

DATA MANAGEMENT, EXISTING TOOLS/SOFTWARE

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U.S. Environmental Protection Agency



DISCUSSION

- Existing approach
- Good practices when using xlsx
- Data management
- Available compilation tools
- Inventory System Management Toolkit
- Other tools
 - FAO Data Collection templates
 - CBIT-GSP NID template (under review) and BTR report template (under development)

EXISTING APPROACH

- Good starting point!
 - Includes some standardization and checks
 - Include documentation of data sources
 - Set up for time series calculations



GOOD PRACTICES FOR ORGANIZING RAW DATA AND PROCESSING

- Retain record of raw unprocessed data as received/downloaded in current inventory files and inventory archive (when inventory is complete)
- Copy/read in raw data into estimation file for further processing/estimation steps (generalized approach)
 - Introduce into own sheet
 - Ensure data source/reference information/links are noted
 - Ensure units are noted
 - Note any data versions if relevant
- Create look up tables for unit conversions, constants, EFs, GWPs – never hardcode
- Calculation steps should be annotated, stepwise for transparency and also to facilitate QA/QC
- Automate QC where feasible, i.e., trend checks, implied EF checks

Discuss – potential to standardize data input sheets to extent possible, for example:

- Year
- Value
- Data type1 (e.g., activity data, emission factors, other factors)
- Data Name (e.g., fuel consumption)
- Units
- Sector
- Category
- Subcategories
- Carbon pool and fuel type/subtype information as relevant
- CRT category/subcategory code
- Data sensitivity (Y/N)



TYPES OF DATA AND OTHER INFORMATION TO MANAGE

- Manage raw input data
- Calculations
- GHG estimates (totals and by gas at various levels)
 - Subcategory (could be most disaggregated level)
 - Category level (could be most disaggregated level)
 - Subsector
 - Sector
 - Subnational (?)
 - National
- Cross-cutting analysis
 - Key category analysis (data for analysis can come from previous list)
 - Recalculations (requires easy access to previous estimates)
 - Uncertainty information
- Common Reporting Table data
 - Emissions, activity data, and notation keys/explanations (including use of flexibility)



Support products

National Inventory Document

Common Reporting Tables

Web publication?



AVAILABLE COMPILATION TOOLS

Options



IPCC Inventory Software

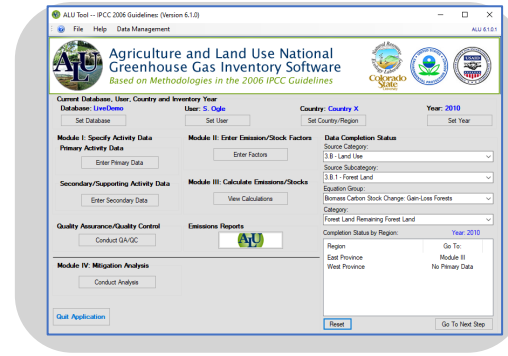
- Free, available software, already organized to apply IPCC GL
- Can also import time series data
- Manages all data mentioned on previous slide
- Can aggregate data, generate summary data reports, etc.
- Includes cross-cutting analysis capability (i.e. KCA, uncertainty analysis using approach 1)
- Interoperability with CRTs
- Limitations (i.e., incompatible with Mac OS, usability improvement, other)



Country-specific tools

(i.e., use of xlsx spreadsheets, or other customized application (e.g. database based approach, e.g., R, Python, etc.)

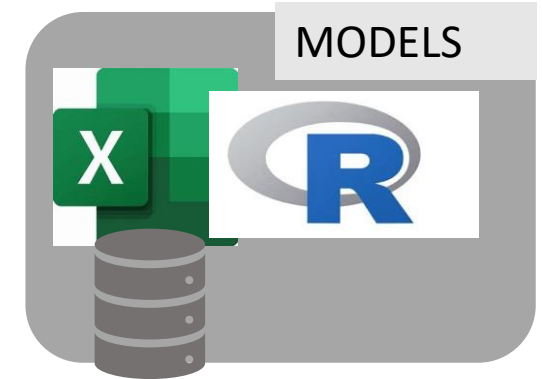
- Develop or build from existing system
- Standardize organization of data inputs/outputs
- XLS easy to use, simple but has limitations for larger data sets, link errors, etc.
- Requires developing system to aggregate and synthesize data
- Potential limitations
 - Database development requires specialized expertise
 - Maintenance over time



Sector-specific tools

(e.g., Agriculture and Land Use National Inventory Software (ALU))

- Free available software, organized to apply IPCC GL
- Facilitates compilation of indicated sector
- Doesn't cover all sectors



Combination of tools

(IPCC Inventory Software and other tools)

- Use best tool for task
- Lose some standardization across sources
- Potential to import information into IPCC software for aggregation? QC?

Considerations



AGRICULTURE AND LAND USE GREENHOUSE GAS INVENTORY SOFTWARE (ALU)

- ALU was developed based on experiences in EPA led capacity building projects
 - Developed and housed with Colorado State University
- Guides the compiler through the process of the inventory analysis for the AFOLU sector
- Provides data management capabilities (and documentation) and prevents obvious errors (built in QC checks)
- Provide utilities that encourage *good practice* (e.g., documentation of choices)
- Mitigation analysis
- ALU is difficult to use without having lots of training and direct use experience
- Significant improvements underway addressing usability/user interface, completeness, mitigation analysis, among others.
 - Ideally accessing engineers/programmers who can support development

The screenshot displays the ALU Tool interface for IPCC 2006 Guidelines (Version 6.1.0). The window title is "ALU Tool -- IPCC 2006 Guidelines: (Version 6.1.0)" and the menu bar includes "File", "Help", and "Data Management". The version number "ALU 6.1.0.1" is shown in the top right corner.

The main header features the ALU logo and the text "Agriculture and Land Use National Greenhouse Gas Inventory Software" with the subtitle "Based on Methodologies in the 2006 IPCC Guidelines". Logos for the Natural Resource Ecology Laboratory at Colorado State University, the Environmental Protection Agency, and USAID are also present.

The interface is organized into several sections:

- Current Database, User, Country and Inventory Year:** Includes fields for Database (LiveDemo), User (S. Ogle), Country (Country X), and Year (2010), each with a corresponding "Set" button.
- Module I: Specify Activity Data:** Contains "Primary Activity Data" (Enter Primary Data) and "Secondary/Supporting Activity Data" (Enter Secondary Data) buttons.
- Module II: Enter Emission/Stock Factors:** Includes an "Enter Factors" button.
- Module III: Calculate Emissions/Stocks:** Includes a "View Calculations" button.
- Quality Assurance/Quality Control:** Includes a "Conduct QA/QC" button.
- Emissions Reports:** Includes an "Emissions Reports" button with the ALU logo.
- Module IV: Mitigation Analysis:** Includes a "Conduct Analysis" button.
- Data Completion Status:** A summary section for the year 2010, showing a table of completion status by region (East Province, West Province) and a "Go To" dropdown menu with options for "Module III" and "No Primary Data".

Additional buttons include "Quit Application", "Reset", and "Go To Next Step".

FAO DATA COLLECTION TEMPLATES

- Excel-based package to facilitate compilation of data inputs
- Includes comprehensive list of activity data and parameters, that must be collected to estimate, mostly at Tier 1, all categories within all sectors
- Link: [The Greenhouse Gas Data Management \(GHG-DM\) Tool \(fao.org\)](https://www.fao.org/gHG-dm/)



CBIT-GSP'S NATIONAL INVENTORY DOCUMENT TEMPLATE

- Report template following suggested outline from Glasgow (COP27)
 - User needs to update/elaborate content, but some content is already available
- Coming soon!



EPA Toolkit for Building National GHG Inventory Systems

Customizable Templates to help inventory compilers build and advance GHG inventory management systems that suit their national circumstances.

