CAAA90 Section 812 Second Prospective Study

Primary PM Adjustments

Briefing for 812 Council
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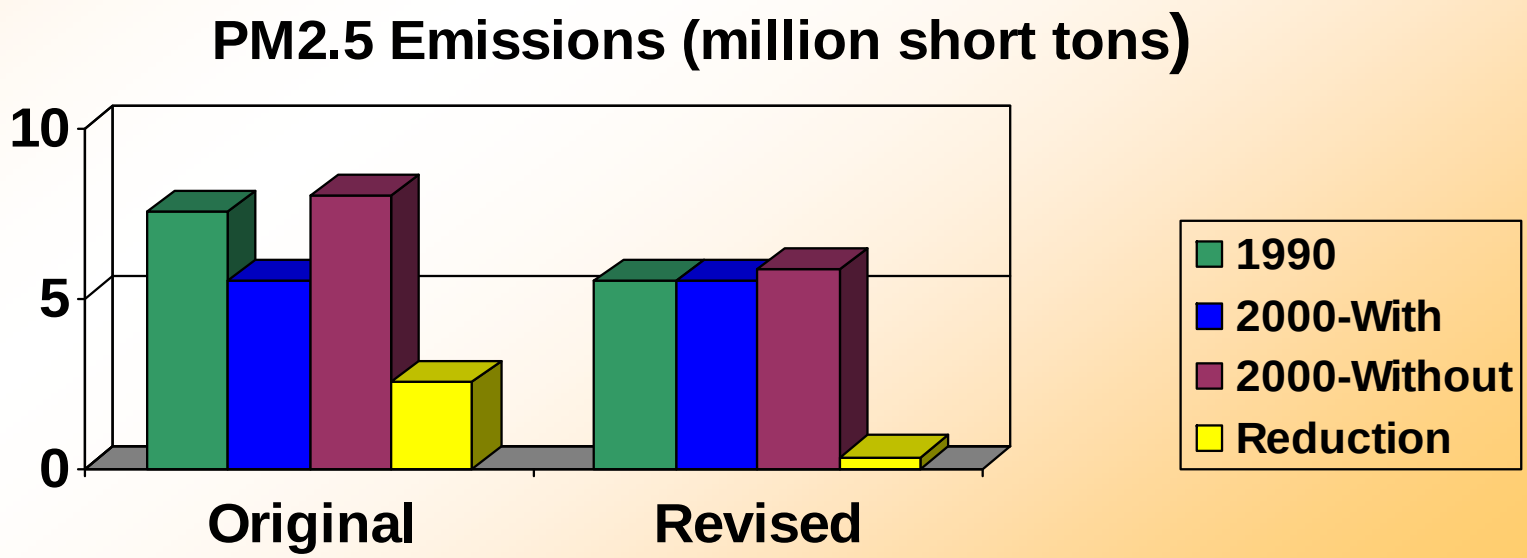
Primary PM Revisions – Problem Definition

1. Unintended oversight in applying FDTFs to crustal
2. Problematic estimation of non-EGU and some area source Primary PM reductions
   - Artifacts of changes in inventory methodologies between—
     - 1990 NEI used for *without-CAAA90* case, and
     - 2002 NEI used for *with-CAAA90* case



Primary PM Revisions – Principles

- Rerunning CMAQ not feasible
- Scale concentrations of affected species and source categories based on revised emissions inventories
  - … reasonable since Primary PM fairly linear and non-interactive with other species
  - … focus on refining the estimated change in PM mass
- Scaling adjustment approach ignores transport
  - … but transport is uncertain anyway and already a function of single year representative meteorology
- Not an issue for acidic or nitrogen deposition
- Affects visibility estimates
  - … though primary particles less important than secondary particles –esp sulfates– for extinction

Primary PM Revisions – Analytical Steps

1. Update Primary PM emissions estimates
   - Area sources and Non-EGU point
   - EC, OC, Crustal (also SO_4, NO_3)
   - *With-* and *Without-CAAA*, all target years
2. Generate PM species-specific adjustment factors for each county
3. Adjust CMAQ speciated data for EC, OC, Crustal
4. Re-run MATS with adjusted CMAQ inputs:
   - Generates new gridded air quality input files for BenMAP
5. Re-run BenMAP
6. Generate change pages

Primary PM Emissions Adjustments – Area Sources

With-CAAA

1. Apply fugitive dust transport factors by county and SCC
2. Speciate all emissons by SCC profile

Without-CAAA

1. Adjust 2000 estimates for overestimation bias
   - Construction, paved roads, unpaved roads, residential woodburning, industrial combustion
2. Generate 2010 and 2020 estimates from revised 2000
   - Apply growth factors
3. Apply fugitive dust transport factors by county and SCC
   - Apply to #1 and #2 and unadjusted SCCs
4. Adjust additional SCCs for underestimation bias
   - Set equal to *With-CAAA*
5. Speciate all emissons by SCC profile

Primary PM Emissions Adjustments – Non-EGU Point Sources

With-CAAA

1. No change

Without-CAAA

1. Begin with original county-level emissions data set
   - Speciated by county into EC, OC, Primary $PM_{2.5}$, etc.
2. Estimate crustal $PM_{2.5}$ values for *With-* and *Without-CAAA*
   - Subtract EC and OC from Primary $PM_{2.5}$
3. Set EC, OC, Crustal equal to *With-CAAA* values

Overall Procedure for Calculating CMAQ Adjustment Factors

For each county:

1. Calculate old Area and Non-EGU Point emissions estimates– for EC, OC, Crustal PM.
   - Speciate and sum across all SCCs (Area)
   - Use existing county-level data (Non-EGU Point)

2. Calculate new emissions estimates (after adjustments)
   - Sum across SCCs (Area).

3. Calculate ratio of the “new” emissions estimate to the “old” estimate to derive an adjustment factor that can be applied to CMAQ data on EC, OC, Crustal.

Adjustment Factors Description

Adjustment factors will be specific to:

1. County – we will calculate separate adjustment factors for each county

2. PM Species – we will calculate separate adjustment factors for EC, OC and crustal PM species

3. Scenario – we will calculate separate adjustment factors for the With- and Without-CAAA scenarios

4. Area and Non-EGU Point Emissions only (one joint factor; can report individual factors as well)

This will result in 6 adjustment factors per county per year, 18 factors total.

Applying Adjustment Factors to CMAQ Data

For each Scenario, Target Year, and County:

1. Calculate Primary Fraction of EC, OC, and Crustal $PM_{2.5}$
   - EC: 100%
   - OC: Apply quarterly fractions *by EPA Region* generated by ICF from ADVISOR database, all years
   - Crustal: 100%

2. Calculate Portion of *Primary* EC, OC, and Crustal generated by Area and Non-EGU Point
   - Apply annual fractions generated by ICF using 2010 CMAQ/PPTM results

3. Apply corresponding adjustment factors to values from Step 2.

4. Recompile adjusted EC, OC, and Crustal $PM_{2.5}$ values (all sources) for input into MATS.