

Opinion: Coordinated Development of Emission Inventories for Climate Forcers and Air Pollutants

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Presentation Topics

1. Possible implications of a new SLCF methodology report
2. Historical context to understand key differences in Air Pollutant and GHG inventories
3. Benefits & challenges of various coordination approaches
4. Recommendations & final thoughts

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Possible implications of a new Short-Lived Climate Forcer (SLCF) Methodology Report

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What do we mean by ‘***coordination***’?

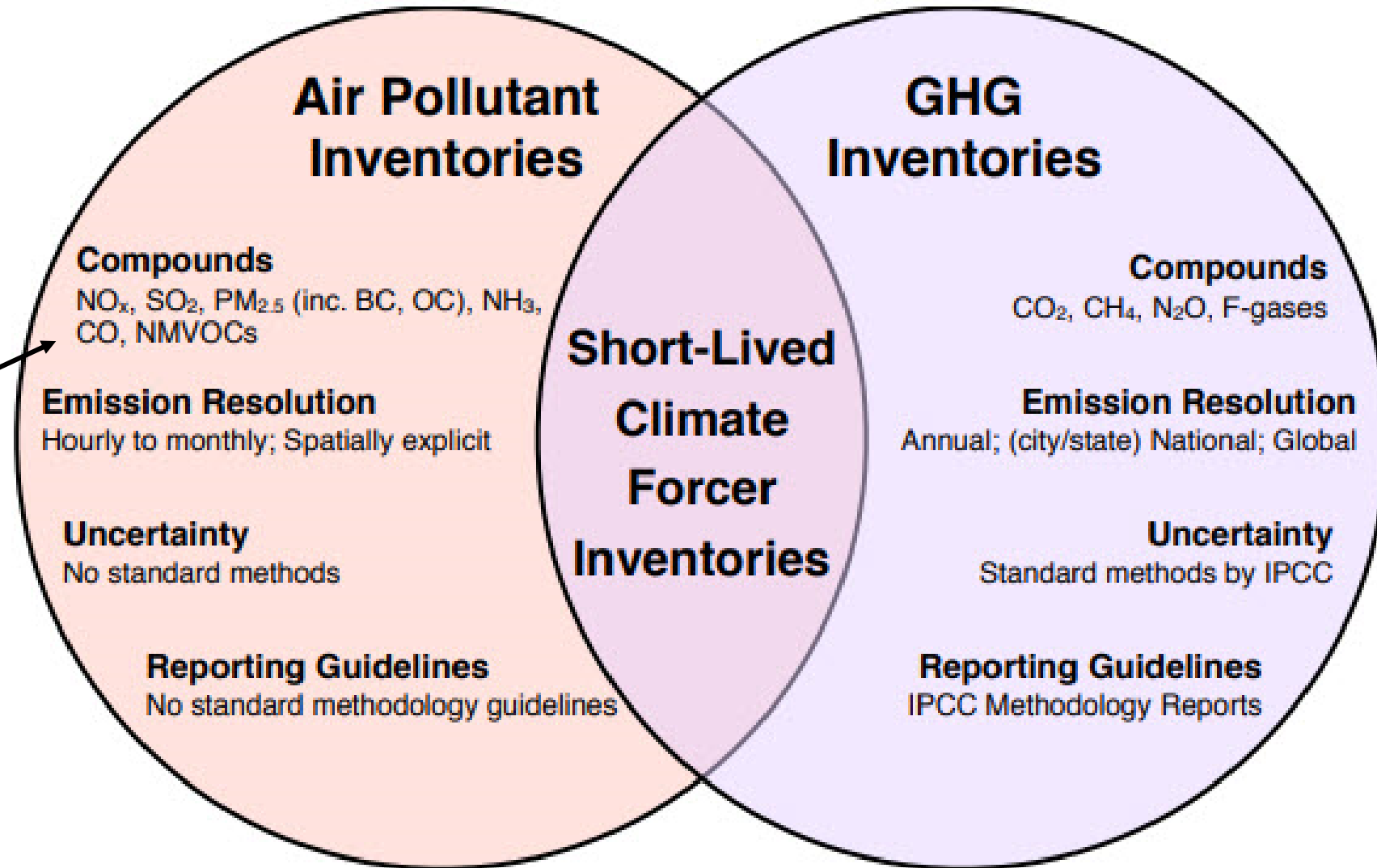
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What do we mean by ‘***coordination***’ and ***what factors need to be considered*** when developing SLCF methodological guidance?

Inventories of GHGs vs Short-Lived 'Air Pollutant' Climate Forcers



All air pollutants (APs) listed here are direct/indirect climate forcers.

There are additional categories of APs such as metals and other HAPs that are included in many national inventories.

Historical Context (#1): Development of GHG and AP inventories have been distinct – driven by differences in their end uses and reporting requirements

Greenhouse Gas Inventories

- Starting ~1993 – inventories developed by national governments (Annex I) for the purpose of tracking emission trends and mitigation progress

Air Pollutant Inventories

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- Required UNFCCC emissions reporting (Annex I countries), soon to be implemented by all signatories, under the Enhanced Transparency Framework of the Paris Agreement

For GHGs, **Emissions** are the policy target

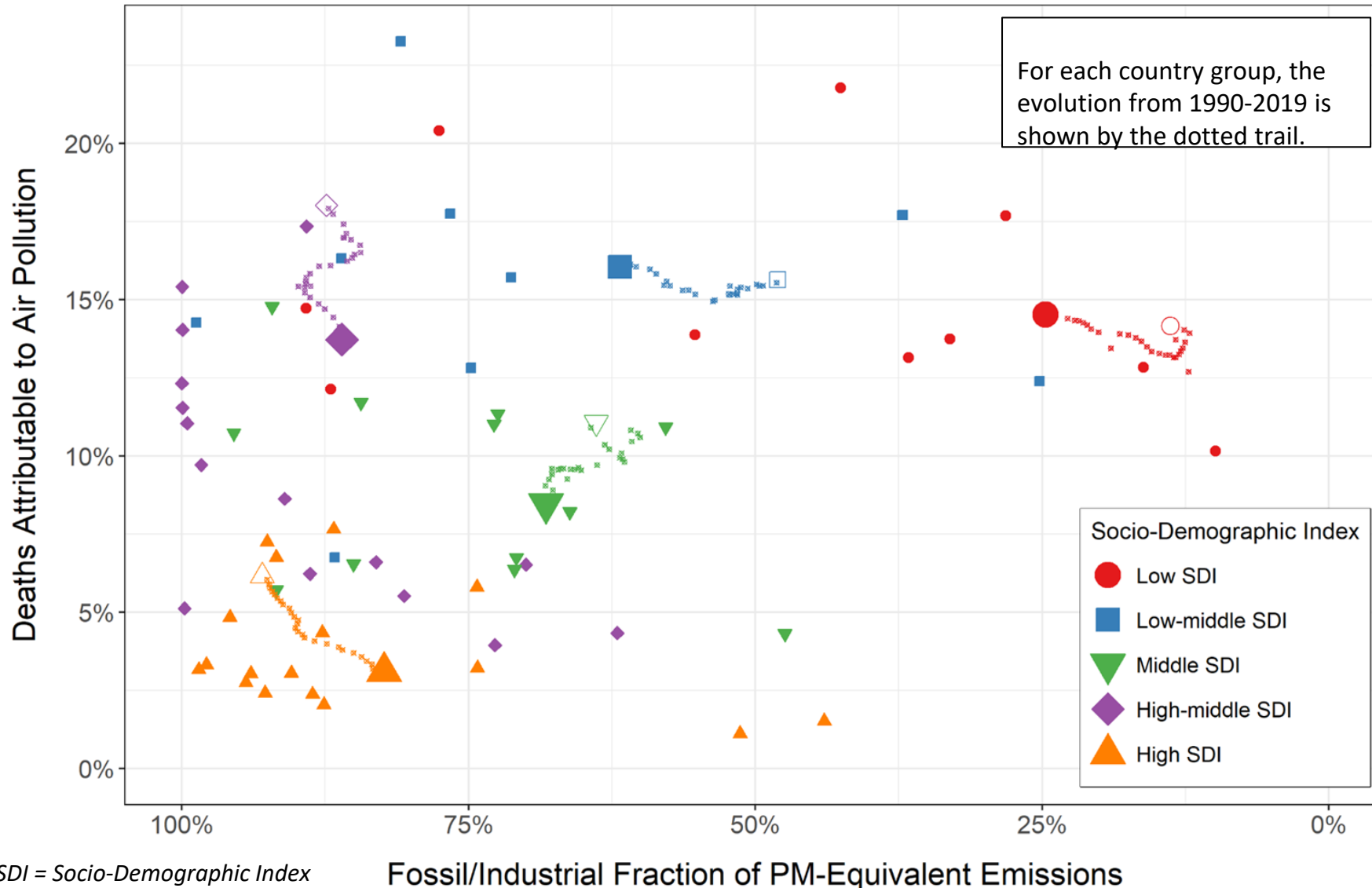
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- Currently, established AP inventory programs in most OECD countries and many research institutions, but no global reporting mechanism

For APs, **Concentrations** are the end regulatory target

Inventory Context {Equivalent Particulate Matter (PM) Emissions}

One major factor shaping the use & development of inventories is socio-economic status.



- Socio-economic development is an overriding priority for low SDI countries
- AP will be large concern, but inven. not as critical
- CO₂ emissions are relatively lower on the RHS and AP uncertainty generally higher
- AP emission inventories become more important and, arguably useful, toward the left and lower-left

Historical Context (#2): Due to different end uses, GHG and AP inventories have similar but distinct data needs

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- Large volumes of activity and emission factor data (less so for combustion CO₂), w/ country and facility-specific information required for higher IPCC Tier methods.
- Limited country and facility-specific data available in developing countries, but IPCC guidance is provided for Tier 1 estimates with default emission factors.

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- Large volumes of activity and emission factor data, often *required to be* at the facility (or sub-national) level and dependent on operational conditions, or performance/presence of emission control devices
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- Limited country and facility-specific data available in developing countries, but IPCC guidance is provided for Tier 1 estimates with default emission factors.
- Reported data to the UN are at the national level (sufficient for mitigation tracking, and most scientific impacts)
- National inventory activities are often conducted by environmental ministries (and reported by UNFCCC national focal point) – not always the same groups that develop national air pollution inventories (e.g., USA)

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- Reported data for regulatory and impact analyses need to have higher spatial and temporal detail
- Inventory activities (if present) are often supported by long-standing regulatory processes in developed countries

Historical Context (#3): AP and GHG inventories typically differ in uncertainty reporting

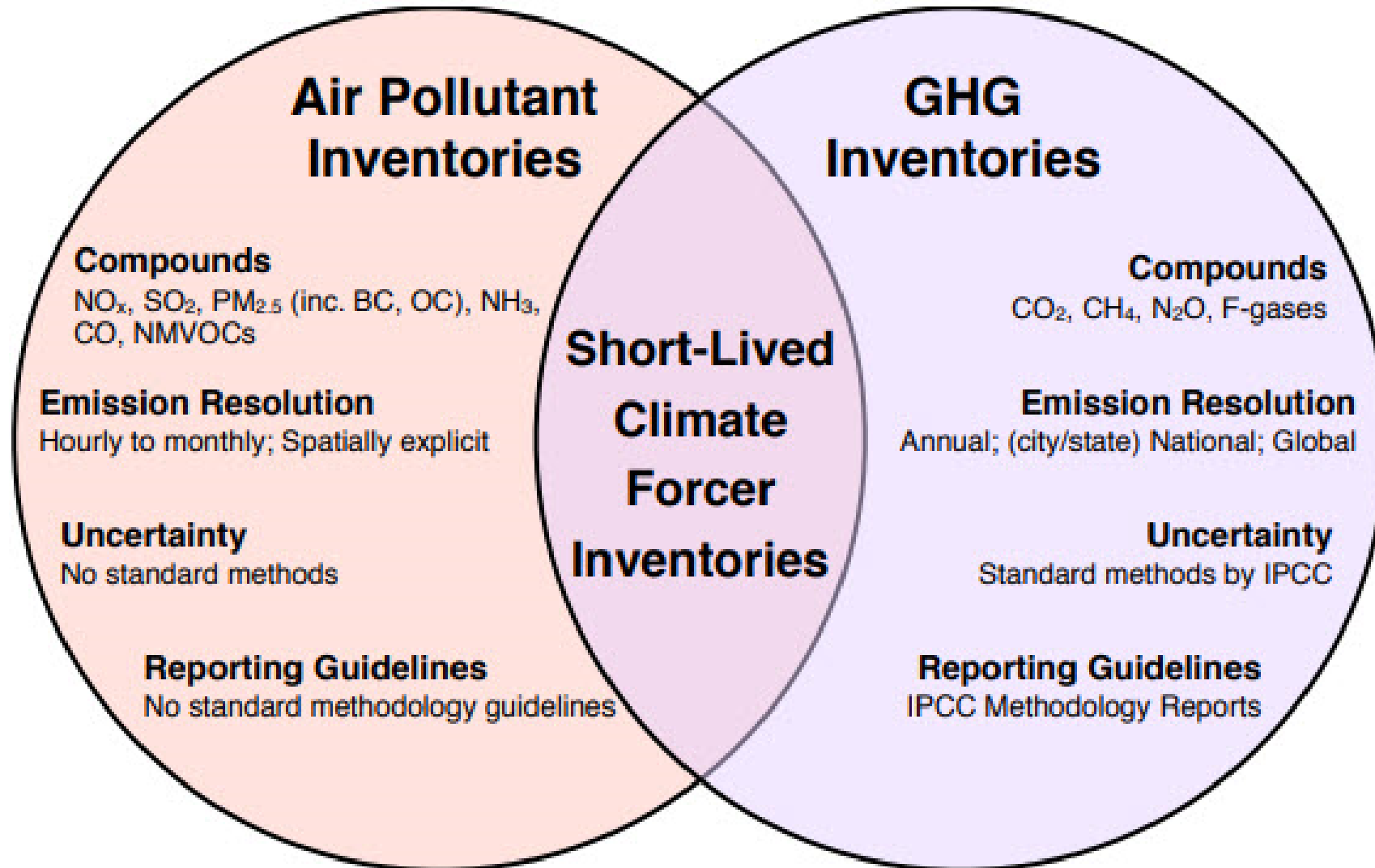
Greenhouse Gas Inventories

- Standard IPCC methodologies to report uncertainties (Approach 1 and 2)

Air Pollutant Inventories

- Limited focus on estimating AP uncertainties by regulatory agencies due to wide variety of data sources and methodologies across sectors.
- Uncertainties often higher in developing countries due to data gaps and information on local technologies and usage patterns
- Uncertainties will become more important for policy analyses and mitigation actions as emissions are reduced; BUT lack of uncertainty estimates should not be an impediment for mitigation action

Inventories of GHGs vs Short-Lived 'Air Pollutant' Climate Forcers



There are both benefits and challenges with coordinating AP and GHG inventory activities... and a range of possible approaches

Possible benefits

Full coordination/harmonization:

- Could help countries without current programs to establish sustainable systems to develop GHG and AP inventories

Challenges

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Partial Coordination:

- Increased engagement across AP and GHG communities could:
 - Help to better align emission source and chemical specie definitions, methodological approaches, and facilitate additional data collection
 - facilitate productive engagement between research groups and GHG and AP inventory compilers
 - Better align and inform gridding (temporal and spatial) methodologies – required to assess environmental and health impacts and tools to compare top-down (observation-based) and bottom-up emission estimates (per IPCC 2019 Refinements).

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Challenges

- GHG and AP inventories often have very different end uses (e.g., AP regulatory analyses vs. GHG mitigation tracking)
- Air pollutant methodologies can be more data intensive and, therefore, can have longer lag times (e.g., MOVES)
- Underlying driver data at different scales may be available at different times, since national fuel consumption statistics are often updated more quickly than sub-national data
- Key emission categories can also differ substantially between air pollutant and GHG inventories, suggesting potentially different development priorities between the two

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With limited resources available for inventory (AP & GHG) development, any coordination needs to ensure that a country's regulatory needs are met and reflect their unique circumstances

Final Thoughts/Recommendations

General thoughts on coordination

- IPCC SLCF methodology could help fill a gap for global AP methodologies and/or increase coordination between AP & GHG communities
- Keep end uses in mind during methodology development (e.g., mitigation tracking vs regulatory development vs. scientific assessment)
 - Full GHG & AP coordination – may not always be useful (or possible), but could benefit countries that do not have current inventory systems
 - Partial GHG & AP coordination – align sector and chemical definitions (or document where they differ), facilitating compiler-researcher engagement, etc.

Recommendations relevant to this expert meeting:

- Chemical compounds - consider indirect & direct forcers; establish flexibility to allow for new information on NMVOCs and PM speciation
- Sectoral detail - define the appropriate level of detail for each sector and establish flexible reporting to reflect regionally key sources
- Tiered Methodology Approach - assess where Tier 1 is and is not appropriate (e.g., where Tier 1 would produce unreliable estimates)
- Reporting flexibility - assess what level of flexibility in reporting requirements would be helpful (e.g., sectoral detail by emission type)

Caveats for national AP reporting (as would be done to UNFCCC)

- National reporting does not provide the spatial and temporal detail needed for AP impact analysis
- When done well can provide a useful indication of trends
- Unlike combustion CO₂, when done poorly, can result in grossly incorrect trends (need more than just a quality flag)
- Note that some AP inventory systems do not produce true time series (need to flag this)

Related topics for continued discussion

- How to balance resource limitations for inventory (GHG or AP) development/provide guidance on identifying key sources?
- Can the inventory community leverage existing work from the research community (both bottom-up and top-down)?
- What recommendations or methodologies are appropriate/useful for spatial and temporal emissions allocation?
- Can general IPCC uncertainty guidance be applied to APs?

