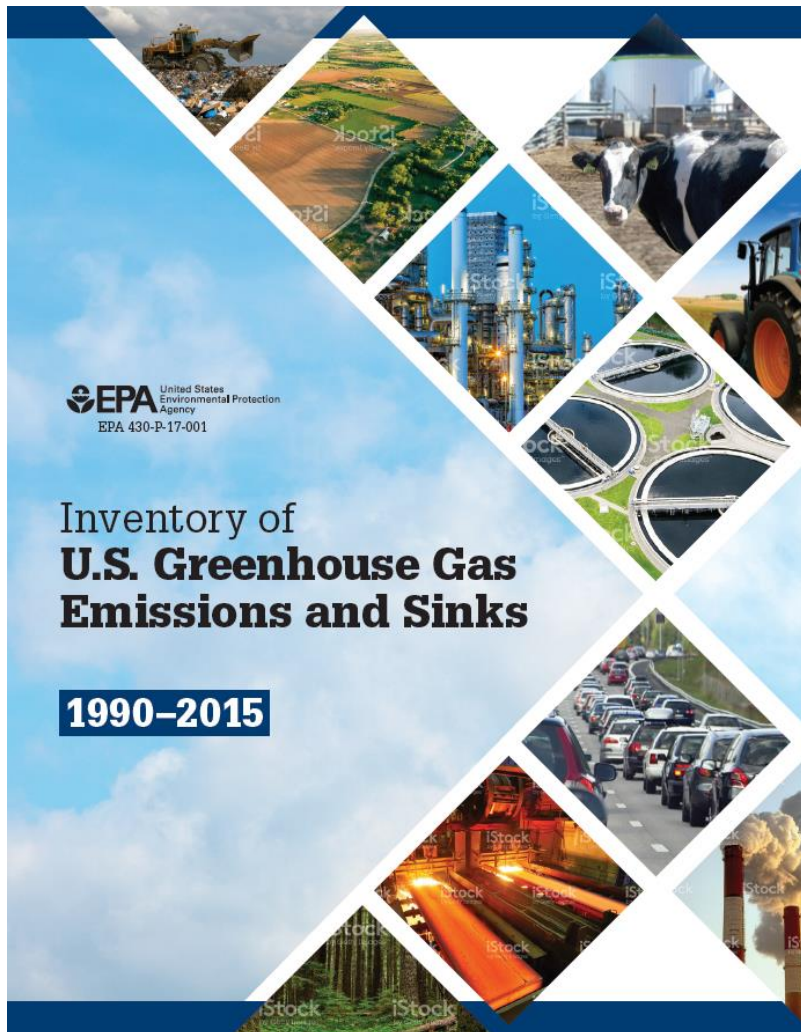


Annual Inventory of U.S. GHG Emissions and Sinks



FIA User Group Meeting
Madison, WI—April 4, 2017

Tom Wirth
US EPA—Climate Change Division

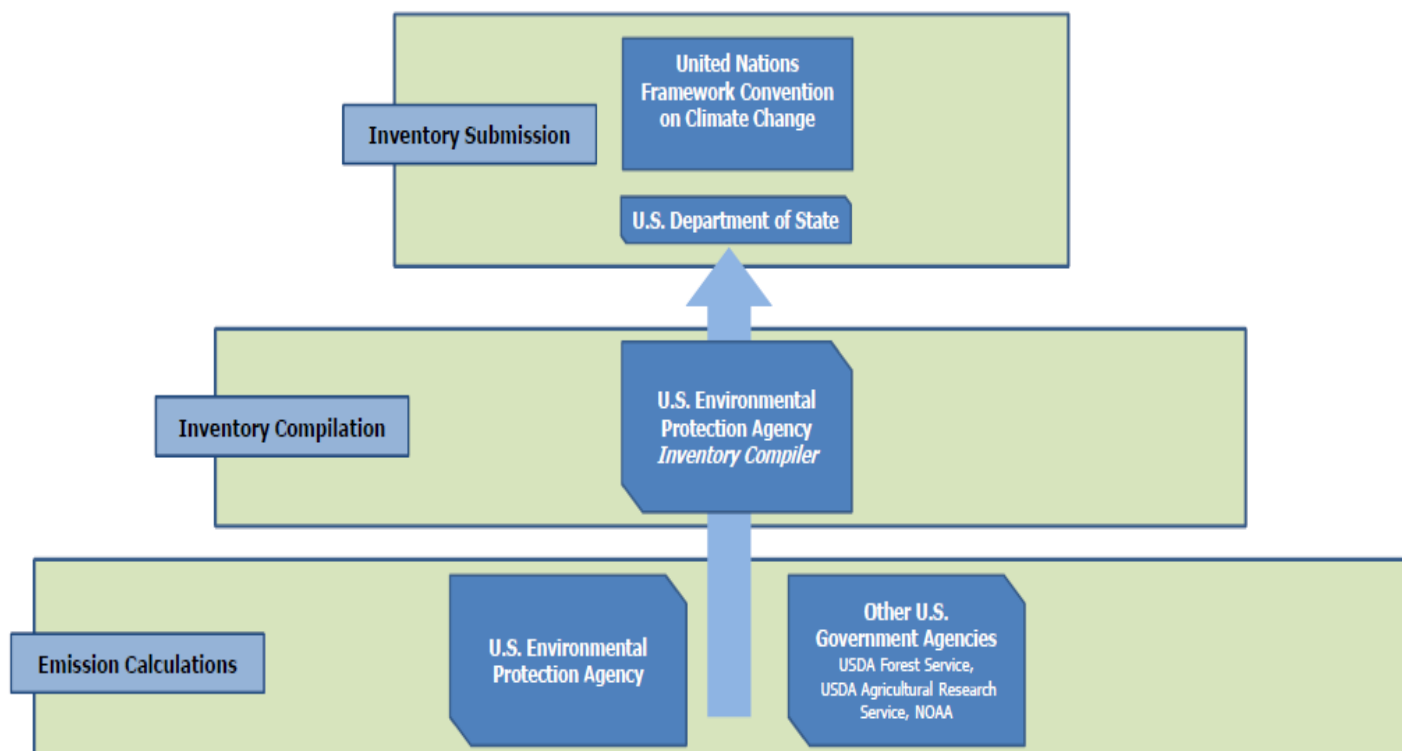
National GHG Inventory



- Produced annually—due on April 15
- Reports on anthropogenic GHG emissions and removals over time: 1990 to the present
- Five methodological chapters
 - Energy
 - Industrial Processes and Product Use
 - Waste
 - Agriculture
 - Land Use, Land-Use Change and Forestry
- Six primary gases
 - CO₂, CH₄, N₂O, HFCs, PFCs, SF₆
- Used to track our commitments under the UNFCCC



United States National Inventory Arrangements



Data Collection

Energy

- U.S. Department of Energy and its National Laboratories
- Energy Information Administration
- U.S. Department of Transportation
- Bureau of Transportation Statistics
- Federal Highway Administration
- Federal Aviation Administration
- U.S. Department of Defense – Defense Logistics Agency
- U.S. Department of Commerce – Bureau of the Census
- U.S. Department of Homeland Security
- U.S. Department of Labor's Mine Safety and Health Administration
- EPA Office of Transportation and Air Quality MOVES Model
- EPA Greenhouse Gas Reporting Program (GHGRP) and Acid Rain Program
- American Association of Railroads
- American Public Transportation Association
- U.S. Department of Labor – Mine Safety and Health Administration
- Data from research studies, trade publications, and industry associations



Agriculture/LULUCF

- U.S. Department of Agriculture (USDA) National Agricultural Statistics Service
- USDA Natural Resources Conservation Service
- USDA Economic Research Service
- USDA Farm Service Agency
- USDA Animal Plant Health Inspection Service
- Conservation Technology Information Service
- U.S. Geological Survey
- USDA Forest Service
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Department of the Interior Bureau of Land Management
- EPA Office of Solid Waste
- U.S. Census Bureau
- Alaska Department of Natural Resources
- American Society of Agricultural Engineers
- Association of American Plant Food Control Officials
- Tennessee Valley Authority
- Data from research studies, trade publications, and industry associations



Industrial Processes and Product Use

- U.S. Geological Survey National Minerals Information Center
- EPA GHGRP
- U.S. Department of Commerce
- American Iron and Steel Institute (AISI)
- American Chemistry Council (ACC)
- U.S. Aluminum Association
- Air-Conditioning, Heating, and Refrigeration Institute
- Data from research studies, trade publications, and industry associations



Waste

- EPA GHGRP
- EPA Office of Land and Emergency Management
- Data from research studies, trade publications, and industry associations



IPCC Guidelines and UNFCCC Reporting for National GHG Inventories



IPCC Guidelines Agriculture, Forestry and Other Land Uses (AFOLU)

UNFCCC Reporting

Agriculture

- Enteric Fermentation (CH_4)
- Manure Mgt. (CH_4 and N_2O)
- Agric. Soil Mgt. (N_2O)
- Rice (CH_4)
- FBAR (CH_4 and N_2O)
- Liming/Urea (CO_2)



LULUCF

(36 LU/LUC Categories)

- Forestland & LCF
- Cropland & LCC
- Grassland & LCG
- Wetlands & LCW
- Settlements & LCS
- Other Land & LCO

Five C Pools &
Non- CO_2 Gases

Evolution of IPCC AFOLU Methodological Guidance



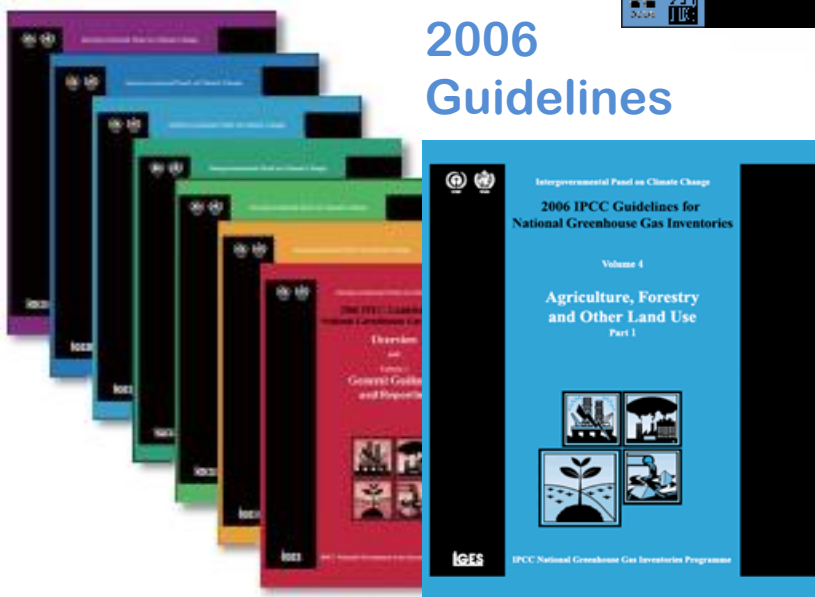
1996 Guidelines



2000 & 2003 GPG



2006 Guidelines



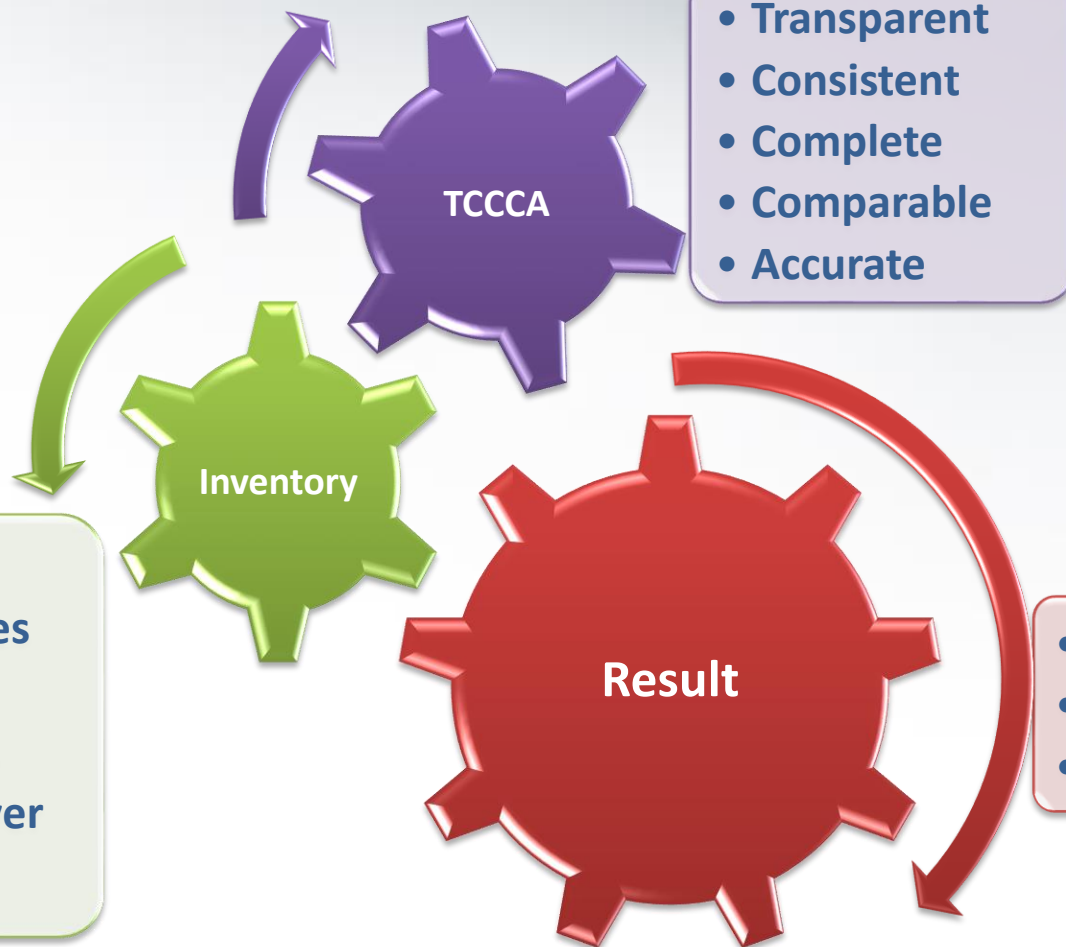
2013 Wetlands Supplement



2019 Methodology Report



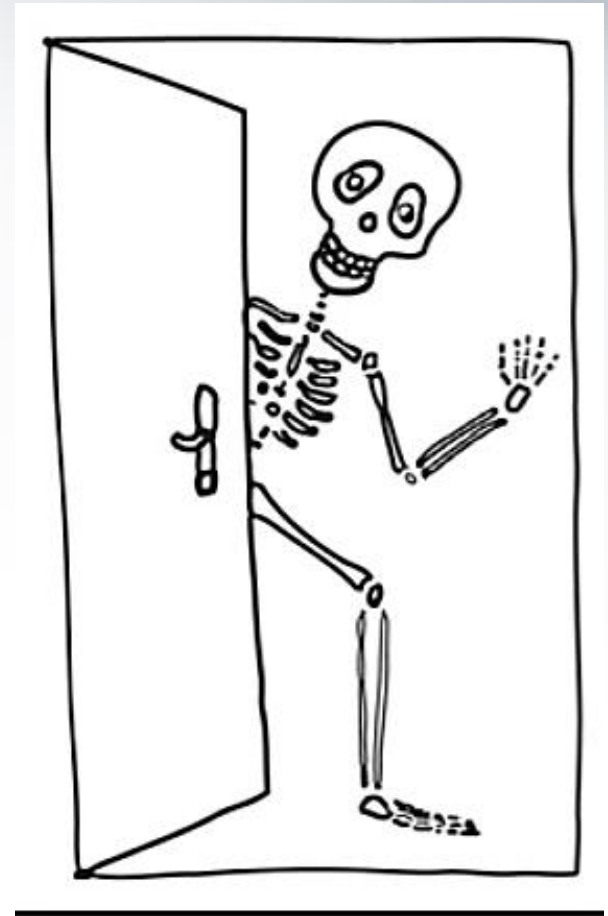
Inventory Quality Indicators and Good Practice Guidance



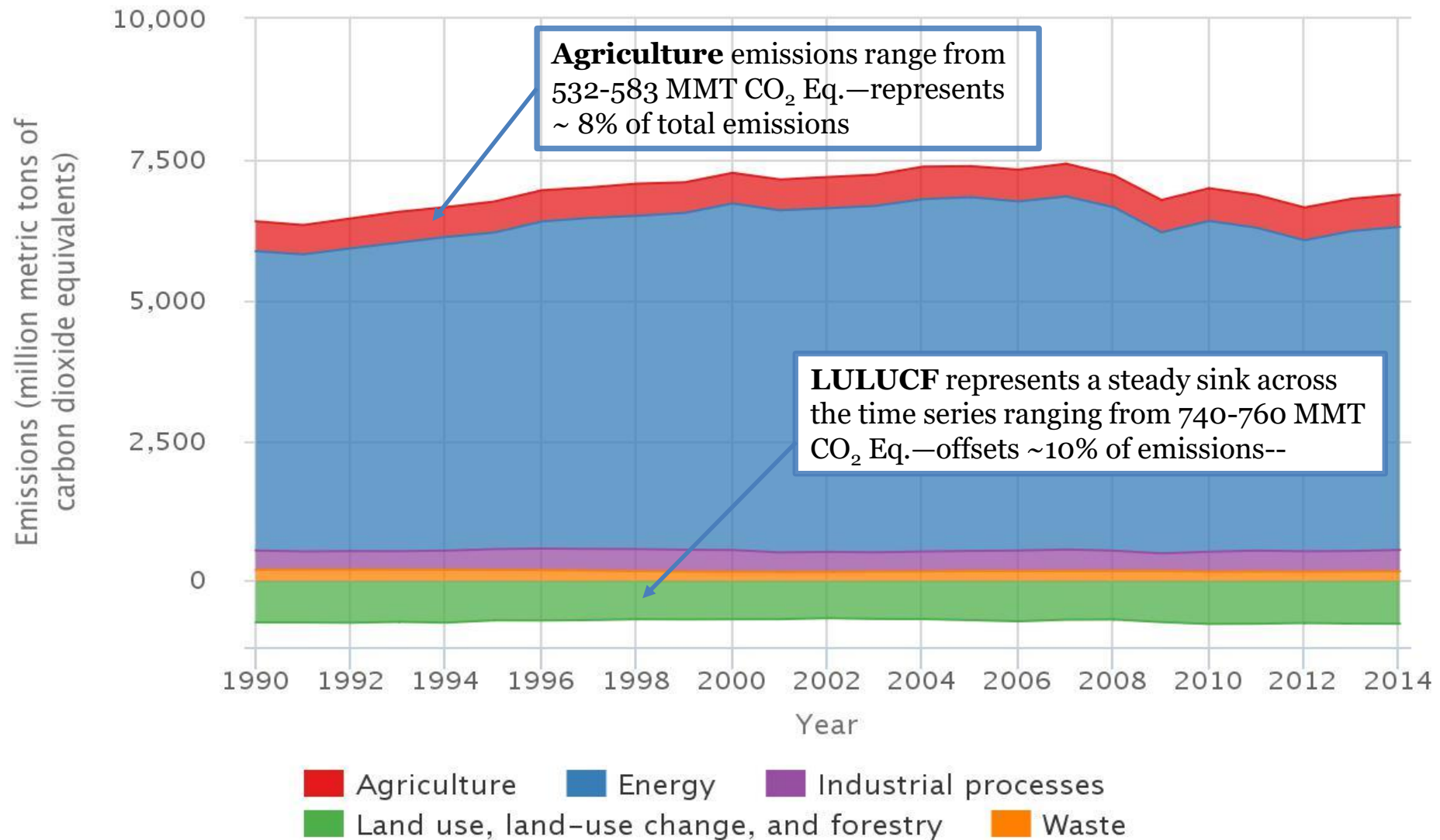
Domestic and International Review Processes



- Annual Domestic Reviews
 - Expert and Public reviews
 - Thirty days each
 - Not formal reviews, as with regulations, but becoming more so
- Annual UNFCCC Reviews
 - Centralized in Bonn
 - In-Country by multidisciplinary team
 - Annual review report developed
 - Inventory team must respond to recommendations in the report



U.S. Greenhouse Gas Emissions by Inventory Sector, 1990–2014



Final Points



- US Inventory is one of the highest quality inventories of any country e.g., completeness, transparency, methods/activity data
- However, significant improvements are necessary, such as:
 - Improve tracking of land use conversion i.e., areas and resulting carbon stock changes
 - Decrease the latency in the reporting e.g., more frequent NRI updates, use of remote sensing imagery
 - Report on C stock changes from interior AK

Questions?

Thanks for listening!

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Climate Change Division
GHG Inventory Coordinator—
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To download a copy of the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*:

<http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html>

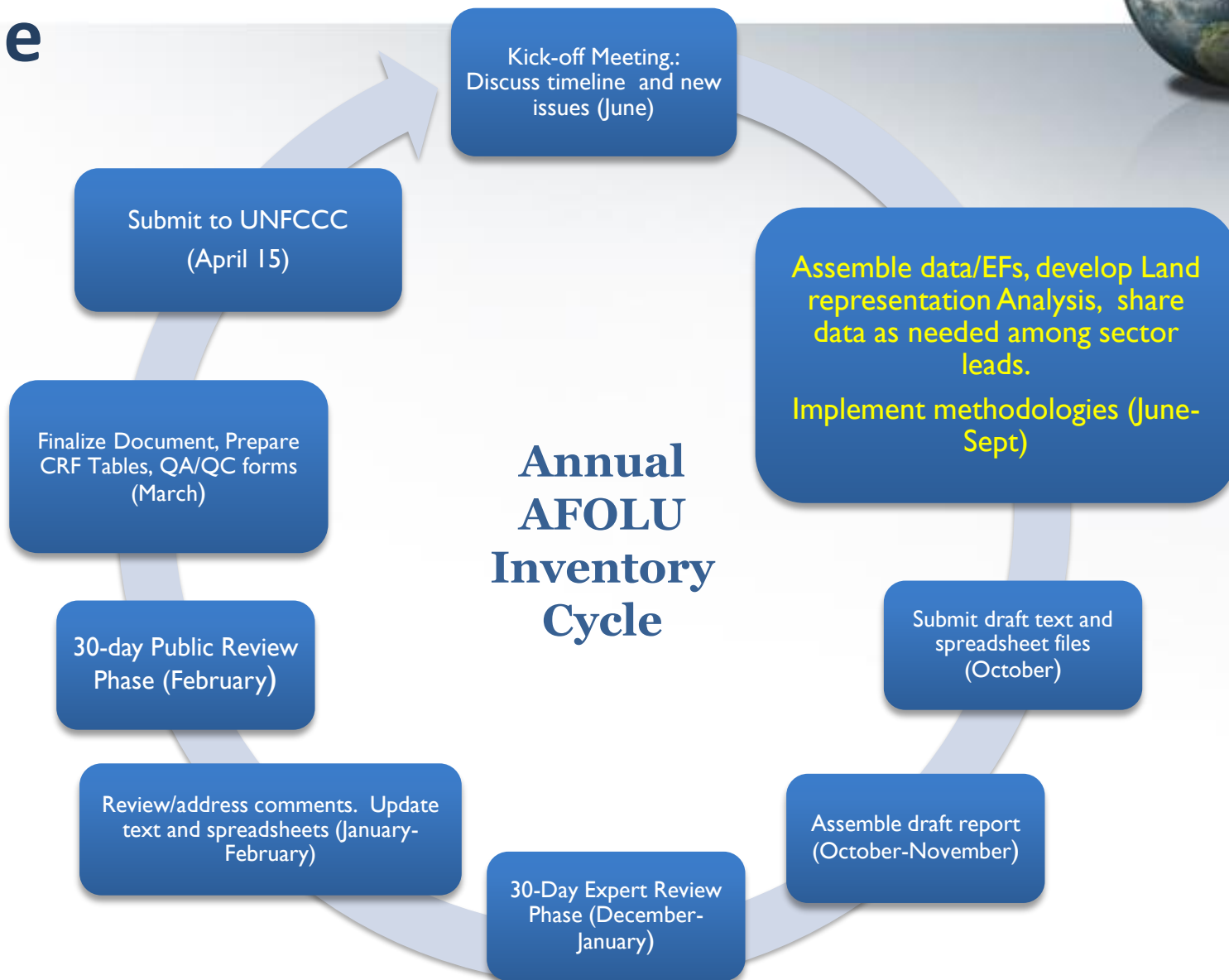
Chapter Structure Based on UNFCCC Reporting Requirements



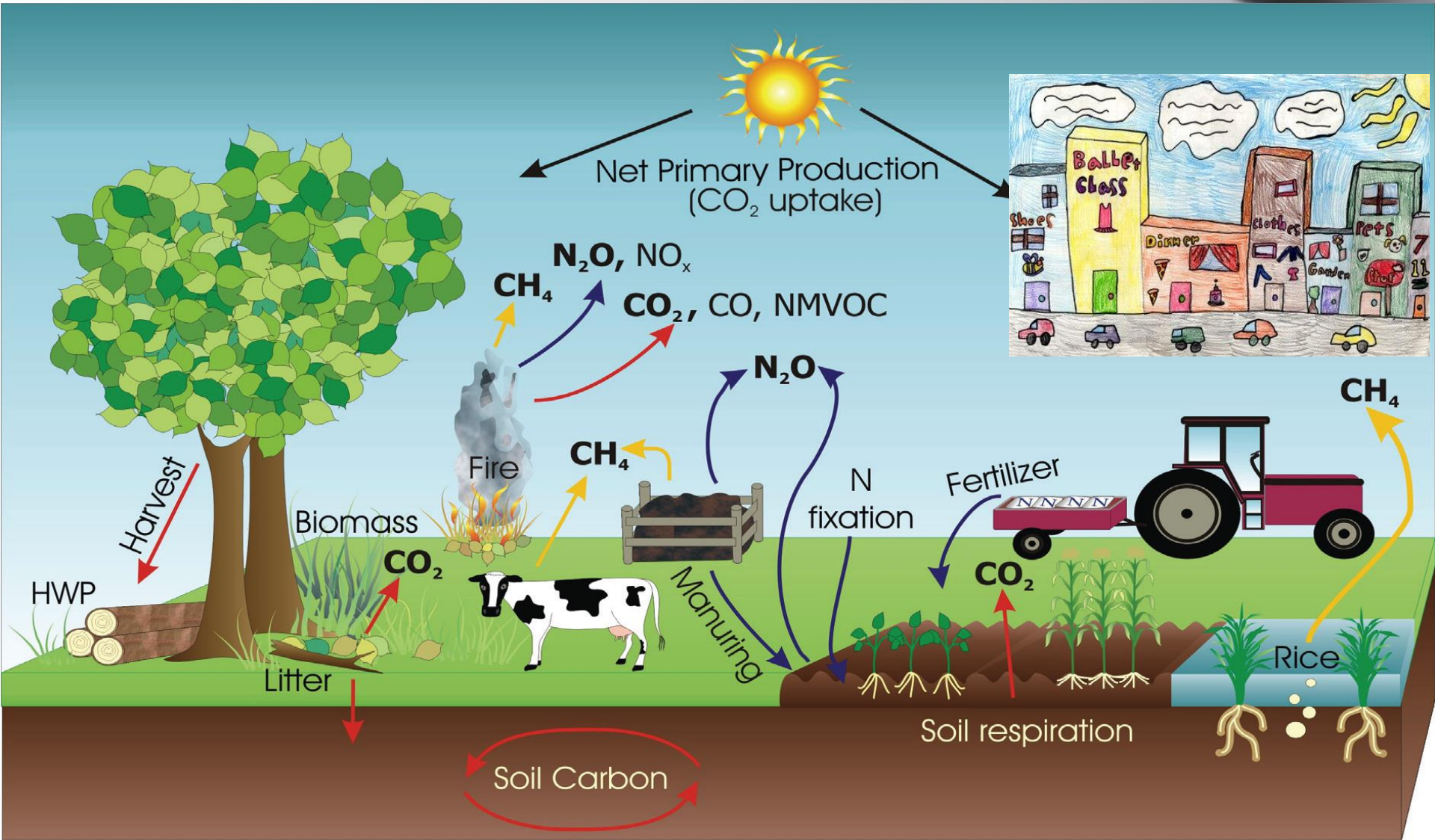
- Overview
 - Description of source/sink—cause of emission/removal
 - Trends/drivers
 - Emissions/removals in MMT CO₂ eq. and kilotons of gas
- Estimation methodology and activity data
- Uncertainty; Monte Carlo simulation for a 95% confidence interval with lower and upper bounds around the central estimate
- Time series consistency
- QA/QC and verification
- Recalculations Discussion
- Planned Improvements



“Idealized” Annual AFOLU Inventory Cycle



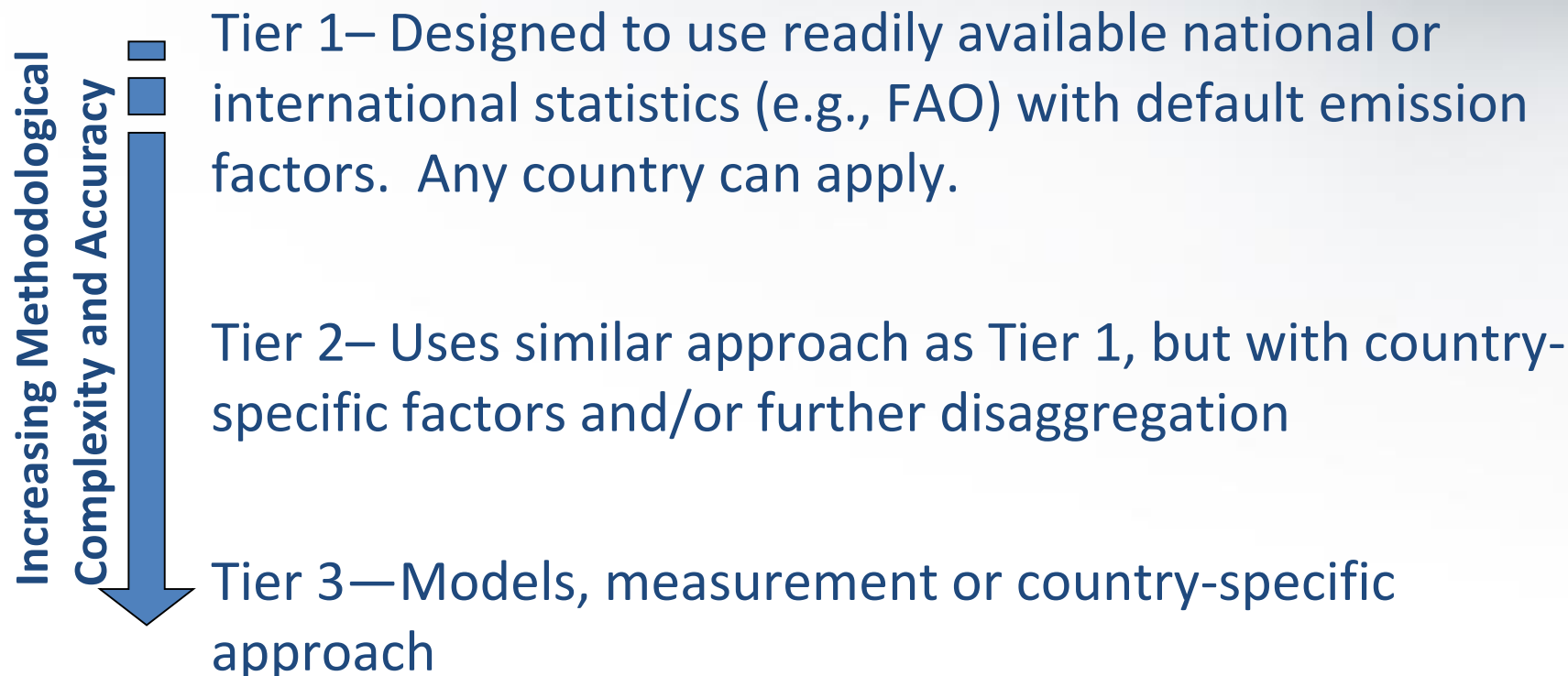
GHG Emissions and Removals from Agriculture, Forestry and Other Land Use (AFOLU)



IPCC Tiered Methodologies



For each source/sink category methods are provided at three tier levels:



The Tier used is driven by the significance of the flux and availability of data

AFOLU Emissions and Removals:

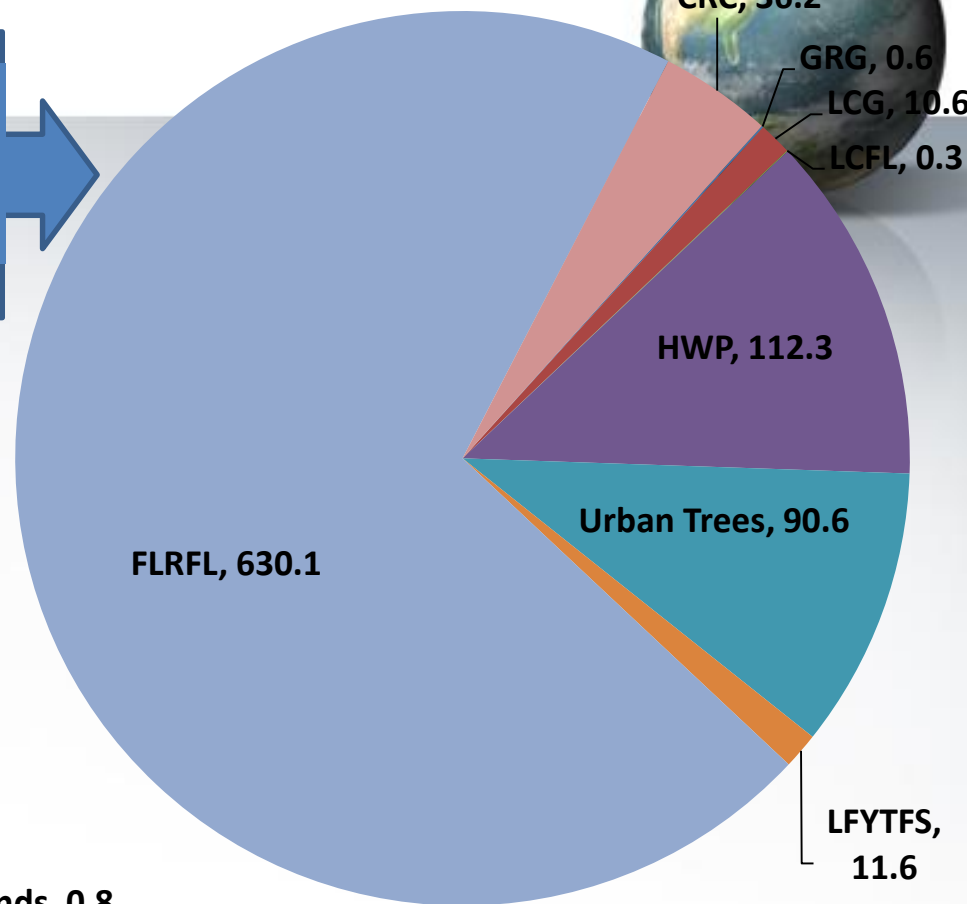
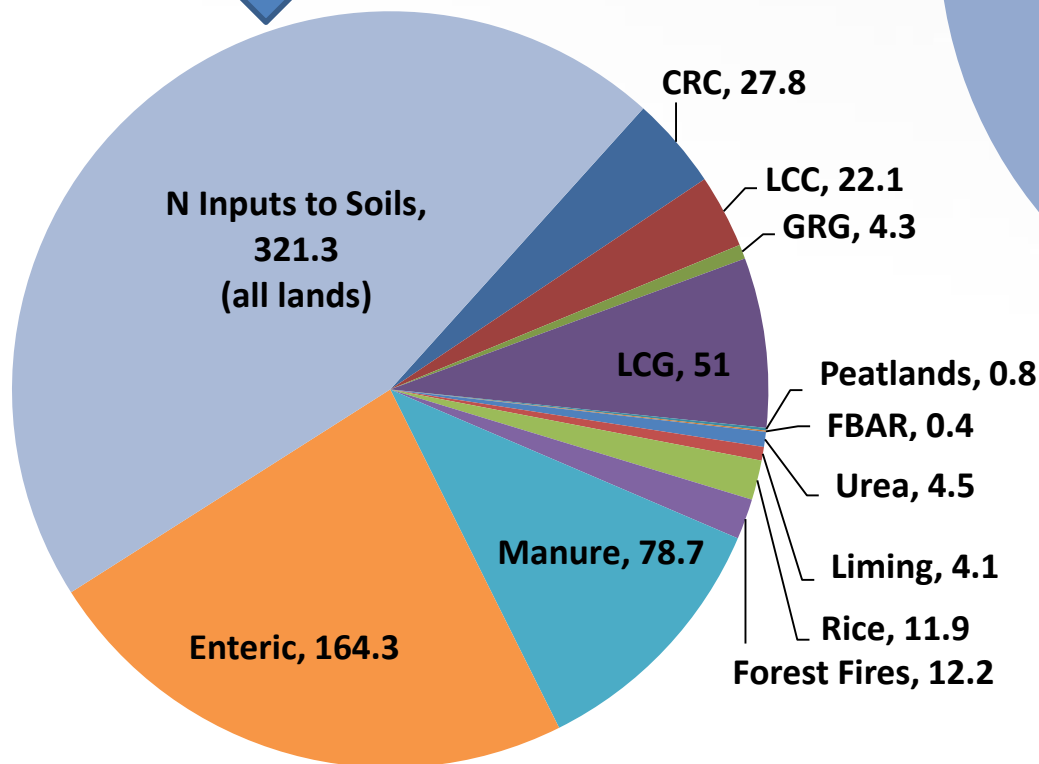
2014

SOURCES

703.4 (MMT CO₂ Eq.)*
(Agric. & LULUCF Sources)

SINKS

892.3 (MMT CO₂ Eq.)
(LULUCF sinks only)



Net AFOLU Flux = (188.9)
(MMT CO₂ Eq.)

*An additional 52 MMT CO₂ Eq. is emitted from on-farm mobile and stationary combustion (e.g., tractors, generators)

IPCC Managed Lands Criteria i.e., Anthropogenic Fluxes



- **All Croplands and Settlements**
- **All Forest Land with active fire protection**
- **All Grassland if affected by livestock; accessible by roads and/or other infrastructure**
- **Protected lands maintained for recreational and conservation purposes**
- **Lands with active and/or past resource extraction**
- **Lands that were previously managed remain in managed land base for 20 years**



Managed land = 890 Mha
Unmanaged land = 46 Mha (Alaska)
Total Land Base = 936 Mha