

People Get Ready There's a Train Comin'

EPA Regulation Jeopardizing Electric Reliability:
An Update

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The Magnitude of the Issue

“An EPA Regulatory Spree Unprecedented in U.S. History”
Wall Street Journal, March 4, 2011

- Not business as usual at EPA over last 40 years: incremental increase in stringency and compliance costs.
- New regulations unprecedented in number, speed, scope, stringency, and cost.
- For many beyond available technology to the infeasible.
- Industry not crying wolf about magnitude of impacts.
- Projected Impacts on historic scale: cost, electric rates, reliability, employment, U.S. competitiveness and security.
- NERC: EPA rules greatest single threat to reliability over the next five years.

And the Urgency?

Substance	Ambient 1980-2000	Ambient 1980-2010	Emissions 1980-2008	Emissions 1980-2010
Carbon Monoxide (CO)	-79%	-82%	-58%	-71%
Ozone (O ₃)	-25%	-28%	-49%	NCD
Lead (Pb)	-92%	-90%	-96%	-97%
Nitrogen Dioxide NO ₂	-46%	-52%	-40%	-52%
Particulates (PM10)*	-31%	-38%	-46%	-83%
Fine Particulates (PM2.5)**	-21%	-27%	-36%	-55%
Sulfur Dioxides (SO ₂)	-71%	-76%	-56%	-69%
NCD- No Current Data	*1990-2010	**2000-2010		

Decades of Continuous Air Quality Improvement

Source: U.S. Environmental Protection Agency, "Air Quality Trends," January 2012, at <http://www.epa.gov/airtrends/aqtrends.html> (April 18, 2012).

Percent Change in Air Quality

Pollutant	1990-2010		2000-2010	
	Texas	Nation	Texas	Nation
Carbon Monoxide (CO) (Eight-Hour)	-79	-73	-62	-54
Ozone (Eight-Hour)	-21	-17	-17	-11
Lead (Pb)	-76	-83	-35	-62
Nitrogen Dioxide (NO ₂) (Annual)	-29	-45	-21	-38
PM ₁₀ (24-Hour)*	-41	-38	-31	-29
PM _{2.5} (Annual)*	---	---	-11	-27
Sulfur Dioxide (SO ₂) (24-Hour)	-85	-68	-68	-48

Negative numbers indicate a decrease.

-- Trend data not available.

Statistics are directly related to the level and averaging time of the NAAQS:

- CO – Annual 2nd Maximum Eight-Hour Average
- Lead – Annual Maximum Quarterly Average
- NO₂ – Annual Arithmetic Average
- Eight-Hour Ozone – Annual 4th Maximum Eight-Hour Average
- PM₁₀ – Annual Second Maximum 24-Hour Average
- PM_{2.5} – Seasonally-Weighted Annual Average
- SO₂ – Annual Arithmetic Average

- [Data and Trends](#) from the EPA

2011* Design Values

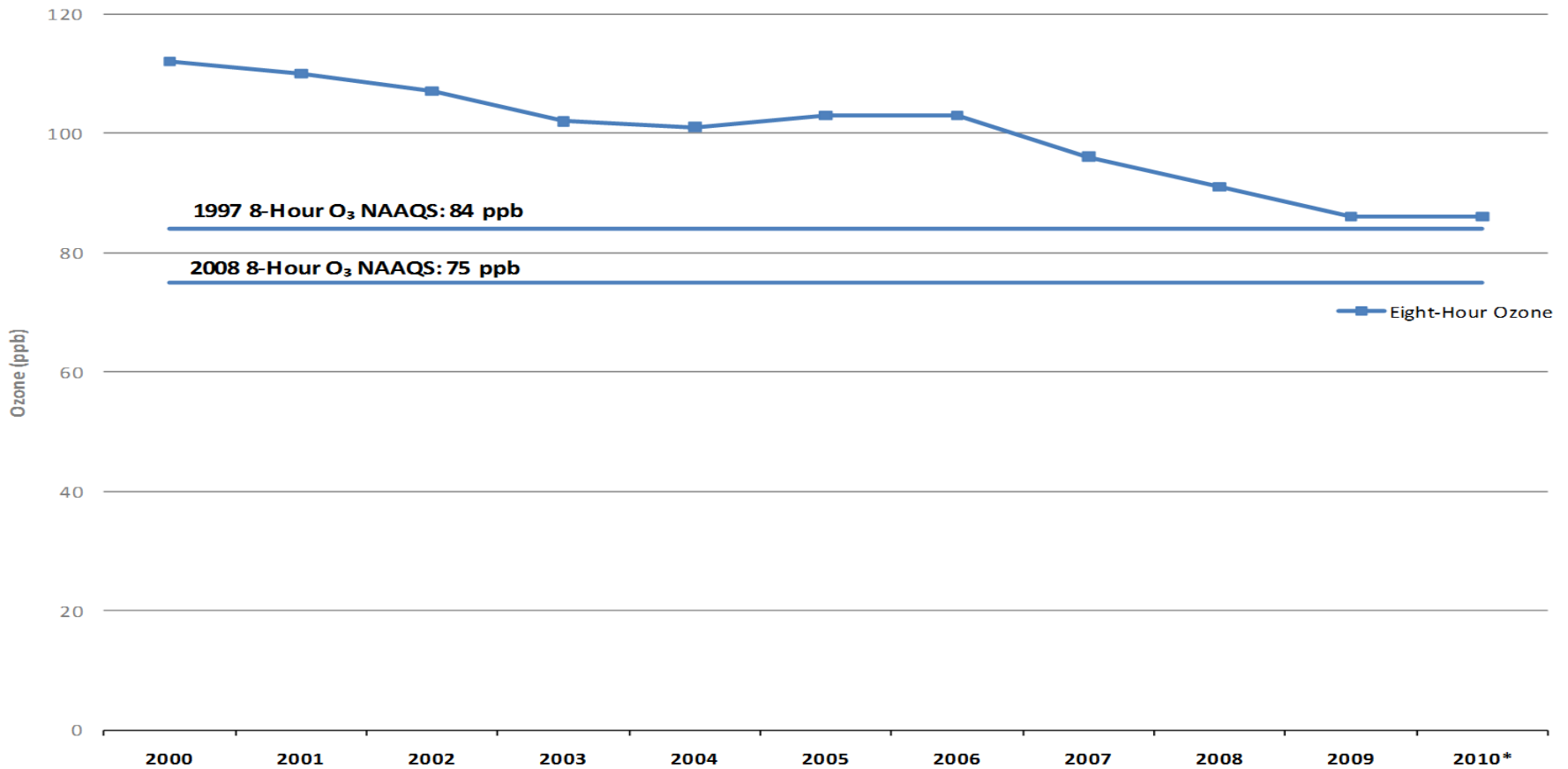
Area	Ozone (ppb)	SO ₂	PM _{2.5} 24 Hour	PM _{2.5} Annual
Dallas-Fort Worth	90	15	31	10.8
Houston Galveston-Brazoria	89	42	24	12.6
Beaumont-Port Arthur	79	68	N/A	N/A
Northeast Texas	77	61	N/A	11
Austin-Round Rock	75	N/A	23	10.5
San Antonio	75	N/A	22	9.5
Corpus Christi	72	30	25	10.5
Waco	72	6	N/A	N/A
El Paso	71	11	29	10.1
Victoria	70	N/A	N/A	N/A
Lower Rio Grande Valley	64	N/A	23	10.8

Notes:

- These data is not certified and it may include exceptional events and is subject to change.
- Values highlight in red are design values above the NAAQS for that pollutant:
Ozone > 75 ppb, SO₂ > 75 ppb, PM_{2.5} 24-Hour > $\mu\text{m}/\text{m}^3$ PM_{2.5} Annual > 15.0 $\mu\text{m}/\text{m}^3$

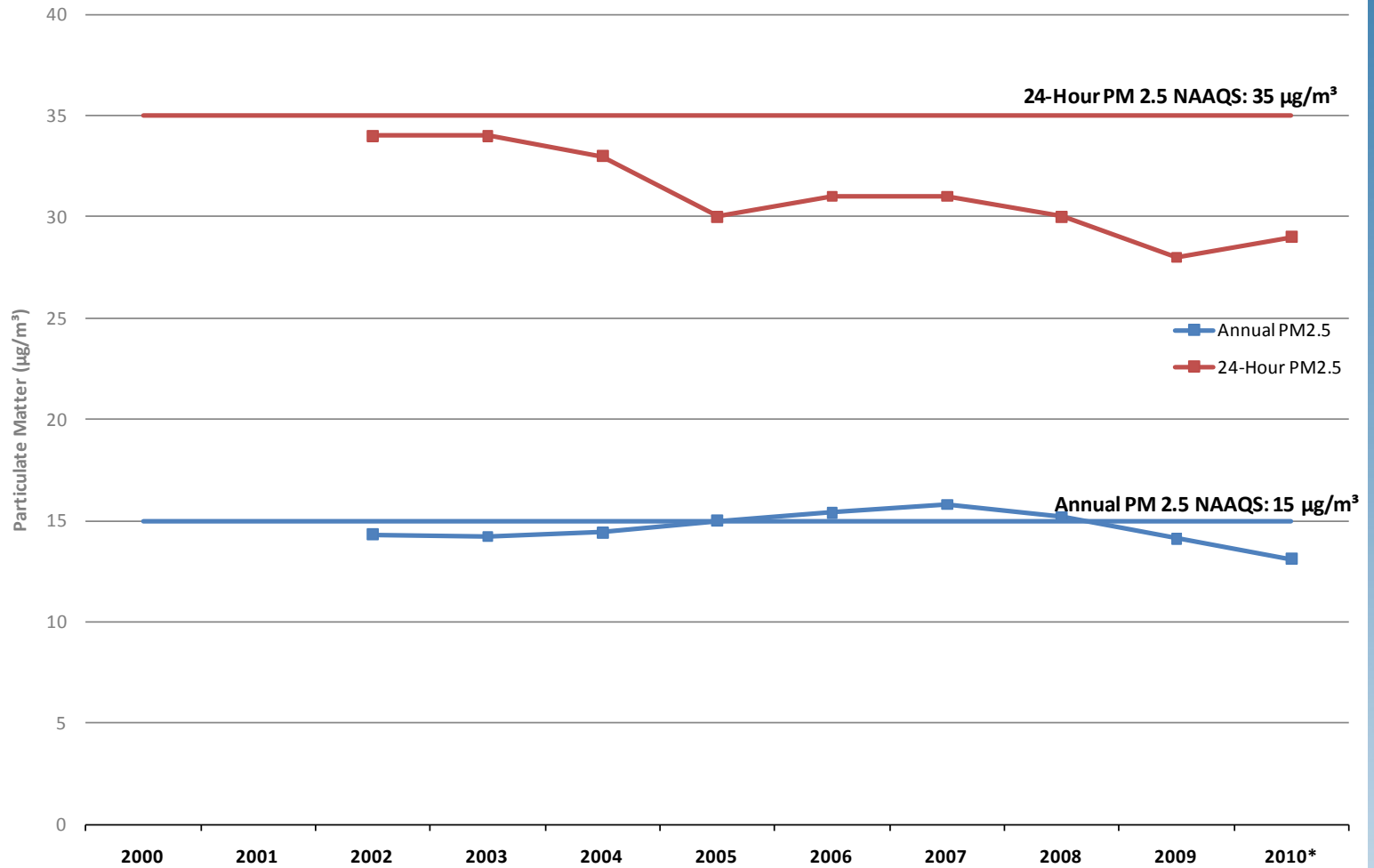
. . . And Texas

Texas Ozone (O₃) Trend



*2010 Design values are preliminary as of March 22, 2010, and are subject to change. Design values are calculated using data from EPA's Air Quality System

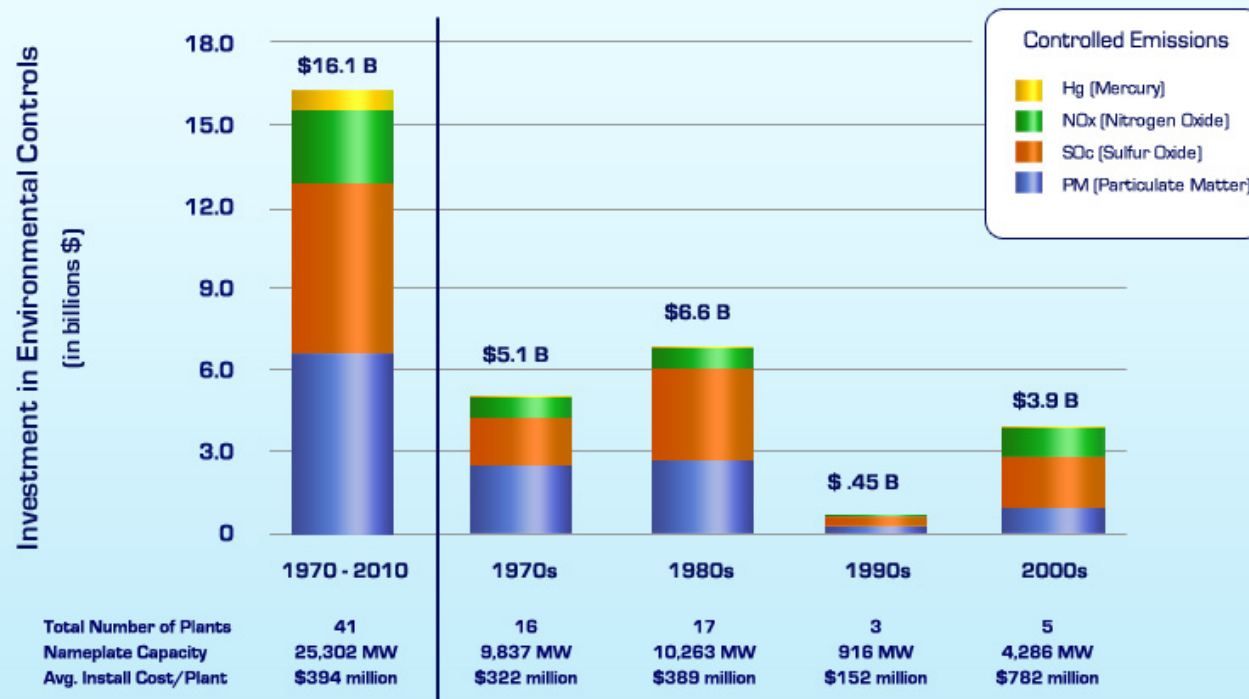
Texas Particulate Matter (PM 2.5) Trend



*2010 Design values are preliminary as of March 22, 2010, and are subject to change. Data is not available prior to 2002. Design values are calculated using data from EPA's Air Quality System

Investments in Clean Coal Technology

1970 - 2010



Emission control online date, cost and type information based on data from the U.S. Environmental Protection Agency, EPA IPM v4.10 Documentation and EPA's National Electric Energy Data System (NEEDS) v4.10. Particulate control cost data from Argonne National Laboratories. Environmental consequences of, and control processes for, energy technologies. Park Ridge: Noyes Data Corporation, 1990; reagent injection cost data from Jon Norman, United Conveyor Corporation, "UCC Dry Sorbent Injection: Dry Sorbent Injection as an Alternative to Scrubbers"; additional data compiled from other public sources, including press releases, company websites, etc. Unit characteristic sources based on data from U.S. Energy Information Administration (EIA), Existing Electric Generating Units by Energy Source, 2008, and EIA Form EIA-860 Annual Electric Generator Report, 2009 Data.

* Additional Sources: Initial operation dates for Sandow 5, Oak Grove 1 & 2, and Sandy Creek are from other sources, including Luminant & CPS websites, press releases, and other publicly available information.

New EPA Rules Impacting Electric Generation

Converging Effective Dates, Cumulative Impacts, Duplicative Goals

- **Cross State Air Pollution Rule (CSAPR)— now final—20 states challenge, decision should be released this summer**
- **Mercury and Air Toxics Rule (MATS)— now final, 14 states & UMW initial court challenge**
- **Greenhouse Gas New Source Performance Standards (NSPS) for EGUs— proposed 4/12.**
- New Ozone NAAQS— Final 75 ppb rule . . . But not for long!!
- New SO₂ NAAQS—Final
- New PM_{2.5} NAAQS—Pending
- Cooling Water Intake Rule (CWIR)—proposed
- Coal Combustion Residual Rule (CCR)—proposed

Cross-State Air Pollution Rule (CSAPR)

- Adopted in July 2011. Compliance 1/1/2012. Now Stayed by DC Circuit Court of Appeals. Review on the merits expected Fall 2012.
- Objective: Reduce the transport of pollutants from “upwind locations” that cross state lines and impair air quality in “downwind locations.”
- Requires steep reductions of SO₂ and NO_x in select upwind states that EPA models find impair downwind states attainment of Ozone and PM_{2.5} NAAQS.
- 80% of the downwind areas targeted already attain the NAAQS for PM_{2.5} and ozone.
 - Downwind states targeted violated PM_{2.5} NAAQS (24 hr) less than one-half percent 2007-2009.
- Hence: “This rule represents another case where EPA has inadequately rationalized the need for a complex regulatory scheme to solve a non-existent problem.” --TCEQ Chm. Brian Shaw, Ph.D. in congressional testimony.
- With a January 2012 effective date, PUC and ERCOT predicted rolling-blackouts.
- DC Circuit Stayed 48 hours before effective date.

CSAPR—*cont'd*

- Since 1980, SO₂ emissions have declined by 70% according to EPA's data.
- EPA now mandates up to 46% additional reduction within two years.
- Additional reductions on CSAPR timetable infeasible for many coal-fired EGUs, esp. Texas lignite-fired EGUs.
- Texas not included in the upwind states at CSAPR proposal.
- EPA included Texas in the final rule for alleged impacts at one monitor in Illinois.
- Illinois monitor attains NAAQS and projected to maintain NAAQS attainment.
- Since 1970, coal-fired generators have reduced NO_x and PM by 84% per KWh.
- Court Ruling.

Mercury and Air Toxic Standards for Power Plants (utility MATS)

- Final 12/11, 1,117 pages, 500-page Regulatory Impact Analysis
- NESHAP standards for new and existing power plants: MACT and emission limits
- Binds 1,400 coal-fired and oil-fired EGUs at 600 power plants nationwide
- Reduction of mercury and hazardous pollutants (acid gases, hazardous organics, and non mercury metals)
- Compliance date—Statute mandates by 2015.
 - 1-year extension at EPA discretion.
 - 2-year extension via § 113(a) of the Clean Air Act (CAA)—but need documented reliability impacts.
- Enforcement policy legally questionable.

MACT Standards & NESHAPS (Hard Emission Limits)

- Little Compliance Flexibility—NSPS boiler by boiler
- Requires 90% mercury reduction, but EGU mercury reductions already reduced by 60%.
- 88% Acid Gases, 41% SO₂ Emission Reduction
- Texas already reduced ambient concentrations of SO₂ by at least 70%.

But Remember

- U.S. Power Plants contribute 1% of global deposition of mercury
- U.S. Power Plants emit 30 tons per year of Mercury.
China: 400 tons per year.
- EPA strains to identify measurable health benefits from MATS

Rule Preamble: “We believe it is reasonable to err on side of regulation . . . in the face of uncertainty.”

EPA’s Reference Dose (RfD) for mercury 2-3 times stricter than WHO, FDA, or other bodies. Most recent national surveys of mercury in blood levels—well below even EPA RfD.

EPA's Health "Benefits"

	Benefits from HAPs (billions)	"Co-Benefits" from non-HAPs (billions)
Mercury	\$ <0.1	\$ 1-2
Acid Gasses	\$ 0	\$ 32-87
Non-Hg Metals	\$ 0	\$ 1-2
Total	\$ <0.1	\$ 33-90

- **EPA estimated MATS will prevent 0.00209 IQ point loss per child**
- EPA estimated each child will gain 0.0956 school days over their lifetime
- 0.00209 IQ points x 244,468 children = 511 IQ points per year
- EPA assumes a net monetary loss per decrease in one IQ point of between ~\$8,000 and ~\$12,000 (in terms of foregone future earnings)
- Benefit = \$4.2M to \$6.2M

EPA's Cost-Benefit Analysis MATS

By EPA admission: over \$9 billion annually.

- MATS most expensive rule ever promulgated.

- EEI's estimate costs at over \$100 billion.

EPA's Regulatory Impact Analysis (RIA):

- Benefits from mercury reduction--.004% of total benefits.

- Co- benefits from PM2.5– 99.9%

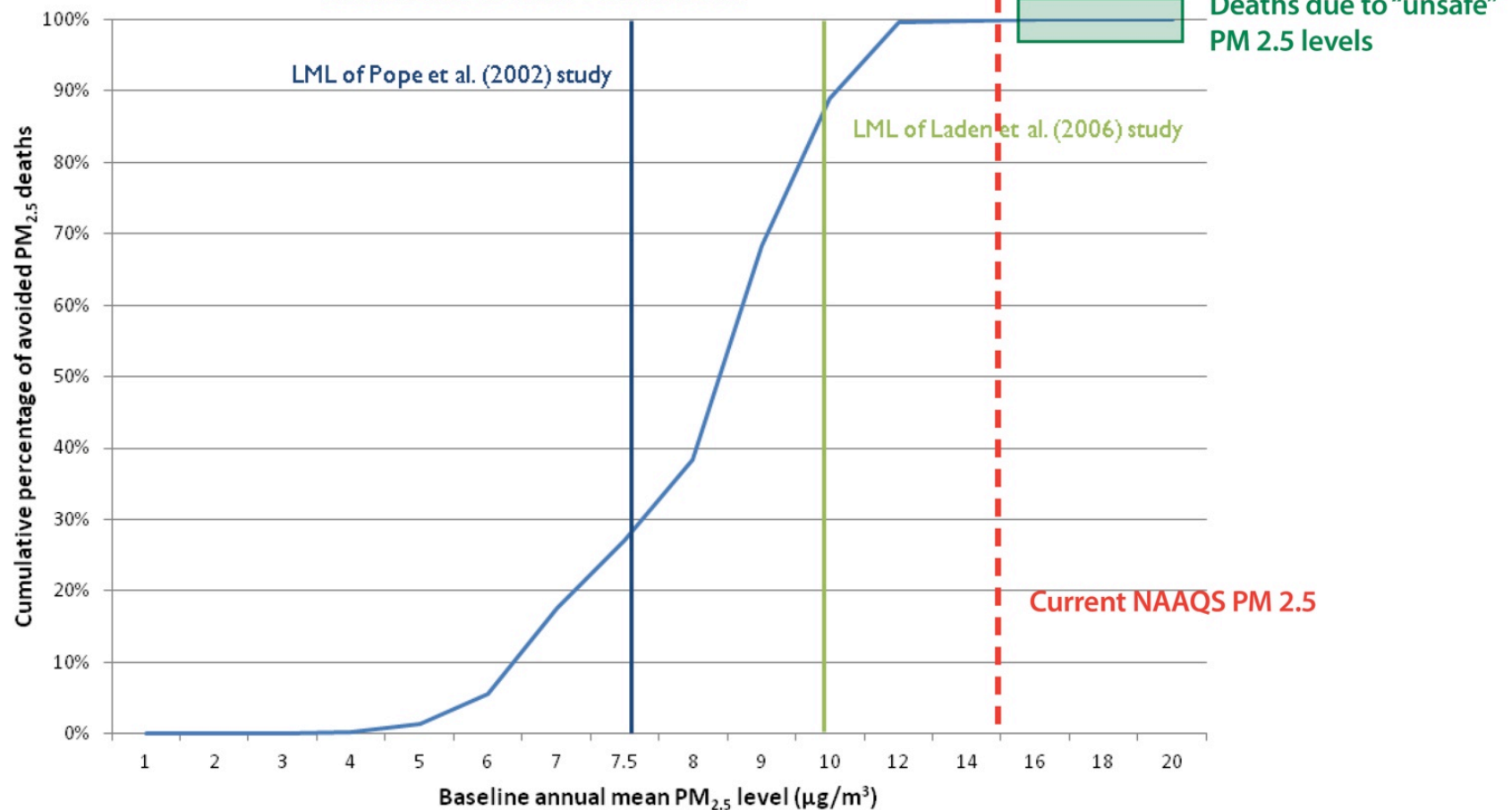
However. . .

- Co-benefits from reducing ambient $PM_{2.5}$ garnered from $PM_{2.5}$ way below the NAAQS.
- Since 2009, EPA using no safe-threshold linear regression to assign health risks and calculate health benefits.
- Increased mortality risks 3 to 4-fold.

EPA Obsession with PM_{2.5}

- Since 2009, PM_{2.5} co-benefits for rules not targeting PM_{2.5}
- 13 rules—PM_{2.5} accounts for more than 50% of benefits
- 6 rules—PM_{2.5} accounts for more than 99% of the benefits
- RIA's—traditionally courts cannot review
- *See* Anne Smith “An Evaluation of PM_{2.5} Health Benefit Estimates for Regulatory Impact Analysis,” NERA (Dec. 2011).
- Will EPA's use of co-benefits survive the Curt's deference to EPA's technical discretion a la Chevron ?

Deaths due to "safe" PM 2.5 levels



Of the total PM-related deaths avoided:

73% occur among population exposed to PM levels at or above the LML of the **Pope et al.** study.

11% occur among population exposed to PM levels at or above the LML of the **Laden et al.** study.

Source: Table 5-15, EPA's RIA in final Utility MACT (mercury) Rule.

Year	RIAs for Rules Not Targeting Ambient PM 2.5	PM Co-Benefits Are >50% of Total	PM Co-Benefits 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 Compression Ignition Engines > 30 l. per Cylinder	X	
2010	Reciprocating Internal Combustion Engines NESHAP -- Compression 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	Commercial & Industrial 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 (<i>Final Rule's RIA</i>)	X	≥ 99%
2011	Mercury Cell Chlor Alkali Plant Mercury Emissions NESHAP	X	
2011	Sewage Sludge Incineration Units NSPS & Emission Guidelines	X	X

Source: A. Smith, Co-Benefits, p.18.

NSPS for GHG Emissions for EGUs

-EPA proposed in April 2012

- First Hard Emission limit for CO₂ under EPA's "Enlargement Finding" for GHG.

"Strictly Limited to Existing Sources" –*but:*

- Rule requires new EGUs greater than 25 MW to limit of 1000 lbs. of CO₂ per MWh

- Based on NGCC technology.

- Stunning Economic Engineering

- Not health-based limit

NSPS for GHG Emissions for EGUs

- “EPA does not project any new coal-fired EGUs without CCS to be built in absence of this proposal through 2030.”

EPA: New Coal-Fired Plants could meet standard with 50% CO₂ reduction by CCS.

- CCS not now practicable at scale & cost prohibitive
- CO₂ Standard: not feasible for coal-fired EGU and legally questionable under CAA.
- EPA’s RIA— no measurable costs, no measurable benefits ?

Power Plant Closures

- Different Numbers
- Edison Electric Institute Estimate: Announced closure of 53,000 MW of Coal-fired Generation
- 15.5% of the 339 GW of coal-fired capacity (2010) in approx. 30 states.

Power Plant Closures—(*cont'd*)

- Closures/retirements for multiple reasons
- But EPA regs loom large—*infeasible* mandates for many EGUs
- Of course, historically low natural gas prices (increased supply)
- Is natural gas now immune to historic price volatility?
- Will Natural Gas maintain its “Clean” status at EPA
- Sierra Club: “Beyond Natural Gas” to join “Beyond Coal” Campaign.
- Methane as a greenhouse gas.

Electric Reliability

NERC: estimates 4 EPA rules risk loss of 80 GW of existing capacity by 2012.

- Study found EPA regs the greatest threat to reliability over next five years.

- FERC is of two minds and reluctant to interfere with EPA rule promulgation.

- Texas reliability problems: EPA regs, low NG prices, low to negatively priced wind.

- CSAPR as adopted would lead to outages in Texas under 2011 Summer demand.

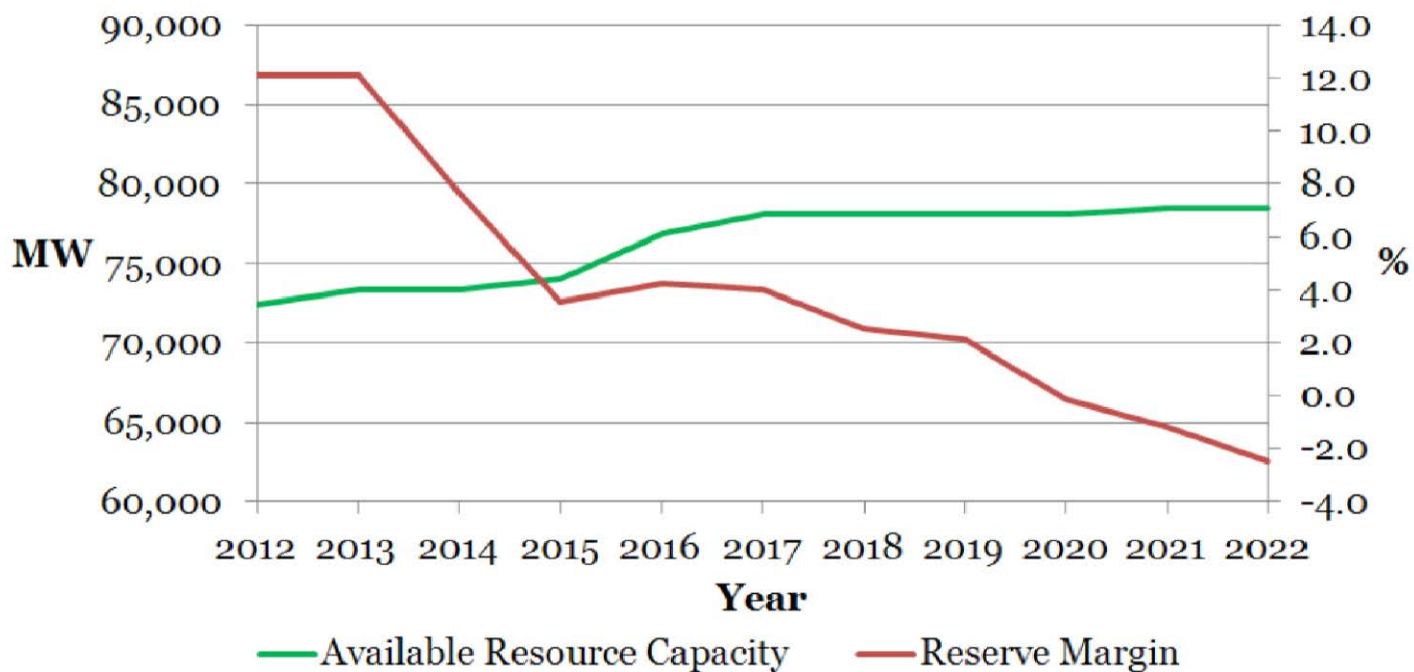
- Shrinking reserve margins in TX: load growth demand and less new capacity than anticipated.

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Electric Reliability—*cont'd*

- Regulatory uncertainty and historic low NG prices depress capital investment in new capacity.
 - Wind Generation setting records (only off peak)-7400 MW, 3/6/12;
 - 24% of load
 - Low to zero to negative wind pricing confounds market signals
 - Wind must generate to maintain PTC subsidy and to sell renewable credits
- “ *ERCOT Investment Incentives and Resource Adequacy*, ” The Brattle Group, 6/12.
- Brattle Group Recommendation: Lower reliability goals or adjust market structure.
 - Allow wholesale offer caps to triple to \$9,000 MWh during power emergencies

Projected Resource Capacity and Reserve Margin from ERCOT's Dec. '11 Update to the CDR Report



Only units with signed interconnection agreements are included in the projected values

And what about electric rates?

- PJM Interconnection Capacity Auction for 2015.
May 2012- first real, market prices under new EPA regs.
- PJM operates grid for 13 States
- Market clearing price (almost all NG) \$136 per MW
_8 times higher than 2012 price of \$16 per MW.
- For northern Ohio – the 2015 price was \$357/MW.
- Most studies project 10-25% increase in retail electric rates w/new EPA rules.
- Under aggressive renewable mandates, electric rates in the UK doubled over the last 8 years.

Legal and Political Volatility

- Lawsuits flying from all sides.
- Texas Attorney General has a dozen suits against EPA
 - Score to date: EPA Zero Wins
- Texas joined 14 states and UMW to challenge MATS
- CSAPR ruling from DC Circuit Court of Appeals expected this summer
- Ruling on Endangerment Finding and other GHG rules expected this year
 - will go to Supreme Court.
- US Congress passed many bills to delay or vacate EPA rules. House passage only.
- SJR 37 to overturn MATS under Congressional Review Act on Senate floor by June 18.

And If I Didn't Convince You That Big Trouble Lies Ahead ...

