Ozone Standards and Public Health

Expanding benefits assessments to include monetized public health benefits

Paul Miller, Iyad Kheirbek, and Gary Kleiman

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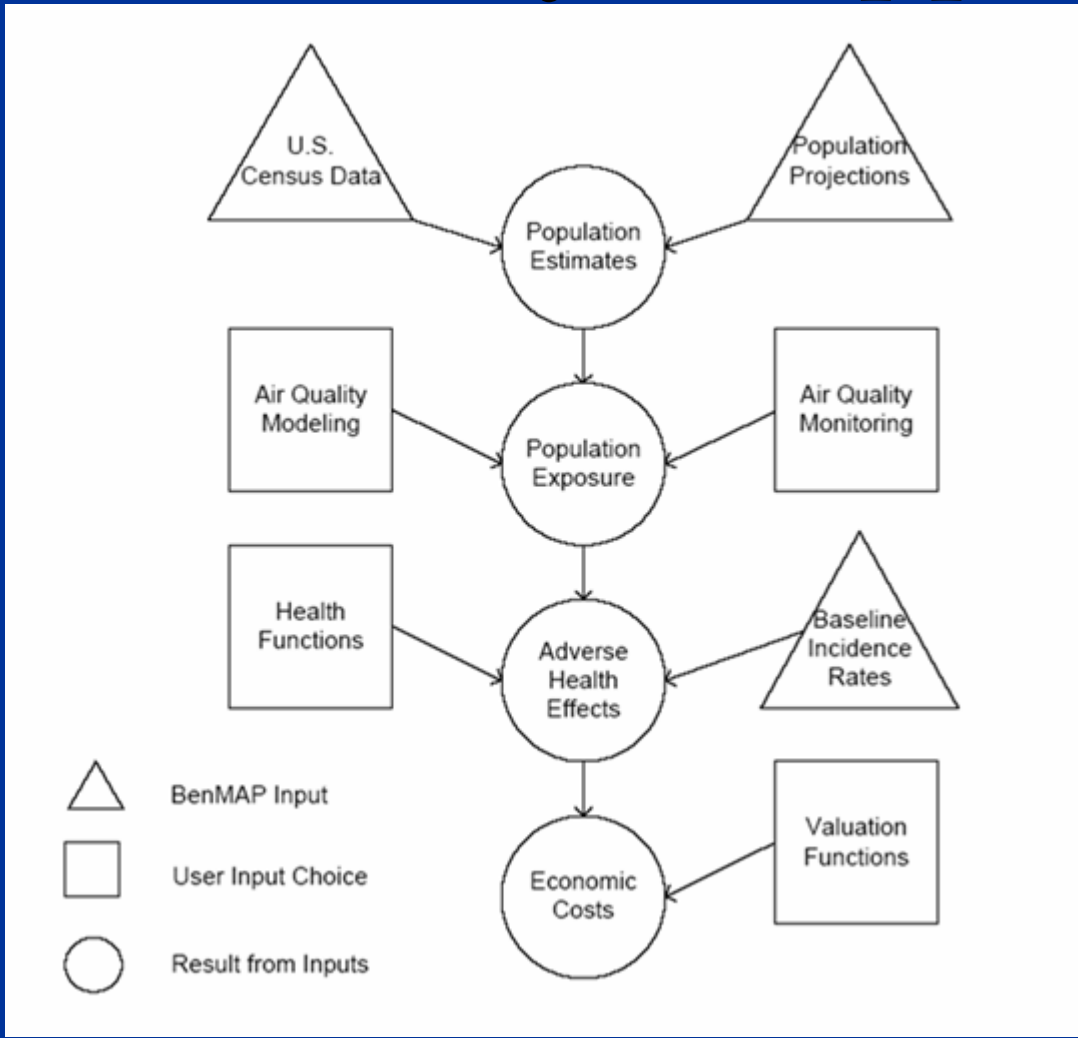
Benefits/Cost Analysis

- Weighs costs of imposing a regulatory program against monetized benefits of adoption
- Health and environmental benefits of air quality regulation has not traditionally been easy to monetize
- New tools developed by EPA help to identify these benefits of control programs

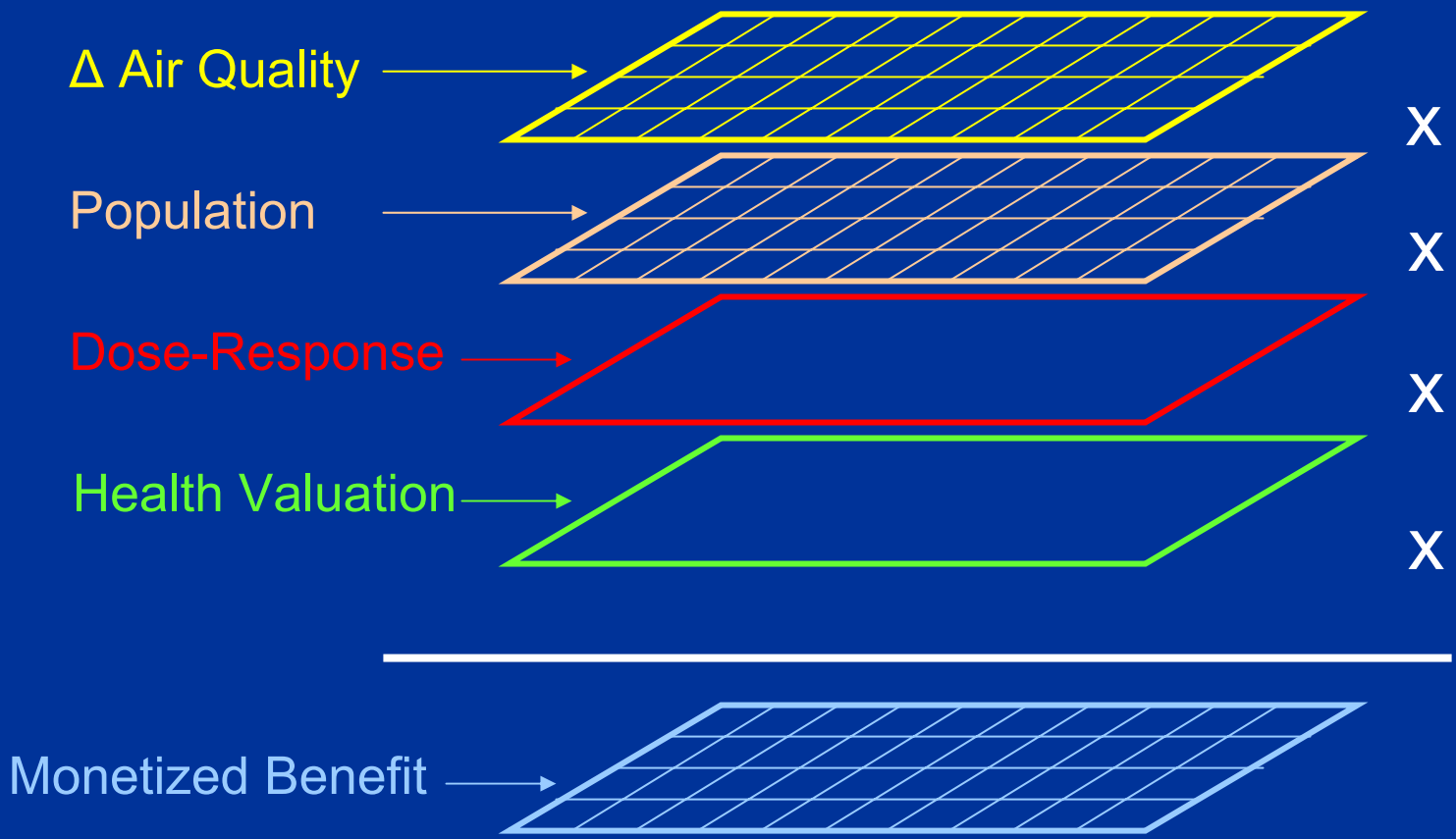
Benefits Mapping and Analysis Program

- Estimates the health impacts and associated economic values associated with changes in ambient air pollution
- Uses gridded output from air quality models to estimate average exposure to particulate matter and ozone by people living in U.S. counties
- Includes databases of concentration-response functions and economic valuations of health impacts

BenMAP Analysis Approach



What does BenMAP do?



Role of Analyst

- Automated system, but…
  - User must develop and provide air quality scenarios and modeling input
  - User must select appropriate health endpoints User must select appropriate epidemiological studies (for incidence rates)

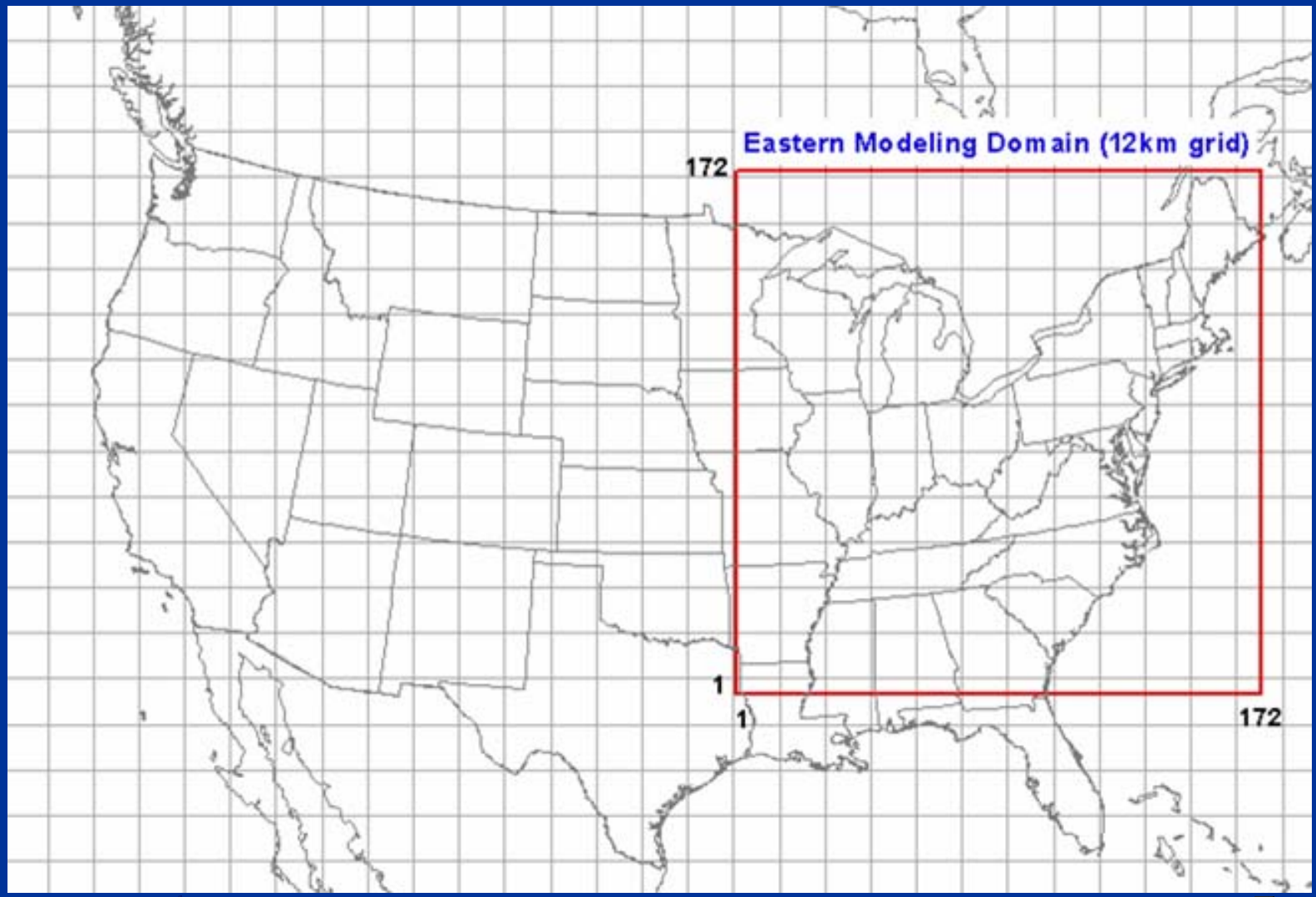
What did we do?

- Estimated the magnitude and value of avoided adverse health endpoints that would result in attaining a *range of proposed ozone NAAQS* in 2018 for the OTR.
- Look at accrued benefits beyond *CAIR+ and Beyond On-The-Way (BOTW) programs* aimed at attaining the current 8-hour NAAQS (0.08 ppm).
- Estimated benefits using EPA's Environmental Benefits Modeling and Analysis Program (BenMAP)

BenMAP Input

- Used 2018 CALGRID model results provided by NHDES that reflect hourly ozone concentrations after implementation of CAIR+ and BOTW strategies.
- Modeled May 15th-September 15th ozone season
- Model domain covers eastern half of the US in 172x172 12km grid cells.

Modeling Domain



Health Studies-Ozone

Health Endpoint	Studies
Mortality	Five studies, all ages, nationwide.
Hospital Admissi Respiratory	Five studies in the elderly, one in infants. Performed in four US cities, one Canadian city.
Asthma Related Visits	Four studies, all ages, US and Canadian cities.
School Absence s	Two studes in children, US cities.
Worker Producti	One study, adults, nationwide.

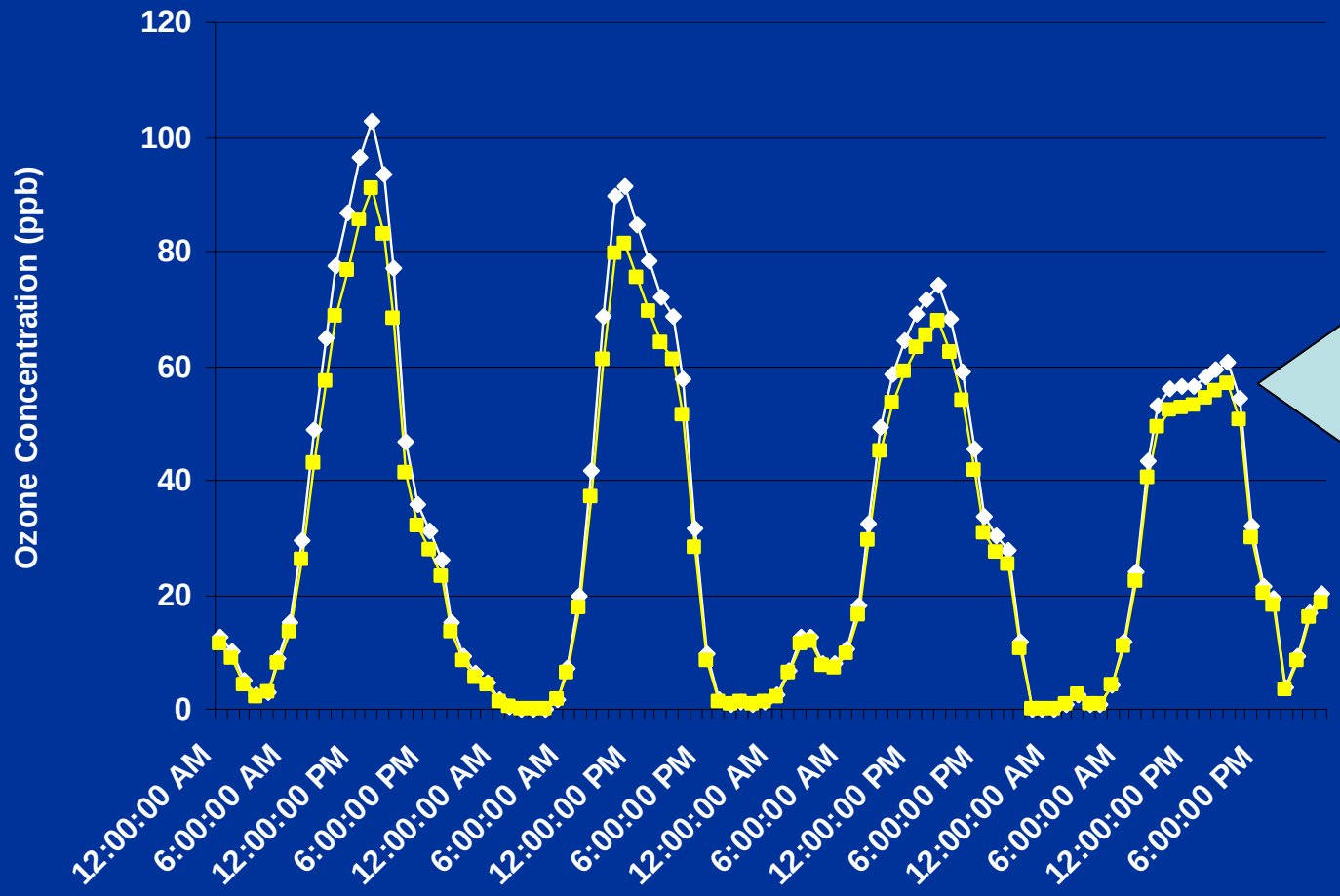
C consistent with EPA CAIR RIA

We have treated mortality differently!

Value of Avoided Incidence

Endpoint Group	*Unit Value of Avoided Incidence (2000$)*
Mortality	$6,324,101
Hospital Admissions, Respiratory	$7,759-$25,876 depending on endpoint
Emergency Room Visits	$261-$312
School Loss Days	$75
Work Loss Days	Based on county specific median daily wage

"Rollback" Study



Rollback levels underestimate potential benefits since some regions will likely be below any given NAAQS

Rollback Study Method

- Applied BenMAP's Monitor Rollback feature.
- Future year monitor concentration projections were developed based on modeled concentrations for the grid cell in which a monitor resides.
- Developed additional future year "pseudo"-monitor projections for grid cells with >25,000 people

Rollback Study Method II

- Rolled back future year model data to three NAAQS levels: 60 ppb, 70 ppb, 75 ppb (4th Highest 8-hour Max)
- Interpolated monitored values to the CALGRID grid (172x172 12km grid cells)
- Calculated benefits based on the difference between the baseline grid and the rolled back grid.

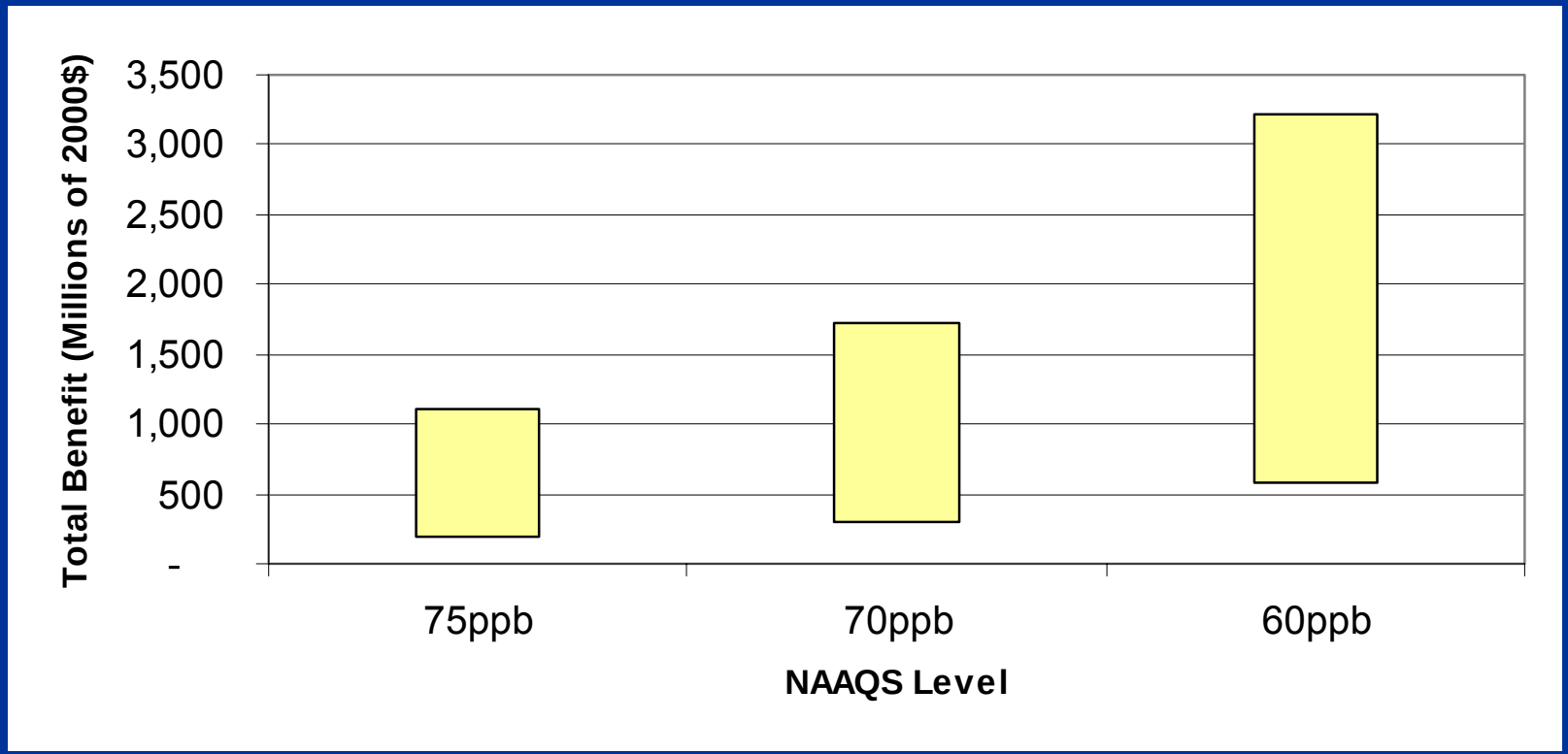
Estimates of Avoided Incidences

due to reductions in ozone from three rollback scenarios

Endpoint	Reduced Incidences in OTR		
	60 ppb	70ppb	75ppb
ER Visits, Asthma	180	95	60
Hospital Admissions, All Respiratory Endpoints, >64 Years and <2 Years	1,700	910	600
School Loss Days	435,000	234,000	154,000
Loss of Income Due to Decreased Worker Productivity	2,770,000	1,350,000	830,000
Mortality (Range of Five Studies)	84 - 406.7	42.7 - 219.7	27.3 - 142.4

Comparison of Total Monetary Benefit Across OTR States

Total Monetary Benefit Including Range of 5 Mortality Studies



Summary of Results, Rollback to Proposed NAAQS

- Attainment of a 75 ppb standard could result in a total monetary benefit of 192 to 918 million dollars in the OTR in 2018.
- Relative to a 75 ppb standard, a more stringent 70 ppb standard could result in an additional 107 to 498 million dollars.
- Relative to a 75 ppb standard, the most stringent 60 ppb standard could result in an additional 394 million to 1.7 billion dollars.

Caveats

Benefits likely underestimated

- Model may underestimate projected ozone
- Assumed 0.040 ppm background likely high
- PM2.5 benefits from NOx control not considered (and can be comparable to ozone benefits)
- VOC benefits (e.g., reduced air toxics) not considered
- Welfare benefits (e.g., reduced crop and forest loss) not considered
- Benefits are for the OTR only!

More Caveats

Benefits likely underestimated

- Rollback method assumes every area "just attains" the NAAQS
- May be other "health endpoint" costs like outpatient treatment or home care not included
- Benefits are calculated relative to CAIR+ so additional benefits of getting from CAIR to CAIR+ are not included here

Conclusion

- Revised ozone NAAQS mortality/morbidity benefits are large (billions of dollars)
- The CASAC range gives significantly higher benefits than the upper end of EPA range
- The benefit estimates are conservative, and can be even higher

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Thank You!

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