

Ozone Attainment, OTC's Multi-Pollutant Approach

OTC Supporting Documentation
Statement of Bradley Campbell, Chair
Exhibit 2

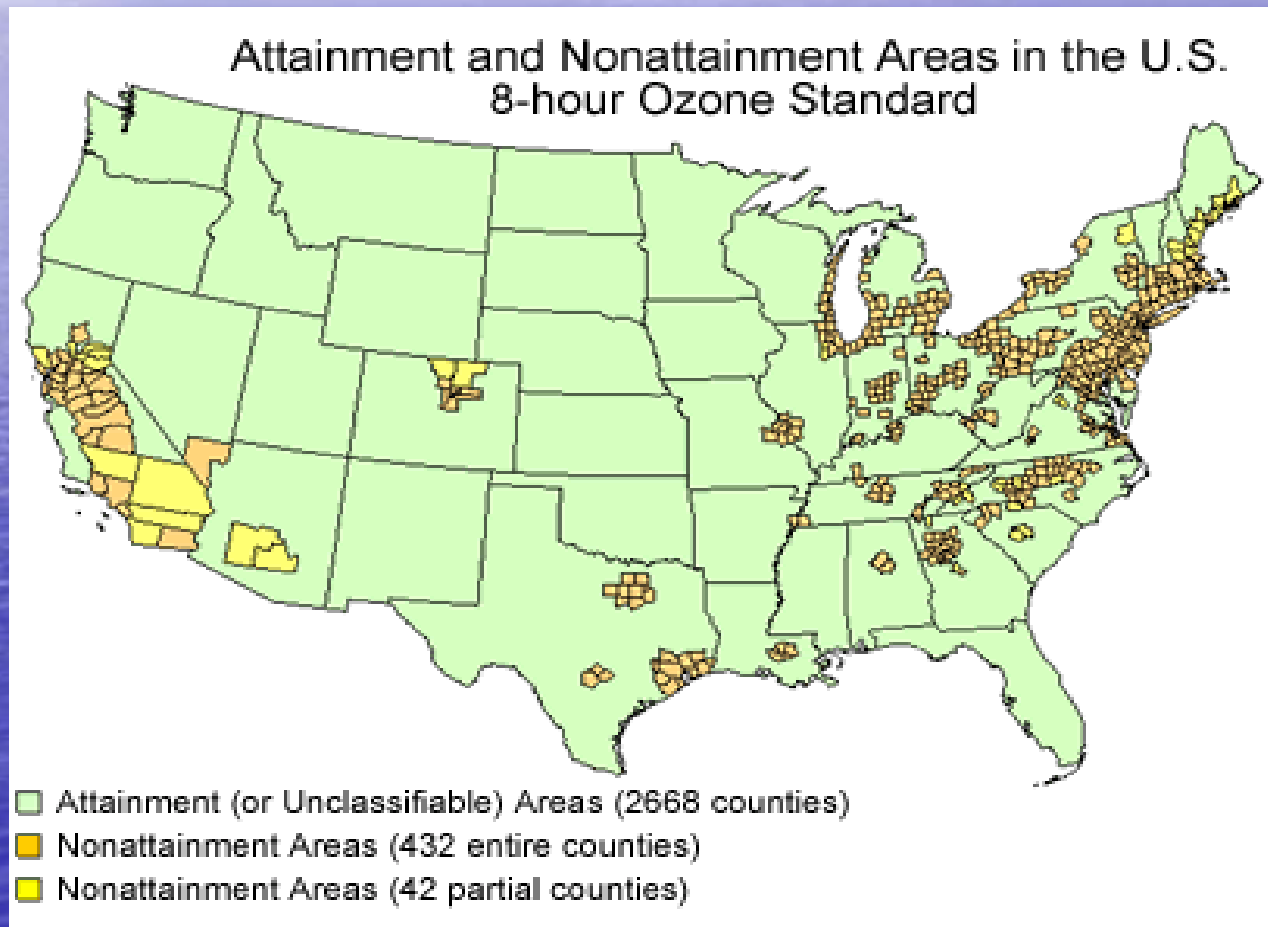
January 26, 2005

Senate Environment and Public Works Committee
Subcommittee on Clean Air, Climate Change and Nuclear Safety

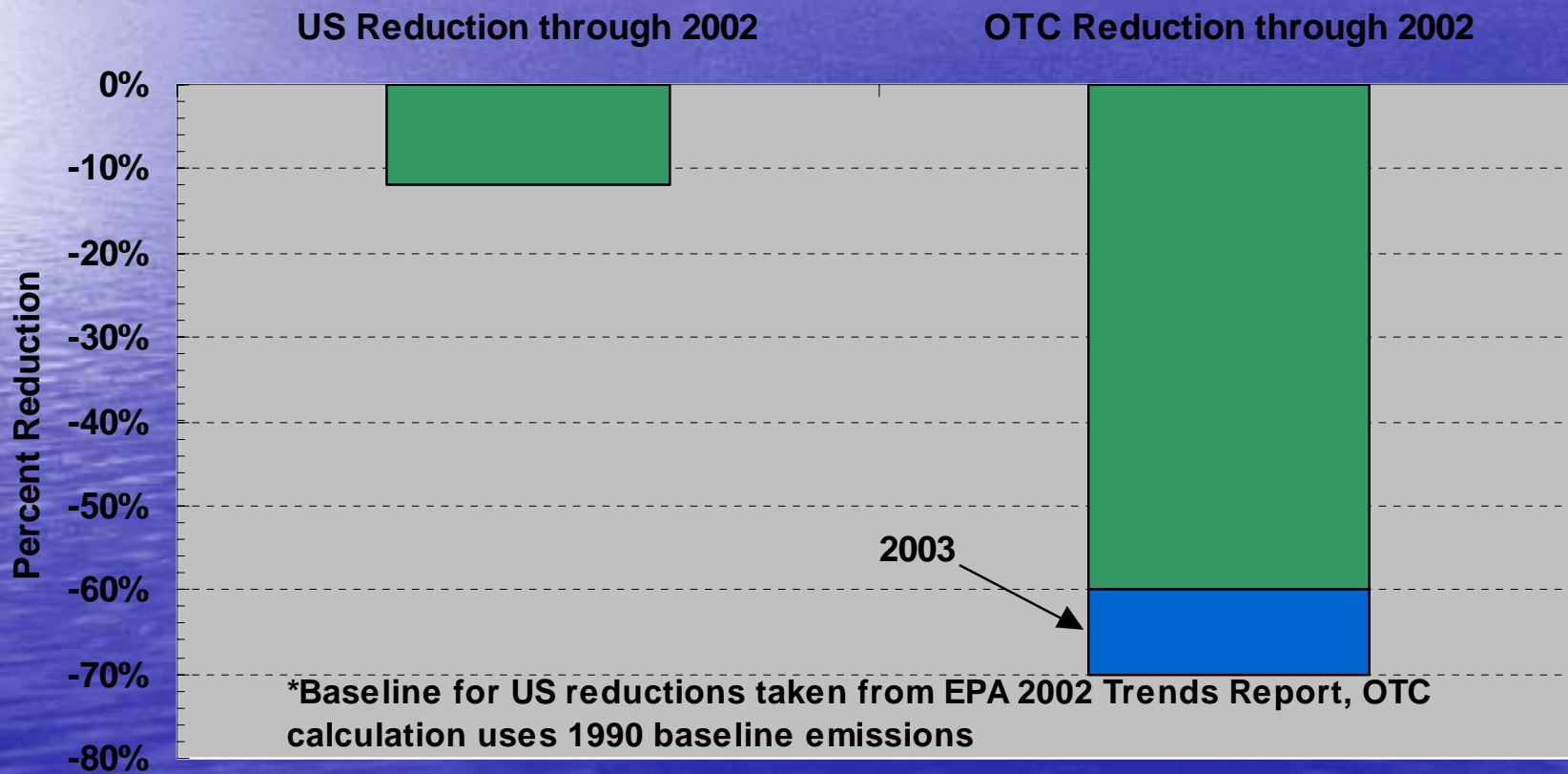
Ozone Transport Commission
Washington, D.C.



EPA 8 Hour Non-Attainment Areas

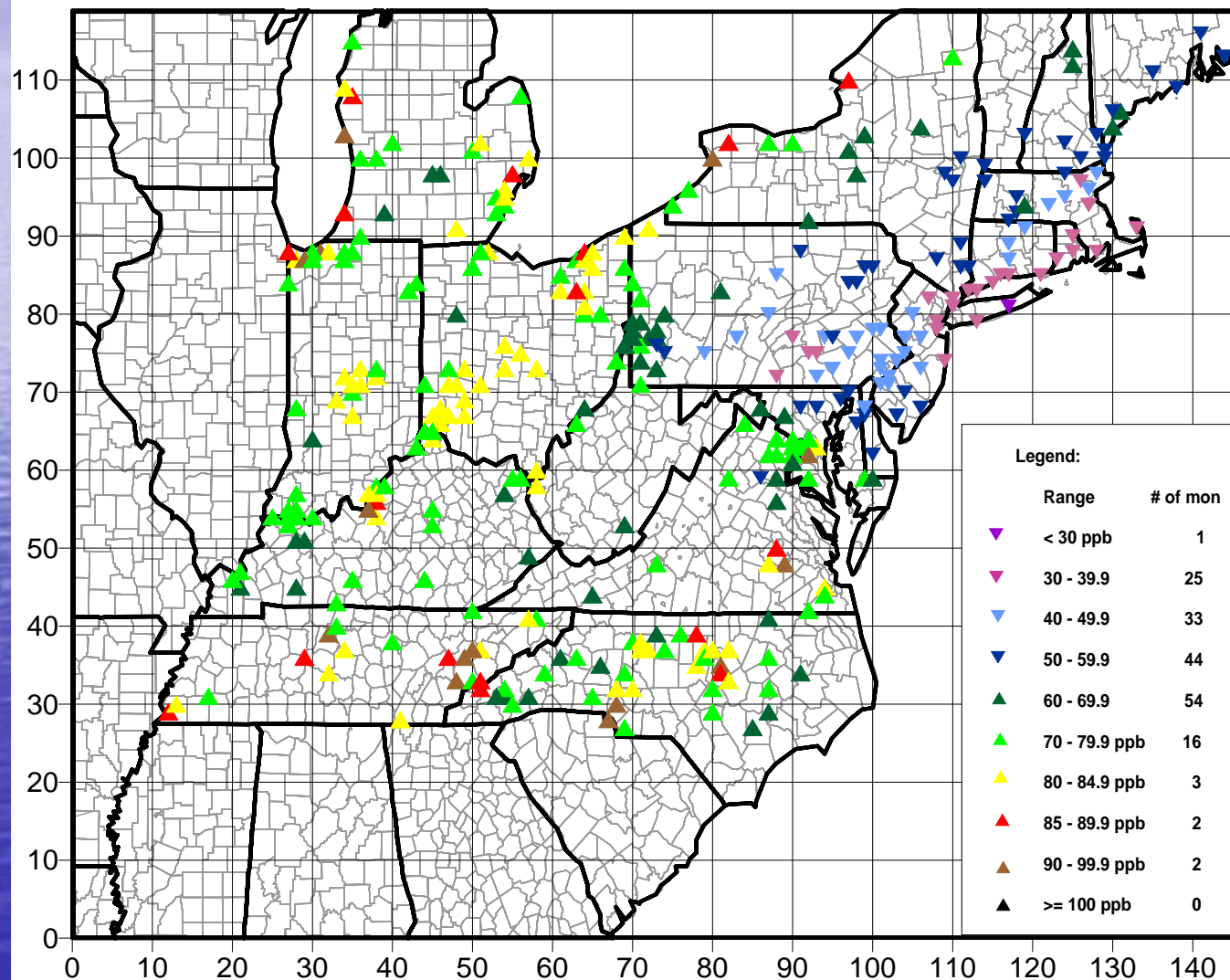


Electric Sector NOx Reductions Nationally vs. OTR



Ramifications – Zero Anthropogenic OTR

CALGRID Modeling Domain, Maximum Adjusted Control Case 8-hour Ozone Concentrations at Ozone Monitors
2010 CSI, Zero Out Anthropogenic Emissions in the OTR



Ramifications

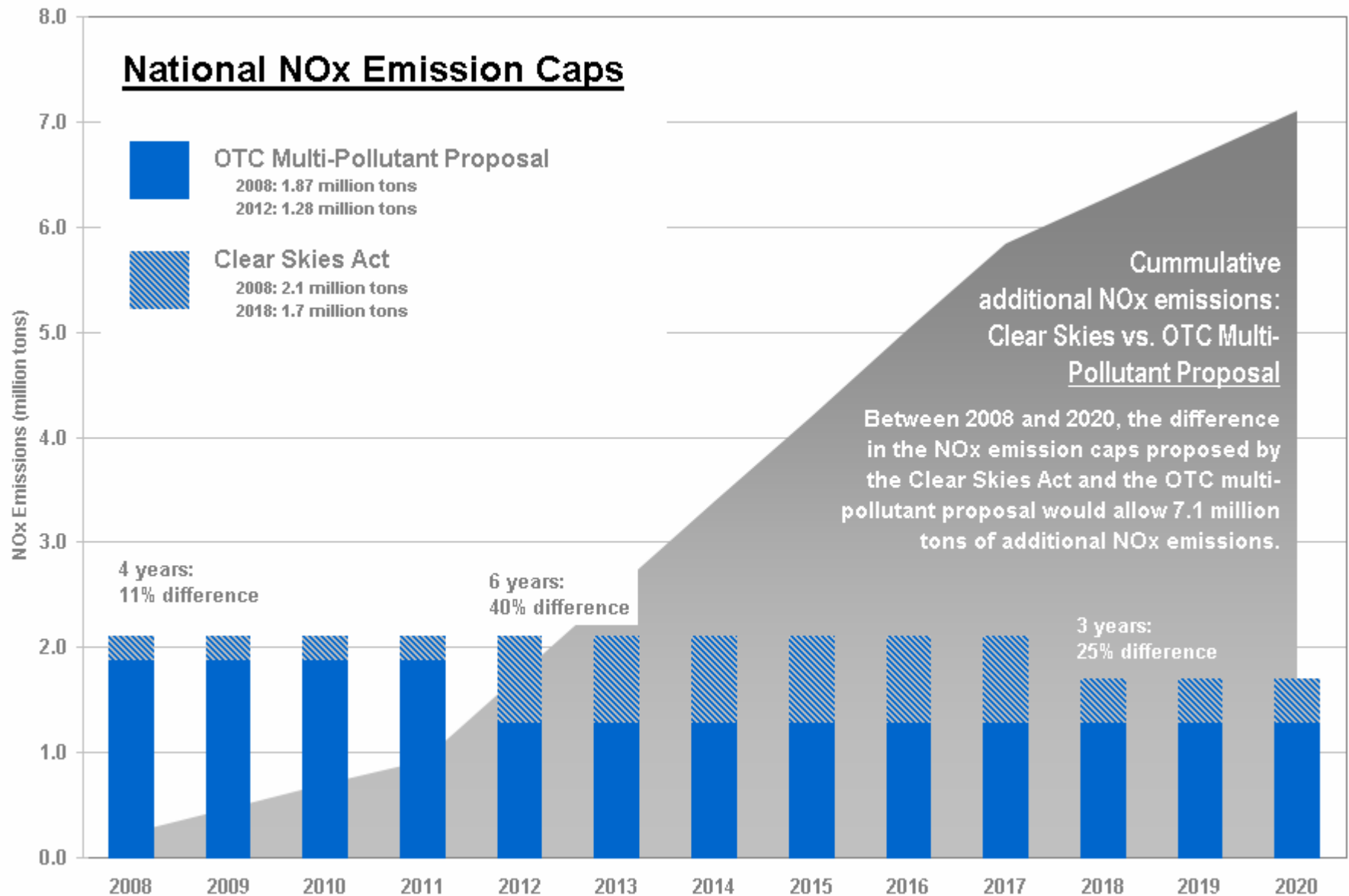
Transported Ozone (ppb)	# Monitors	% of Standard
< 30 ppb	1	25 %
30-39.9 ppb	25	44 %
40-49.9 ppb	44	56 %
60-69.9 ppb	54	81 %
70-79.9 ppb	16	94 %
80-84.9 ppb	3	106 %
85-89.9 ppb	2	113 %
90-99.9 ppb	2	119 %

OTC's Multi-Pollutant Proposal

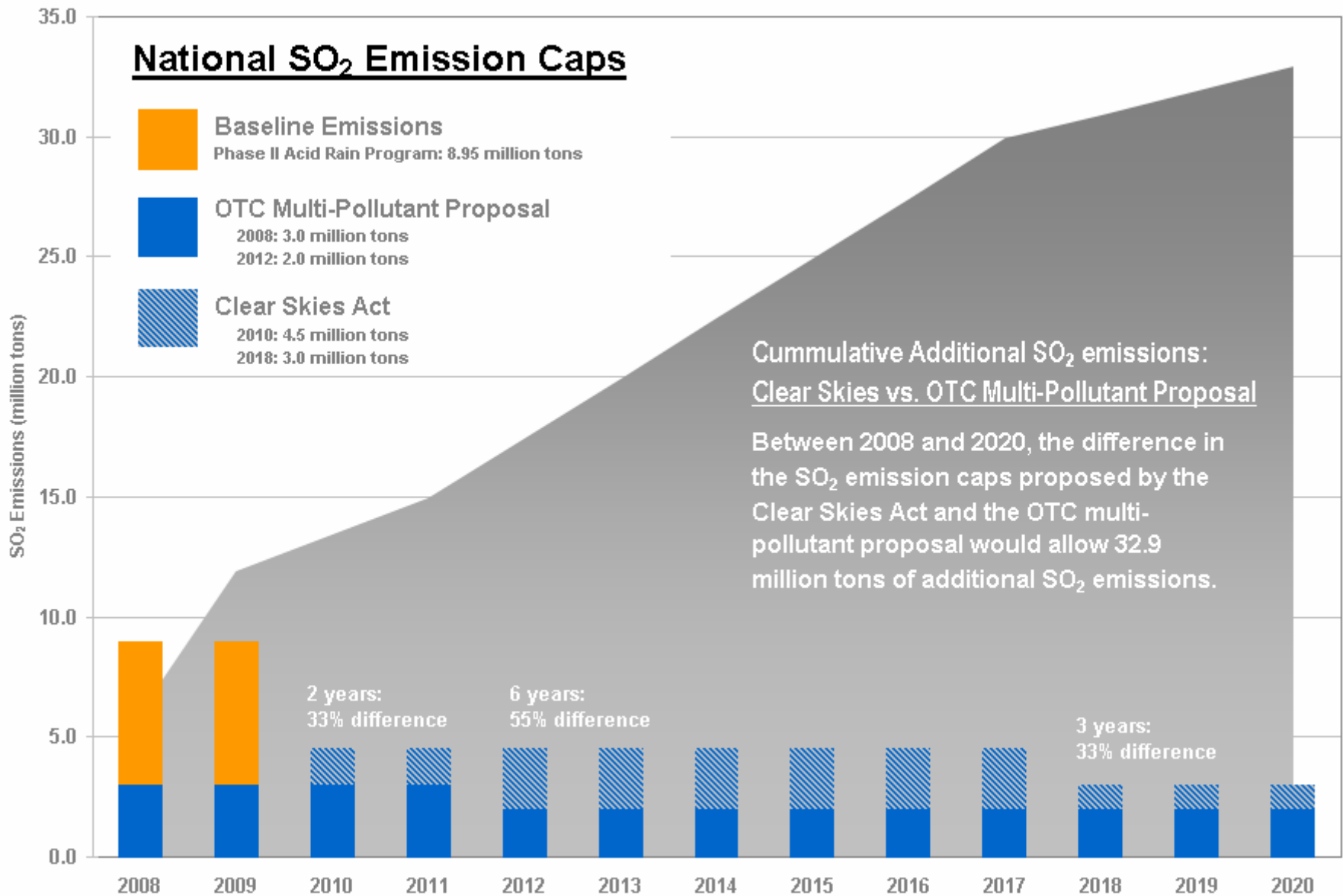
Pollutant*	Historical Baseline	Emission Reduction Targets
NOx	3.65 million tons (EPA projected emissions 2005)	2008 – 1.87 million tons 2012 – 1.28 million tons
SO₂	8.95 million tons (Phase II Acid Rain Cap)	2008 – 3.0 million tons 2012 – 2.0 million tons
Mercury	48 tons (1999 emissions)	2008 – 15 tons 2012 – 10 tons 2015 – roughly 5 tons

*The OTC encourages Congress to act on a national program or programs promoting efficiencies that address emissions such as carbon dioxide and other greenhouse gases in a cost-effective, coordinated, and streamlined manner.

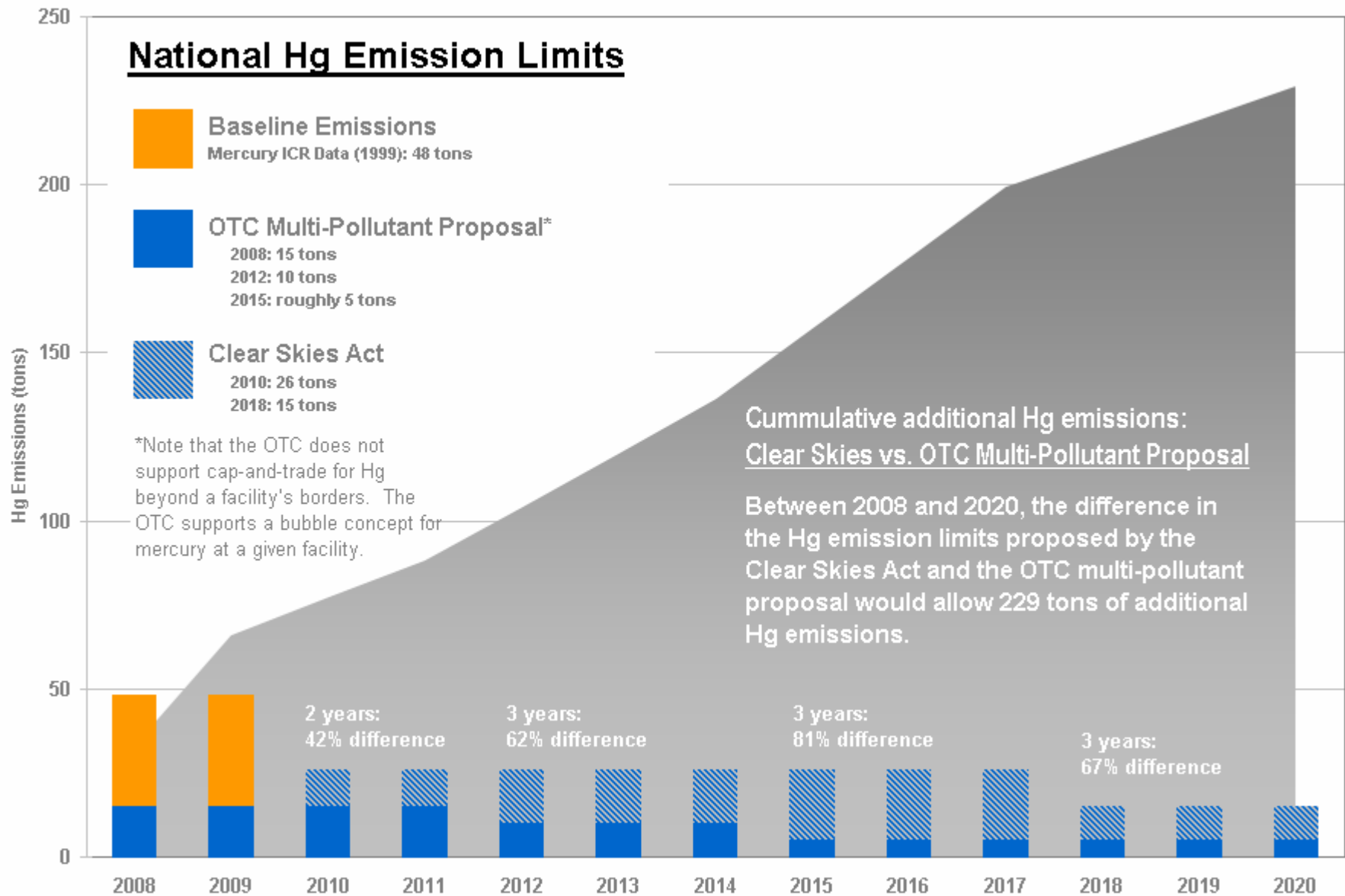
Clear Skies: NOx Comparison



Clear Skies: SO₂ Comparison



Clear Skies: Mercury Comparison



OTC Modeling Work and Results

- A series of modeling runs were performed to evaluate the OTC multi-pollutant proposal.
- Modeling was performed with ICF's Integrated Planning Model (IPM) using EPA's modeling assumptions version 2.1.6. Detailed assumptions can be found at: <http://www.epa.gov/airmarkets/epa-ipm>.
- Scenario 1 relies on EPA demand growth and natural gas price assumptions.
- Scenarios 2 and 3 rely on Energy Information Administration (EIA) demand growth and natural gas price assumptions.

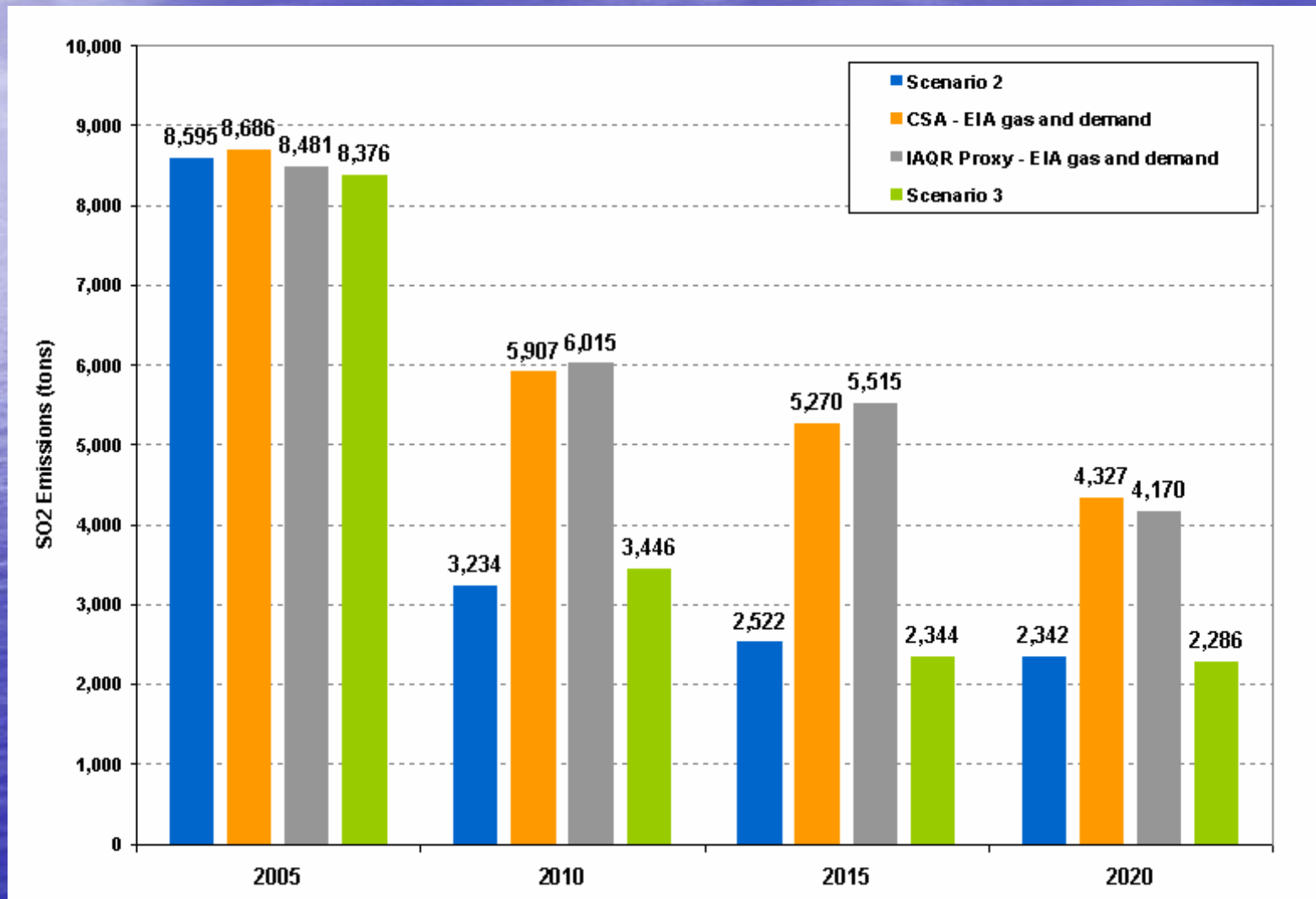
OTC Modeling Scenarios

Scenario	NO _x	SO ₂	Hg
Scenario 1 ^{EPA} EPA demand growth assumptions and gas prices	NOx SIP Call in 2004 1.87 million ton cap in 2008 1.28 million ton cap in 2012 National annual cap and trade	Title IV SO ₂ 3 million ton cap in 2008 2 million ton cap in 2012 National annual cap and trade	none
Scenario 2 ^{EIA} EIA demand growth assumptions and gas prices	NOx SIP Call in 2004 1.87 million ton cap in 2008 1.28 million ton cap in 2012 National annual cap and trade	Title IV SO ₂ 3 million ton cap in 2008 2 million ton cap in 2012, National annual cap and trade Transfer of allowance bank allowed subject to Progressive Flow Control beginning in 2008 based on 10% trigger and 2:1 surrender ratio	none
Scenario 3 ^{EIA} EIA demand growth assumptions and gas prices	NOx SIP Call in 2004 1.87 million ton cap in 2008 1.28 million ton cap in 2012 National annual cap and trade	Title IV SO ₂ 3 million ton cap in 2008 2 million ton cap in 2012 National annual cap and trade Transfer of allowance bank allowed subject to Progressive Flow Control beginning in 2008 based on 10% trigger and 2:1 surrender ratio	5 ton cap in 2015 National annual cap and trade

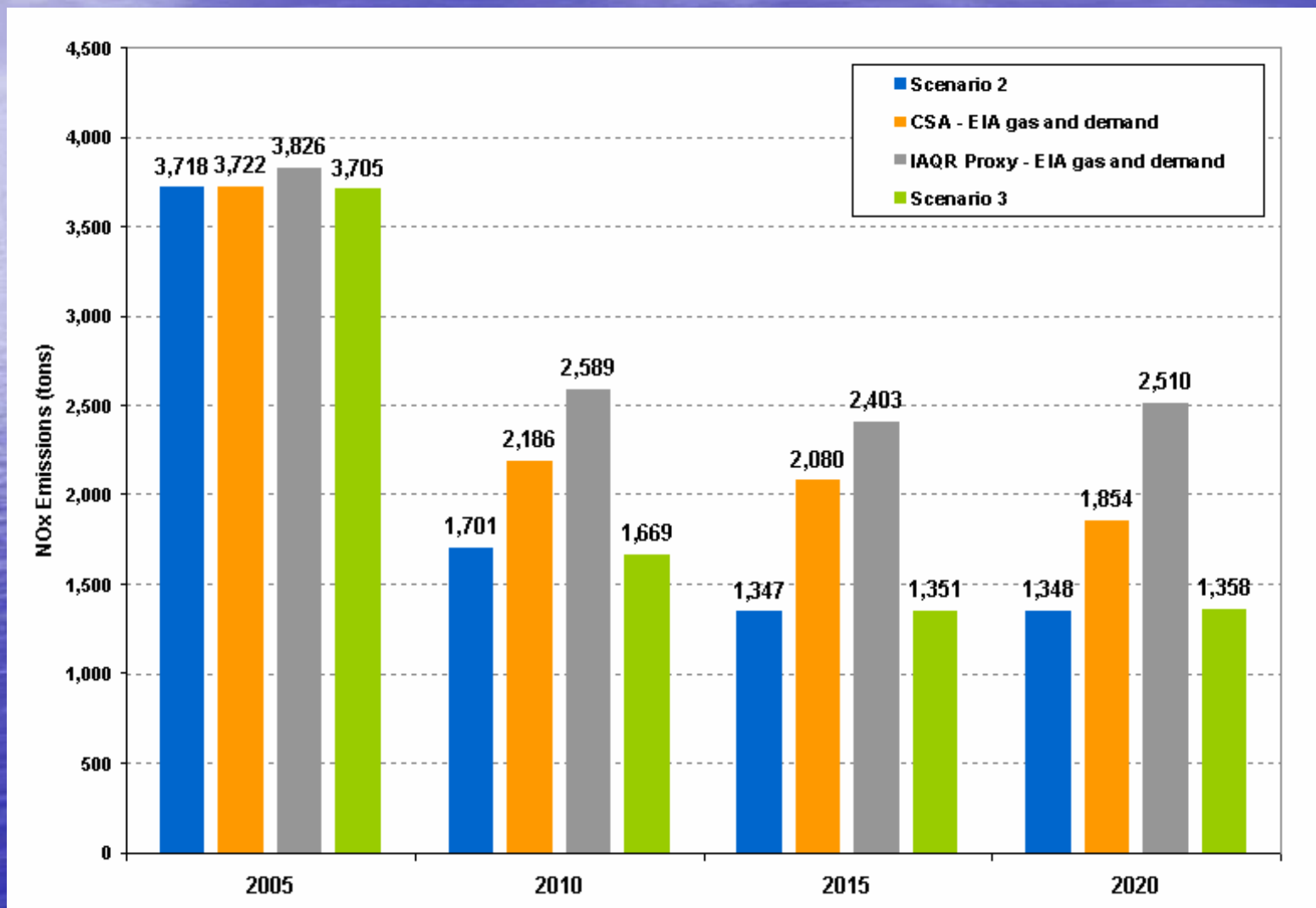
Comparative Scenarios

- EPA has used the same modeling assumptions used by the OTC to evaluate a hypothetical Base Case (i.e., business-as-usual scenario), the Clear Skies Act, and a proxy for the Interstate Air Quality Rule (IAQR).
- We compare their results with the OTC modeling results to understand the economic impacts of the various policies.

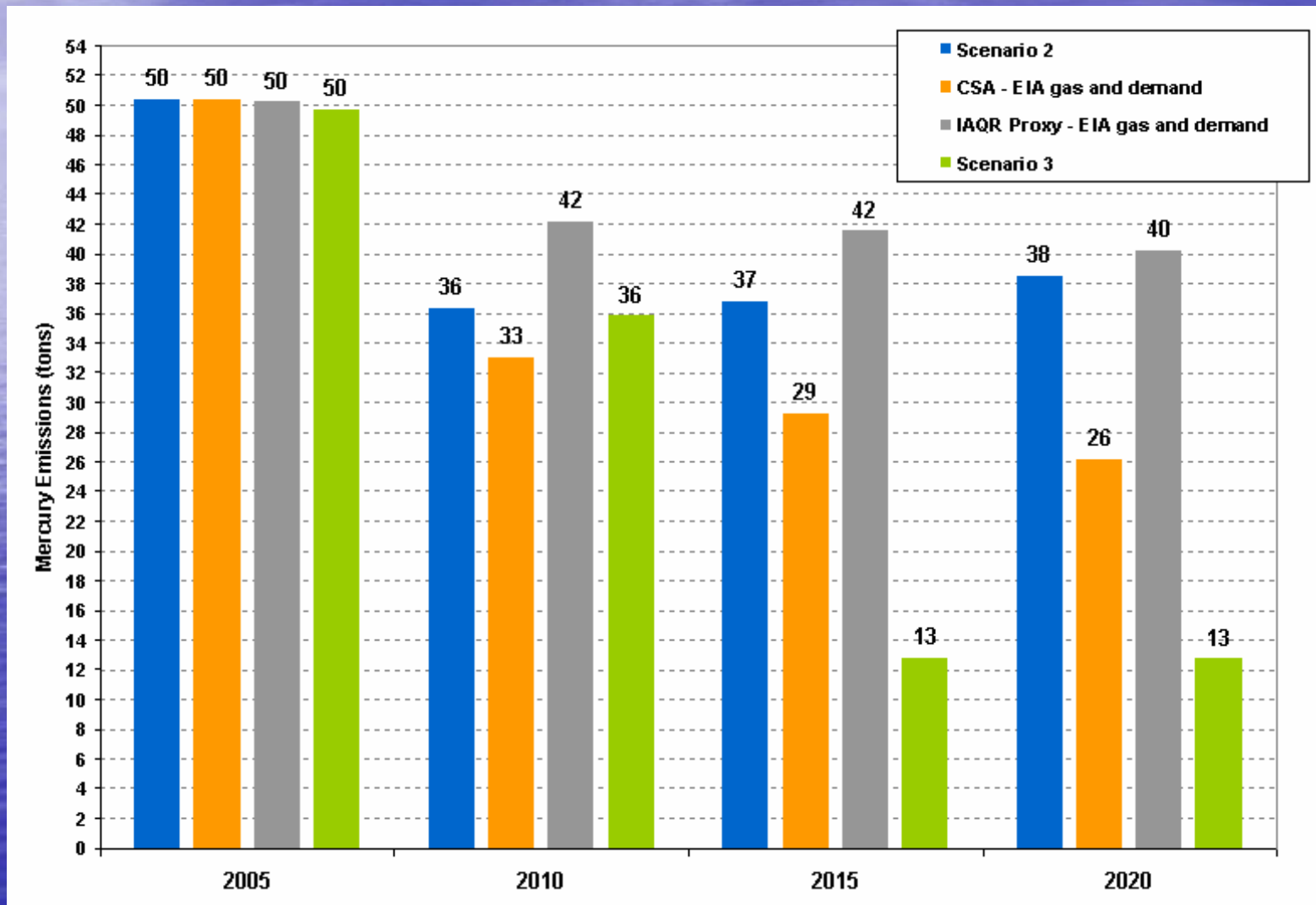
SO₂ Emissions Comparison



NOx Emissions Comparison



Mercury Emissions Comparison

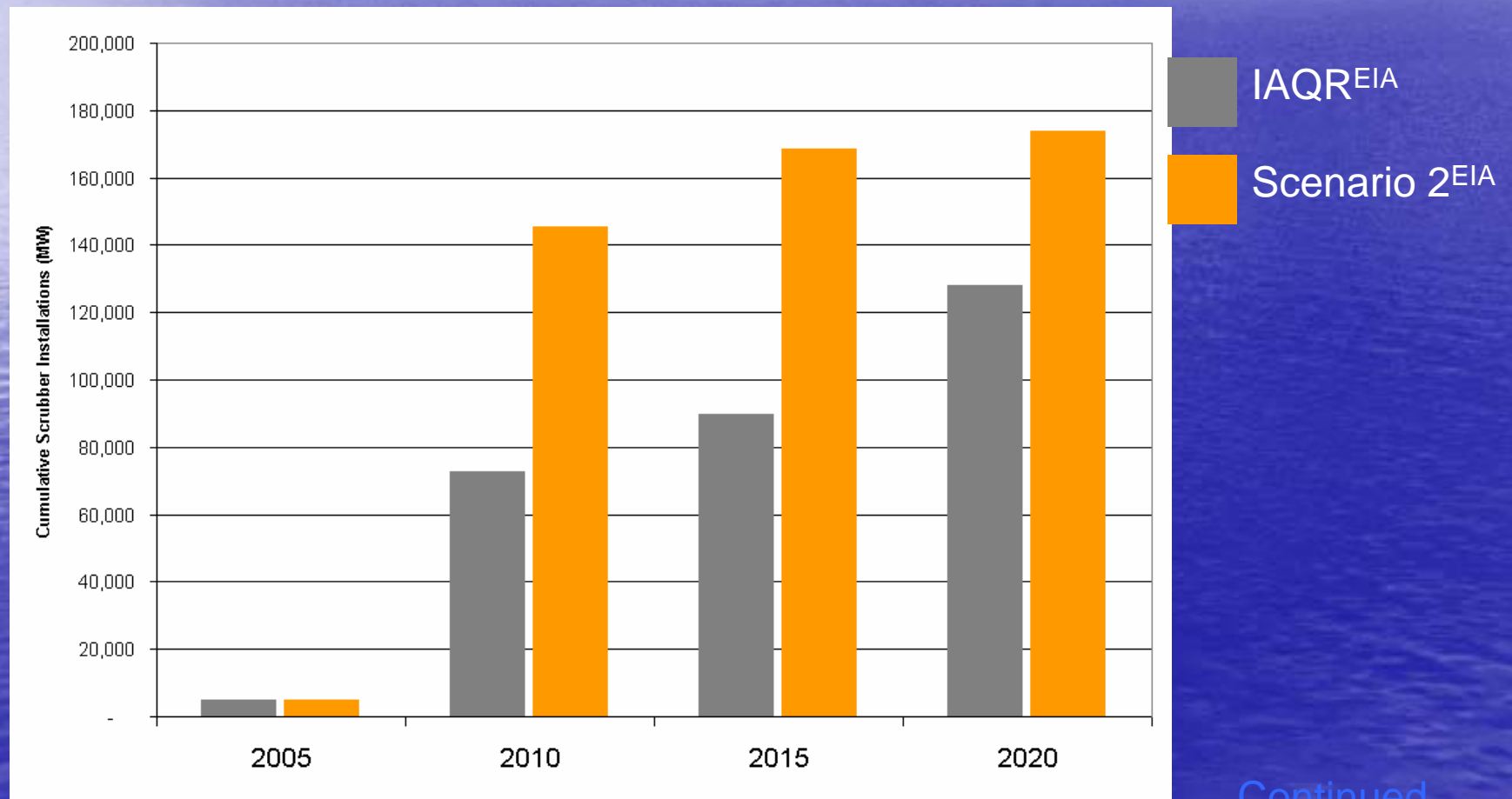


Scrubbers Installed

Scenario	2005	2010	2015	2020
OTC Scenarios				
Scenario 1 ^{EPA}	5,066 (+35%)	103,164 (+87%)	138,286 (+87%)	163,819 (+87%)
Scenario 2 ^{EIA}	5,066 (+3%)	145,540 (+90%)	168,507 (+88%)	174,018 (+87%)
Scenario 3 ^{EIA}	5,066 (+3%)	132,976 (+89%)	135,607 (+85%)	135,607 (+84%)
EPA Scenarios				
Base Case ^{EPA}	3,301 (NA)	13,818 (NA)	18,511 (NA)	21,820 (NA)
Base Case ^{EIA}	4,926 (NA)	15,146 (NA)	20,281 (NA)	21,906 (NA)
Clear Skies ^{EPA}	5,066 (+35%)	60,770 (+77%)	81,617 (+77%)	109,295 (+80%)
Clear Skies ^{EIA}	5,066 (+3%)	77,595 (+80%)	98,706 (+79%)	126,770 (+83%)
IAQR Proxy ^{EPA}	5,066 (+35%)	62,549 (+78%)	81,619 (+77%)	112,263 (+81%)
IAQR Proxy ^{EIA}	5,066 (+3%)	72,771 (+79%)	89,615 (+77%)	127,849 (+83%)

Scrubber Installations

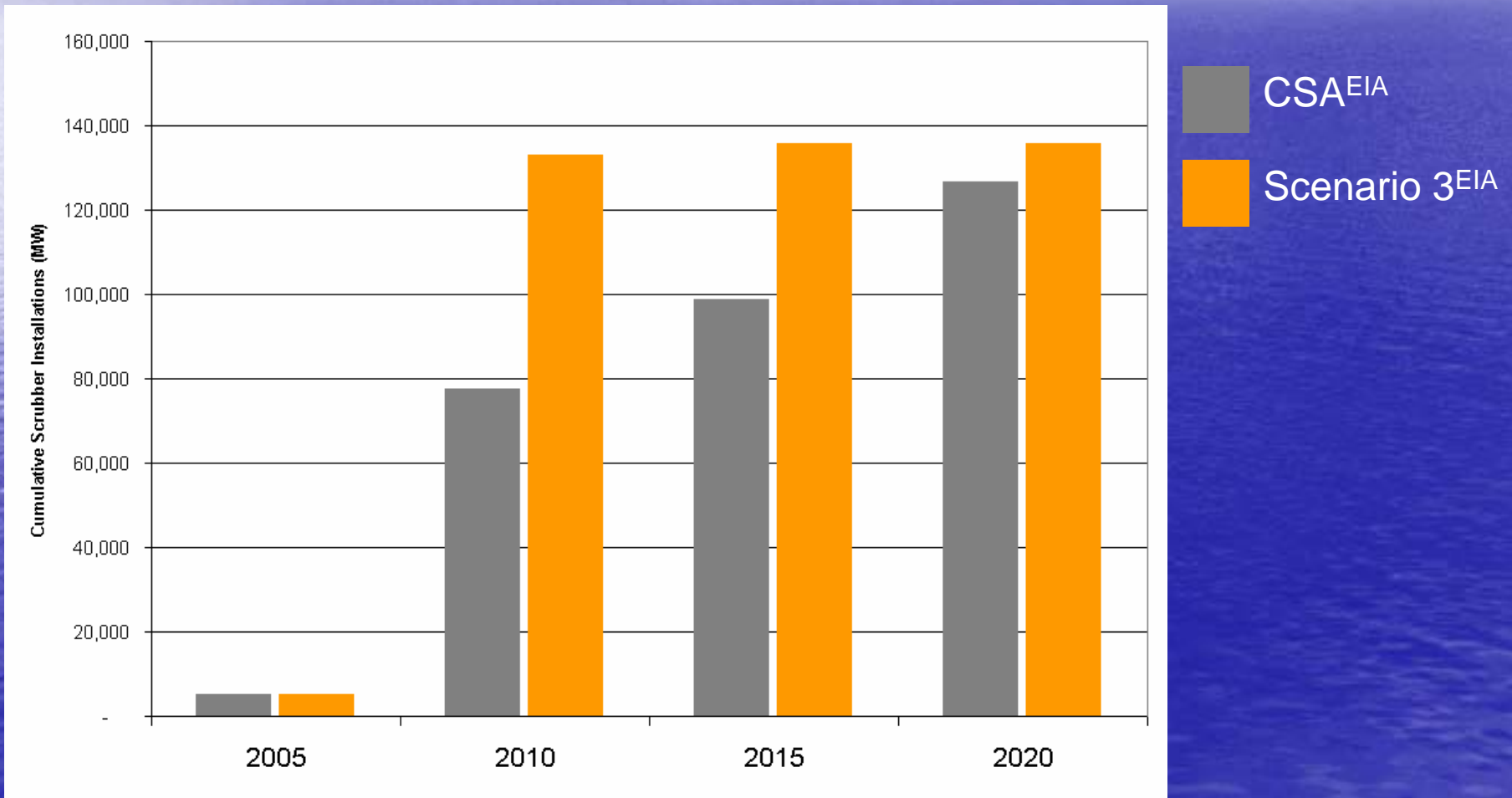
Figure 1. Cumulative Scrubber Installations



Continued

Scrubber Installations, continued

Figure 1. Cumulative Scrubber Installations



SNCR Installed

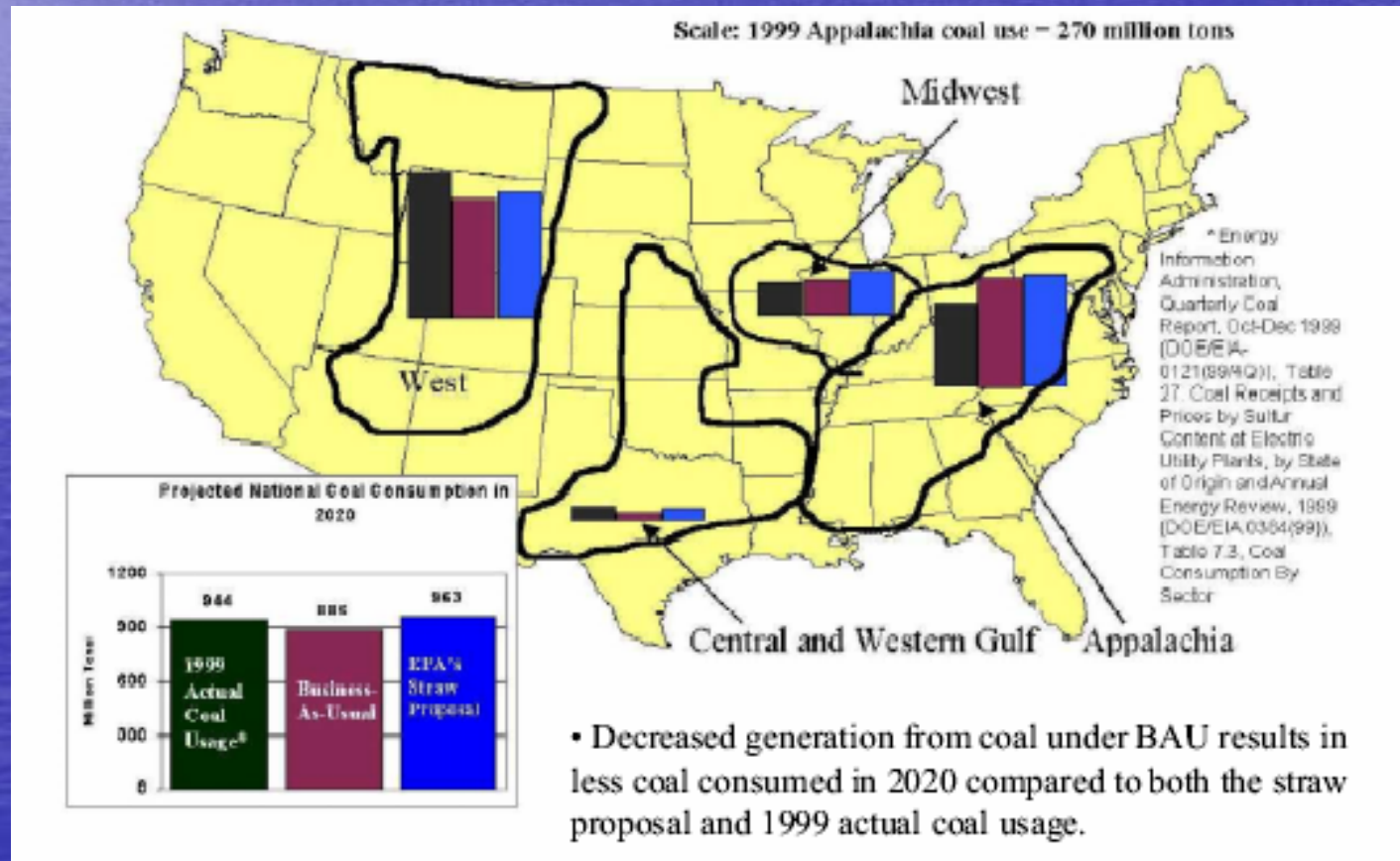
Scenario	2005	2010	2015	2020
OTC Scenarios				
Scenario 1 ^{EPA}	176 (+100%)	7,344 (+68%)	7,884 (+53%)	7,884 (+38%)
Scenario 2 ^{EIA}	266 (-3%)	7,608 (+41%)	8,670 (+36%)	8,735 (+23%)
Scenario 3 ^{EIA}	84 (-225%)	7,407 (+39%)	7,407 (+26%)	7,407 (+9%)
EPA Scenarios				
Base Case ^{EPA}	0 (NA)	2,347 (NA)	3,717 (NA)	4,851 (NA)
Base Case ^{EIA}	273 (NA)	4,499 (NA)	5,507 (NA)	6,769 (NA)
Clear Skies ^{EPA}	38 (+100%)	1,269 (-85%)	1,549 (-140%)	2,750 (-76%)
Clear Skies ^{EIA}	-	6,211 (+28%)	6,683 (+18%)	7,915 (+14%)
IAQR Proxy ^{EPA}	322 (+100%)	402 (-484%)	1,546 (-140%)	1,775 (-173%)
IAQR Proxy ^{EIA}	-	5,220 (+14%)	6,061 (+9%)	6,061 (-12%)

SCR Installed

Scenario	2005	2010	2015	2020
OTC Scenarios				
Scenario 1 ^{EPA}	22,350 (-54%)	114,147 (+56%)	161,019 (+63%)	161,819 (+61%)
Scenario 2 ^{EIA}	36,259 (-18%)	139,875 (+57%)	176,562 (+61%)	182,752 (+60%)
Scenario 3 ^{EIA}	34,808 (-23%)	135,558 (+55%)	137,286 (+50%)	137,286 (+47%)
EPA Scenarios				
Base Case ^{EPA}	34,428 (NA)	49,668 (NA)	58,923 (NA)	62,959 (NA)
Base Case ^{EIA}	42,664 (NA)	60,425 (NA)	68,469 (NA)	72,837 (NA)
Clear Skies ^{EPA}	29,942 (-15%)	91,684 (46%)	101,844 (42%)	133,558 (53%)
Clear Skies ^{EIA}	37,010 (-15%)	106,747 (+43%)	130,574 (+48%)	162,910 (+55%)
IAQR Proxy ^{EPA}	28,245 (-22%)	73,588 (+33%)	105,309 (+44%)	106,882 (+41%)
IAQR Proxy ^{EIA}	35,601 (-20%)	86,150 (+30%)	117,710 (+42%)	117,898 (+38%)

Generation Fuel Mix

In September 2001, EPA projected that coal consumption would increase under the “straw man” proposal relative to 1999 levels, with a shift from western coal mines to Midwest and Appalachian coal producers. The OTC proposal with similar limits on emissions is assumed to result in a similar outcome.



Changes in Coal Production

Scenario	2005	2010	2015	2020
OTC Scenarios				
Scenario 1 ^{EPA}				
Bit	12,951	15,214	15,989	16,210
Lig	683	876	777	681
Sub	6,142	4,855	4,335	4,163
Total	19,776 (-4%)	20,945 (-3%)	21,100 (-4%)	21,053 (-9%)
Scenario 2 ^{EIA}				
Bit	13,639	16,172	19,083	20,528
Lig	953	1,032	999	964
Sub	6,240	4,870	5,691	6,558
Total	20,832 (-2%)	22,074 (-2%)	25,773 (-3%)	28,050 (-5%)
Scenario 3 ^{EIA}				
Bit	13,530	16,231	17,402	17,818
Lig	935	929	95	66
Sub	6,207	4,387	3,087	3,090
Total	20,672 (-2%)	21,546 (-4%)	20,585 (-22%)	20,973 (-29%)

Changes in Coal Production - Continued

EPA Scenarios				
Base Case ^{EPA} OTC Scenario 1	20,557 (NA)	21,542 (NA)	21,988 (NA)	23,244 (NA)
Base Case ^{EIA} OTC Scenarios 2& 3	21,152 (NA)	22,459 (NA)	26,467 (NA)	29,547 (NA)
Clear Skies ^{EPA} OTC Scenario 1	20,270 (-1%)	21,084 (-2%)	21,453 (-2%)	21,427 (-8%)
Clear Skies ^{EIA} OTC Scenarios 2& 3	20,879 (-1%)	22,189 (-1%)	26,152 (-1%)	29,207 (-1%)
IAQR Proxy ^{EPA} OTC Scenarios 1	20,247 (-2%)	21,322 (-1%)	21,696 (-1%)	21,738 (-6%)
IAQR Proxy ^{EIA} OTC Scenarios 2& 3	20,823 (-2%)	22,357 (-0.5%)	26,308 (-1%)	28,983 (-2%)

Generation Fuel Mix

Figure 1. Generation Fuel Mix
OTC Scenario 2^{EIA} (2020)

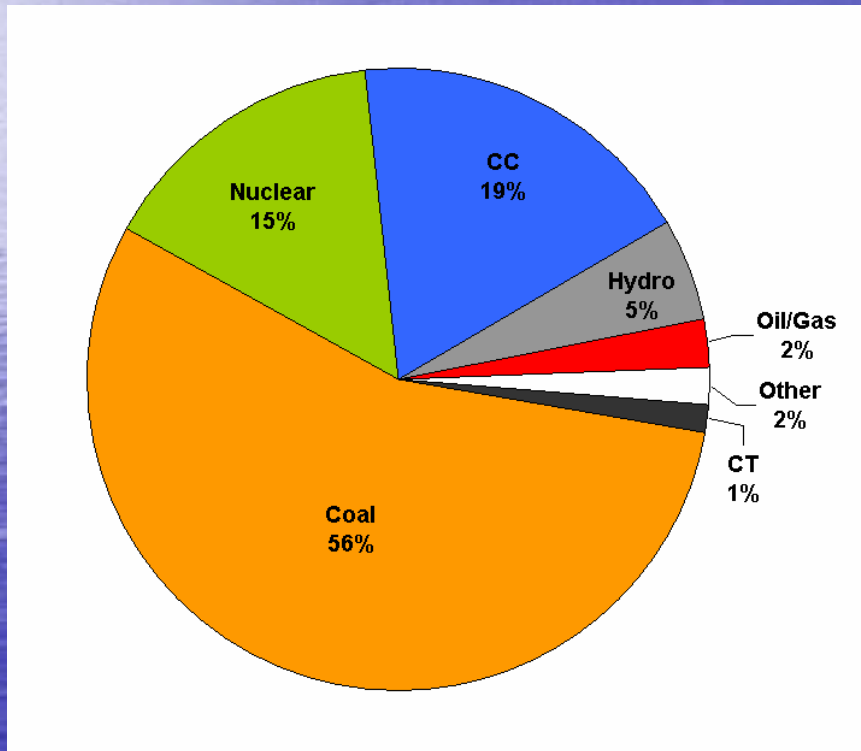
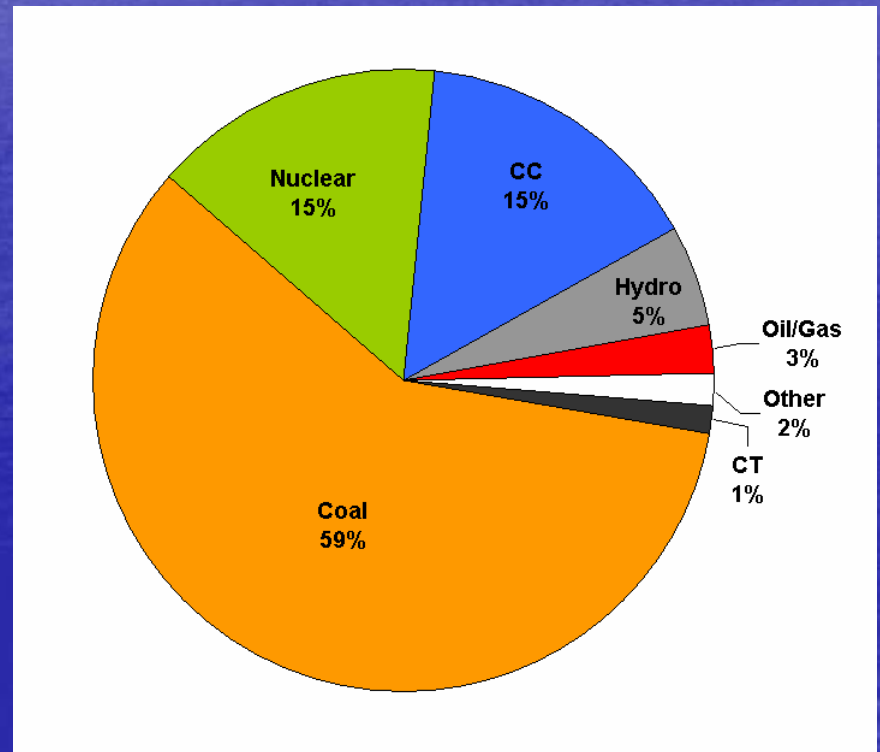


Figure 2. Generation Fuel Mix
IAQR^{EIA} (2020)



Continued

Generation Fuel Mix, continued

Figure 1. Generation Fuel Mix
OTC Scenario 3^{EIA} (2020)

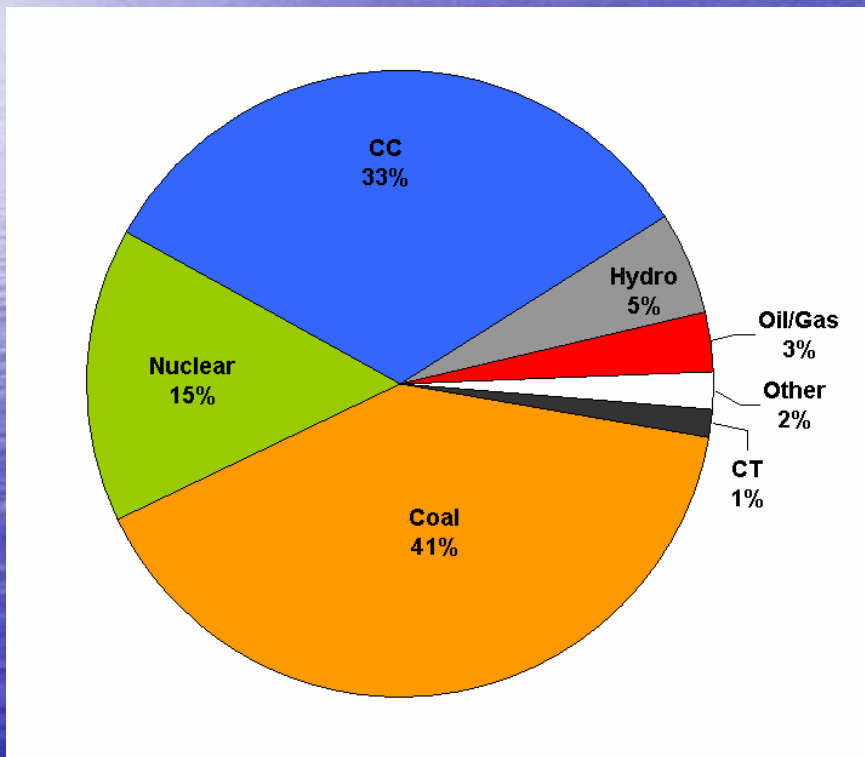
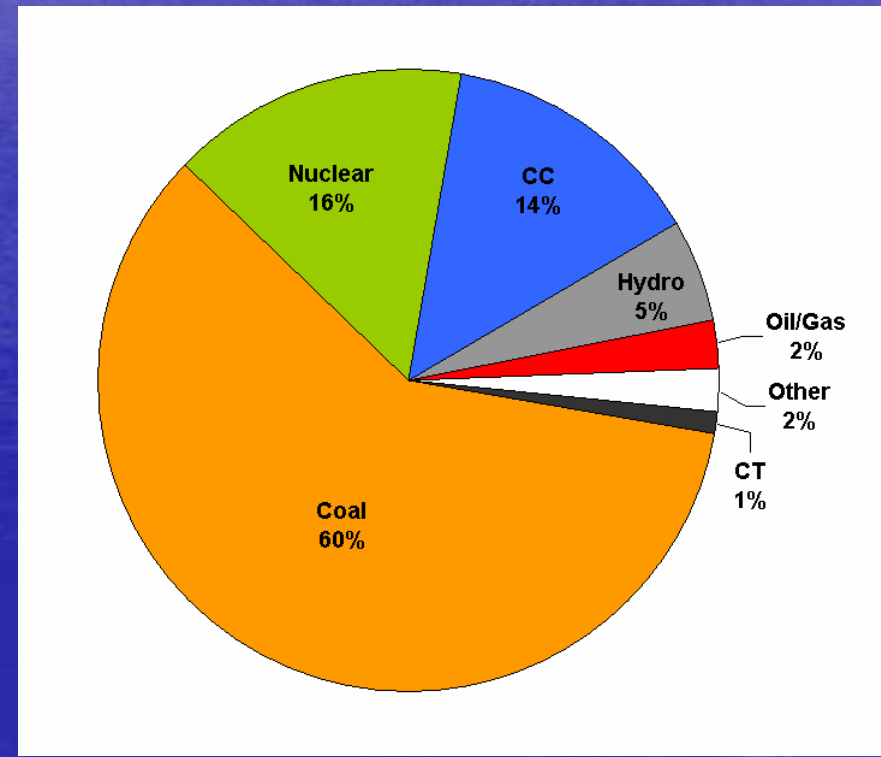


Figure 2. Generation Fuel Mix
CSA^{EIA} (2020)



Major Capacity Changes

Figure 1. Capacity Additions and Retirements OTC Scenario 2^{EIA}

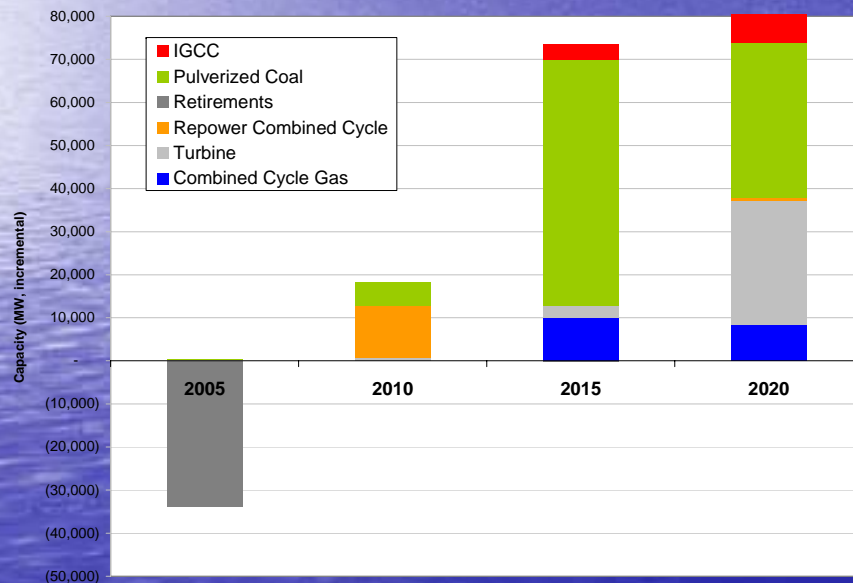
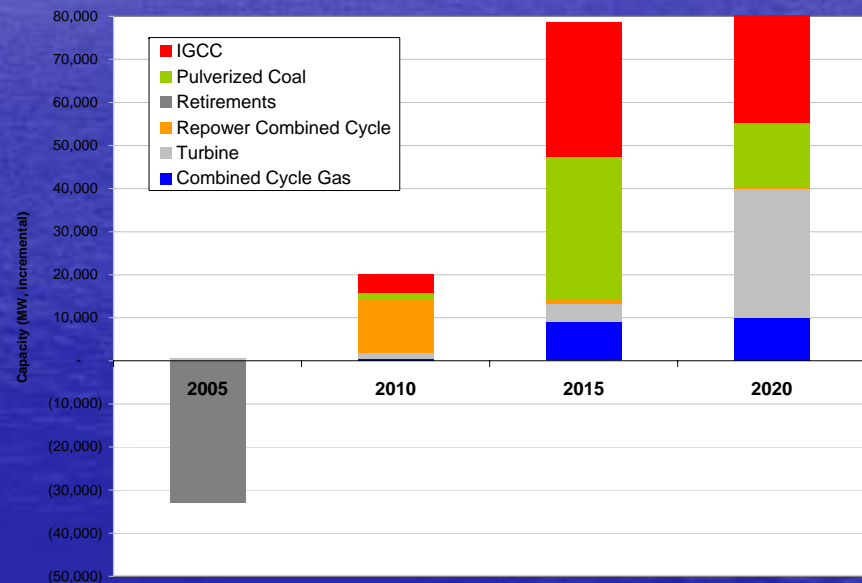


Figure 2. Capacity Additions and Retirements IAQR^{EIA}



Continued

Major Capacity Changes, continued

Figure 1. Capacity Additions and Retirements OTC Scenario 3^{EIA}

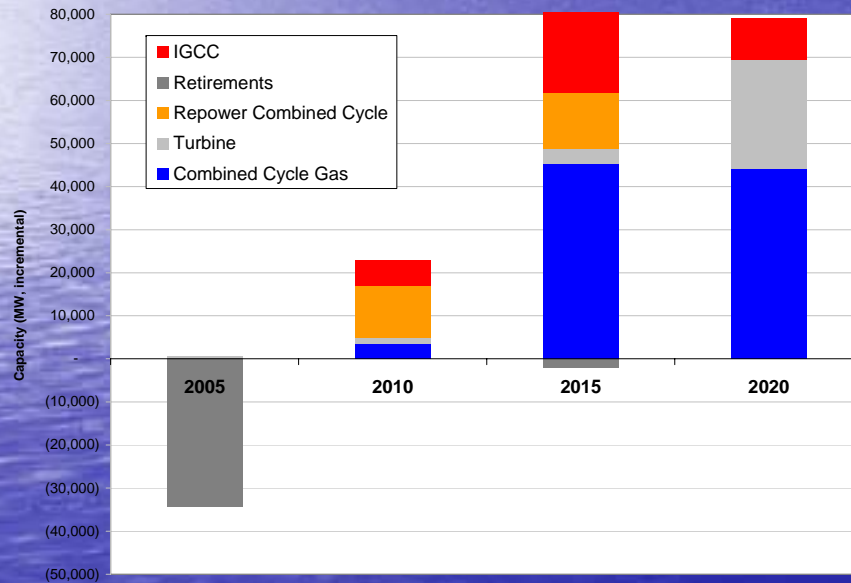
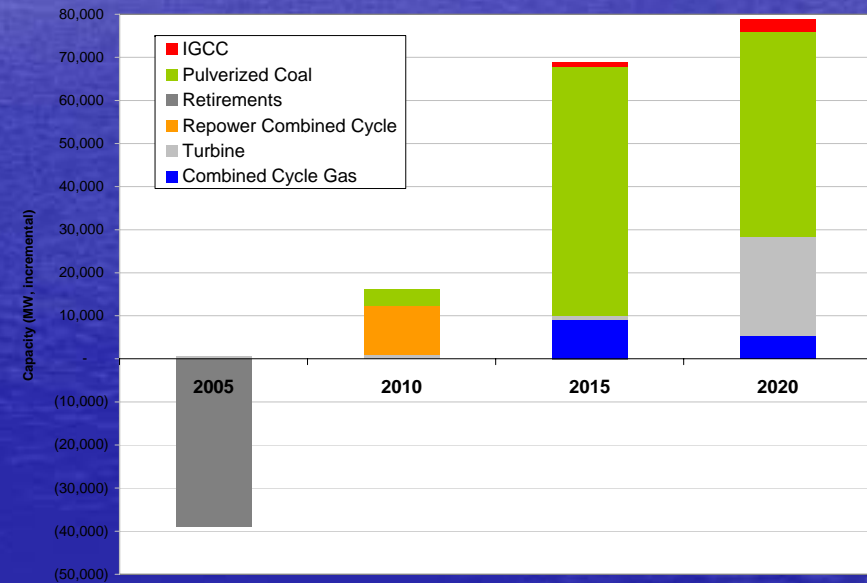
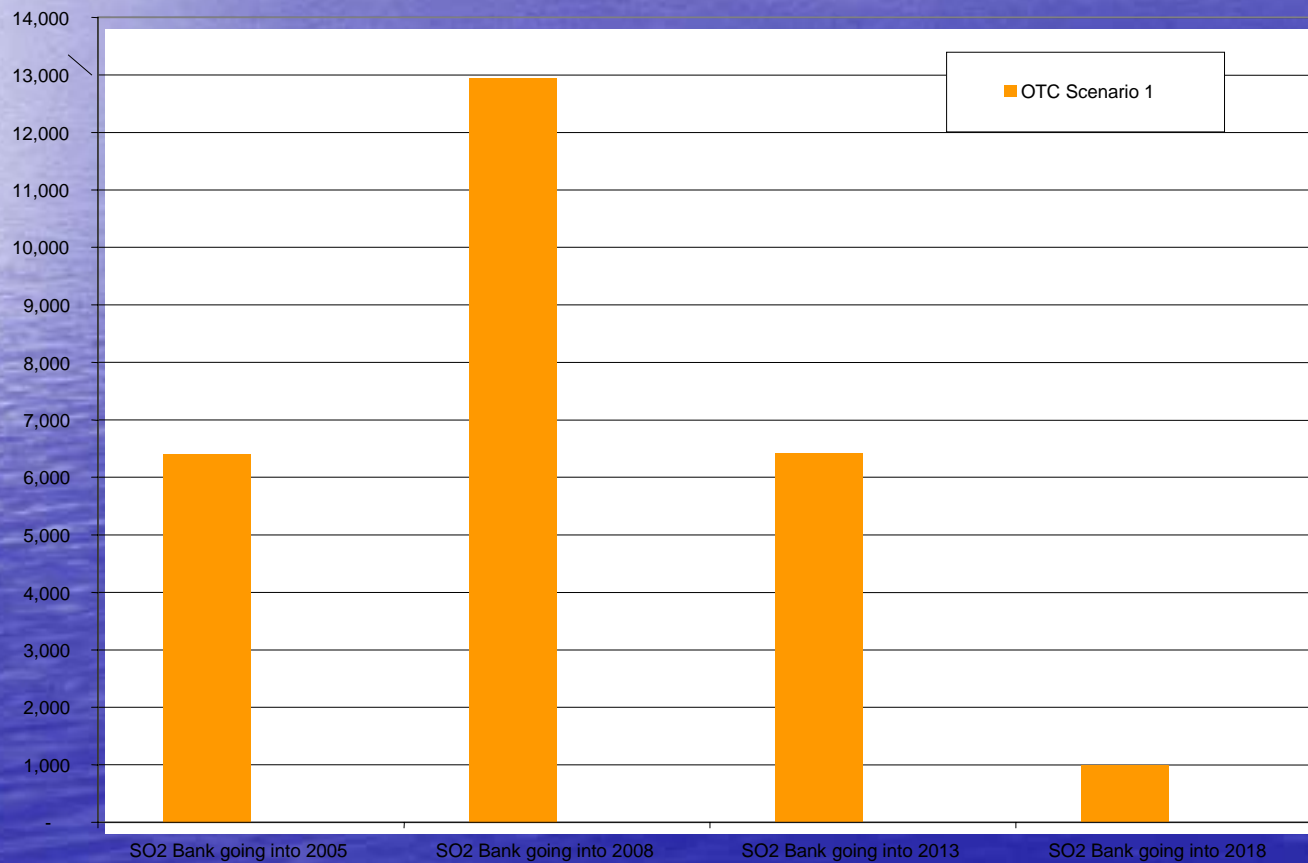


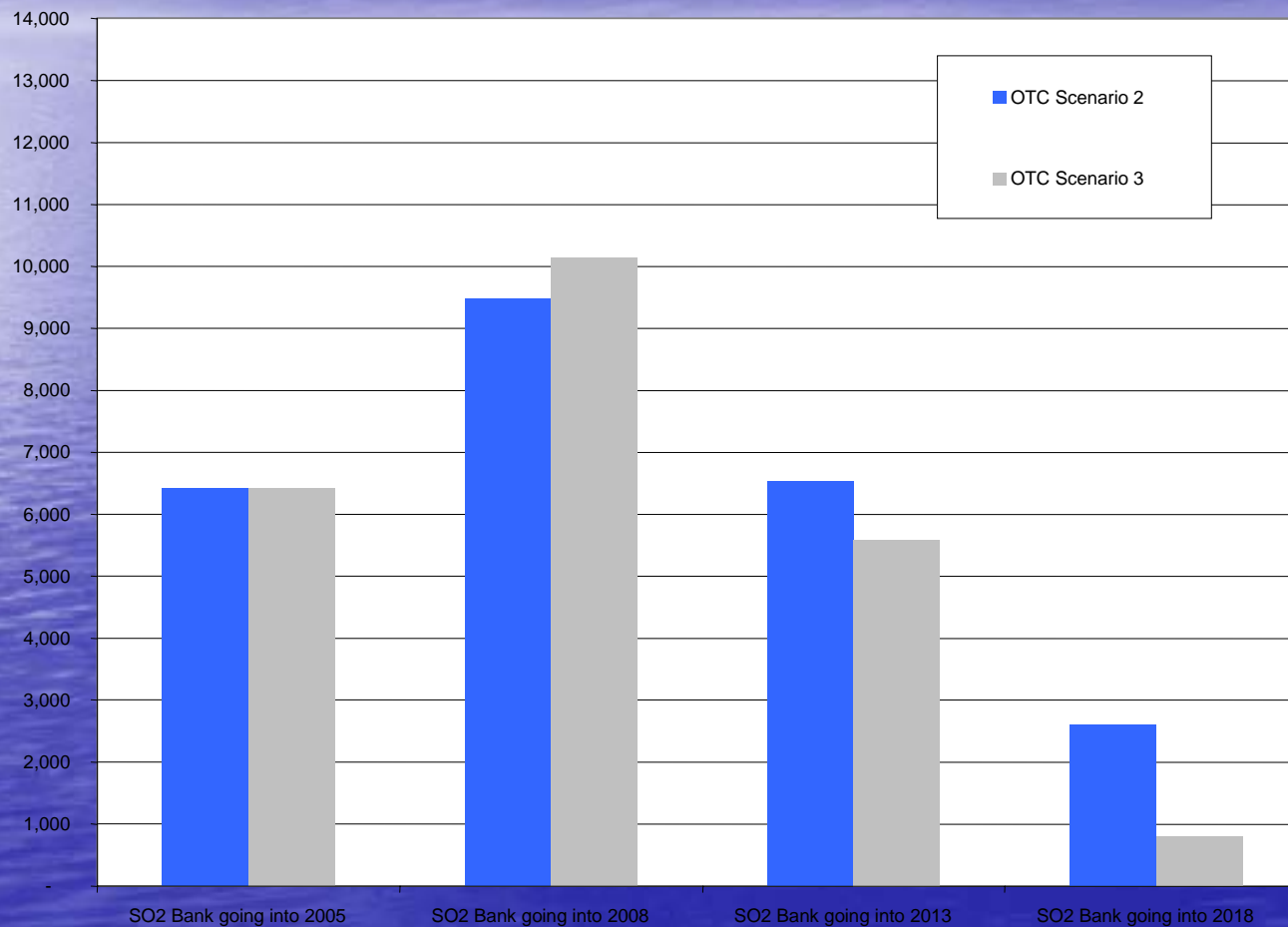
Figure 2. Capacity Additions and Retirements CSA^{EIA}



Banked SO₂ Allowances



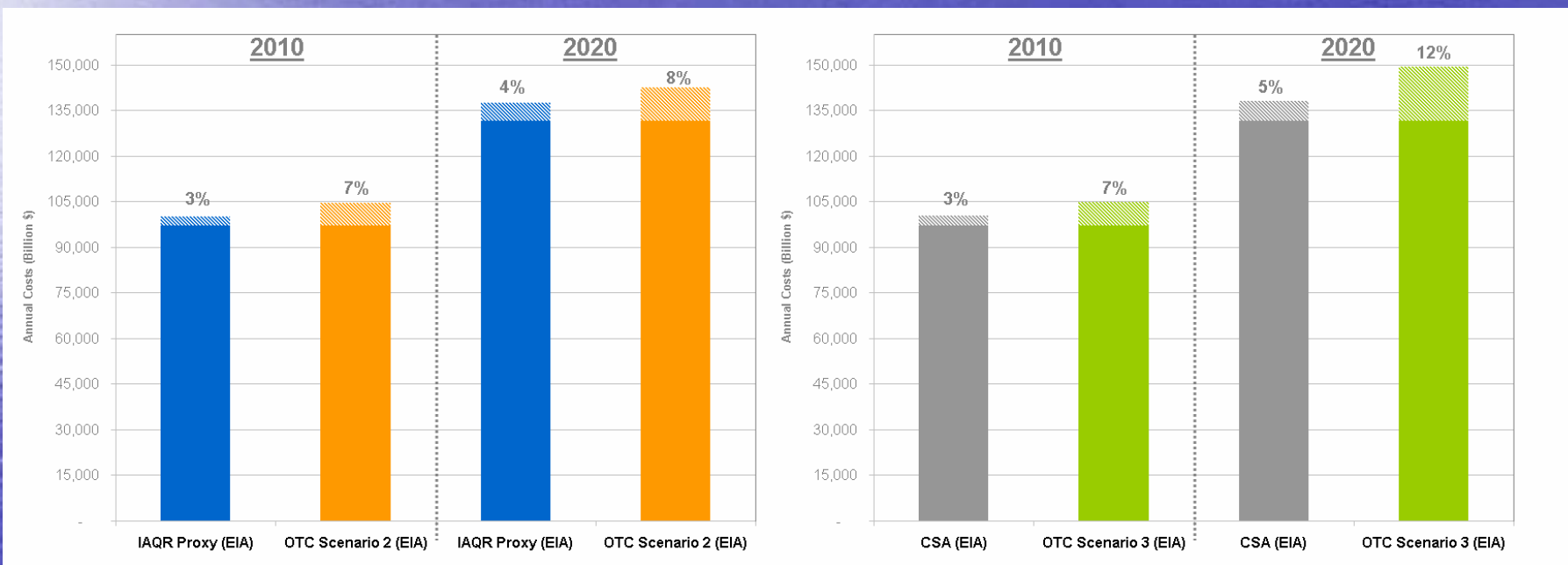
Banked SO₂ Allowances



Annual Compliance Costs

Figure 1. Annual Compliance Costs as a % of Total System Costs

Figure 2. Annual Compliance Costs as a % of Total System Costs



Each bar (light and dark portions) represents the total costs required to operate the electric generating system. The lighter portions of the bars show the incremental costs attributable to the multi-pollutant proposals. The darker portions show EPA's Base Case projections of total system costs.

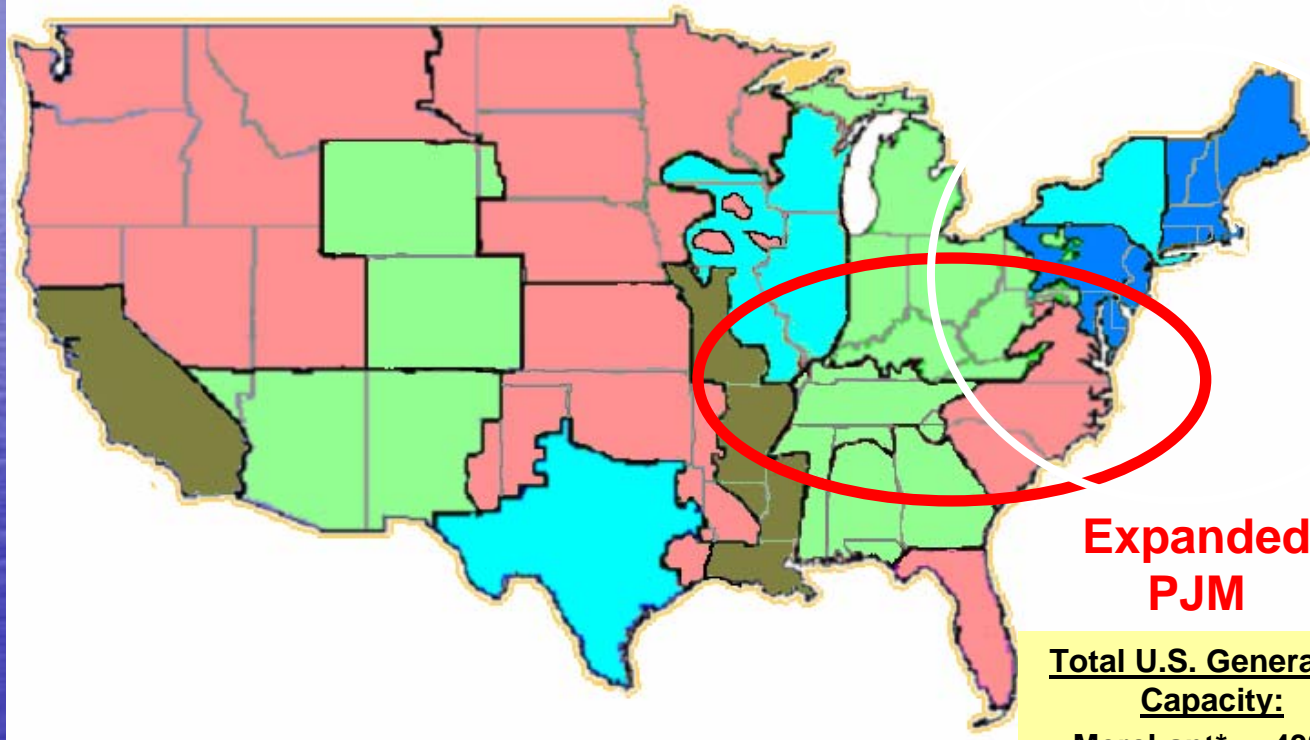
Electricity Price Impacts

- OTC Scenario 2^{EIA} is projected to result in a national average wholesale electricity price 4% higher than the IAQR Proxy^{EIA} in 2020.
- Scenario 3^{EIA} is projected to result in a national average wholesale electricity price 8% higher than CSA^{EIA} in 2020.
- Retail price impacts will be lower (on a percentage basis) in all cases because retail prices reflect both the electricity costs as well as the cost of delivering the electricity, which remains constant.

The Unlevel Playing Field

Merchant v. Regulated/Re-Regulated Generation

National Distribution of Merchant Generation



Merchant Generation Ownership*

- >80%
- 60% - 80%
- 40% - 60%
- 20% - 40%
- <20%

* Represents non-utility and non-public power generation ownership

Expanded PJM

Total U.S. Generation Capacity:

Merchant*	43%
Utility	36%
Public	21%

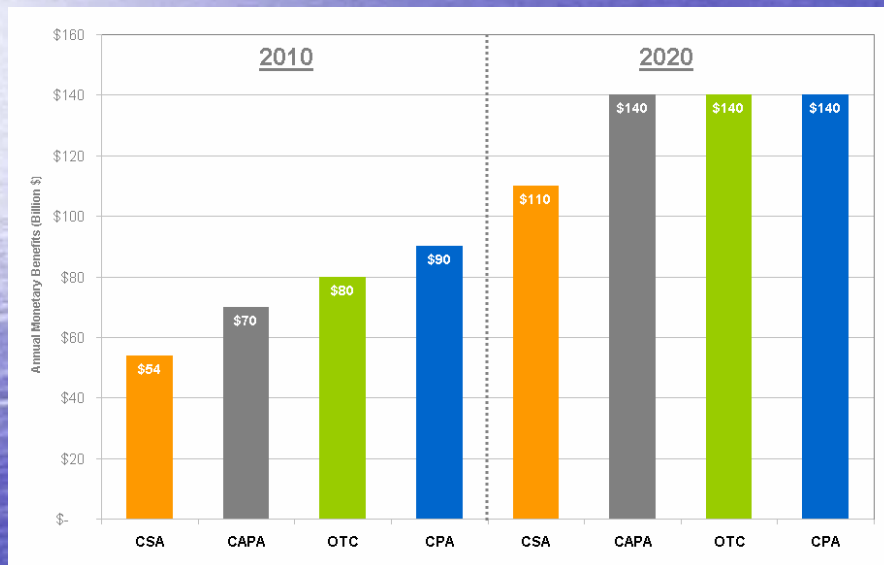
Source: PowerDat

Benefits Analysis

- EPA has prepared an analysis of the health benefits attributable to the Clear Skies Act. It has also analyzed the Clean Air Planning Act and the Clean Power Act in response to requests from the Senate Environment and Public Works Committee. These analyses include an estimate of the monetized benefits of the three proposals as well as estimates of the number of premature deaths avoided. The vast majority of the monetized benefits result from reduced concentrations in fine particle concentrations (e.g., EPA does not estimate benefits attributable to reduced mercury exposure.) These estimates are presented on the following slide.
- EPA's benefits estimates (for CAPA and CPA) are based entirely on the SO₂ reductions achieved by the bills.
- In the near term (2009-2011), the OTC SO₂ emission cap lies between those proposed by CAPA and the CPA; therefore, we estimate that the OTC proposal would generate \$80 billion in monetized health benefits in 2010.
- By 2020, the OTC SO₂ cap is below both the CAPA proposal as well as the CPA; therefore, we estimate that the OTC proposal would generate in excess of \$140 billion in monetized health benefits in 2020.

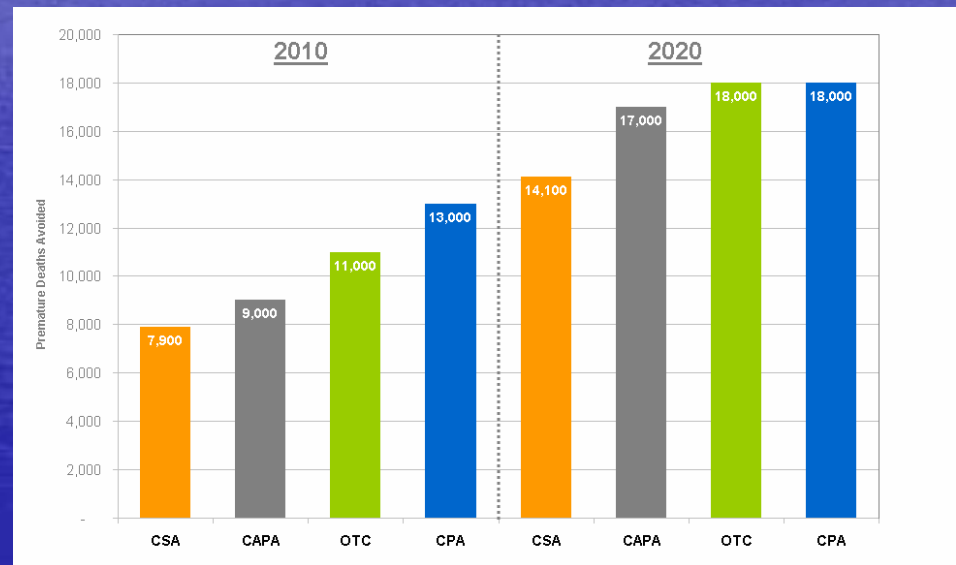
Benefits Comparisons

Figure 1. Annual Monetized Benefits



The OTC multi-pollutant proposal is likely to generate roughly \$80 billion in monetized benefits in 2010, and an excess of \$140 billion in monetized health benefits in 2020.

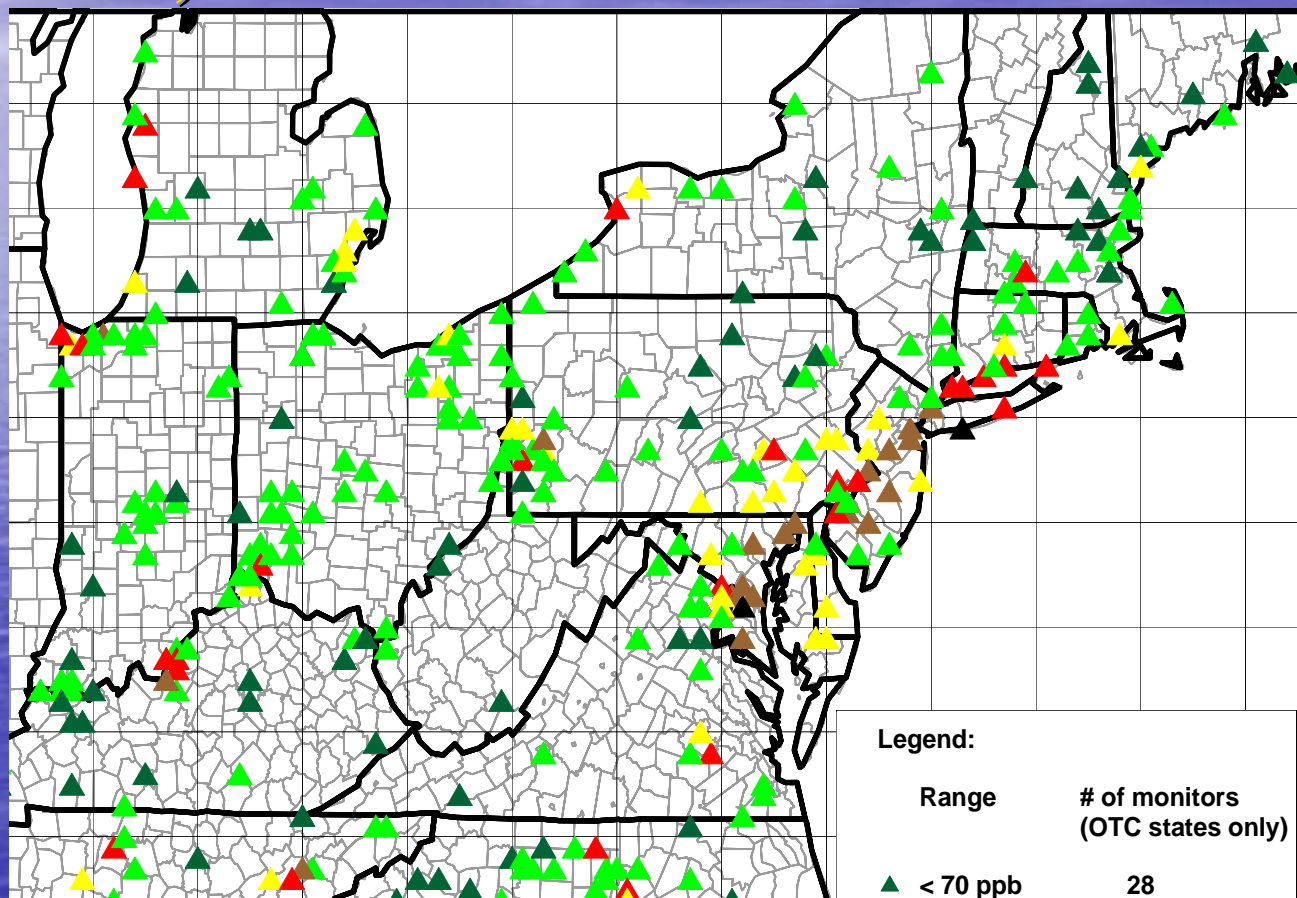
Figure 2. Annual Estimates of Premature Deaths Avoided



Based on EPA's benefits assessments, the OTC multi-pollutant proposal is estimated to avoid 11,000 premature deaths in 2010, and an excess of 18,000 premature deaths in 2020.

OTC Proposal

CSI - 25%, - 25% Area & Mobile 2010



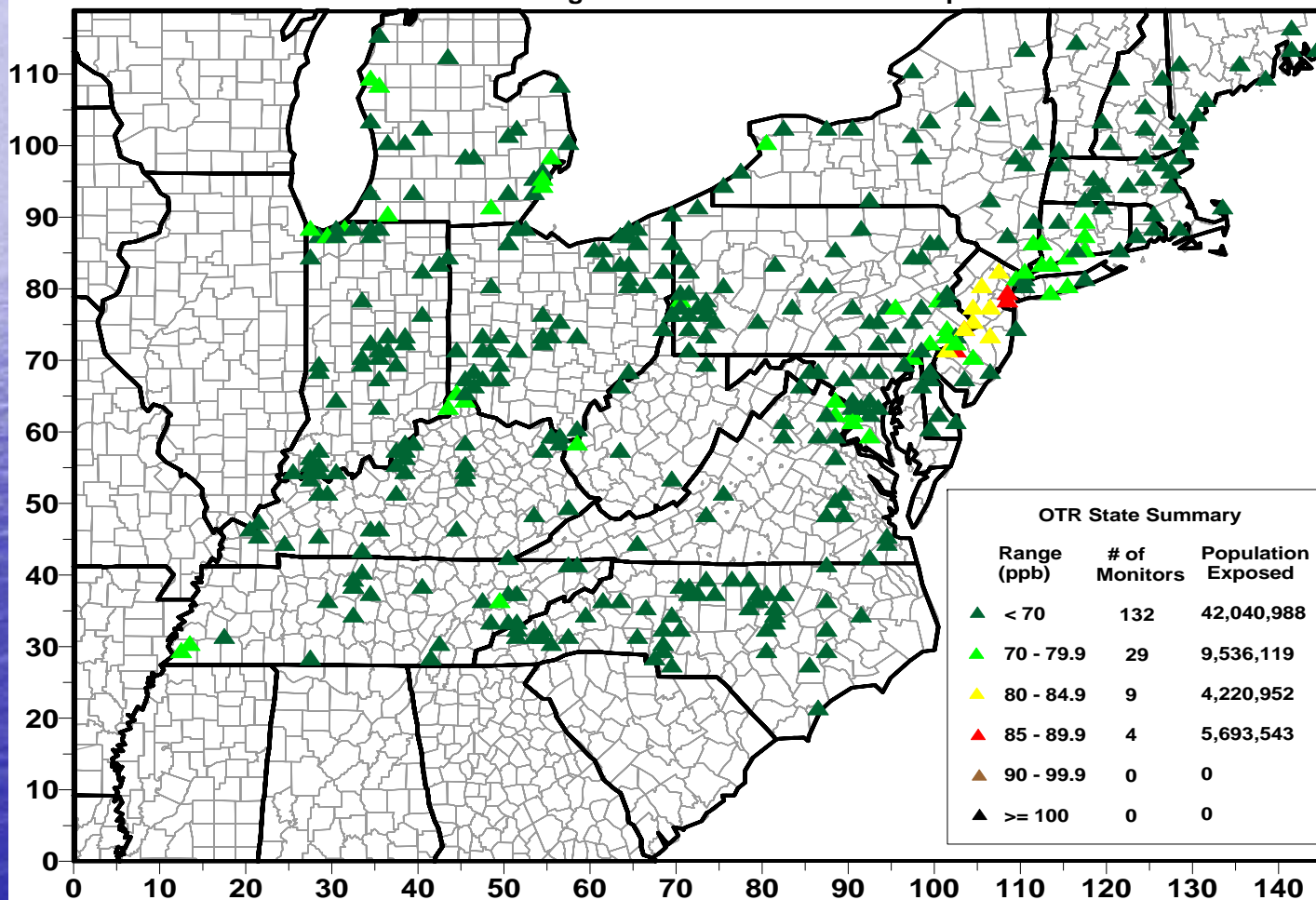
▲ <70, ▲ 70-80, ▲ 80-85, ▲ 85-90, ▲ 90-100, ▲ >100 (ppb)

Preliminary: Based on June 1995 Episode

OTC Proposal

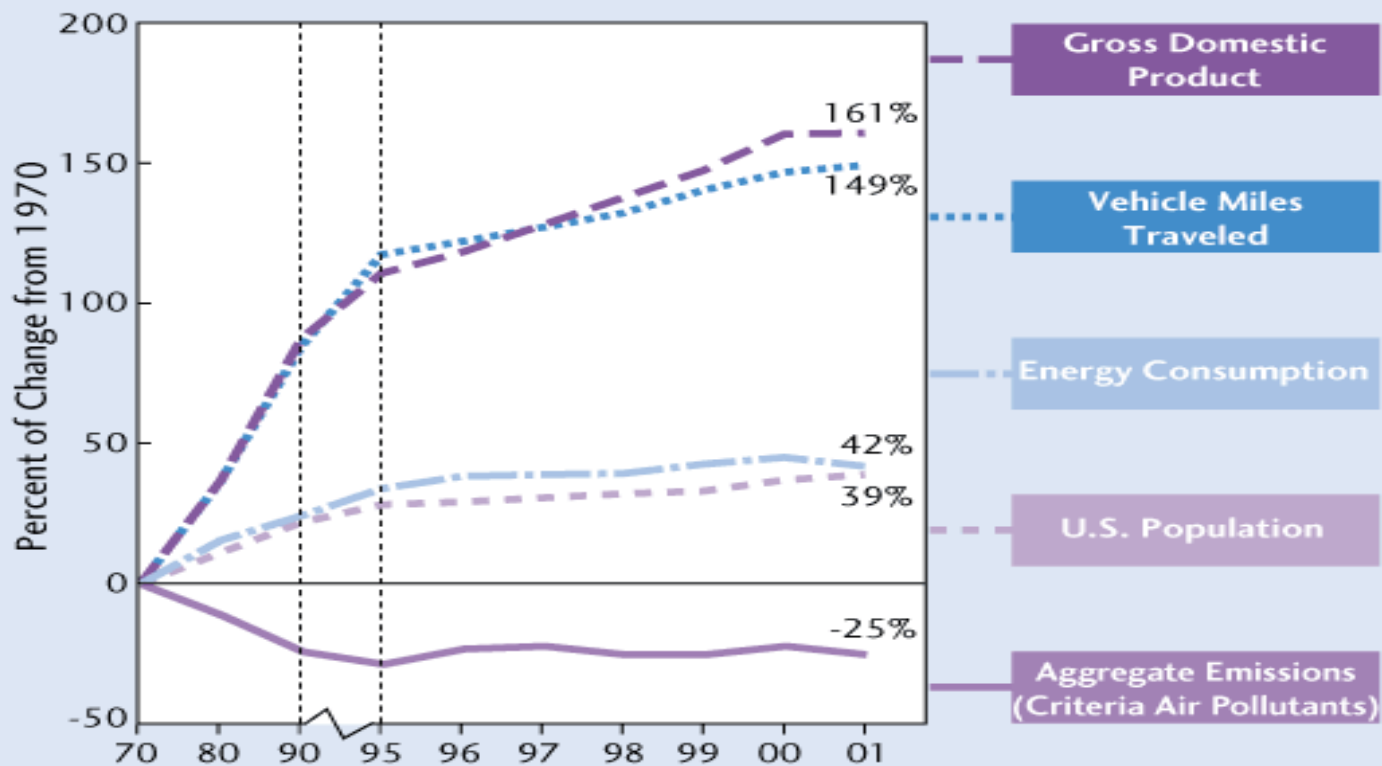
CSI - 25%, - 75% Area & Mobile 2010

Maximum Adjusted Control Case 8-hour Ozone Concentrations at Ozone Monitors
R103 (2010 OTC Resolution minus 75% Area NO_x & VOC and 75% Mobile NO_x)
Based on Maximum Design Values 1999-2001, 2000-2002, & 2001-2003
CALGRID Modeling Domain - JUNE/JULY 1995 Episodes

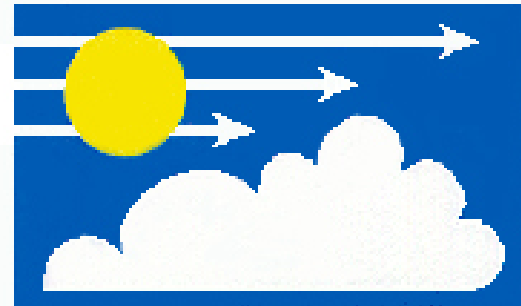


"Environment vs. Jobs and the Economy" ... A False Choice

Exhibit I-1: Comparison of growth measures and emission trends, 1970-2001



Source: EPA, Office of Air Quality Planning and Standards. *Latest Findings on National Air Quality: 2001 Status and Trends*. September 2002.



OZONE
TRANSPORT
COMMISSION