

U.S. EPA Experience in Applying the IPCC Guidelines

Melissa Weitz

U.S. Environmental Protection
Agency

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Overview



- **Background: Use of IPCC Guidance in U.S. National Inventory**
- **General Considerations for Use of IPCC Guidelines for Other Applications**
- **Example: Climate Leaders**
- **Example: Greenhouse Gas Reporting Program**
- **Example: Federal Agency GHG Accounting**
- **Example: National Environmental Policy Act**

Use of IPCC Guidelines in U.S. GHG Inventory



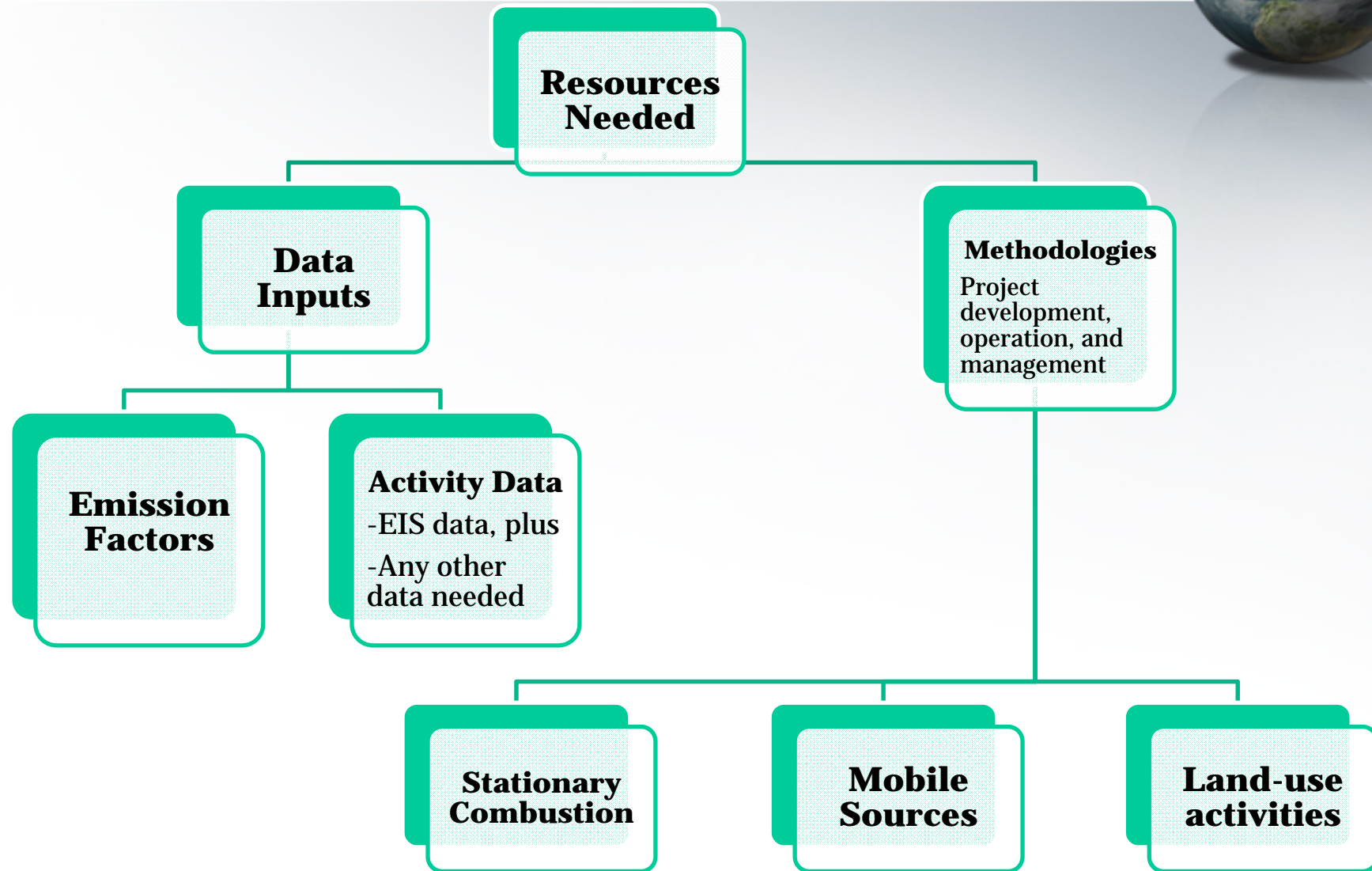
- General use of higher tiers and 2006 IPCC Guidance
- National or regional statistics for activity data
 - e.g. input data on forestry from USFS, data on energy from EIA
- Country-specific models and emission factors
 - Emission factors typically developed from direct measurement
- Use of facility-level reporting program data (GHGRP)
 - Updated emission factors and activity data
 - QA/QC

Considerations for IPCC Guidance in Other Applications



- Each project type is a collection of emissions sources
- Most common emissions sources for project types listed
 - Stationary combustion
 - Mobile combustion
 - Land use
- Classification of emission sources
 - Direct
 - Indirect
- Project boundaries to consider in classification
 - Construction and operation of project
 - Upstream and downstream emissions from project development
 - Upstream emissions (e.g., extraction and production of materials used by the project; exploration and production of fossil fuels at project)
 - Downstream emissions associated with use of those fuels produced by project
- Activities without GHG emissions or methods to calculate
 - Not all activities at a project will emit GHGs

Resources needed to Calculate GHG Emissions



Climate Leaders Offsets Protocols



- ***Climate Leaders*** (2002-2011) was an EPA industry/government partnership that worked with companies to develop comprehensive climate change strategies
 - Partners could use reductions and/or removals that occur outside of their corporate boundary (i.e., offsets) to help to meet their goals
- EPA developed offset guidance based on a top-down performance standard approach to address additionality and to select and set the baseline
 - Use of methodologies, based on IPCC guidance to quantify reduced emissions
- Performance standard protocols developed for several project types
 - Commercial boiler
 - Industrial boiler
 - Landfill Methane
 - Anaerobic digesters
 - Transportation – Bus fleet
 - Afforestation/Reforestation
 - End-use of methane

EPA Offset Methodology Steps



1. Clearly Define the Project Type
 - Location, technology, size
2. Define Project Boundary
 - Physical, GHG, temporal, leakage
3. Determine Regulatory Eligibility
 - Federal, state and local
4. Develop and Apply the Performance Threshold and Emissions Baseline
 - Determination of Additionality – performance threshold (emissions rate, technology, practice)
 - Baseline for calculation – emission baseline
5. Estimate Project Emission Reductions
 - Software tool, Model or Equations
6. Implement Project, Monitor Emissions
 - Limited set of acceptable monitoring approaches – direct metering, modeling
7. Quantify Project GHG Emissions Reductions

Example from Climate Leaders: Anaerobic Digesters



- Emissions reductions = Baseline emissions – project emissions
- Baseline emissions calculated with IPCC-based methods
 - Methods and emission factors to calculate CH₄ from baseline manure management system type
 - Volume 4, Chapter 10: Emissions from Livestock and Manure Management
 - Energy use associated with baseline system
 - Volume 2
- Project emissions are equal to amount of CH₄ not combusted by digester, any project-related energy emissions
 - Measurements of CH₄ captured by digester, estimate of collection and combustion efficiency
 - Energy use associated with project
 - Volume 2

GHGRP



- EPA regulation requiring annual reporting of GHGs by 41 source categories
 - 33 types of direct emitters
 - 6 types of suppliers of fuel and industrial GHGs
 - Facilities that inject CO₂ underground for geologic sequestration, enhanced oil recovery, or any other purpose
- Most source categories began collecting data in 2010, with first annual reports submitted to EPA in September 2011
- Facilities use uniform methods prescribed by the EPA to calculate GHG emissions, such as direct measurement, engineering calculations, or emission factors derived from direct measurement
 - In some cases, facilities have a choice of calculation methods for an emission source
- Direct reporting to EPA electronically
- EPA verification of GHG data

Example from GHGRP



- 2006 IPCC guidance on solid waste disposal sites
 - Discourages mass balance approach
 - Produces results that are not comparable with the FOD method which produces more accurate estimates of annual emissions.
 - Provides instead a Tier 1 version of the FOD method
 - Includes a simple spreadsheet model with step-by-step guidance and improved default data
- GHGRP Subpart HH—Municipal Solid Waste Landfills
 - MSW landfills that generate 25,000 tons CO₂e or more must report GHG data and other information to EPA
 - CH₄ generation calculated using FOD equations from 2006 IPCC guidance
 - Volume 5, Chapter 3, solid waste

Example from GHGRP



- IPCC 2006 guidance on geologic sequestration (GS)
 - Volume 2—Energy. Chapter 5 Carbon Dioxide Transport, Injection, and Geological Storage
 - Methodologies for the estimation of emissions from capture, transport, injection, and GS of CO₂
 - Based on principle that the CCS system should be accounted for in a complete and consistent manner across the entire Inventory
 - For GS, the IPCC guidelines outlines a Tier 3 methodology for estimating and reporting emissions based on site-specific evaluations of each storage site
- GHGRP Subpart RR: Geologic Sequestration source category
 - Provides a mechanism for facilities to monitor and report the quantity of CO₂ sequestered on an annual basis
 - Facilities subject to Subpart RR must develop and implement an EPA-approved MRV plan.
 - Once a facility has an approved MRV plan, it reports basic information on CO₂ received for injection, the amount of CO₂ geologically sequestered using a mass balance approach and annual monitoring activities.

Federal Agency Guidance



- Executive Order 13514 calls on Federal agencies and departments to lead by example in increasing sustainability and energy-efficiency across the Federal Government
- Order requires federal agencies to submit GHG inventories annually
- Guidance on Federal Greenhouse Gas Accounting and Reporting establishes Government-wide requirements for measuring and reporting GHG associated with Federal agency operations
 - Guidance serves as the Federal Government's official Greenhouse Gas Protocol and was used by Federal agencies to develop their GHG inventories
- GHG Reporting Portal provides GHG calculation functionality for default calculation methodologies
 - Most default methods directly from or based on IPCC guidance

Example from Federal Agency Guidance



- Agency guidance for calculating CH₄ and N₂O emissions from onsite wastewater treatment and septic systems
- Methods consistent with IPCC
- Default methodology uses national averages to determine the treatment processes and operating variables
 - Inputs are type of wastewater treatment system, population served
- Advanced methodology approach uses facility-specific wastewater treatment processes and operating variables
 - Inputs are type of wastewater treatment system, population served, digester gas, fraction of CH₄ in biogas, BOD₅ load, fraction of BOD₅ removal performance, N load

NEPA



- **National Environmental Policy Act (NEPA) signed into law in 1970**
 - Establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment
 - Provides a process for implementing these goals within the federal agencies
- **Requires an environmental impact statement for any major Federal action significantly affecting the quality of the human environment**
 - Statements assess environmental impact of and alternatives to major federal actions significantly affecting the environment
 - Includes direct, indirect and cumulative effects

NEPA and GHG



- 2010 NEPA draft guidance on considering greenhouse gas emissions and climate change in their proposed actions
- Explains how Federal agencies should analyze environmental impacts of greenhouse gas emissions and climate change when assessing environmental impacts of a proposed action
- Provides examples of tools and programs for calculating emissions
 - EPA Greenhouse Gas Reporting Program methods and tools for quantification of emissions from large direct emitters, and for determining whether projects or actions exceed the 25,000 metric ton of CO₂-equivalent greenhouse gas emissions (uses IPCC guidance)
 - Agency Guidance for quantification of Scope 1 emissions at Federal facilities (uses IPCC guidance)
 - Department of Energy Voluntary reporting of GHG guidance for quantification of emissions and removals from terrestrial carbon sequestration and various other project types

Example for calculating GHG for NEPA



Project Example: Mining

Relevant source categories

- Stationary combustion: Stationary Internal Combustion Engines, Process Heaters/Coal Dryers
- Mobile sources: motor vehicles and engines, nonroad vehicles and engines
- Land-use: land-clearing
- Potential fugitive methane emissions

Examples of applicable GHG calculations tools & resources

- IPCC methods for Energy (Volume 2)
 - Chapter 2: Stationary combustion, Chapter 3: Mobile combustion, Chapter 4: Fugitive emissions
- IPCC methods for Agriculture, Forestry and Other Land Use (Volume 4)

Other U.S. Examples



- California
- IRS tax credits
- Biomass

Thank you

