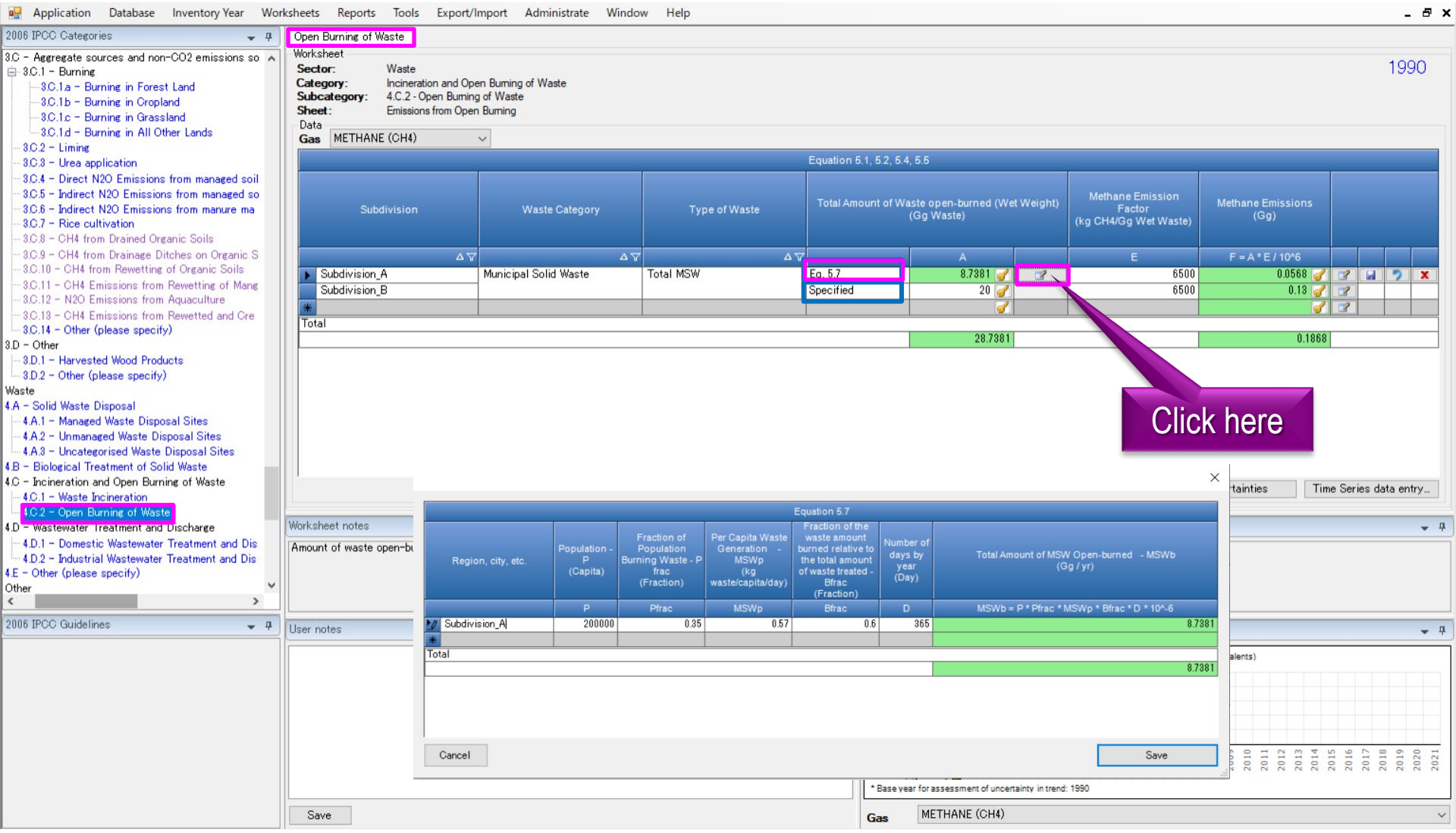


Biological Treatment of Solid Waste



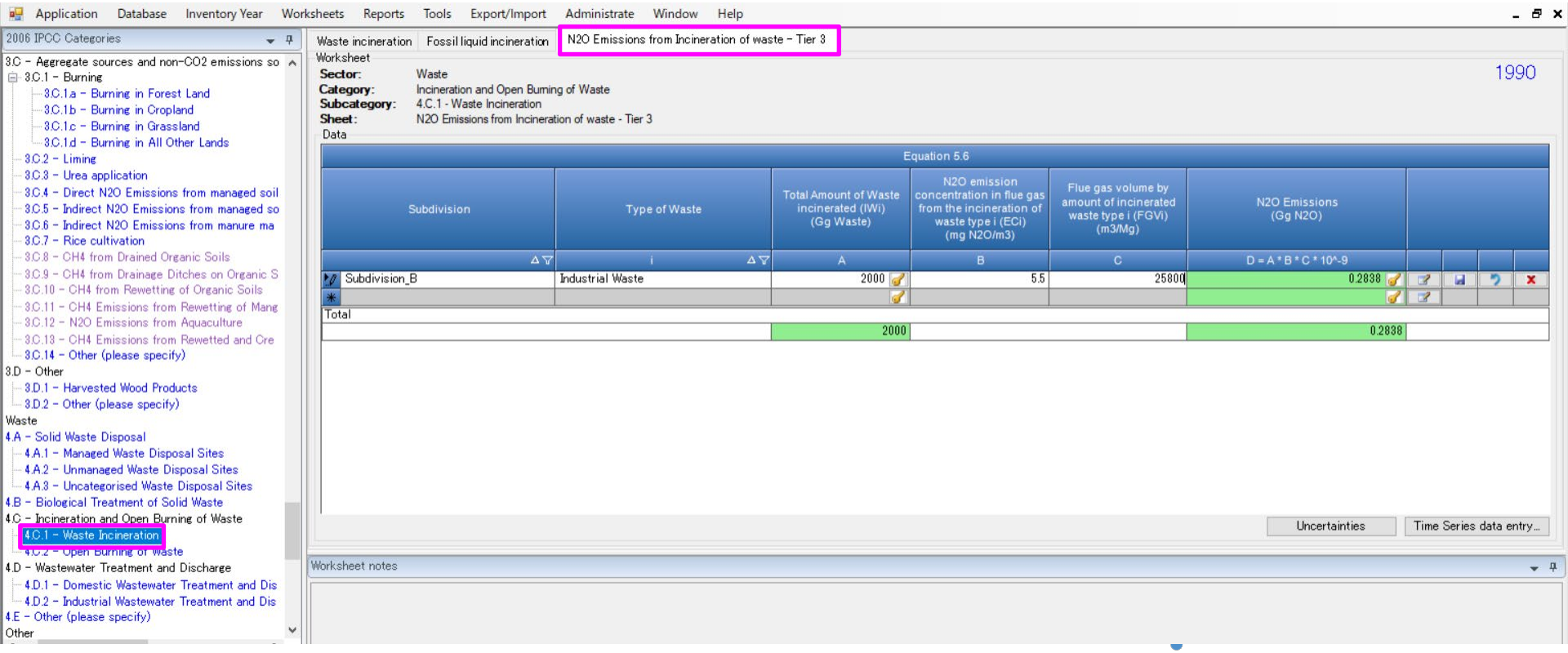
Incineration and Open Burning of Waste

- Estimation of amount of waste open-burned (Equation 5.7, Chapter 5, Volume 5, *2006 IPCC Guidelines*)



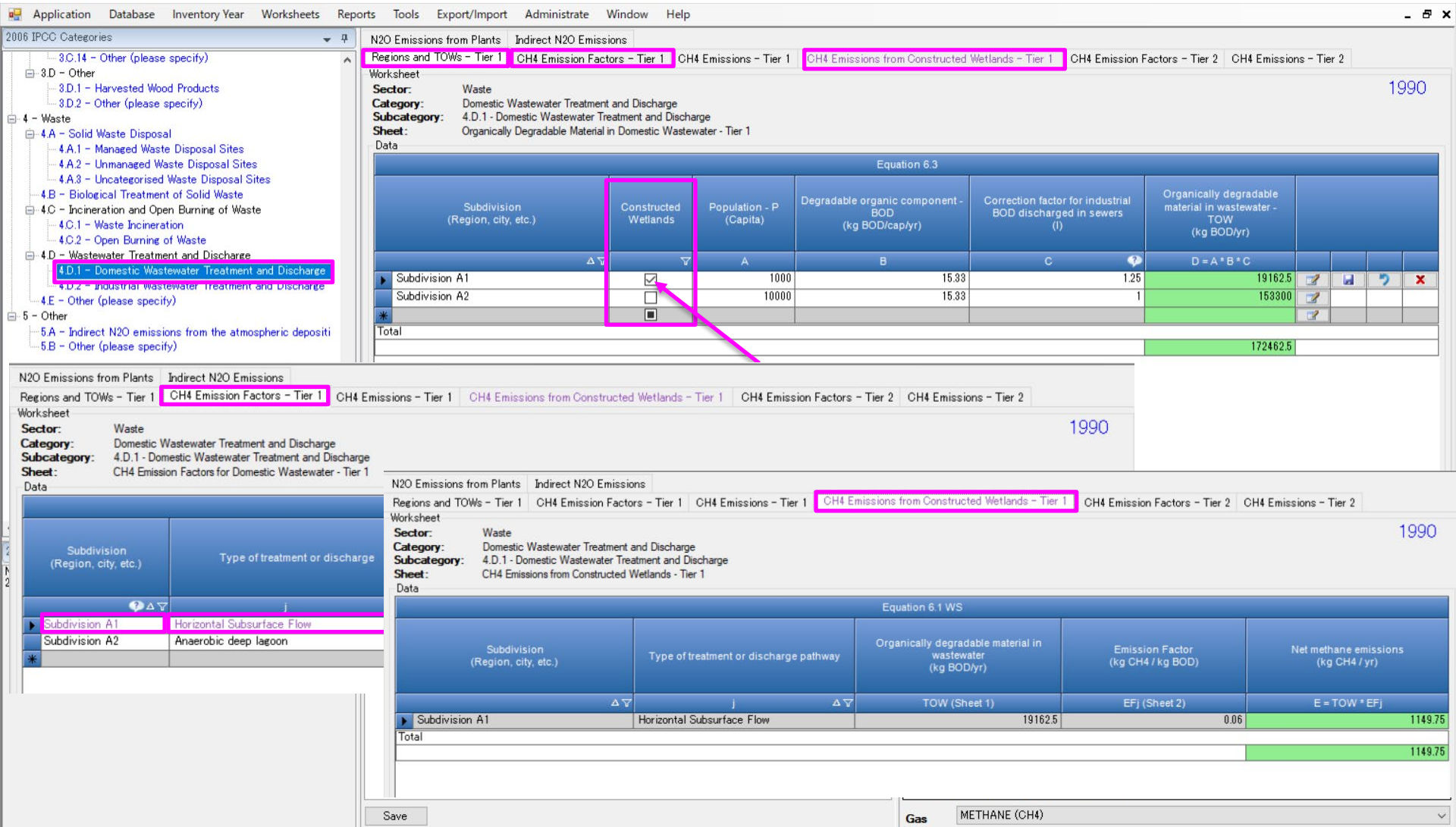
Incineration and Open Burning of Waste: Tier 3 Method

- Estimation of N_2O emissions from waste incineration based on site specific data and flue gas concentration (Equation 5.6, Chapter 5, Volume 5, *2006 IPCC Guidelines*)



Wastewater Treatment and Discharge

- Methods for estimation of CH_4 and N_2O emissions from constructed wetlands for wastewater treatment



Waste Data

- Collection of data is a fundamental part of inventory compilation. It is preferable to use national data, however waste data covering all waste types and treatment techniques may not be available
- Chapter 2 of Volume 1 gives general guidance on data collection
- Volume 5 of the *2006 IPCC Guidelines* provides default values for Waste sector e.g., default data on waste generation, management, composition, and default EFs/parameters
- IPCC Emission Factor Database (EFDB) contains EFs and other parameters with background technical information that can be used for estimation of GHG emissions and removals https://www.ipcc-nggip.iges.or.jp/EFDB/main.php

Thank you

https://www.ipcc-nggip.iges.or.jp/

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