

Task Force on National Greenhouse Gas Inventories



# Time Series Consistency

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INTERGOVERNMENTAL PANEL ON climate change

# Time Series



- We need to know, not just the emissions/removals now but how they are changing.
  - (e.g. Kyoto targets are % changes)
- An Inventory is not just an estimate of a single year. It needs estimates for a number of years.
  - Ideally this is built up a year at a time
- How do we know the year-on-year changes are accurate?
  - Same methods used for all years, if possible
  - Methods should reflect drivers of change
  - Estimates for previous years may have been made in earlier years
    - Are these comparable?
  - Continuity needed
    - in methods and in inventory capacity

# Time Series Consistency



- The general principal is to always calculate the emission/removal using the same method and data sources
- If a new inventory improves or changes a method then earlier years should be **recalculated** using the same method
  - Thus a new inventory may report a different emission/removal for an earlier year than an earlier inventory
- The new method may not be applicable for earlier years (e.g. lack of data)
  - But all the annual estimates should be comparable
  - Time series consistency guidance helps ensure this

# Objectives



“As inventory methods improve and more relevant data become available, it is **good practice to apply this new information if it improves the reliability and accuracy of the inventory**”

“It is good practice to recalculate historic emissions when methods are **changed** or **refined**, when new source categories are **included** in the national inventory, when **errors** in the estimates are identified and corrected.”

# What to do?



- **Previous estimates** should be recalculated **using the new methods** for all years in the time series.
- If it is not possible to use the same methods in all years, the GPGs and 2006 GLs give a number of techniques to ensure times series consistency
  - Splice
  - Surrogate
  - Interpolation/Extrapolation

# Periodic Data – Some Considerations



- When data is not available annually,
  - Estimates need to be **updated** each time new data become available
  - Before new data are available, **new estimates should be extrapolated based on available data**, and then recalculated when new data become available.
  - **Alternative datasets** that can be a proxy for missing data can be used for extrapolating the trend
- Extrapolate data not emissions

# Overlap - Consistent Relationship

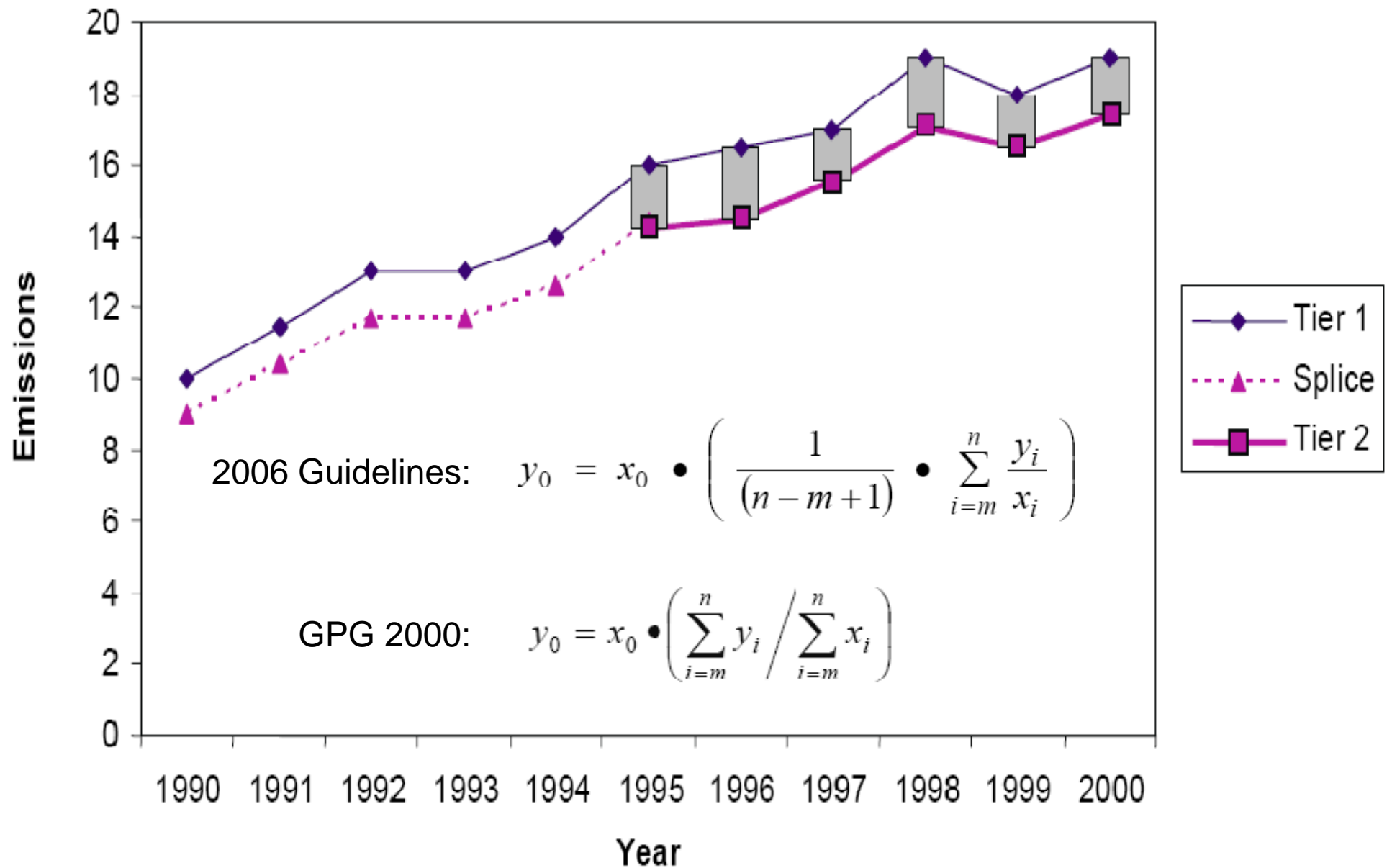
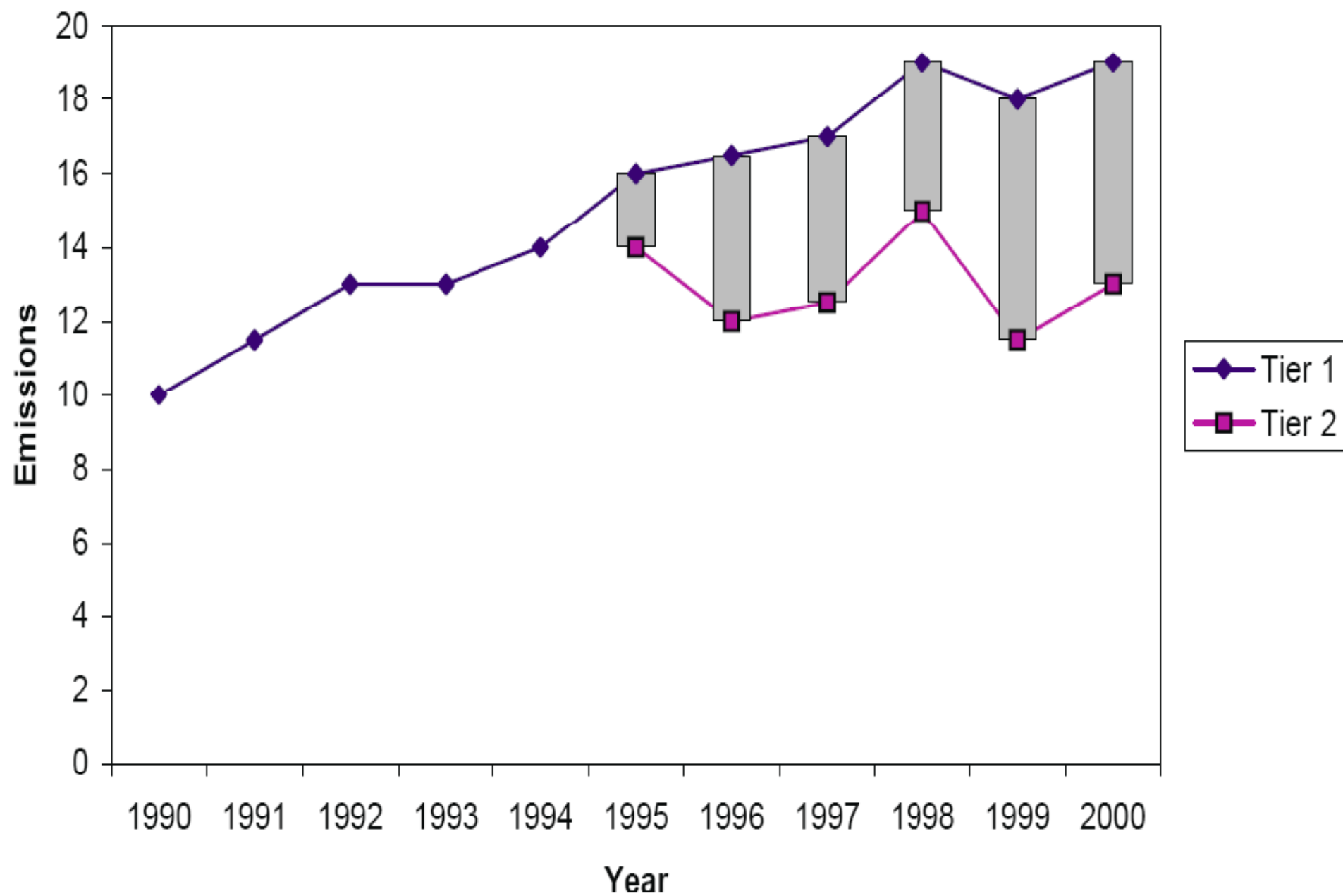
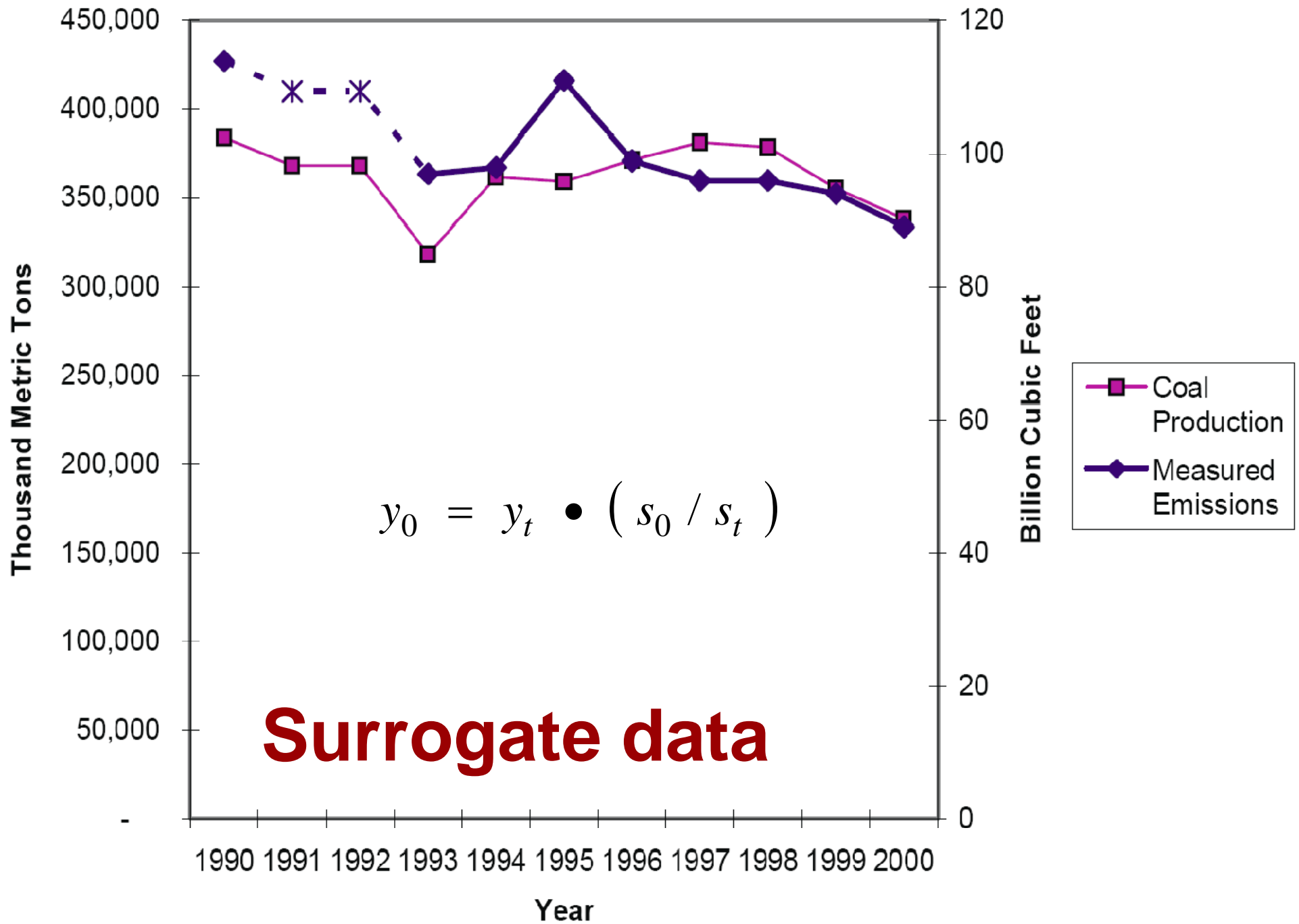
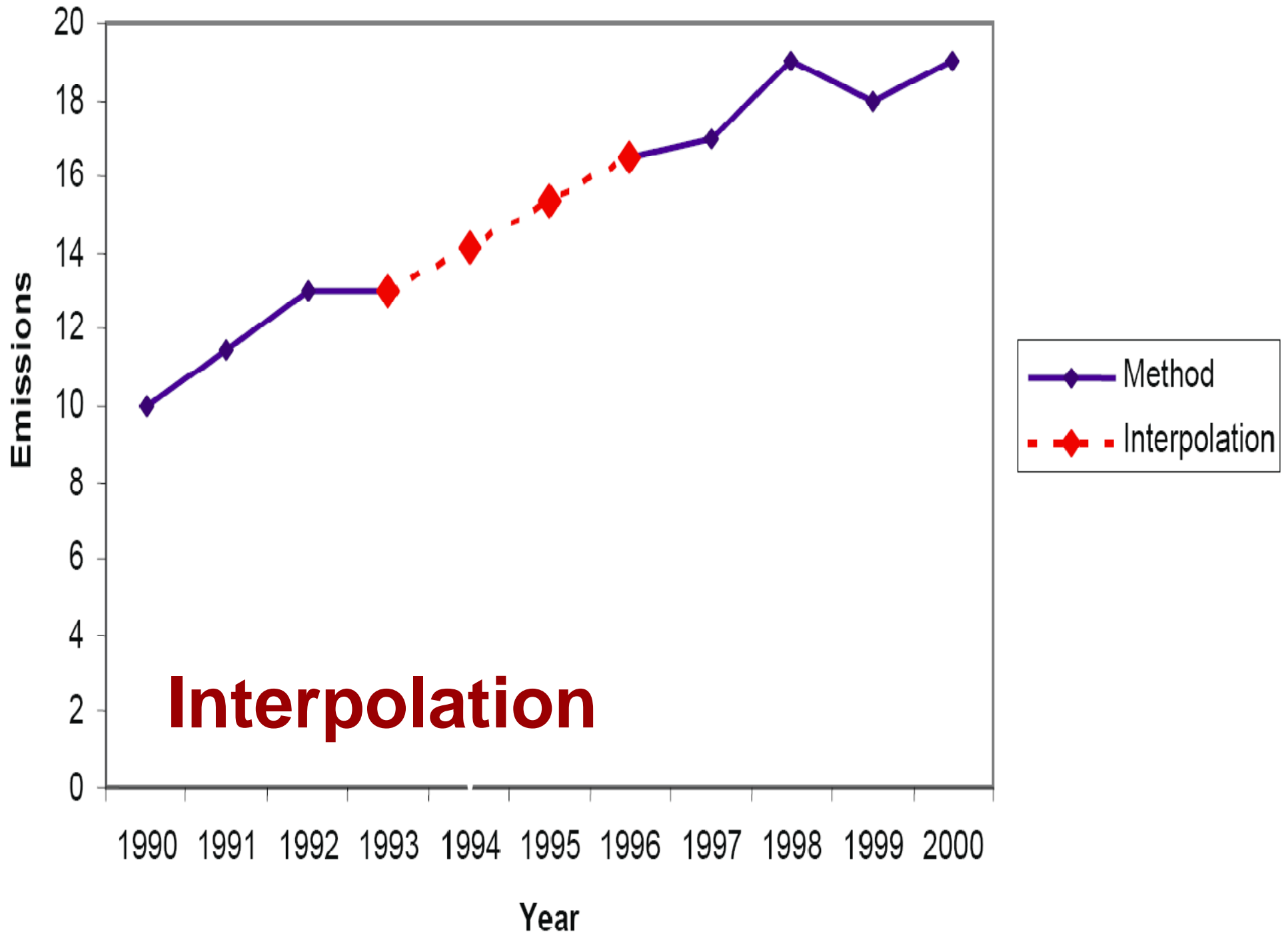


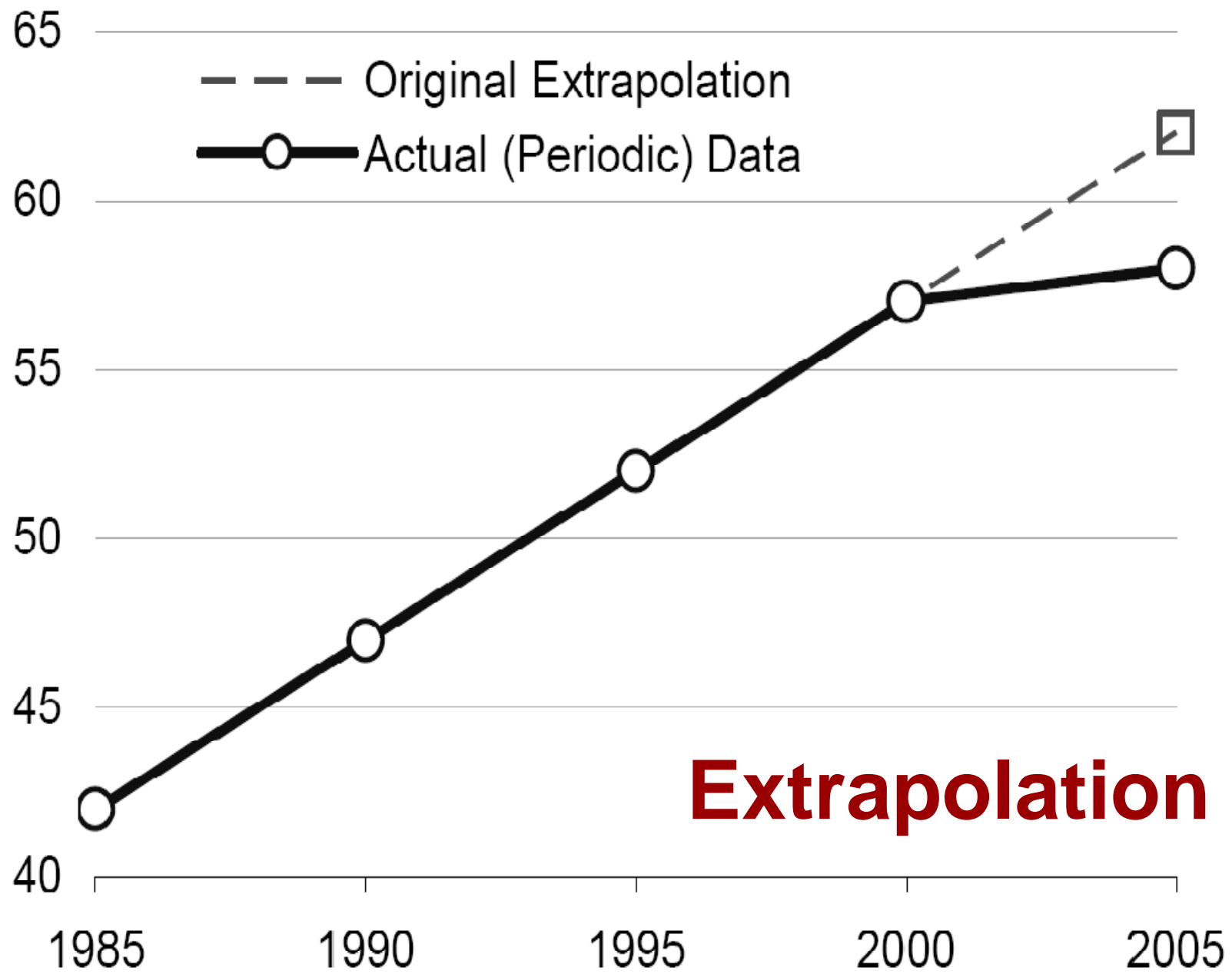
Figure 5.2: Inconsistent Overlap











Approach	Applicability	Comments
Overlap	Data necessary to apply both the previously used and the new method must be available for at least one year, preferably more.	<ul style="list-style-type: none"> <li>• Most reliable when the overlap between two or more sets of annual estimates can be assessed.</li> <li>• If the trends observed using the previously used and new methods are inconsistent, this approach is not <i>good practice</i>.</li> </ul>
Surrogate Data	Emission factors, activity data or other estimation parameters used in the new method are strongly correlated with other well-known and more readily available indicative data.	<ul style="list-style-type: none"> <li>• Multiple indicative data sets (singly or in combination) should be tested in order to determine the most strongly correlated.</li> <li>• Should not be done for long periods.</li> </ul>
Interpolation	Data needed for recalculation using the new method are available for intermittent years during the time series.	<ul style="list-style-type: none"> <li>• Estimates can be linearly interpolated for the periods when the new method cannot be applied.</li> <li>• The method is not applicable in the case of large annual fluctuations.</li> </ul>
Trend Extrapolation	Data for the new method are not collected annually and are not available at the beginning or the end of the time series.	<ul style="list-style-type: none"> <li>• Most reliable if the trend over time is constant.</li> <li>• Should not be used if the trend is changing (in this case, the surrogate method may be more appropriate).</li> <li>• Should not be done for long periods.</li> </ul>
Other Techniques	The standard alternatives are not valid when technical conditions are changing throughout the time series (e.g., due to the introduction of mitigation technology).	<ul style="list-style-type: none"> <li>• Document customised approaches thoroughly.</li> <li>• Compare results with standard techniques.</li> </ul>

# Reporting and Documentation



- All recalculations and measures taken to improve time series consistency should be documented and reported with the inventory
- Information should be documented are;
  - The **effect of the recalculation** of the level and trend of the estimate
  - The **reason** for recalculation
  - A **description** of the changed or refined methods
  - **Justification** for the changes
  - The **approach previously used**
  - The **rationale** for selecting the new approach
  - If the new method cannot be applied to the whole time series the **methods used in each time** period and **the splicing method** used should be documented

# Summary

- We need consistent estimates of emissions/ removals for all years
  - If new method is used it should be applied to all years, if possible
- Where this is not possible, inventory compilers should follow the time series consistency guidance to provide consistent estimates for all years
  - Splicing / Surrogates / Interpolation / Extrapolation / etc
- All decisions methods and reasons should be documented

