Emission Factor Database (EFDB)

Technical Support Unit, IPCC TFI

WMO UNEP

ipcc
INTERGOVERNMENTAL PANEL ON climate change

CO_2 from combustion of crude oil

CO_2 Emissions (Gg/yr) = CEF • AD • 44/12 • 10^{-3}

- CEF = carbon emission factor for crude oil (t-C/TJ)
- AD = Crude oil consumption expressed in energy unit (TJ)

From national statistics, etc…

N_2O from adipic acid production

N_2O Emissions (Gg/yr) = EF • AD • 10^{-6}

- EF = emission factor for adipic acid production (kg / tonnes of adipic acid produced)
- AD = amount of adipic acid produced (t)

CH_4 from enteric fermentation of dairy cattle

CH_4 Emissions (Gg/yr) = EF • AD • 10^{-6}

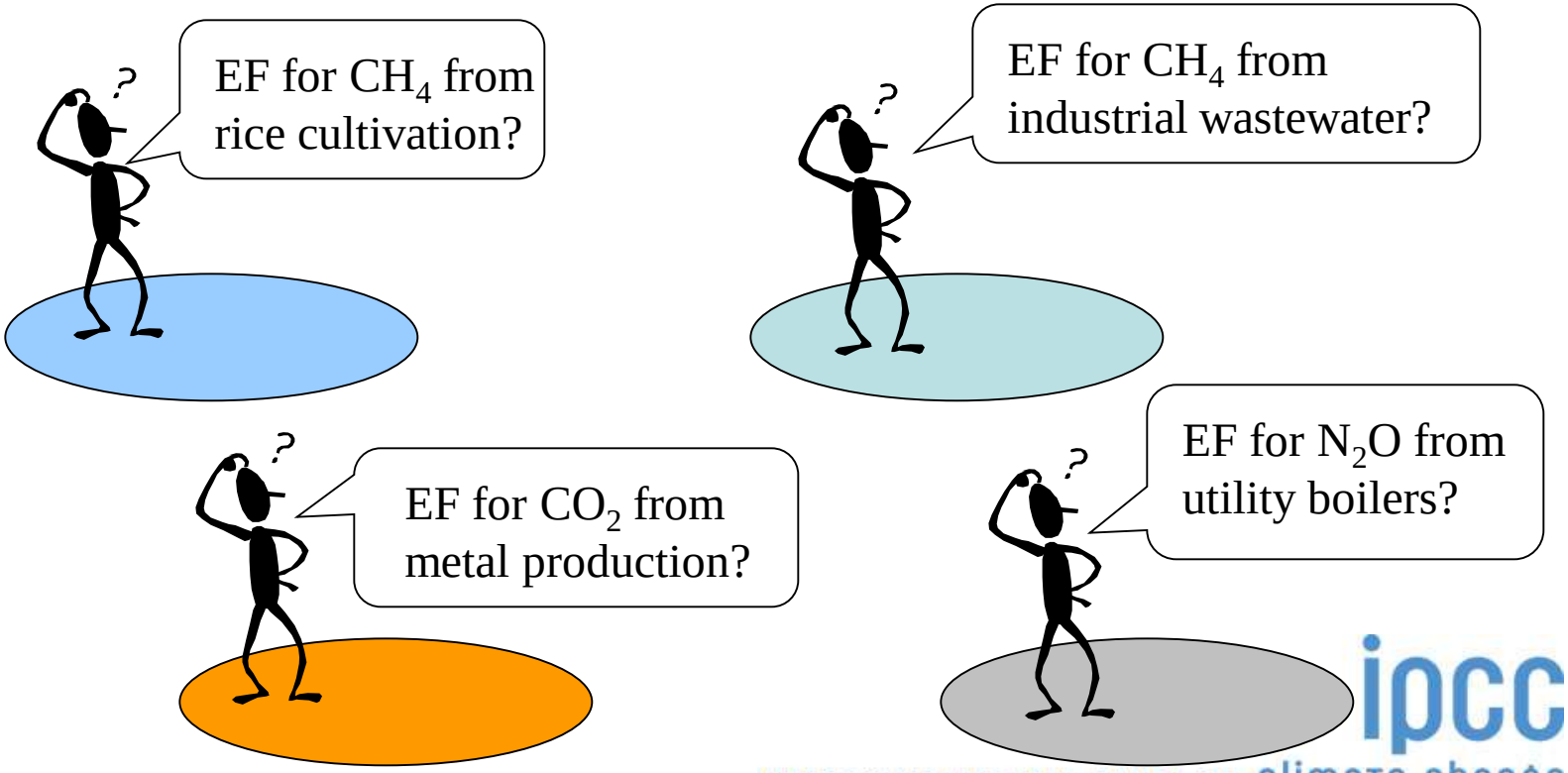
- EF = emission factor for dairy cattle (kg/head/year)
- AD = population of dairy cattle in the country (head)

Measurements, Experiments, …, or…?

WMO

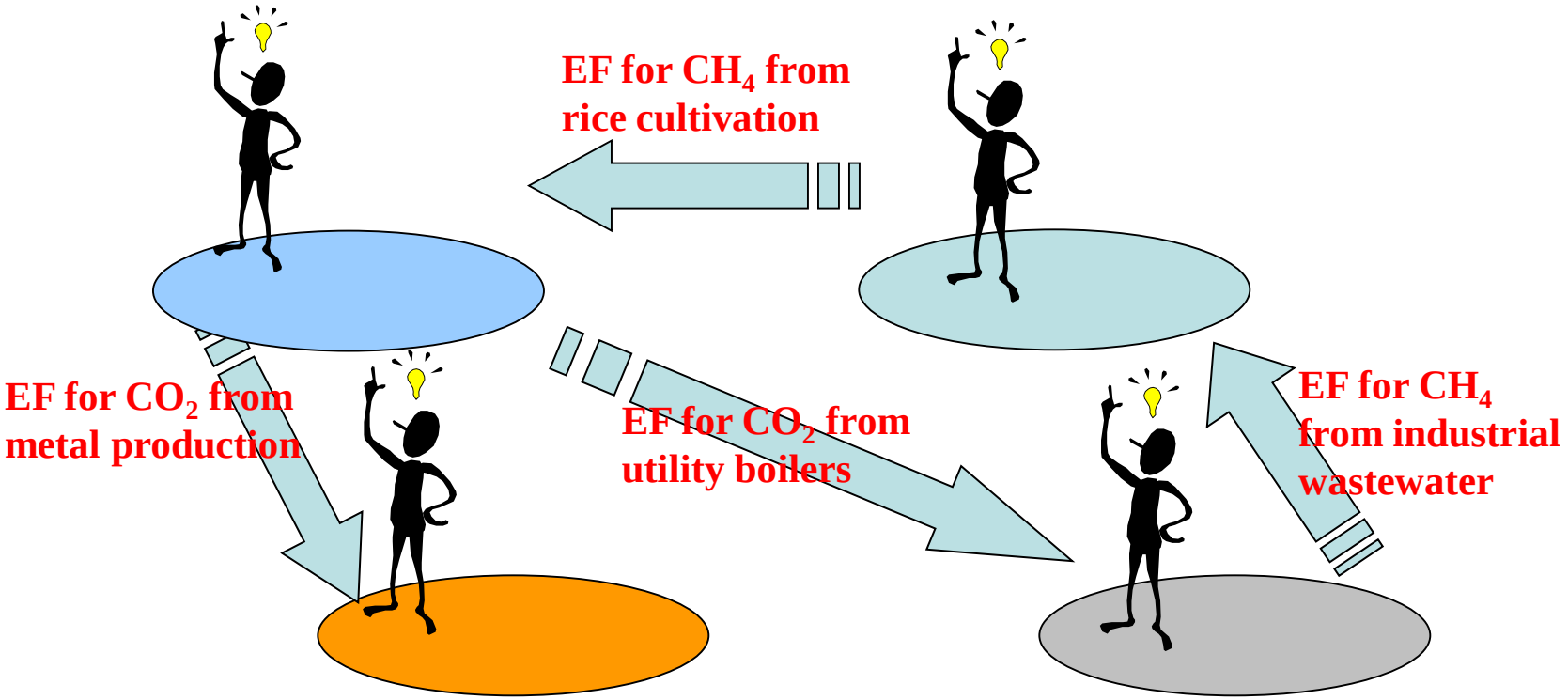
Why is the EFDB needed?

- Desirably, emission factors that reflect national circumstances should be used in inventory compilation.
- However, development of such emission factors is difficult - it is costly, time consuming, requires much expertise.



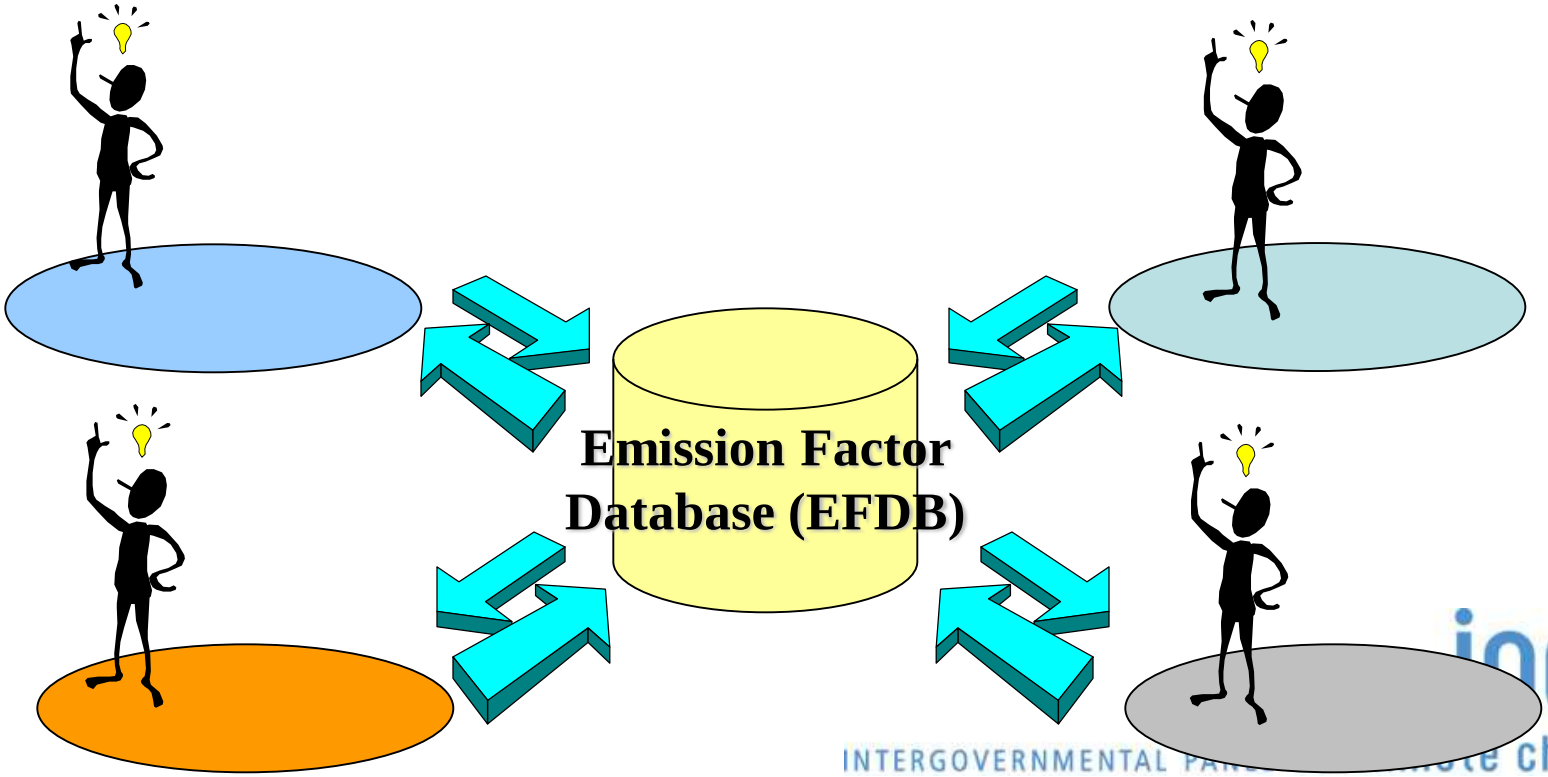
Why is the EFDB needed?

- By sharing data/information, emission factors that take into account local conditions (national circumstances) can be obtained cost-effectively.



Why is the EFDB needed?

- An easily accessible database on emission factors and other relevant parameters will facilitate sharing data/information by inventory compilers, experts, scientists worldwide.



EFDB is expected to serve as...

- **Library** of well documented emission factors and other parameters which
  - **Evolves dynamically through contributions of new data from researchers, scientists, industry...**
  - Provides a wide variety of emission factors and other parameters with background documentation or technical references so that users can select and use appropriate data on their own responsibility.
- **Communication platform** for distribution and commenting on new research and measurement data

Data contained in EFDB

- At present, EFDB contains the IPCC default data (from 1996 Guidelines, Good Practice Guidance reports and 2006 Guidelines).
- Additional data from the global scientific and inventory society are also contained.
- New data will be evaluated for acceptance by EFDB Editorial Board according to the following criteria.
  - EFDB should assist countries in producing inventories that are neither over- nor underestimates so far as can be judged and in which uncertainties are reduced as far as practicable.
  - To this end, the data to be included should be…

Criteria for Inclusion of New Data

- **Robust**
  - Within the accepted uncertainty, the value is unlikely to change if there was repetition of the original measurement programme or modelling activity.
- **Applicable**
  - An emission factor can only be applicable if the source and its mix of technology, operating and environmental conditions and abatement and control technologies under which the emission factor was measured or modeled are clear and allow the user to see how it can be applied.

"***Properties***"

- **Documented**
  - Access information to the original technical reference must be provided to evaluate the robustness and applicability as described above.

Robustness

- Specific issues concerning robustness are, e.g.:
  - Are the measurement techniques including raw data validated and/or verified?
  - Are the modelling techniques including supporting data validated and/or verified?
  - Is the conversion (if any) from model assumptions or measurement conditions to annual or other forms of emission factors or other parameters sufficiently explained and justified?
  - Is an uncertainty assessment on the emission factor or other parameter presented?
- Sufficient documentation (provision of access to technical references) will help.

Robustness

Emission Factor Report (ID: 213625)	
Administrative information	
Data Provider:	GIO/CGER/NIES
Data Provider Country:	Japan
Data Provider Contact:	aizawa.tomoyuki@nies.go.jp
Date calculated:	2005/6/25
Date submitted to EFDB by Data Provider:	2006-03-27 20:05:57
Date posted to EFDB by IPCC:	Unknown
Technical information	
Gas:	**NITROUS OXIDE**
...	...
Usage/Review information	
Type of parameter:	Measured
Measurement technique/standard:	The N2O decomposition ratio (same meaning as "destruction
Periodicity of measurement:	Online infrared gas analyzers and flow meters were used to continuously measure the concentrations and the flow rates of N2O entering and exiting the decomposition equipment. The instantaneous value of a measurement was recorded every few seconds. The instaneous values recorded data were used for N2O emission calculations.
External quality control performed:	The independent auditing organization certified in August, 2005 that emission estimates were conducted properly and the data obtained and verified from the investigation were valid and
Date of measurement:	2004-4-1 to 2005-4-1
Comments from the data provider:	As 0.03% of the generated N2O gas escapes through the online infrared gas analyzer and during the first crystallization process, the remaining 99.97% is fed into decomposition equipment. In addition, 99.97% of the N2O fed is destroyed. Therefore, the overall destruction factor is 99.94% (= 0.9997 * 0.9997).
Comments from others:	
Link:	

Source: IPCC Emission Factor Database (http://www.ipcc-nggip.iges.or.jp/EFDB/)

Applicability – "properties" are crucial

- "Properties" define what EFDB users might see as important information in order to judge whether the data are suitable for their inventories.
- Five types of "properties"
  - Technologies/Practices
  - Parameters/Conditions
  - Region/Regional Conditions
  - Abatement/Control Technologies
  - Others

Applicability – "properties" are crucial

Emission Factor Report (ID: 513626)	
Administrative information	
Data Provider:	Xiaoquan Zhang
Data Provider Country:	China
Data Provider Contact:	xiaoquan@caf.ac.cn
Date calculated:	2006-06-28
Date submitted to EFDB by Data Provider:	2006-07-11 19:33:14
Date posted to EFDB by IPCC:	2006-09-08 16:02:18
Technical information	
Gas:	**CARBON DIOXIDE**
IPCC 1996 Source/Sink Category:	**Land-Use Change & Forestry (5) -> Changes in Forest and Other Woody Biomass Stocks (5A) -> Tropical Forests (5A1) -> Plantations (5A1g)**
IPCC 2006 Source/Sink Category:	**Agriculture, Forestry, and Other Land Use (3) -> Land (3.B)**
Properties	
Technologies/Practices:	The rotation is around 25 years. Thinning is usually done. Other management activities include fertilizer application.
Abatement/Control Technologies:	Other activities include pest and disease control, and fire control
Parameters/Conditions:	Tree species: Chinese fir (Cunninghamia lanceolata); age ranges from 3 to 60 year-old.
Region/Regional Conditions:	Country: China; Region: Southern China; Climate zone: subtropical, very moist climate; Mean annual temperature is 17°C; Mean annual precipitation is 1500mm.
Others:	tree height ranges from 2 to 28.1 meter, DBH from 2 to 48.1 cm
Description:	**Biomass Expansion Factor (BEF2) converting volumes of extracted rounwood to total aboveground biomass (overbark) for Chinese fir**
Value:	**1.66 (1.21 - 2.97)**
Unit:	**dimensionless (dimensionless)**
Value in common units:	
Common unit:	
Equation:	Equations 3.2.3, 3.2.7, and 3.2.8 in IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry
IPCC Worksheet:	Worksheet FL-1a of IPCC GPG-LULUCF
Source of data:	compiled from Science literature (calculated from 121 studies from 39 published articles in

Source: IPCC Emission Factor Database (http://www.ipcc-nggip.iges.or.jp/EFDB/)

Applicability – "properties" are crucial

Annex to the EFDB User Manual (Version A-1.10)

IPCC Source/Sink Category	Examples of Emission Factors or Other Parameters	Guidance on/Examples of Properties associated with the Emission Factors or Other Parameters Specified in the Left Column				
		Technologies/ Practices	Abatement/ Control technology	Parameters/ Conditions	Region/ Regional conditions	Other Properties
Temperate Forests (5A2)	Annual Average CO_2 Uptake by Aboveground Biomass Annual Average CO_2 Uptake by Belowground Biomass Dead Biomass Production (woody debris, forest floor) Tree Diameter (under or over bark) Biomass Expansion Factor per Tree Species Above and Belowground Biomass Estimation Annual Average Accumulation of Dry Matter as Biomass (conversion factor) Harvested Wood	<For Natural Forest> **Protected / accessed by communities** **Type of Management practices applied:** e.g., - *harvesting* <For Forest Plantations> **Type of management practices applied:** e.g., - *Thinning* - *Harvesting* - *Fertilizing* - *Rotation information* - *Drainage*	**What kind of control in operation:** e.g., - *Pest & disease control* - *Fire control* Protected areas Changing practice to increase forest biomass stock: e.g., - *Reduce harvesting* Change in tree species	**Forest conditions:** e.g., - *Coniferous Temperate forest* - *Broadleaf* - *Mixed* **Forest age** **Forest type:** e.g., - *Closed forest* - *Mixed (closed) and open (secondary)* - *Primary/secondary* - *Closed/open woodland* - *Disturbed* - *Closed forest fallow* Effect by atmospheric condition, e.g. CO_2, N, S deposition, Ozone	**Regions:** e.g., - *Asia* - *North America* **Climatic zone:** e.g., - *Dry* - *Semi-arid* - *Semi-moist* - *Very moist* **Climatic conditions:** e.g., - *Rainfall* - *Temperature* Sub-regions Countries and specific climate conditions	**Any assumptions used to derive/use emission factors or other parameters**

Source: Annex to the EFDB User Manual (Version A-1.10) (IPCC, 2005)

Documentation

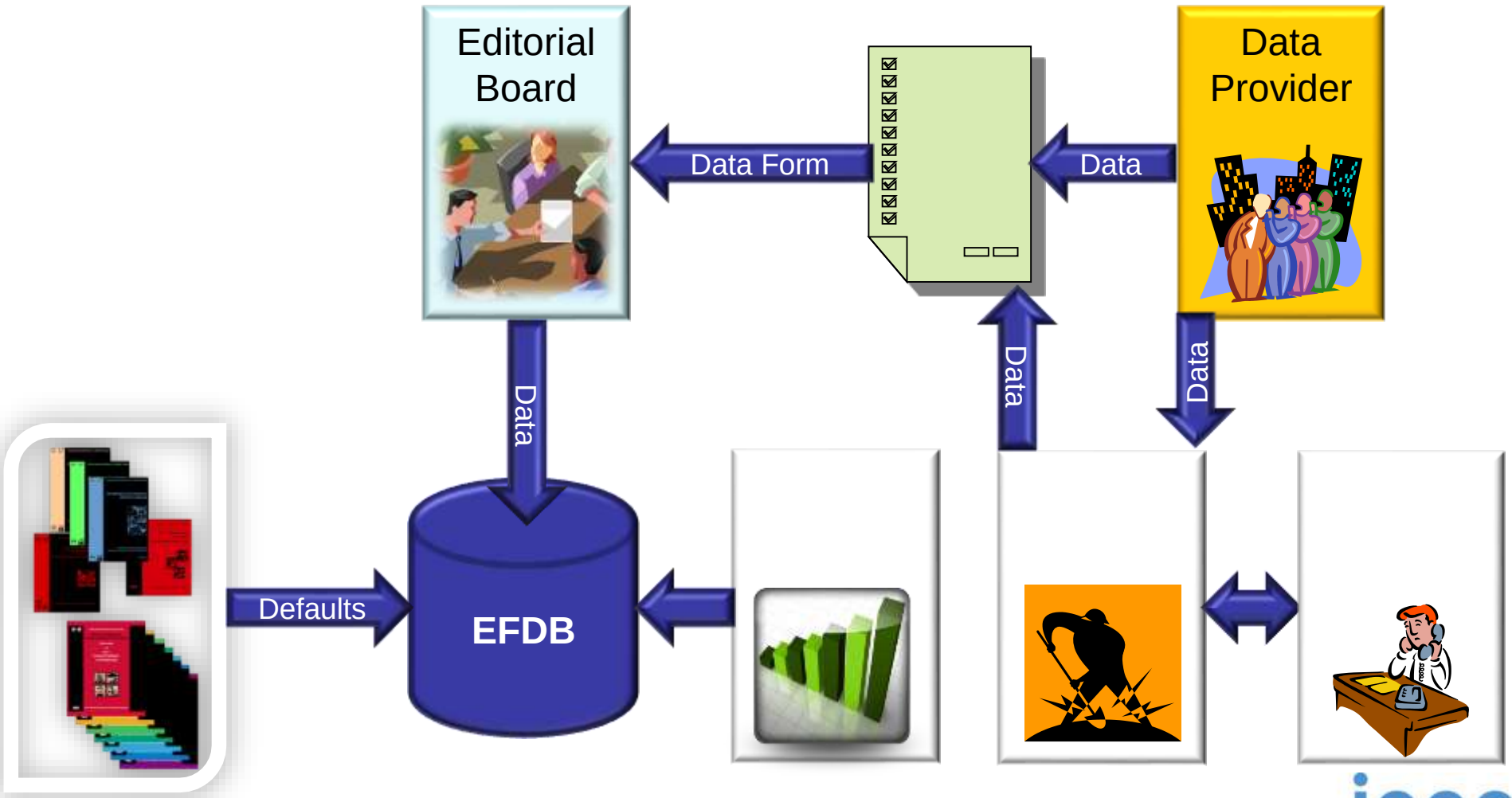
- Sufficient information on technical references
  - scientific or technical publication in an internationally available journal
  - report or book with an ISBN number
- URL where the technical references are available will be quite helpful.

Documentation

Emission Factor Report (ID: 513034)	
Administrative information	
Data Provider:	IPCC
Data Provider Country:	(Not applicable)
Data Provider Contact:	ipcc-efdb@iges.or.jp
…	…
Technical information	
Gas:	**CARBON DIOXIDE**
…	…
IPCC Worksheet:	Worksheet FL-1a of GPG-LULUCF
Source of data:	IPCC Good Practice Guidance for LULUCF, Table 3A.1.10 (Default Values of Biomass Expansion Factors (BEFS)), page 3.178.
Technical Reference:	Isaev et al., 1993; Brown, 1997; Brown and Schroeder, 1999; Schoene, 1999; ECE/FAO TBFRA, 2000; Lowe et al., 2000; Refer to FRA Working Paper 68 and 69 for average values for developing countries (
Reference language:	English
…	…
Usage/Review information	
Type of parameter:	1996 IPCC default
Comments from the data provider:	Data applicable to Forest Land Remaining Forest Land (5-FL-1) and to Land Converted to Forest Land (5-FL-2)
Comments from others:	
Link:	http://www.fao.org/forestry/index.jsp

Source: IPCC Emission Factor Database (http://www.ipcc-nggip.iges.or.jp/EFDB/)

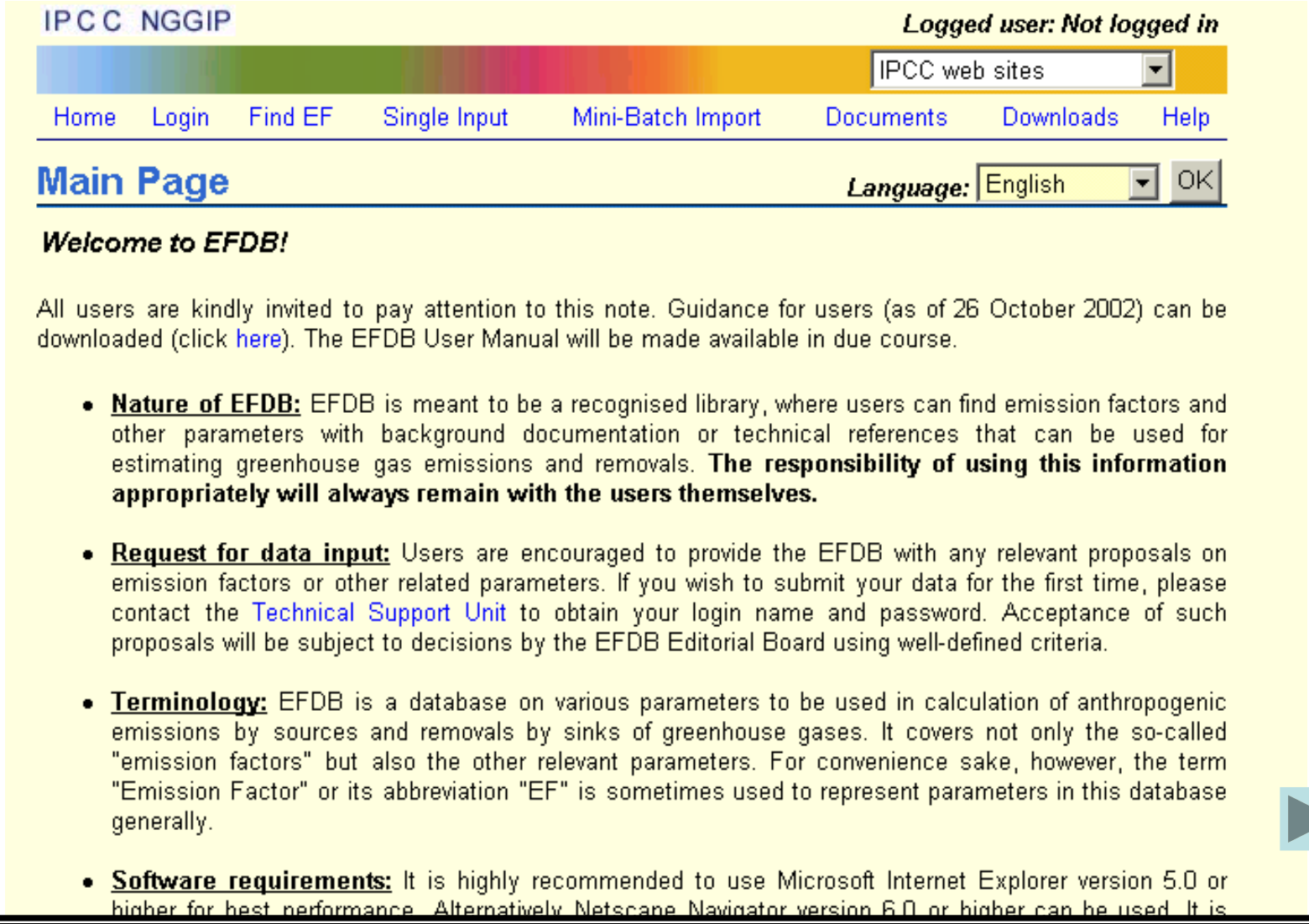
Populating EFDB



How to Access the EFDB

- Two different applications are available.
  - **Web application**
    - For all users to carry out on-line search
    - For data providers to submit new emission factors or other parameters
  - **CDROM application**
    - For all users, in particular for those who have difficulty with Internet connection, to carry out off-line search
- The web application is the core of this system. New data will be made available in the Web application first.

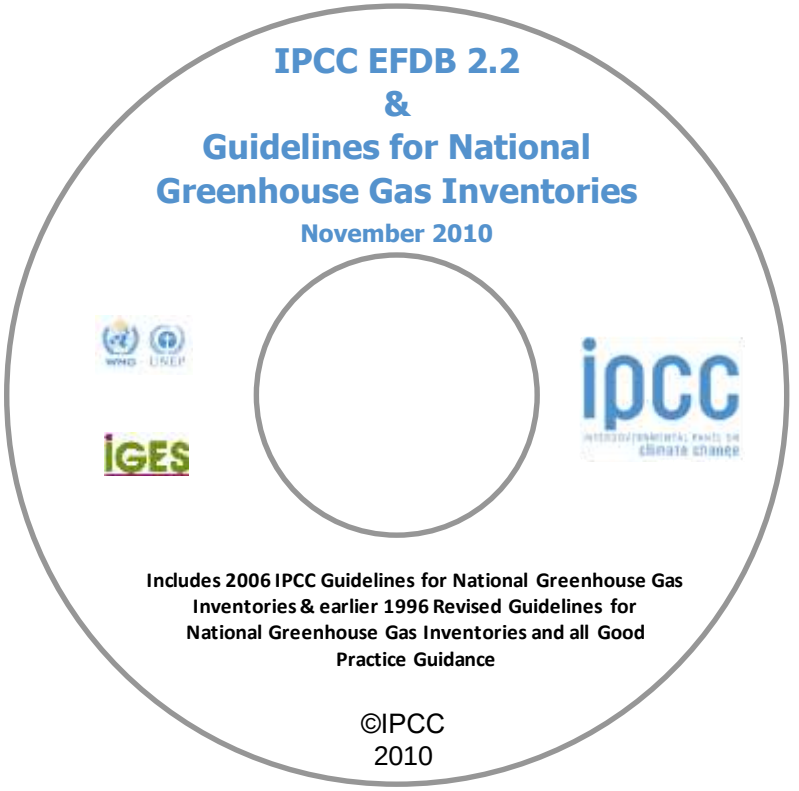
EFDB Web application



http://www.ipcc-nggip.iges.or.jp/EFDB/

EFDB Local CDROM application

- Can be operated locally (on a stand-alone PC).
- For detailed guidance, see the **User Guide for Local CDROM application**.
- For supplementary information, see also:
  - Appendices A-D of the User Manual for Web application
  - Annex to the User Manual for Web application



EFDB Local CDROM application

- EFDB Local CDROM application works with MS Access MDB file, which contains the copy of the on-line web database.

- The latest MDB file will be made available
  - Through the Internet: At the "Downloads" section of the web application; and/or
  - In the form of CD-ROM: Will be distributed annually or biannually, possibly on the occasion of sessions of SBSTA or COP.

Your participation is welcome!!

- Success – depending on input from the global scientific and inventory society
  - EFDB is open to any relevant data proposals.
  - If you have your own data on emission factors, please contact the Technical Support Unit (TSU) by e-mail <**ipcc-efdb@iges.or.jp**>.
- Continuous improvement on the content and functionality – Users' feedback will be quite important
- Your participation is highly appreciated!!