



## Task Force on National Greenhouse Gas Inventories

# IPCC tools Inventory Software and Emission Factor Database

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# IPCC Inventory Software

# Introduction

- The IPCC has launched its *IPCC Inventory Software*
- The IPCC Software implements the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- However it can also be used for reporting under the 1996 Guidelines
  - This allows countries to utilise the improvements in the methodologies and default values since 1996
- It improves on earlier software
  - It is database based
  - It is stand-alone – does not depend on specific versions of MS Windows or MS Office.
  - Does not require internet access or expensive hardware

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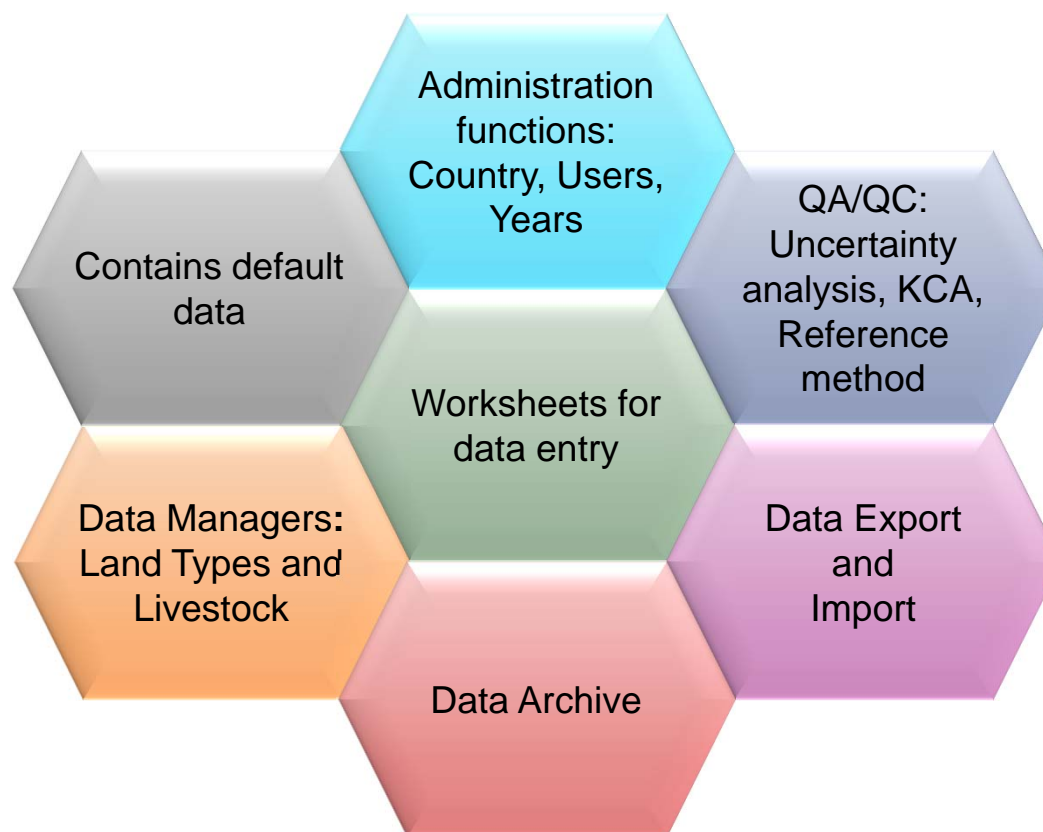
# IPCC Guidelines

- IPCC Guidelines consist of:
  1. Methods
  2. Default data
  3. Good Practice Guidance
  4. Reporting Instructions
- 1,2 & 3 can be used whatever reporting is agreed on
  - IPCC or otherwise
- Thus the methods and data in the 2006 Guidelines can be used however emissions and removals are reported
  - 1996 Guidelines, GPG or 2006 Guidelines

# IPCC Inventory Software

- Inventory Software that can assist in using the IPCC Guidelines
  - ❖ It can be used for the whole inventory or just individual categories
  - ❖ Can be used when reporting 1996 or 2006 Guidelines
  - ❖ Stand alone software with modest hardware requirements
  - ❖ Includes Uncertainty and Key Category Analysis
  - ❖ Aids QA/QC
  - ❖ Will output in non-Annex 1 National Communications format
  - ❖ Will be developed to include more input/output and reporting options and complete Tier 2 coverage
  - ❖ FREE!

# Software Functions



# Let's install the latest version

## 1. Installation file is stored in TFI USB memory

✓ Click "Start.html"

### 3) Inventory Software

The IPCC Inventory Software is now available. It is designed to implement the simplest Tier 1 methods in the 2006 IPCC Guidelines and as such is useful to users of all versions of the IPCC Guidelines.

- [Install the Software](#)
- [User Manual](#)
- [Brochure](#)

Click "Install the Software"

## 2. Launch the software

✓ Click the icon



# Let's install the latest version (2)

## 3. Initial setting at the first run

- ✓ Superuser (Login name and Password)



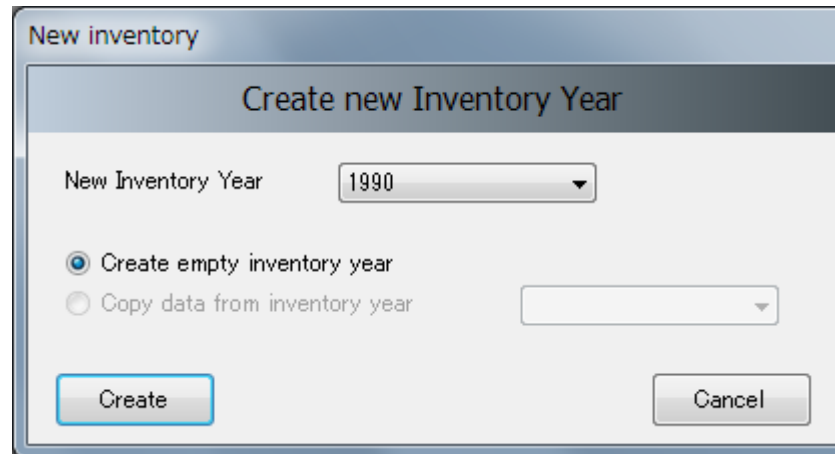
The screenshot shows a dialog box titled "IPCC Inventory Software". The main heading is "Welcome to IPCC Inventory Software". Below this, it states: "The application is being run for the first time. It is necessary to define superuser. Superuser has full control over database and application and is responsible for defining and managing additional users working with this instance of application." The dialog prompts the user to "Please, supply superuser login name and password in the textboxes". There are four input fields: "Login", "Password", "Confirm Password", and "Password hint". At the bottom, there are "OK" and "Cancel" buttons.



# Let's install the latest version (3)

## 3. Initial setting at the first run - continued

- ✓ Country
- ✓ Inventory year



The screenshot shows a dialog box titled "New inventory" with a sub-header "Create new Inventory Year". It contains a dropdown menu for "New Inventory Year" set to "1990". Below this are two radio buttons: "Create empty inventory year" (selected) and "Copy data from inventory year" (unselected). A dropdown menu is visible next to the second radio button. At the bottom, there are "Create" and "Cancel" buttons.

2006 IPCC Software for National Greenhouse Gas Inventories - maya - [Worksheets]

Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

1994

**Main menu**

**Category selected: Energy**

**Energy**

Sector: Energy  
 Category: Fuel Combustion Activities  
 Subcategory: 1.A.1.a.i - Electricity Generation  
 Sheet: CO2, CH4 and N2O from fuel combustion by source categories - T...

Fuel Type: (All fuels) Conversion Factor Type:  NCV  GOV

(All fuels)	Energy Consumption			CO2		CH4		N2O	
Fuel	A Consumption (Mass, Volume or Energy Unit)	B Conversion Factor (TJ/Unit) (NCV)	C Consumption (TJ) (C=A*B)	D CO2 Emission Factor (kg CO2/TJ)	E Amount Captured (Gg CO2)	F CH4 Emission Factor (kg CH4/TJ)	G CH4 Emissions (Gg CH4) (G=C*F/10 <sup>6</sup> )	H N2O Emission Factor (kg N2O/TJ)	I N2O Emissions (Gg N2O) (I=C*H/10 <sup>6</sup> )
Anthracite	1000 Gg	26.7	26700	98300	26...	1	0.0...	1.5	0.04...
Coking Coal	2000 Gg	28.2	56400	94600	53...	1	0.0...	1.5	0.0846
Other Bitu...	3000 Gg	25.8	77400	94600	73...	1	0.0...	2	0.1548
Sub-Bitumi...	4000 Gg	19.0	76000	96100	72...	1	0.0...	1.5	0.1134
Lignite	5000 Gg	18.0	90000	101000	500	1	0.0...	1.5	0.08...
Oil Shale /...	500 Gg	10.0	5000	107000	47...	NE	0	1.5	0.00...
	600 Gg			97500	12...	1	0.0...	1.5	0.01...
	300 Gg			77000	63...	3	0.0...	0.6	0.00...
			320720		303791		0.33277		0.51236

**Data Entry**

**Hierarchical list of categories**

**Worksheet-based calculations follow 2006 Guidelines**

**Time Series Display**

IPCC 2006 Guidelines

Worksheet remarks

1.A1.a.i - Time Series

Gas: CARBON DIOXIDE (CO2)

Country/Territory: Slovakia | Inventory Year: 1994 | Base year for assessment of uncertainty in trend: 1990 | CO2 Equivalents: SAR GWPs (100 year time horizon) | Database file:

2006 IPCC Software for National Greenhouse Gas Inventories - maya - [Worksheets]

Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

IPCC 2006 Categories

- 1.A4b - Residential
- 1.A4c - Agriculture/Forestry/Fishing/Fish F
  - 1.A4.c.i - Stationary
  - 1.A4.c.ii - Off-road Vehicles and Other
  - 1.A4.c.iii - Fishing (mobile combustion)
- 1.A5 - Non-Specified
  - 1.A5a - Stationary
  - 1.A5b - Mobile
    - 1.A5b.i - Mobile (aviation component)
    - 1.A5b.ii - Mobile (water-borne component)
    - 1.A5b.iii - Mobile (Other)
  - 1.A5c - Multilateral Operations
- 1.B - Fugitive emissions from fuels
  - 1.B1 - Solid Fuels
    - 1.B1.a - Coal mining and handling
      - 1.B1.a.i - Underground mines
        - 1.B1.a.i.1 - Mining
        - 1.B1.a.i.2 - Post-mining seam gas emission
        - 1.B1.a.i.3 - Abandoned underground
        - 1.B1.a.i.4 - Flaring of drained methane
      - 1.B1.a.ii - Surface mines
        - 1.B1.a.ii.1 - Mining
        - 1.B1.a.ii.2 - Post-mining seam gas emission
    - 1.B1.b - Uncontrolled combustion and burning
    - 1.B1.c - Solid fuel transformation
  - 1.B2 - Oil and Natural Gas
    - 1.B2.a - Oil
      - 1.B2.a.i - Venting
      - 1.B2.a.ii - Flaring
      - 1.B2.a.iii - All Other
        - 1.B2.a.iii.1 - Exploration
        - 1.B2.a.iii.2 - Production and Upgrading
        - 1.B2.a.iii.3 - Transport
        - 1.B2.a.iii.4 - Refining
        - 1.B2.a.iii.5 - Distribution of oil products
        - 1.B2.a.iii.6 - Other
    - 1.B2.b - Natural Gas
      - 1.B2.b.i - Venting
      - 1.B2.b.ii - Flaring
      - 1.B2.b.iii - All Other
        - 1.B2.b.iii.1 - Exploration
        - 1.B2.b.iii.2 - Production
        - 1.B2.b.iii.3 - Processing

Oil and Natural Gas

Worksheet

Sector: Energy  
 Category: Fugitive Emissions from Fuels - Oil and Gas  
 Subcategory: 1.B.2.a.i - Venting  
 Sheet: CO2, CH4 and N2O from fugitive emissions

1994

Notation Keys Available

Industry Segment	Subcategory	Activity	AD	Emission Factor (Gg CO2/Unit for AD)	CO2 Emissions (Gg CO2)	CH4		N2O	
						Emission Factor (Gg CH4/Unit for AD)	CH4 Emissions (Gg CH4)	Emission Factor (Gg N2O/Unit for AD)	N2O Emissions (Gg N2O)
				$C=A \cdot B$		$E=A \cdot D$		$G=A \cdot F$	
Oil Production	Conventional Oil	1000	10 <sup>6</sup> Sm <sup>3</sup>	9.5E-05	0.095	0.00072	0.72	0.05	50
	Default Weighted Total	500	10 <sup>6</sup> Sm <sup>3</sup>	0.0018	0.9	0.0087	4.35	0.05	25
	Heavy Oil / Cold Bitumen	600	10 <sup>6</sup> Sm <sup>3</sup>	0.0053	3.18		0		0
	Thermal Oil Production	400	10 <sup>6</sup> Sm <sup>3</sup>	0.0022	0.88	0.0035	1.4	0.03	12
Oil Transport	Loading of Off-shore Production on Tanker Ships	300	10 <sup>6</sup> Sm <sup>3</sup>	0.005	1.5	0.0003	0.09	0.0002	0.06
Total					5.763				

Uncertainties

Defaults Available: can be over-written with country specific data

Time Series Data Entry

IPCC 2006 Guidelines

See Table 4.2.7 'Guidance on obtaining the activity data values required for use in Tier 1 approach to estimate fugitive emissions from oil and gas operations' in Chapter 4, Volume 2 of the 2006 IPCC Guidelines

Worksheet remarks

1.B2.a.i - Time Series

Emissions (CO2 Equivalents)

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Country/Territory: Slovakia Inventory Year: 1994 Base year for assessment of uncertainty in trend: 1990 CO2 Equivalents: SAR GWPs (100 year time horizon) Database file:

# Reports

Report	Level	Contents
Summary	1.A.1	Emissions
Short summary	1.A	Emissions
Sectoral	1.A.1.a.ii (Most disaggregated level)	Emissions
Background	1.A.1.a.ii (Most disaggregated level)	Activity data Emissions

Note: All report can be exported as MS Excel file.

# Tools

- Uncertainty analysis
- Key category analysis

Click Tools –  
Uncertainty Analysis

IPCC Inventory Software - maya - [Uncertainty Analysis]

Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help

Uncertainty Analysis - Approach 1 (Table 3.2)

Base year for assessment of uncertainty in trend 1990 Year T 1994

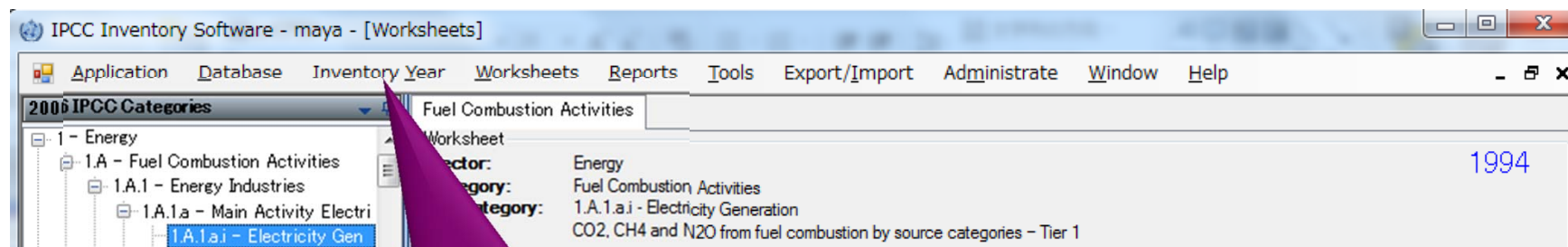
2006 IPCC Categories	Gas	Base Year emissions or removals (Gg CO2 equivalent)	Year T emissions or removals (Gg CO2 equivalent)	Activity Data Uncertainty (%)	Emission Factor Uncertainty (%)
<b>1.A - Fuel Combustion Activities</b>					
1.A.1.a.i - Electricity Generation - Liquid Fuels	CO2	1193.979	635.250	5.000	6.136
	CH4	1.461			28.788
	N2O	4.314			28.788
1.A.1.a.i - Electricity Generation - Solid Fuels	CO2	18345.840			12.412
	CH4	3.891			00.000
	N2O	88.937			22.222
1.A.1.a.iii - Heat Plants - Liquid Fuels	CO2	31.006		5.000	5.000
	CH4	0.027		5.000	5.000
	N2O	0.000	0.000	5.000	5.000

Number of decimal places 3  Zero padding

Refresh Data Export to Excel

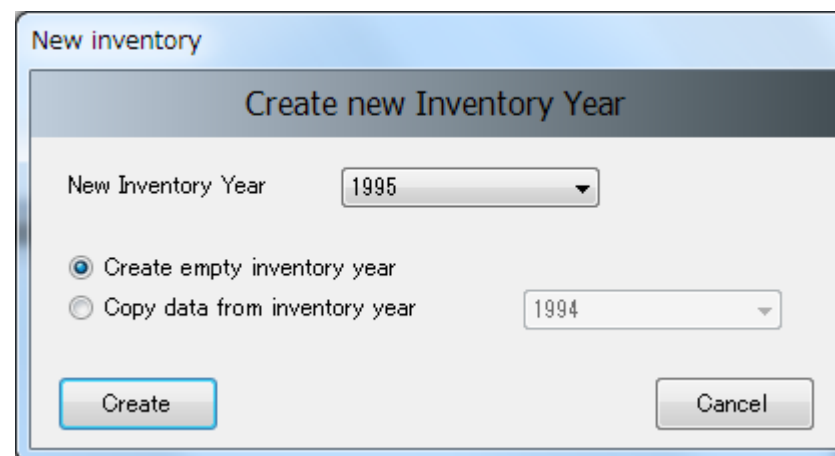
Click "Refresh Data"  
to perform analysis

# Other basic operations

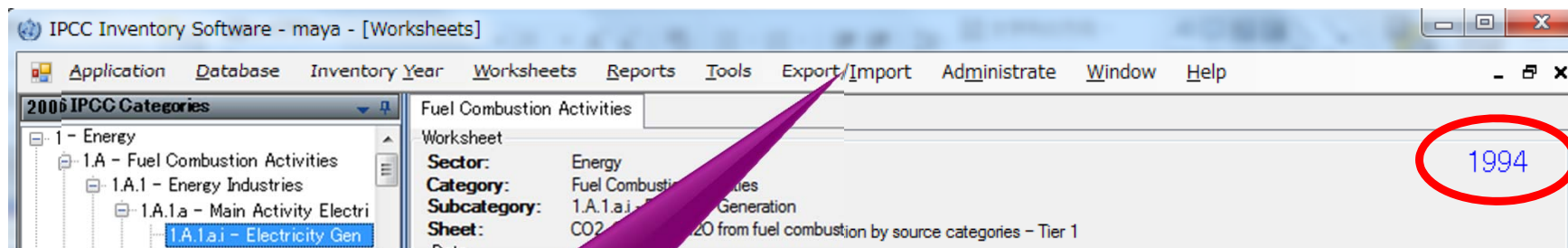


## Inventory Year

- Create New year
- Select year

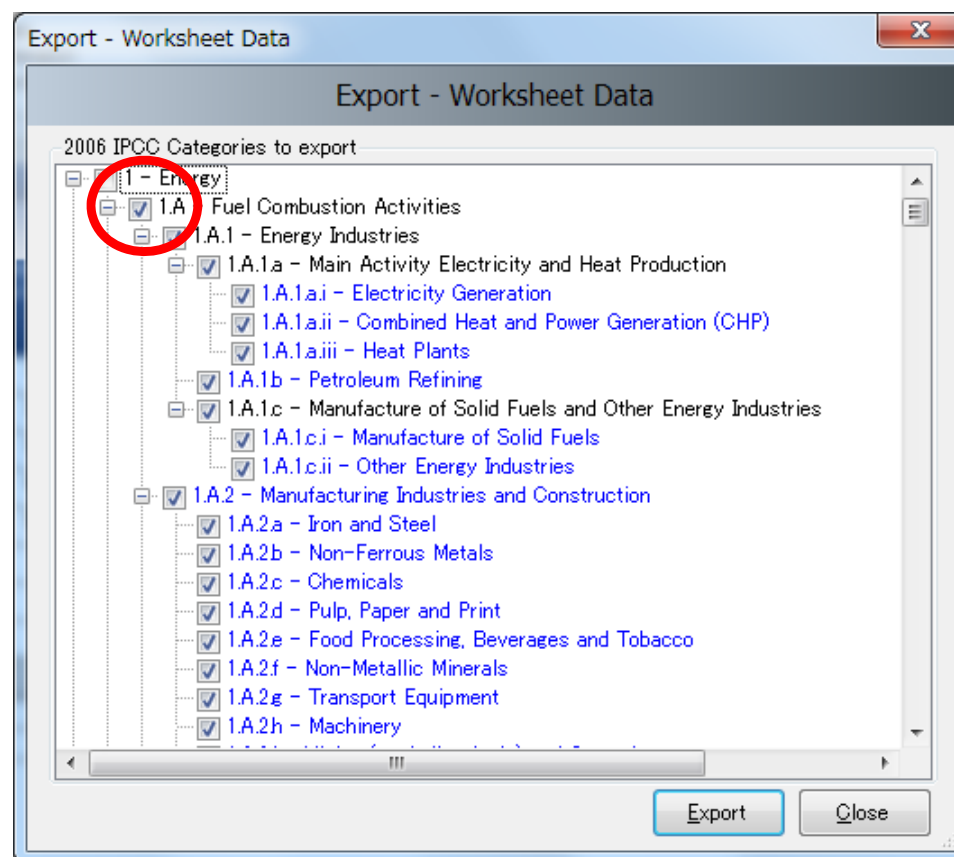


## Other basic operations (2)



Export/Import worksheet data as XML file format.

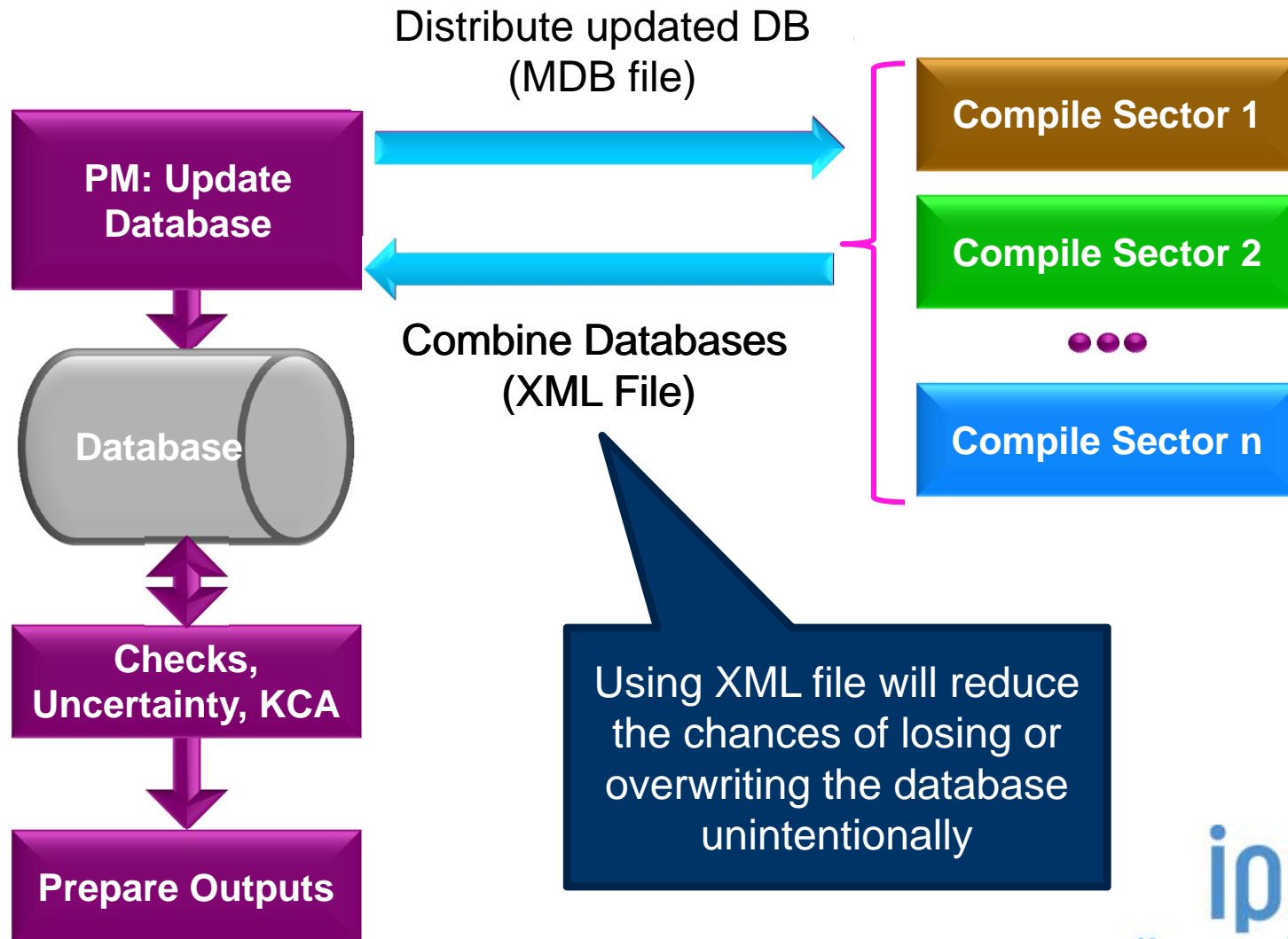
In this example, Worksheet data for category 1A for year 1994 will be exported.



# Multiple Users

Project manager

Sectoral Experts(s)





# Support

- The TSU is supporting the software:
  - ❖ Help Desk: email [ipcc-software@iges.or.jp](mailto:ipcc-software@iges.or.jp)
  - ❖ Web Forum: <https://discussions.zoho.com/ipccinventorysoftware/>
- TSU is preparing User Guide including dummy data
- TSU will maintain software and is planning to add functions to the software:
  - ❖ Complete Tier 2 coverage
  - ❖ More output formats

# Emission Factor Database (EFDB)

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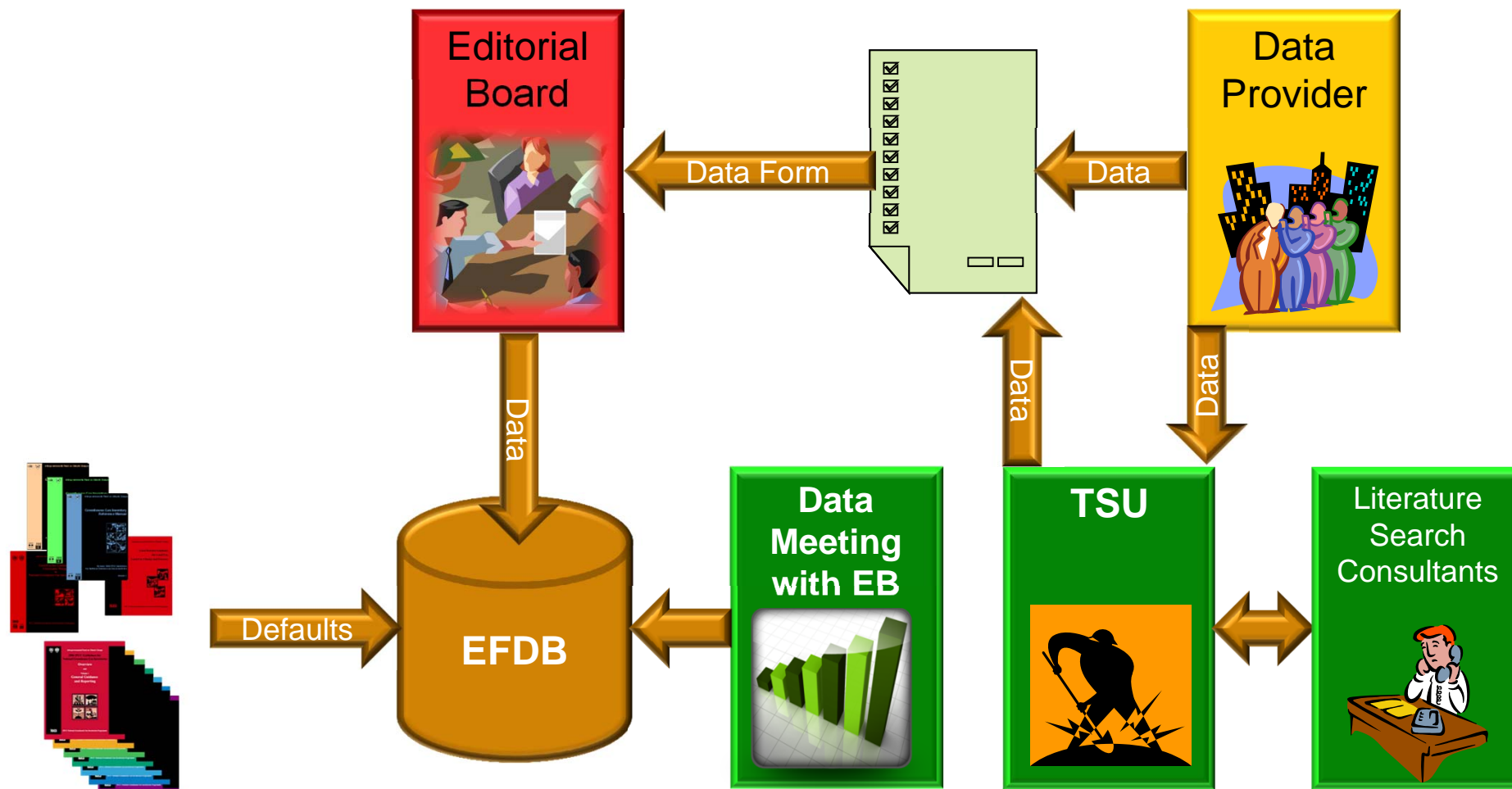
# Need for Emission Factor Database (EFDB)

- IPCC Guidelines contain global or regional default values (mostly for Tier 1) based on the best science when guidelines were compiled.
- Higher tier estimates need country-specific factors based on:
  - ❖ Situation in country, methods, management etc
  - ❖ Latest science and best practice available
  - ❖ Latest mitigation being applied
- However
  - ❖ it is expensive to measure all these. It would be more efficient to use appropriate literature or experience in similar situations.
  - ❖ Emission factors and other parameters may not be easily accessible.

# EFDB – Dynamically evolving library

- A library:
  - ❖ Documented Emission Factors (interpreted broadly – all parameters)
    - Peer reviewed
    - Non-peer reviewed (government reports, industry studies etc.)
    - In any language (need English abstract)
  - ❖ Available through internet as well as in the form of CDROM
    - <http://www.ipcc-nggip.iges.or.jp/EFDB/>
  - ❖ Information about when and where this data may be applicable
  - ❖ Evolves dynamically - new data from inventory compilers, researchers, industry...
  - ❖ Communication platform for distribution of new research and measurement data
  - ❖ Data evaluated by Editorial Board (EB)
- However the user **MUST** decide if this is suitable in their specific situation

# Populating EFDB



# Further growing importance of EFDB

- In the context of revision of the UNFCCC reporting guidelines for Annex I Parties, the SBSTA32 welcomed the work of the IPCC to facilitate the use of the 2006 IPCC Guidelines, including its efforts to develop inventory software and the *Emission Factor Database*. It invited the IPCC and other relevant organizations to strengthen their efforts in this area. (FCCC/SBSTA/2010/6, paragraph 76)
- In the context of REDD discussion, the SBSTA32 requested the UNFCCC secretariat to work with the IPCC on promoting the use of the IPCC *Emission Factor Database*. (FCCC/SBSTA/2010/6, paragraph 40)
- In the context of national communications from non-Annex I Parties (NAI-NC), the Consultative Group of Experts (CGE):
  - ❖ Agreed on the usefulness of *Emission Factor Database*; and
  - ❖ Recommended improvement of data quality by enhancement of the sharing of country-specific emission factors through the *Emission Factor Database* among NAI Parties, as an element to be considered in a future revision of the NAI-NC Guidelines.

(FCCC/SBI/2011/5/Rev.1)

# Enhancement and improvement of EFDB

- Continuing efforts for data collection
  - ❖ Data can be proposed by anyone – welcomed!!
  - ❖ Meetings to collect data have been convened every year.
    - Data on forestry, especially biomass expansion factors (Buenos Aires, November 2008)
    - Data on livestock (Santiago, June 2009)
    - Data on soil carbon (Santiago, June 2009)
    - Data on soil N<sub>2</sub>O (São Paulo, December 2010)
    - Data on energy sector (Mumbai, October 2011)
    - Data on waste sector (Langkawi, October 2012)
  - ❖ Up-to-date data/information relevant to "*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*" will be included.
- User-interface is being further improved.



Task Force on National Greenhouse Gas Inventories

*Thank you*