NERA
Economic Consulting

EGU MACT Rule's Benefit-Cost Case and EPA's Reliance on Co-Benefits

Prepared on behalf of UARG

Anne E. Smith

Senior Vice President

Washington DC

December 8, 2011

Insight in Economics™

Example of EPA Statements about the EGU MACT Benefits outside of Its RIA

NERA
Economic Consulting

"When these new standards are finalized, they will assist in preventing 11,000 heart attacks, 17,000 premature deaths, 120,000 cases of childhood asthma symptoms and approximately 11,000 fewer cases of acute bronchitis among children each year. Hospital visits will be reduced and nearly 850,000 fewer days of work will be missed due to illness."

-- Administrator Lisa Jackson
(EPA Air News Release extending public comment period on EGU MACT Rule, June 21, 2011)

Synopsis of Benefits and Costs Presented in the EGU MACT RIA Itself

The RIA Finds that "Total" Benefits Exceed Costs by up to 14-to-1

NERA Economic Consulting

- Estimated cost of rule: $11 billion
- Estimated "total" benefits: $53 billion to $143 billion
  - The vast majority of the total benefits have nothing to do with air toxics:
    - $52 billion to $142 billion are due to "co-benefits" from $PM_{2.5}$ reductions
      - Almost entirely due to the monetized value of 6,800 to 17,000 avoided premature deaths due to reduced inhalation of $PM_{2.5}$
    - $0.6 billion are due to "co-benefits" from reduced climate change risk
    - <$0.006 billion are due to air toxics
      - These are the only "direct" benefits in the RIA

What Did EPA Estimate as Direct Benefits from the Hg MACT?

NERA
Economic Consulting

- 511 lost IQ points spread across 244,000 children born each year
  - Average IQ loss = 0.002 points
  - 95th percentile IQ loss = 0.007 points
- Assumes risks extend linearly below the Hg Reference Dose ("RfD")
  - The RfD is, by definition, an exposure that is considered safe with a large margin of safety
- Assumes there is lost earning power that can be attributable to such small IQ differences
- Total monetized benefits estimated $500,000 to $6 million per year (less than 0.01% of Rule's total costs)

What Did EPA Estimate as Direct Benefits of Acid Gases MACT?

NERA Economic Consulting

- HCl accounts for the vast majority of acid gases emitted by EGUs
- The highest HCl exposure that EPA found in its modeling of air toxics from EGUs was only 5% of the level that EPA considers safe
- No risks were identified, and so the quantified benefits are $0

What Did EPA Estimate as Direct Benefits of Non-Hg Metals MACT?

NERA
Economic Consulting

- EPA identified 4 units in the U.S. for which the lifetime cancer risk for the most exposed individual exceeds one-in-a-million (10^{-6})
- EPRI provided a more extensive analysis that found that no units exceed one-in-a-million
- EPA did not quantify any benefits for this non-Hg metals MACT

Disaggregation of the RIA's Benefit-Cost Case

NERA Economic Consulting

	(a) Benefits from air toxics reduction (billions/yr)	(b) Co-benefits from non-toxics (billions/yr)	(c) Costs (billions/yr)	(d) Net Benefits without co-benefits (billions/yr)	(e) Net Benefits including co-benefits (billions/yr)
Mercury MACT	< $0.1	$0.6 to $1.5	$2.3	- $2.3	- $1.7 to -$0.8
Acid Gases MACT	$0	51.7 to 136.9	$5.4	- $5.4	$46.2 to $131.5
Non-Hg Metals MACT	$0	0.7 to 1.6	$3.2	- $3.2	- $2.5 to -$1.6
Organic HAPs Standard	$0	$0	>$0	<$0	<$0
Total	< $0.1	$53 to $140	$10.9	- $10.9	$42 to 129.1

Almost all the EGU MACT benefits are due to acid gases MACT, which forces some SO_2 reductions not needed to meet the $PM_{2.5}$ NAAQS.

Source: Table 1 in A. Smith, Technical Comments on EGU MACT RIA, prepared for UARG, Attachment 13 in Docket Reference # EPA-HQ-OAR-2009-0234-17775.

NERA
Economic Consulting

Reliance on $PM_{2.5}$ Co-Benefits Is Not Confined to the EGU MACT RIA

EPA Is Reliant on $PM_{2.5}$ Co-Benefits In Most of Its Non-$PM_{2.5}$ RIAs for Air Rules

NERA Economic Consulting

Note: Table includes only RIAs for major, non-PM CAA rules in which at least some benefits were quantified.

		PM2.5 co-bens >50% of total benefits	**PM co-bens are only benefits quantified**
1997	Ozone NAAQS (.12 1hr=>.08 8hr)	X	
1997	Pulp & Paper NESHAP		
1998	NOx SIP Call & Section 126 Petitions		
1999	Regional Haze Rule	X	
1999	Final Section 126 Petition Rule	X	
2004	Stationary Reciprocating Internal Combustion Engine NESHAP	X	
2004	Industrial Boilers & Process Heaters NESHAP	X	X
2005	Clean Air Mercury Rule	X	
2005	Clean Air Visibility Rule/BART Guidelines	X	
2006	Stationary Compression Ignition Internal Combustion Engine NSPS		
2007	Control of HAP from mobile sources	X	X
2008	Ozone NAAQS (.08 8hr =>.075 8hr)	X	
2008	Lead (Pb) NAAQS	X	
2009	New Marine Compress'n-Ign Engines >30 L per Cylinder	X	
2010	Reciprocating Internal Combustion Engines NESHAP – Comp. Ignition	X	X
2010	EPA/NHTSA Joint Light-Duty GHG & CAFES		
2010	SO2 NAAQS (1-hr, 75 ppb)	X	>99.9%
2010	Existing Stationary Compression Ignition Engines NESHAP	X	X
2011	Industrial, Commercial, and Institutional Boilers NESHAP	X	X
2011	Industrial, Commercial, and Institutional Boilers & Process Heaters NESHAP	X	X
2011	Comm'l & Indus'l Solid Waste Incin. Units NSPS & Emission Guidelines	X	X
2011	Control of GHG from Medium & Heavy-Duty Vehicles		
2011	Ozone Reconsideration NAAQS	X	
2011	Utility Boiler MACT NESHAP	X	> 99.99%
2011	Mercury Cell Chlor Alkali Plant Mercury Emissions NESHAP	X	
2011	Sewage Sludge Incineration Units NSPS & Emission Guidelines	X	X

Because It Is Separately-Regulated, $PM_{2.5}$ Should Not Serve as Justification for Regulating Other Pollutants

NERA
Economic Consulting

The Problems with EPA's Use of Co-Benefits:

- Scares the public into believing that new rules are absolutely essential for their health.
- Gives EPA a shield to build a complex web of many different rules, when EPA could provide almost all of those purported health-protective benefits with just a single rule: the $PM_{2.5}$ NAAQS.
  - *That EPA does not take this simple, streamlined approach hints at the degree to which it realizes that its co-benefits calculations do not reflect true public health risks.*
- Is just plain bad policy: This approach cannot possibly result in a cost-effective path to addressing a nation's clean air needs.

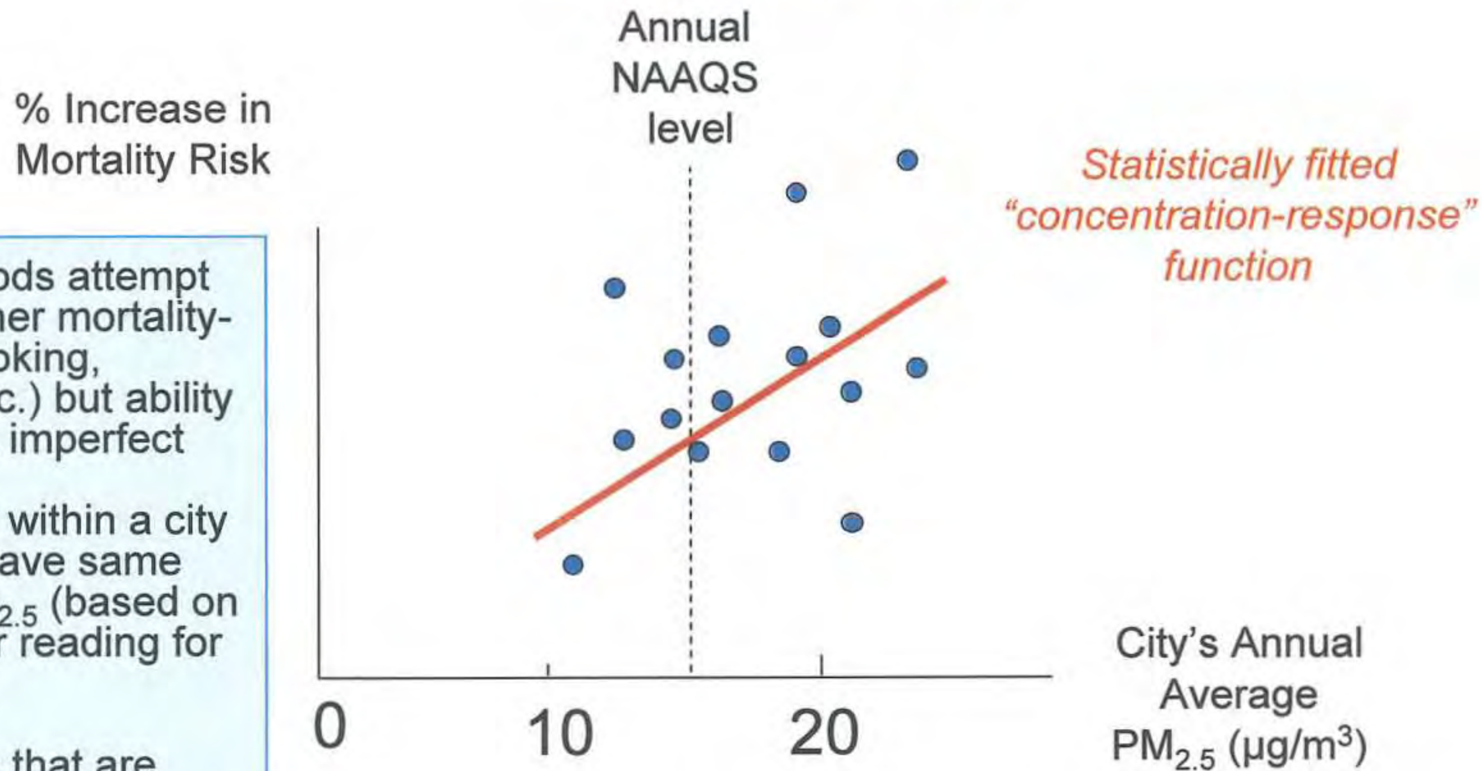
What is the scientific basis for EPA's $PM_{2.5}$ health risk estimates?

.... and why have they become so large?

The Epidemiological Basis for EPA's $PM_{2.5}$ Mortality Estimates

NERA Economic Consulting

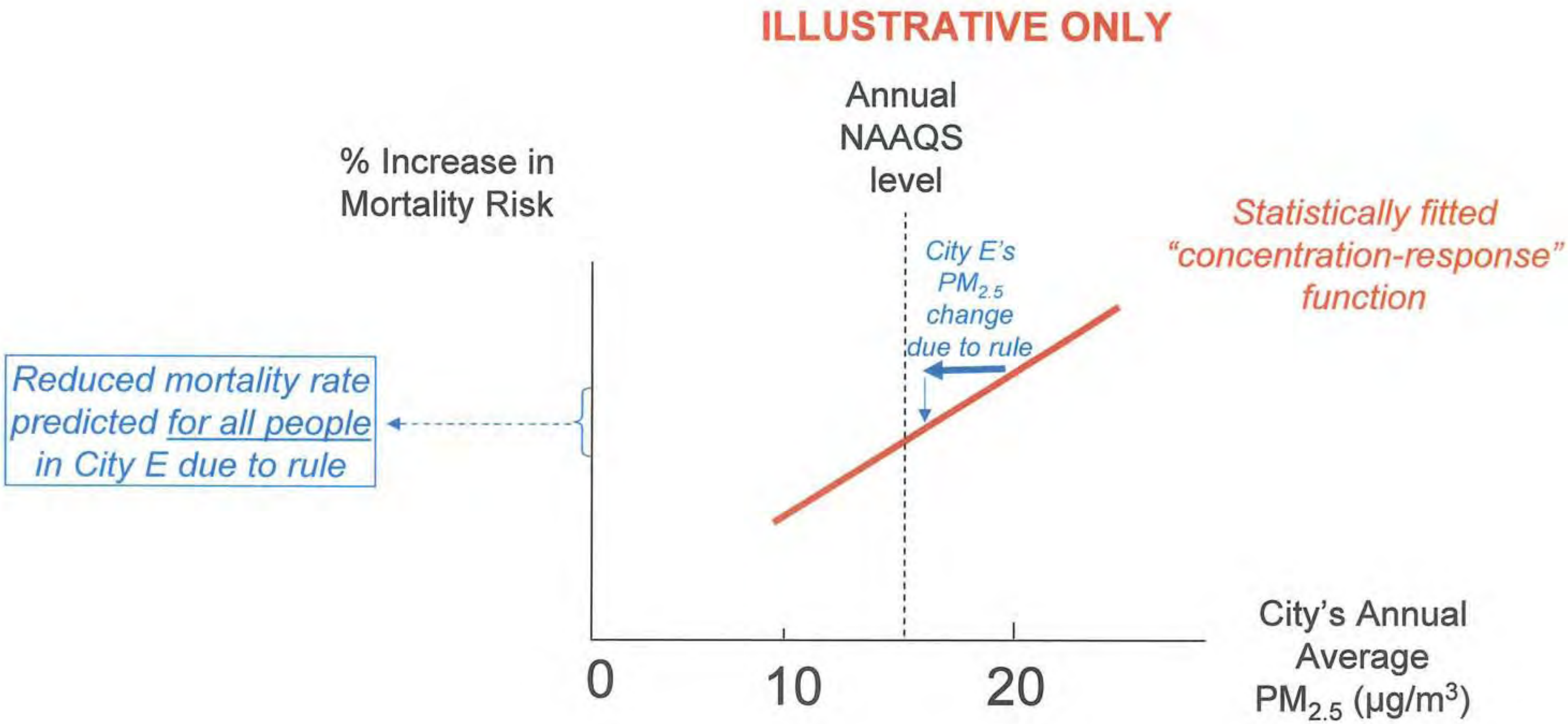
ILLUSTRATIVE ONLY



- Statistical methods attempt to control for other mortality-risk factors (smoking, income level, etc.) but ability to do so is quite imperfect
- Every individual within a city is assumed to have same exposure to $PM_{2.5}$ (based on average monitor reading for the entire area)
- Other pollutants that are correlated with $PM_{2.5}$ are not accounted for in EPA's calculations, and all types of $PM_{2.5}$ are assumed equally potent

The Epidemiological Basis for EPA's $PM_{2.5}$ Mortality Estimates

NERA Economic Consulting



The same calculation is applied to populations in every location in the US and added up,
...resulting in the # of statistical deaths reported as rule's benefits

EPA's Estimates of 2005's Deaths "Due to $PM_{2.5}$" Increased Abruptly Using Same Epidemiological Study

NERA
Economic Consulting

- RIAs 2006-2009: 68,000 – 88,000 (Pope 2002) (Laden 2006)

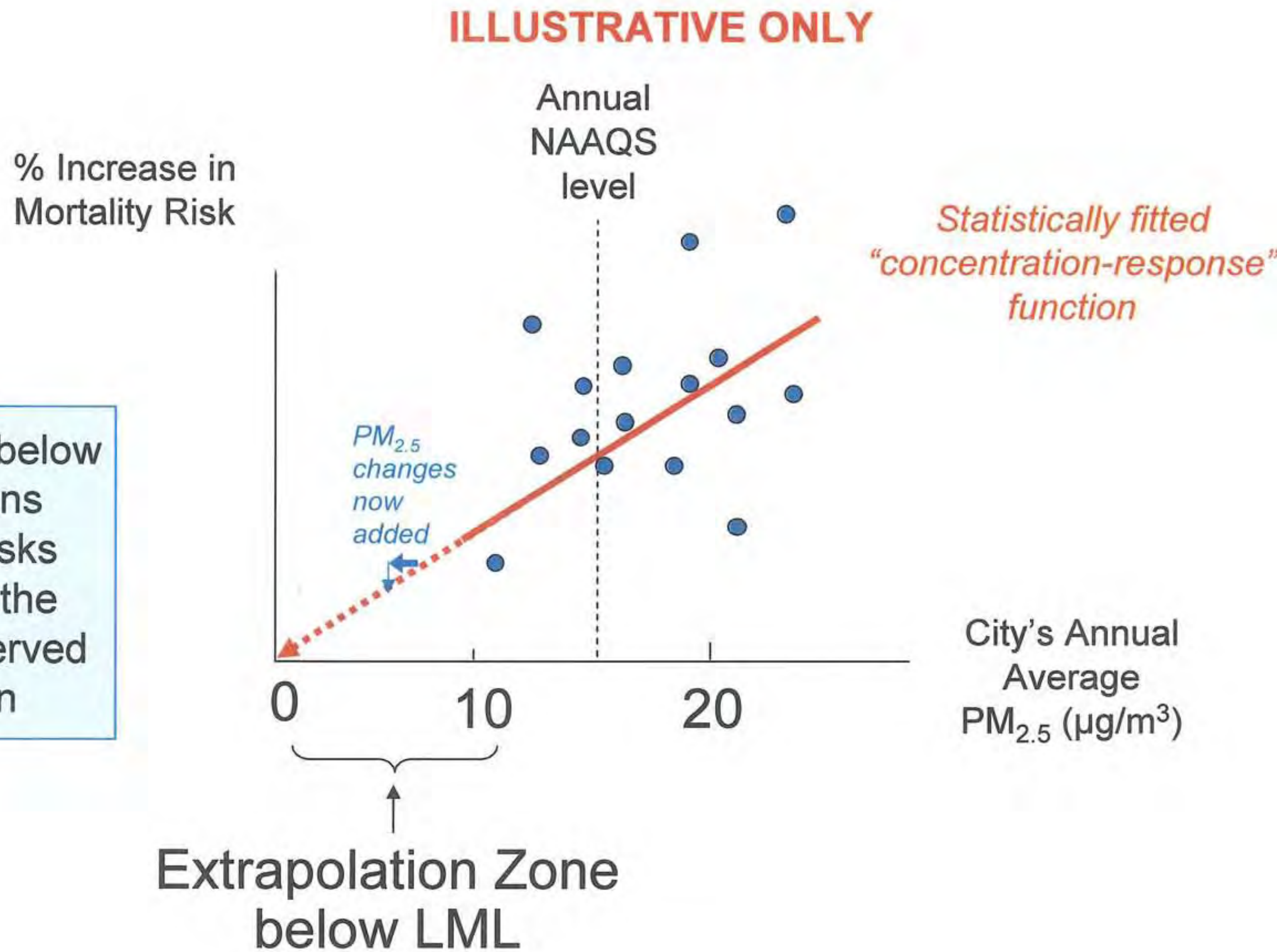
3.6x

- RIAs since 2009: 120,000 – 320,000 (Pope 2002) (Laden 2006)

In 2009, EPA started extrapolating risk estimates to $PM_{2.5}$ levels as low as modeled, well below the lowest measured level ("LML") in the studies

The Epidemiological Basis for EPA's Abruptly Increased $PM_{2.5}$ Mortality Estimates

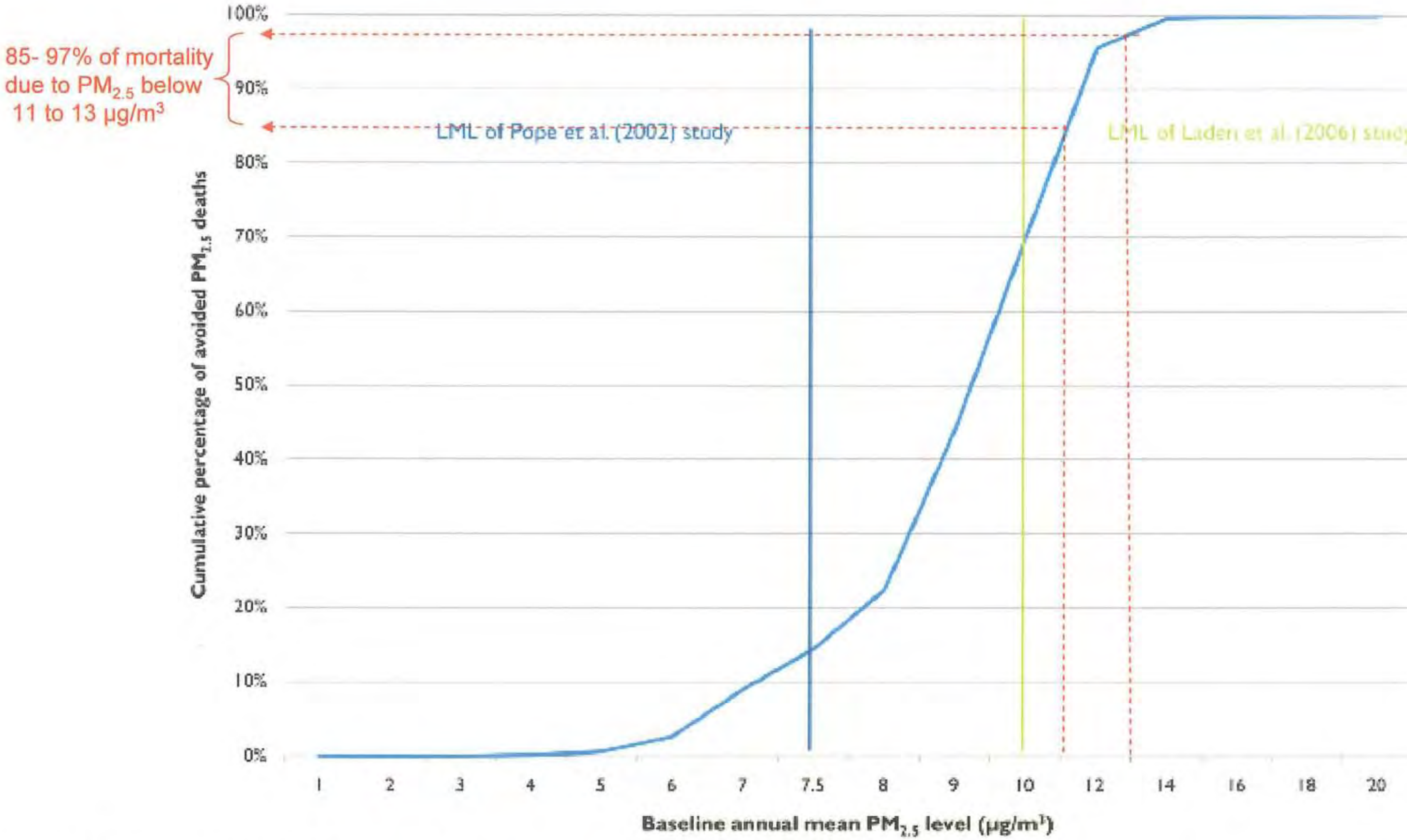
NERA
Economic Consulting



Extrapolation below "LML" means assuming risks exist below the range of observed correlation

Most of the EGU MACT Co-Benefits Are Due to Extrapolation Below the LML

NERA
Economic Consulting

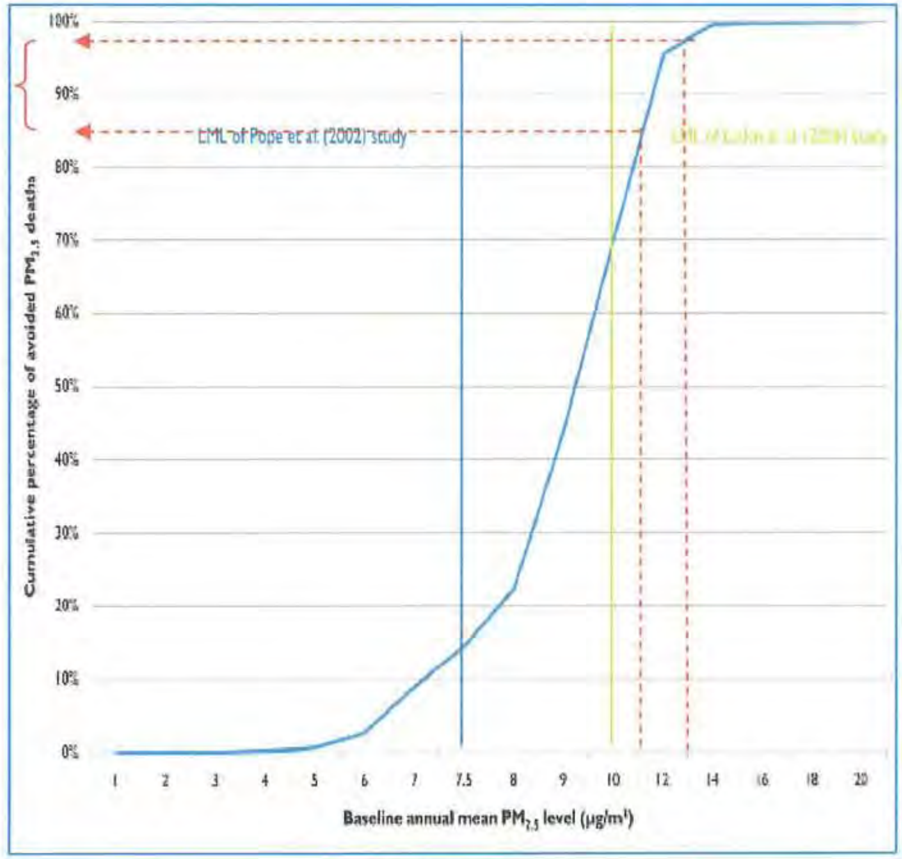


Source: Figure 6-15 in EGU MACT RIA)

Implications of EPA's Figure 6-15

NERA
Economic Consulting

85- 97% of mortality due to $PM_{2.5}$ below 11 to 13 µg/m³

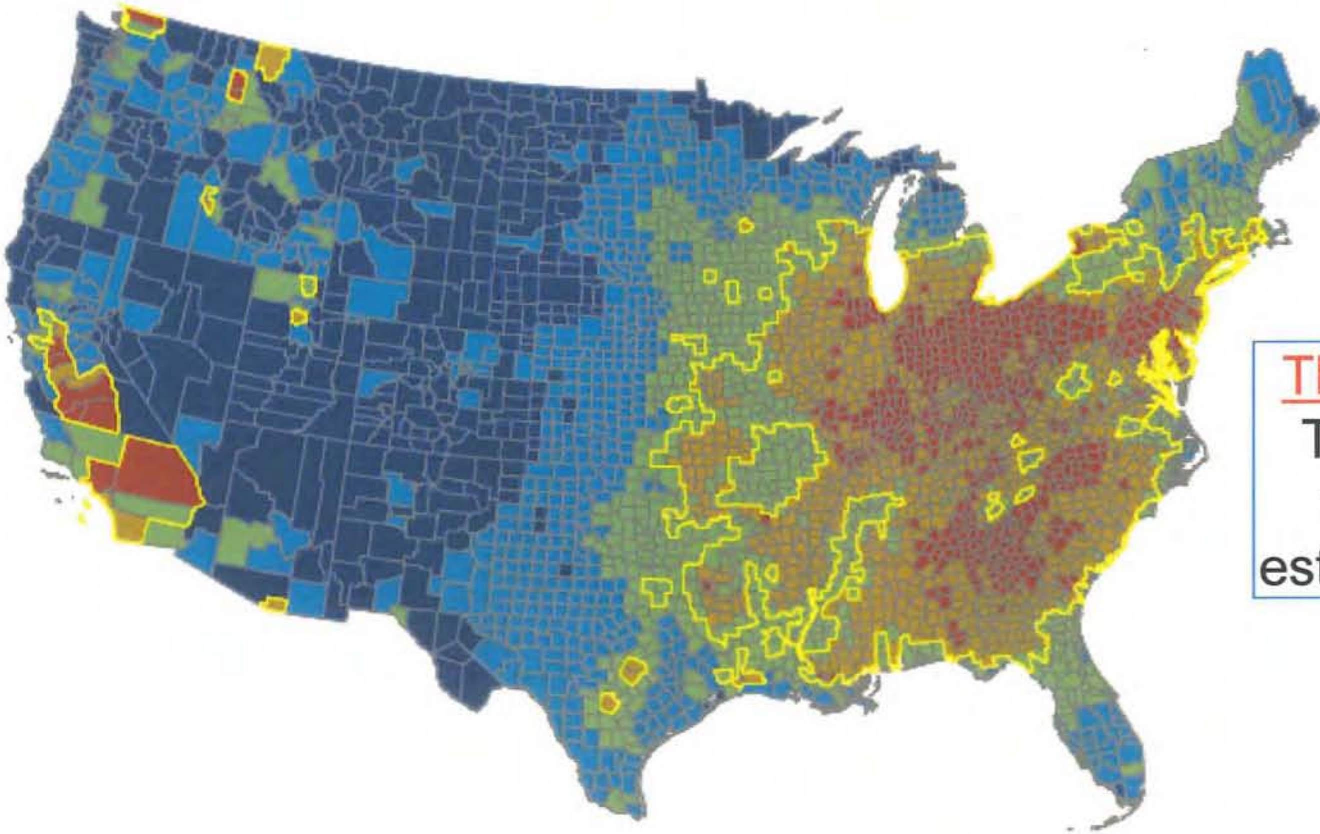


- This means that about 14,500 to 16,500 of EGU MACT's 17,000 "lives saved" are from reductions in $PM_{2.5}$ that occur below range recommended by EPA staff and CASAC for a revised $PM_{2.5}$ NAAQS
- The remaining 500 to 2,500 lives would be "saved" by a revised $PM_{2.5}$ NAAQS, and belong in *that* rule's benefits ledger
- Effectively *all* of the EGU MACT's 17,000 "lives saved" are due to exposures below the level of the 15 µg/m³ standard currently deemed protective of the public health

Source: Figure 6-15 in EGU MACT RIA)

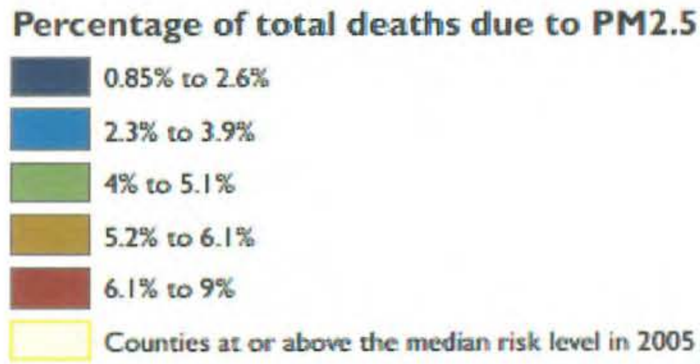
Distribution of $PM_{2.5}$ Mortality Risk in 2005

NERA
Economic Consulting



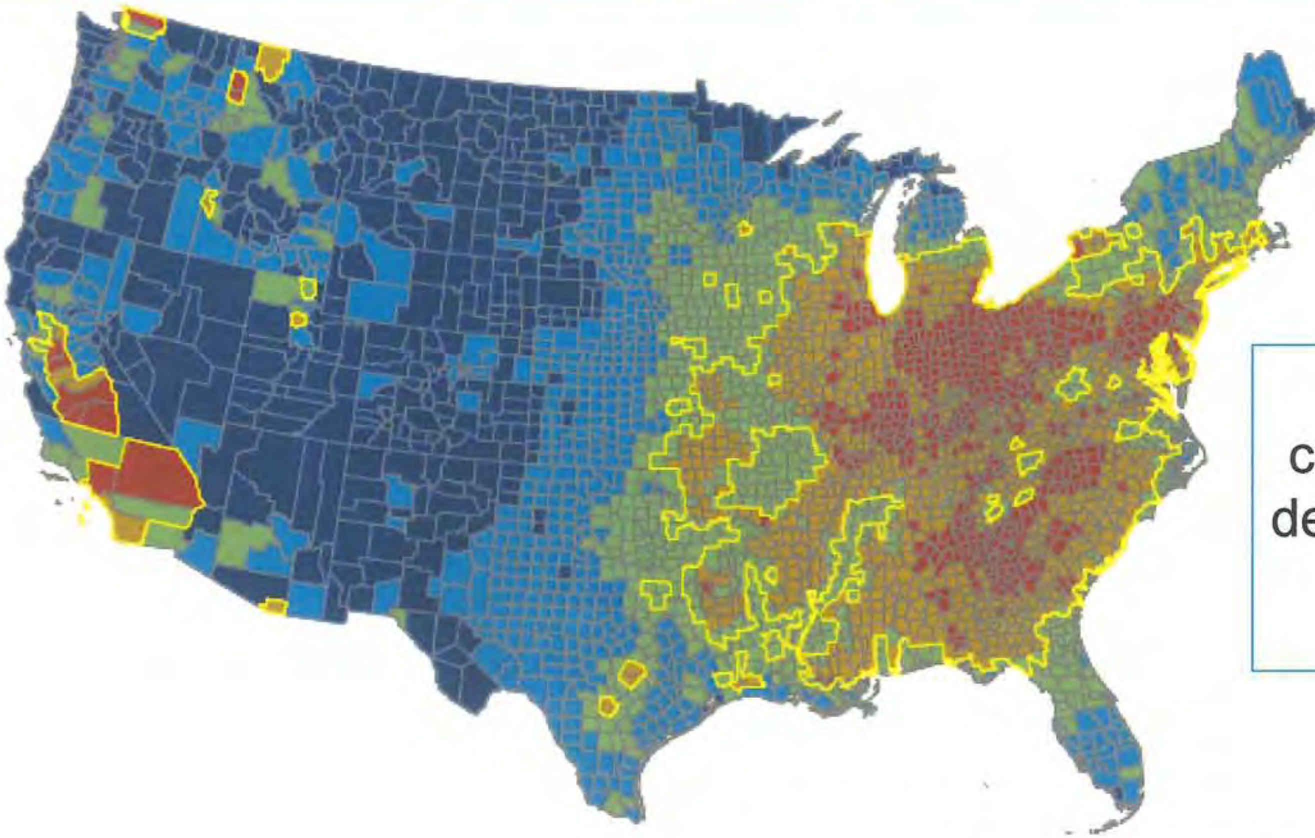
The Fine Print in the RIA:
This figure is consistent with the 6,800 deaths estimate in the EGU MACT

Source: Figure C-2, EGU MACT RIA



Distribution of $PM_{2.5}$ Mortality Risk in 2005

NERA
Economic Consulting



This is the figure that is consistent with the 17,000 deaths estimate in the EGU MACT
(not provided by EPA)

Percentage of total deaths due to PM2.5

- 2% to 7%
- 7% to 10%
- 10% to 13%
- 13% to 16%
- 16% to 22%
- Counties at or above the median risk level in 2005

implies that 320,000 deaths in 2005 (13%)

Source: Figure C-2, EGU MACT RIA with scale adjusted to apply the risk coefficient from Laden *et al.* (2006), which is basis for EPA's 17,000 deaths

Implications of EPA's High End Risk Estimates: *Is this Credible?*

NERA
Economic Consulting

Using $PM_{2.5}$ concentrations in 1979-1983:

25% of all deaths *nationwide average*

~40% of deaths in highest PM cities

Numbers would probably have been even higher ca. 1970 (earliest national SO_2 emissions data)

RIAs for $PM_{2.5}$ Rules Are Also Subject to Overstatement of "Lives Saved"

NERA Economic Consulting

<u>"Lives Saved" in RIA</u>

- 1997 $PM_{2.5}$ NAAQS — 4,000 to 16,000 *(from PM_{10} only to $PM_{2.5}$ at 15/65)*
- 2005 Clean Air Interstate Rule (CAIR) — 17,000 *(to help attain 15/65 NAAQS)*
- 2006 $PM_{2.5}$ NAAQS (15/35) — 1,200 to 13,000 *(from CAIR/CAMR/CAVR to 15/35)*
- 2011 Cross-State Air Pollution Rule (CSAPR) — 13,000 to 34,000 *(to help attain NAAQS of 15/35 <u>without</u> CAIR/CAMR)*

  -- Approximately doubled by extrapolation below LML

  -- Double-counts much of the above

EPA's Increase in Deaths "Due to $PM_{2.5}$" Is Not Part of Its $PM_{2.5}$ Review Documents

NERA Economic Consulting

- RIAs 2006-2009: 68,000 – 88,000 (Pope 2002) (Laden 2006)

In 2009, EPA started extrapolating risk estimates to $PM_{2.5}$ levels as low as modeled well below the lowest measured level ("LML") in the studies

3.6x

- RIAs since 2009: 120,000 – 320,000 (Pope 2002) (Laden 2006)

- Quantitative Risk Analysis in Current $PM_{2.5}$ NAAQS Review: 63,000 (Krewski 2009)

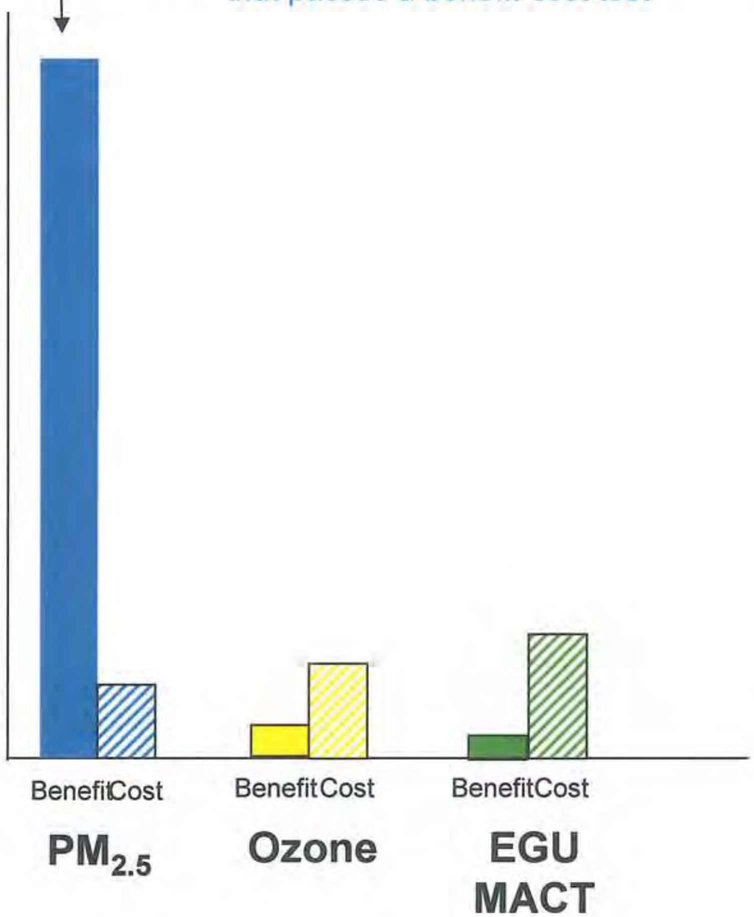
The QRA (reviewed by CASAC) does not extrapolate below the "lowest measured level" (LML)

Illustration of How the Use in RIAs of $PM_{2.5}$ Co-Benefits Leads to Excessive Regulation

Note: While EPA estimates large $PM_{2.5}$ benefits such as this illustration suggests, many consider these large benefits to be speculative because they are based on uncertain epidemiological methods, and are mainly attributable to reductions in $PM_{2.5}$ well below current or future "safe" NAAQS levels.

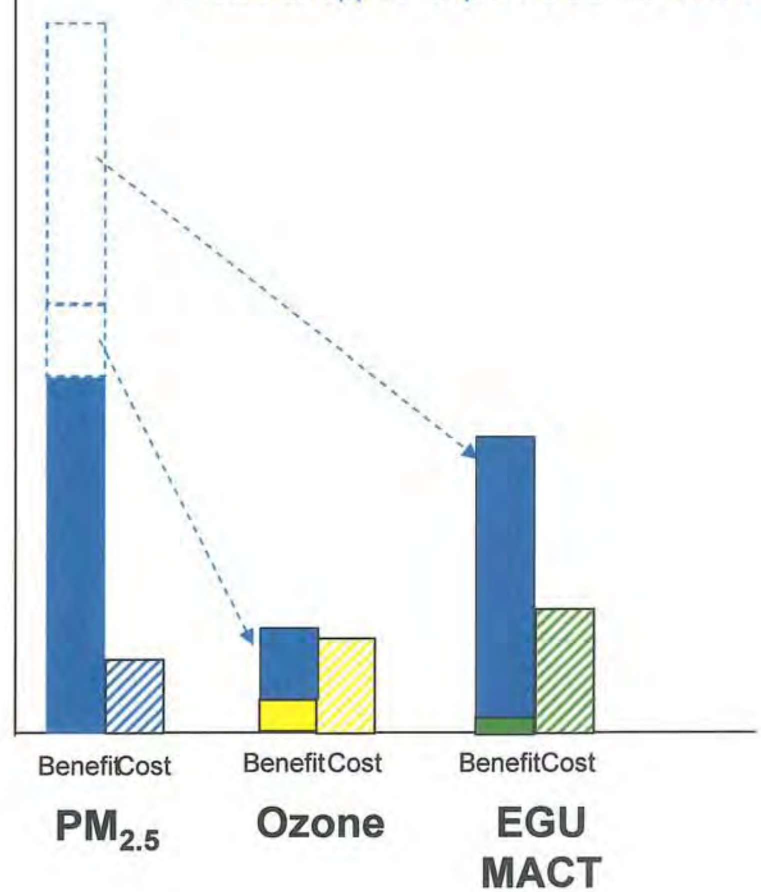
Only Direct Benefits Are Counted

$PM_{2.5}$ rule is only 1 of 3 illustrative rules that passes a benefit-cost test



PM2.5 Benefits Shared Out as Co-Benefits"

$PM_{2.5}$ benefits moved from $PM_{2.5}$ ledger to non-PM rules' ledgers as "co-benefits": same 3 rules all appear to pass a benefit-cost test



Recap of Limitations of EPA's $PM_{2.5}$ Benefits Estimates (for Both Direct and Co-Benefits)

NERA Economic Consulting

- Based on statistical correlations that are highly limited by:
  - Inability to fully control for many key mortality risk factors
  - Inability to identify actual $PM_{2.5}$ exposures
  - Failure to control for other potential culprit pollutants
  - Lack of clearly identified physiological mechanism
- Assumes all types of $PM_{2.5}$ have identical potency
- Assumes that there is no decreasing marginal benefit as $PM_{2.5}$ falls to zero
- Most (or all) of the $PM_{2.5}$ benefits are from changes in $PM_{2.5}$ levels already in the "safe" zone under the NAAQS