The Intergovernmental Panel on Climate Change and Methods for Measuring SF$_6$ Emissions

Dina Kruger, USEPA
Co-Chair, IPCC Good Practice Report
Emission Inventories??

- An *emission inventory* is an estimate of the level of emissions from a particular source or group of sources.
- Emission inventories are used for:
  - atmospheric science
  - evaluating progress toward national & international goals
  - participating in emission markets
Greenhouse Gas Inventories: The International Context

- Some background...
  - Framework Convention on Climate Change (FCCC)
  - Intergovernmental Panel on Climate Change (IPCC)
  - Conference of Parties (COP)
  - IPCC Good Practice Guidance
UN Framework Convention on Climate Change

- Adopted at the 1992 Rio Earth Summit
- Ratified by 142 countries (now called the “Conference of Parties” or “COP”)
- Voluntarily reduce GHG emissions to 1990 levels by 2000
- “Inventory” and report annual GHG emissions
Intergovernmental Panel on Climate Change (IPCC)

- Organized by WMO & UNEP in 1988
- International scientific body that assesses:
  - state-of-science on climate change
  - environmental & socio-economic impacts
  - response strategies & costs
  - emission inventory methodologies
- Advisory body to COP
IPCC Inventory Guidance

- IPCC role is to develop source category estimation methods
  - that can be used by countries with different capabilities & resources
  - that result in transparent, high-quality estimates
  - that address uncertainties
IPCC Guidelines -- Timeline

- 1993: 1st version of IPCC Inventory Guidelines issued
- 1996: Revised IPCC Guidelines Issued
  - included High GWP Gases
  - referenced in Kyoto Protocol (Article 5.2)
- 1999: Issued Report on Good Practice Guidance
Basic Principle: All Countries Should Be Able to Estimate

- Tier 1:
  - simple to use
  - requires less data
  - less accurate, less specific

- Tier 2 (or Tier 3):
  - more complex
  - requires more data
  - often plant- or process-specific
  - more accurate, more specific
Choice of Methods

- National circumstances
  - each country chooses its methods based on
    - availability of data
    - significance to domestic policies
  - all countries should use “good practice”
- Tier 2 methods are generally preferred for “key” sources
Good Practice Guidance

What it covers:
- how to choose among and implement methods
- how to collect required data
- how to conduct QA/QC
- how to assess uncertainty
- how to document estimates

www.ipcc-nggip.iges.or.jp/public
Global SF₆ Emissions Are Growing Fast

- Global emissions are well-characterized based on atmospheric concentrations
- Data indicate major growth in SF₆ use in electrical applications
- Annual SF₆ consumption exceeds emissions
Most SF₆ emitted by developed countries
National emissions are less well-characterized than global estimates
Several countries are only beginning to report
US SF$_6$ Emissions Estimates

![Graph showing US SF$_6$ emissions estimates from 1990 to 1998. The graph includes two categories: Magnesium and Electrical Equipment. Each bar represents the emissions for a specific year, with the y-axis indicating MMTCE (metric megatons of CO$_2$ equivalent).]
IPCC Relies on Government & Industry Experts

- Magnesium Expert Group
  - Bill Palmer, Cheminfo
  - Pieter du Toit, SASTech R&D
  - Scott Bartos, USEPA
  - Lowell Brothers, Southern Co. Services
  - Kathryn Ellerton, Allied Signal
  - Bill Irving, USEPA
  - Toshiaki Ohgita, Inst. for Techno-Economics
  - Natalya Parasyuk, ARENA-Eco
  - Takuya Suizu, Fed. of Electric Power Co.
  - Tom Tripp, Magnesium Corp of America
  - Chen Zhenlin, China Meteorological Association
More IPCC Experts

- Utility Expert Group
  - Jos Olivier, Netherlands RIVM
  - Newton Paciornik, Brazil Ministry of Science & Technology
  - Ranier Bitsch, Siemens
  - Lowell Brothers, Southern Co. Services
  - Eric Dolin, USEPA
  - Kathryn Ellerton, Allied Signal
  - Jochen Harnisch, Ecofys
  - Petra Mahrenholtz, German EPA
  - Bill Palmer, Cheminfo
  - Natalya Parasyuk, ARENA-Eco
  - Ewald Preisegger, Solvay
  - Michael Strogies, German EPA
  - Takuya Suizu, Japan Federation of Electric Power Companies
  - Chen Zhenlin, China Meteorological Administration
Magnesium Methods

- Tier 1 (no direct data):
  - national sales method
  - top-down method

- Tier 2 (direct data):
  - direct reporting method
  - hybrid of direct & top-down methods
Electric Utility Methods

- Tier 1: “Potential” approach
- Tier 2: Emission factor approach
  - 2a: Life-cycle emission factors
  - 2b: IPCC default emission factors
- Tier 3: Mass-balance approach
  - 3a: Life-cycle level
  - 3b: Manufacturer & utility level
  - 3c: Country-level mass-balance
How Does Industry Support the Inventory?

- Participating in method development and refinement
  - IPCC Good Practice Project
- Providing data through voluntary programs
- Reviewing the US inventory
  [www.epa.gov/globalwarming/emissions]
Why Should Industry Support the Inventory?

- Sound policy requires sound data
- Emerging emission markets depend on sound data:
  - at $10/ton-carbon equivalent, 1 pound of SF$_6$ *not emitted* is worth $30
  - avoiding emissions through recycling, reduced use, etc., has economic value
- Need to overcome perceived uncertainty of “non-CO$_2$ greenhouse gases”
“Working with the government makes me nervous. Not working with the government makes me more nervous.”

Industry comment overheard at an IPCC Good Practice meeting (Jan 1999)