Better Buildings
U.S. DEPARTMENT OF ENERGY

Co-benefits Reaped from Energy Planning and Energy Efficiency Technology

Tad Aburn, Maryland Department of the Environment
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U.S. DEPARTMENT OF ENERGY

MARYLAND

Department of the Environment

Air Quality and Climate Benefits from Energy Planning & Energy Efficiency

"Show Me the Credit"

Tad Aburn, Air Director, MDE
Better Buildings Summit, May 8, 2014

MDE

Presentation Overview

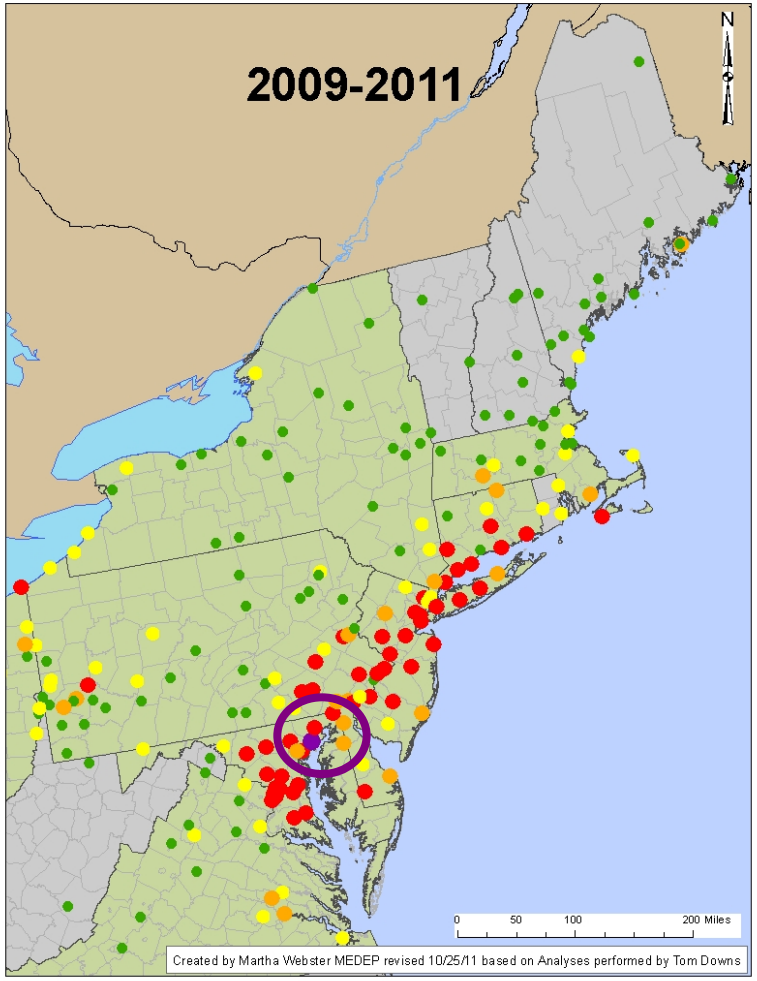
- A little background on air quality in Maryland
- The challenges in building a clean air plan (also called the "SIP")
- Maryland's effort to link our energy efficiency initiatives and other energy programs to the air quality planning process
  - Maryland was part of the EPA "Roadmap" pilot program
    - Focused on the Weight-of-Evidence (WOE) pathway

Air Quality Issues in Maryland

- Ground level Ozone and Transport
- Fine Particulate Matter
- The new sulfur dioxide, nitrogen dioxide and lead standards
- Air quality impacts on the Chesapeake Bay
- A state required greenhouse gas reduction effort
- Multi-Pollutant Planning
- Environmental Justice
- Energy Efficiency efforts can help with all of these issues

Baltimore – The Last Purple Dot

- Our biggest problem is ozone
- Still struggling with the old, 85 ppb ozone standard
- Only area in the east designated by EPA as a “moderate” nonattainment area for the 75 ppb Ozone standard

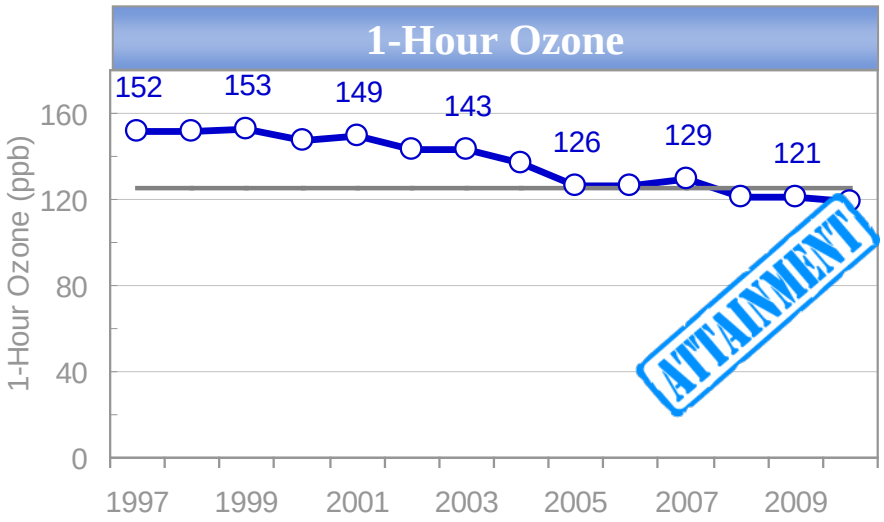


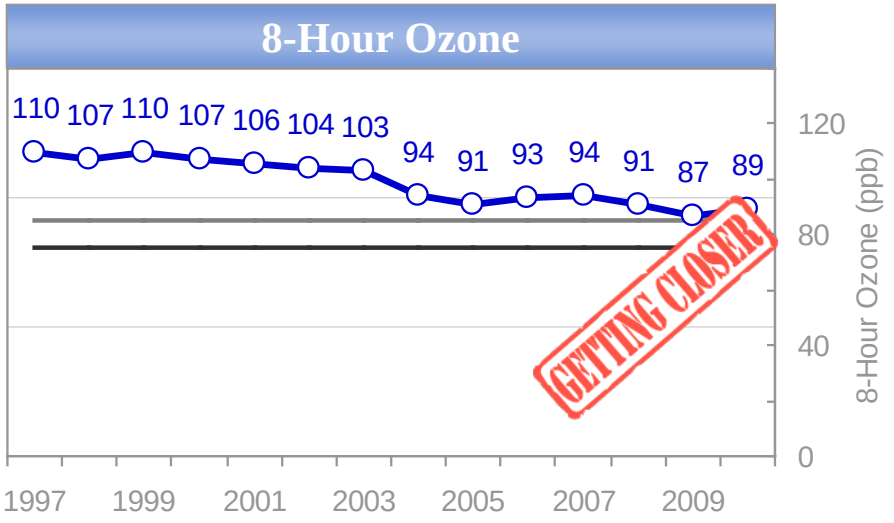
- <71
- 71-73
- 74-75
- 76-85 (mar)
- >85 (mod)

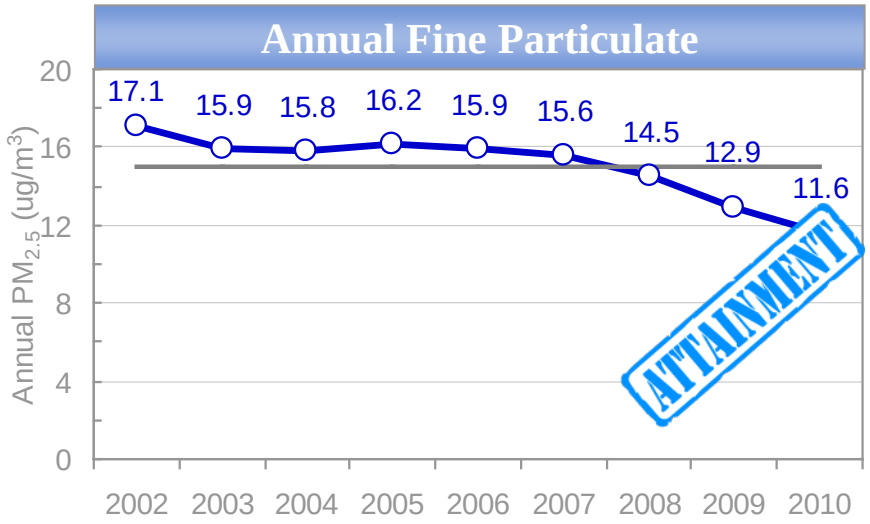
Parts per Billion (ppb)

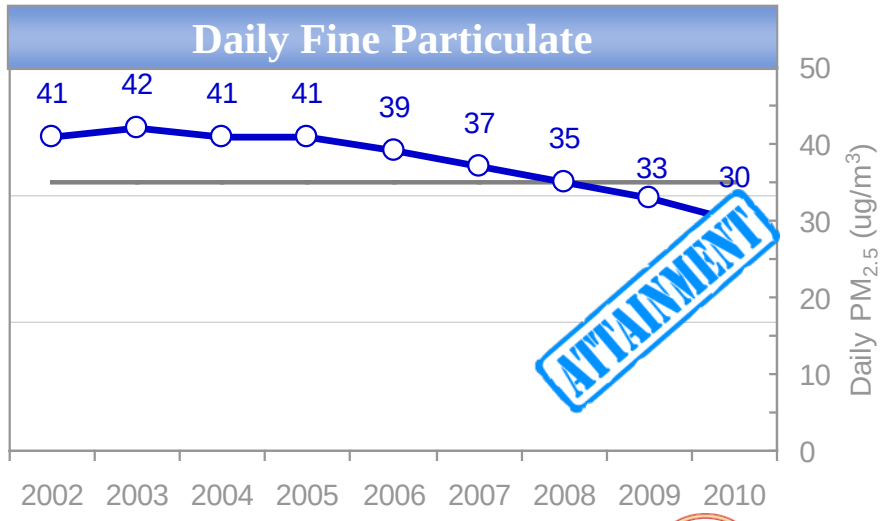
States with Nonattainment Monitors

Progress in Cleaning Maryland's Air









What Have We Learned from All of This?

So What Else Can MD Do?

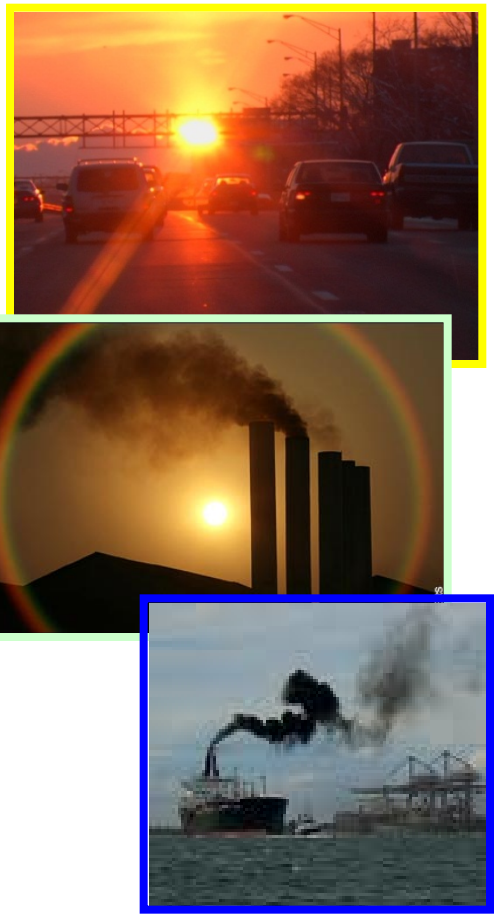
- MDE has worked with the University of Maryland for over 20 years to study where our air pollution problem comes from
- It's not all that complicated
  - Just very, very difficult
- There are two basic pieces:
  - Maryland's emissions
  - Emissions in upwind states
    - On certain days sources in upwind states are responsible for 70% to 90% of our problems

So is Maryland Still Pushing Local Controls?

- Yes – For example, the Maryland Health Air Act
  - It's a $2.6 Billion power plant control program
  - Single sources in upwind states now emit more NOx than all of MDs sources combined
- We are also a California Car State
  - Toughest car standards allowed by law
- New local rules on everything we can find
  - Cement kilns to perfume
  - Even pushing crazy – nontraditional - stuff
    - Voluntary programs, outreach programs, incentive programs
    - Outside-the-box transportation initiatives … and so on
- This is where our efforts on getting energy efficiency and renewable energy (EE/RE) programs into our clean air planning process fit
  - It's one of the crazy – nontraditional – approaches we're pushing to further clean the air

What Have We Done so Far?

- We are working with the Northeast States for Coordinated Air Use Management (NESCAUM) to build the analytical framework that will allow us to take a different approach to AQ planning
- The new approach can:
  - Quantify the emission reductions of multiple pollutants for a broad suite of energy programs
  - Model the reductions in ozone, fine particulate and other pollutants
  - Estimate the public health benefits associated with those reductions, and
  - Quantify the economic benefits and costs



Multi-Pollutant Planning

- Maryland sees this as a critical piece of how we do air quality planning in the future
  - Under the Clean Air Act states are required to adopt State Implementation Plans (SIPs)
- Unfortunately, the laws do not drive multi-pollutant planning
  - They have more of a single pollutant focus
- Our approach:
  - Use the single pollutant mandates – but always look at the multi-pollutant benefits
    - 2010 Ozone SIP
    - 2012 Greenhouse Gas SIP (State law)
    - 2015 Ozone SIP
    - Post 2015 SIPs
  - Address our pollution problem in a more strategic and resource-efficient manner
  - Include the benefits from our EE/RE initiatives as part of this multi-pollutant planning process

Our "Credit for EE/RE" Approach

- Build technical capabilities to analyze and evaluate the emission benefits and air quality improvements associated with EE/RE programs
- Have partnered with the NESCAUM, EPA and other states, like NY and MA, to build these technical tools
- Looking at benefits from reductions in:
  - Greenhouse gas (GHG) emissions
  - Nitrogen oxide (NOx) emissions
    - Number 1 pollutant for ozone
  - Sulfur dioxide (SO2) emissions
    - Number 1 pollutant for fine particulate and regional haze
  - Mercury emissions
  - Other emissions

The Modeling Framework

The Workhorse

- NE-MARKAL model – an energy model that we now use to analyze the energy implications and emission reductions from a “bundled” suite of selected energy programs

Linked models

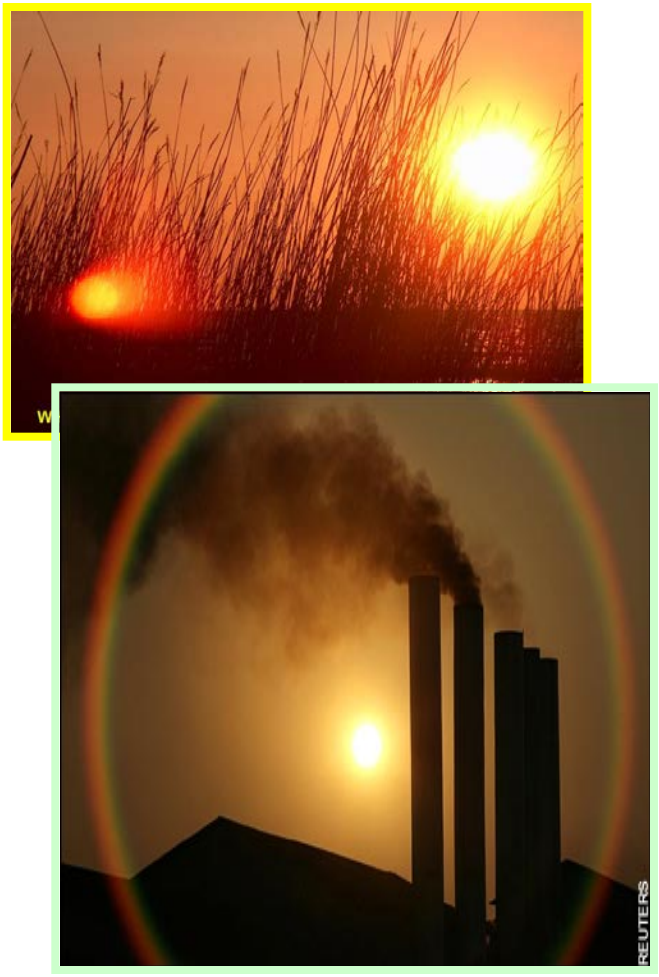
- The photochemical – “air quality” model (CMAQ)
- An economic model (REMI)
- A cost-benefit model (BenMAP)

The Programs We Have Analyzed So Far

- At this time, we have focused on a package of our highest priority energy initiatives in Maryland
  - The Regional Greenhouse Gas Initiative (RGGI)
  - The EmPOWER Maryland program
  - The Maryland Renewable Portfolio Standards (RPS) program
  - The Maryland Clean Cars program
  - Electric Vehicle Initiatives
  - Zero Waste
  - Building and Trade Codes
  - Gas Tax

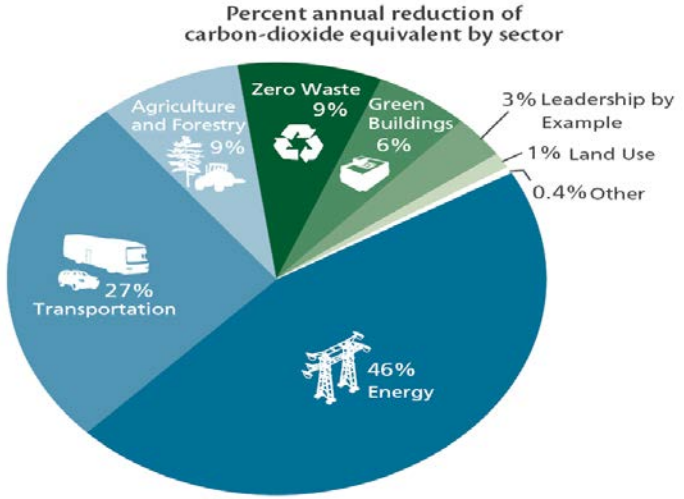
Early Results - A Few Examples

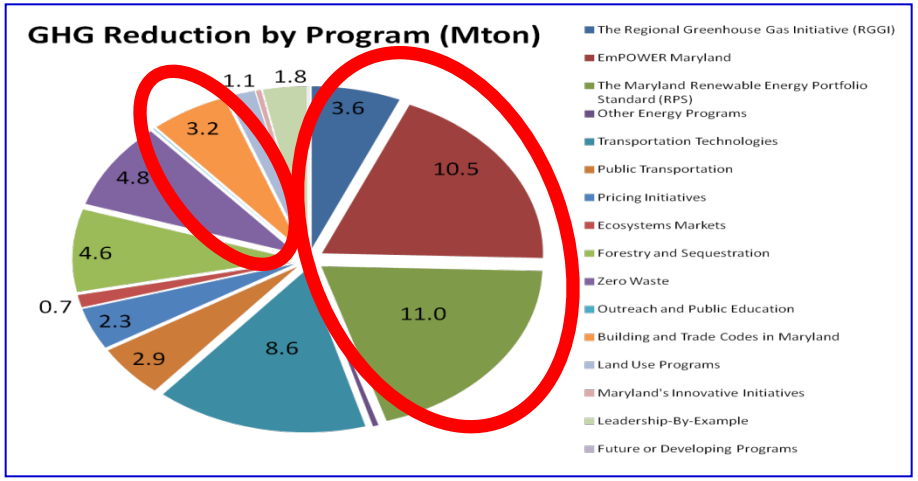
- Still very much a “work-in-progress”
  - Still testing NE-MARKAL
    - Results are really for demonstration and discussion purposes only
- Currently, the GHG reductions and co-benefits (ozone and PM) are a priority
  - Built into our 2012 State Greenhouse Gas Emission Reduction Plan
- As the 2015 ozone SIP approaches, our focus will be GHG and PM co-benefits from our ozone plan



Greenhouse Gas Emission Reductions

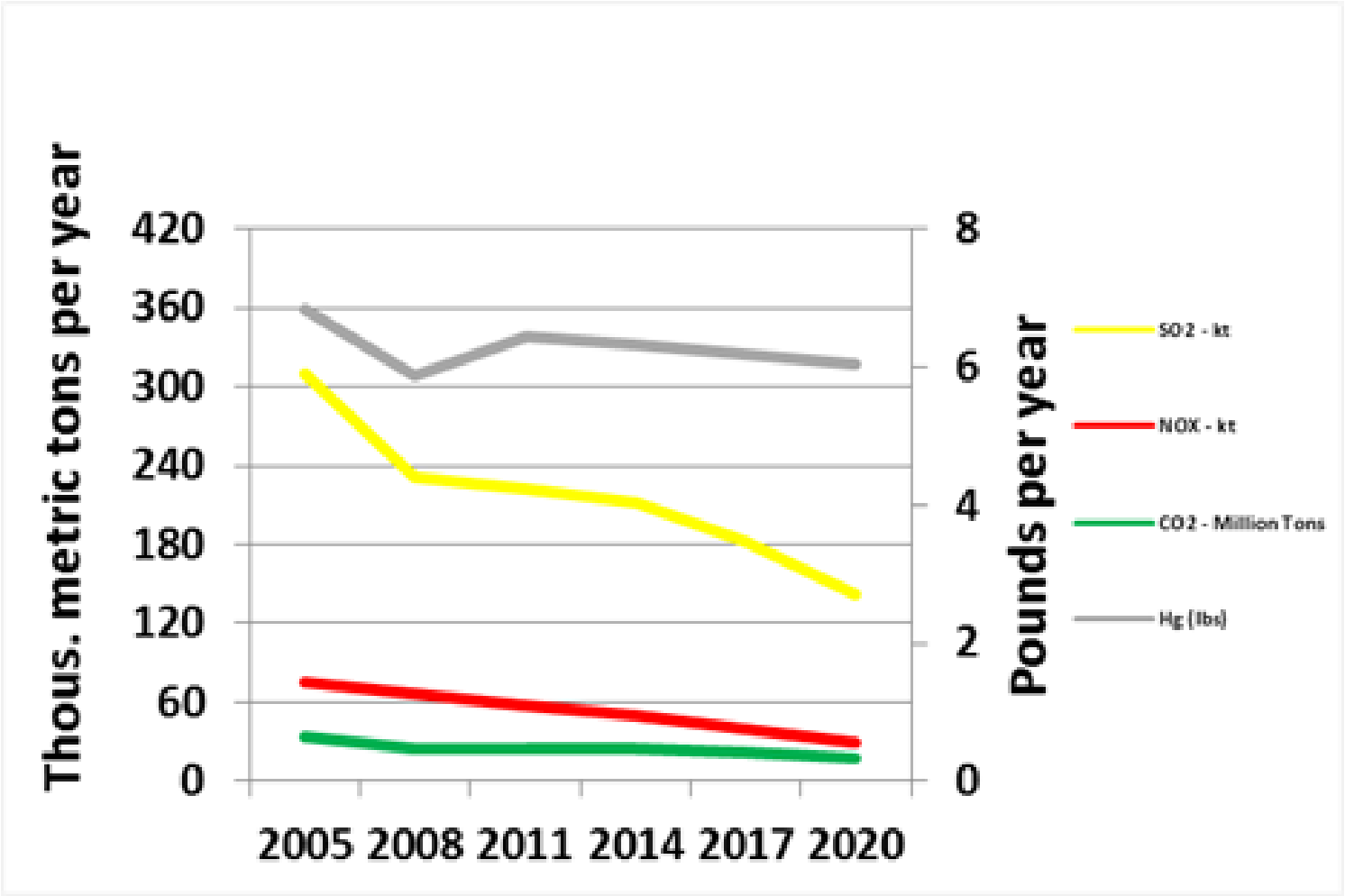
- Over half of the GHG reductions in the State law mandated GHG reduction plan come from EE/RE measures
  - EmPOWER Maryland
  - The Maryland RPS Program
  - RGGI





Energy Sector Emission Reductions

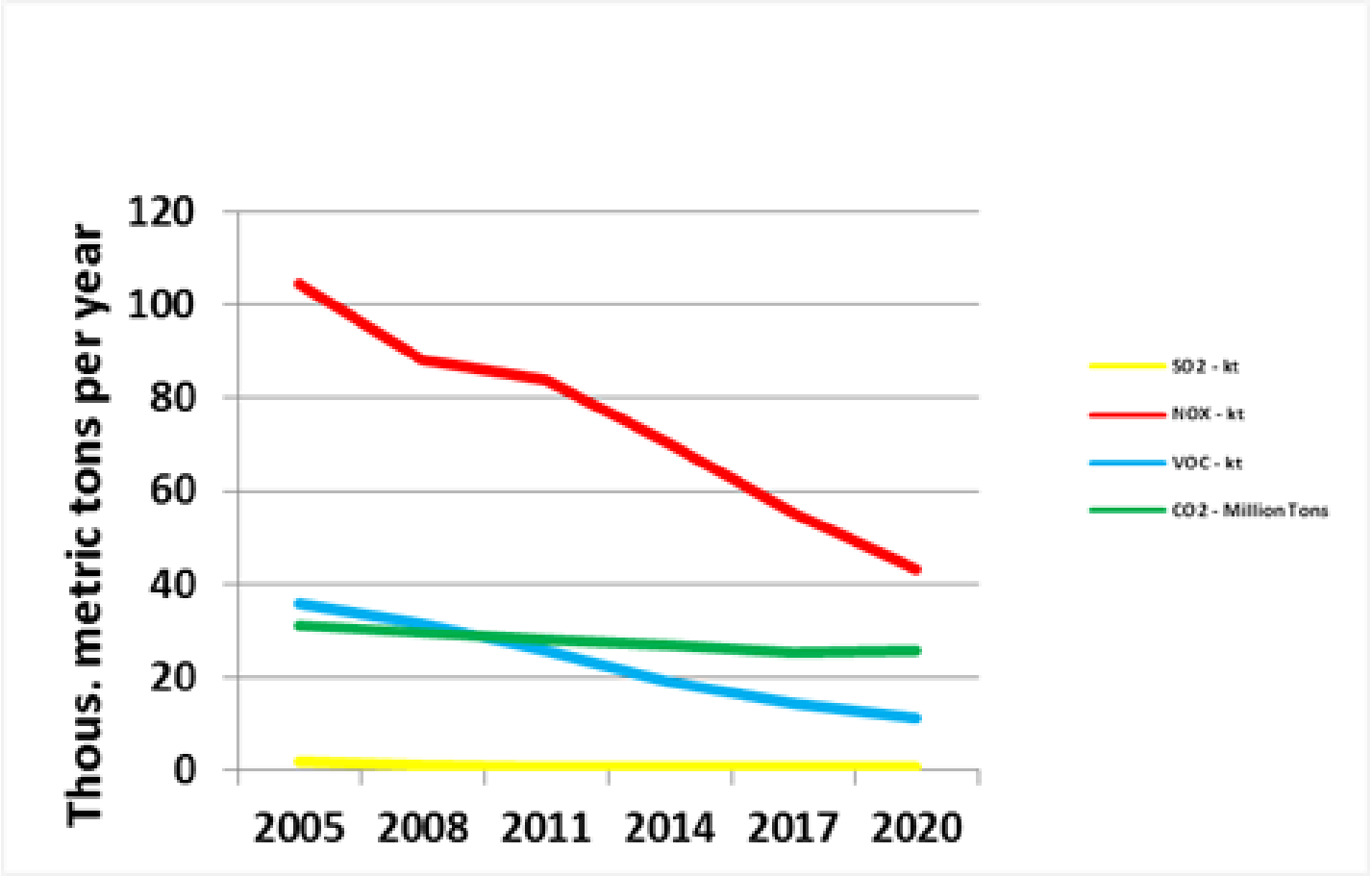
… including energy programs



Preliminary Results

Transportation Sector Emission Reductions

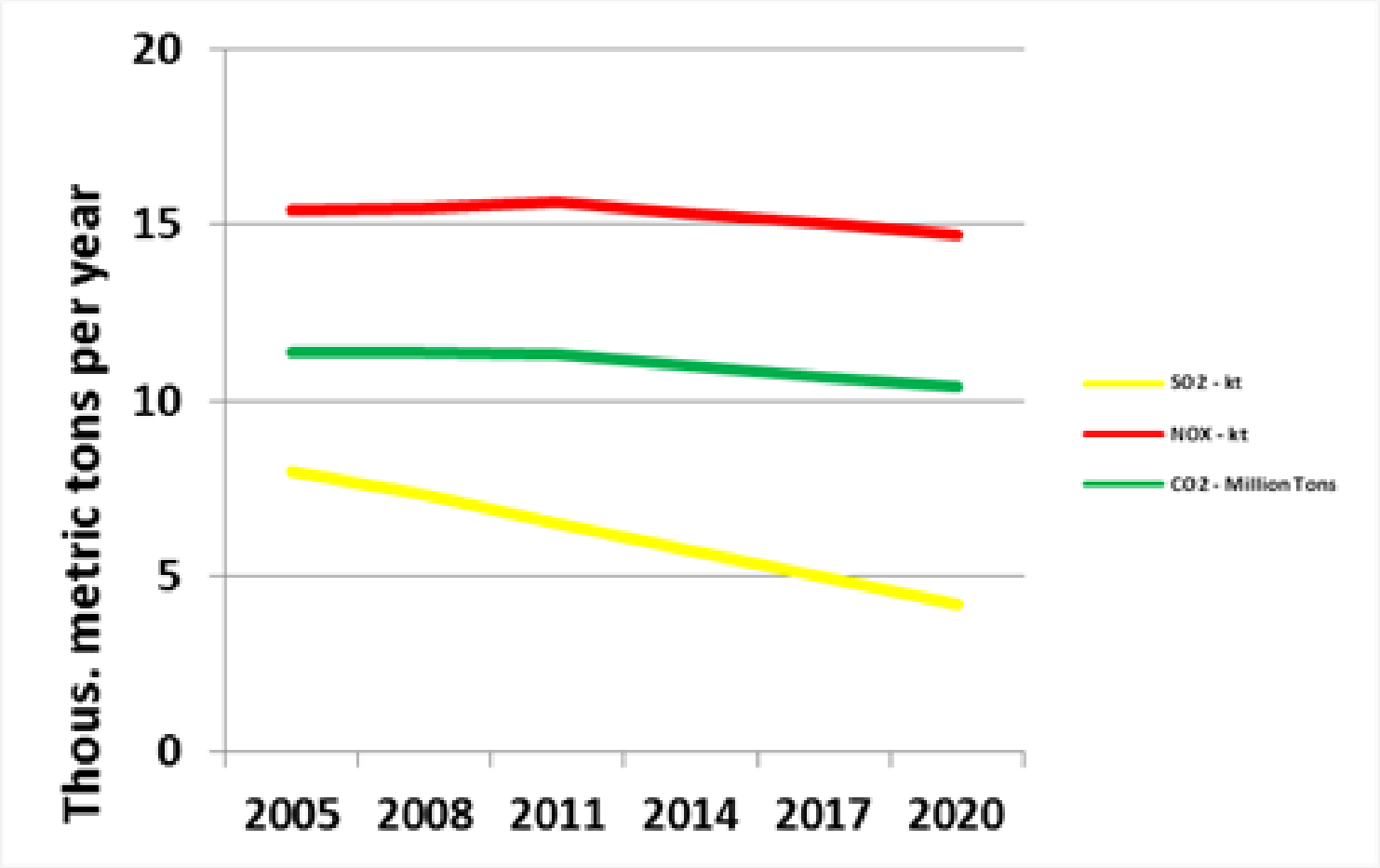
… including energy programs



Preliminary Results

Building Sector Emission Reductions

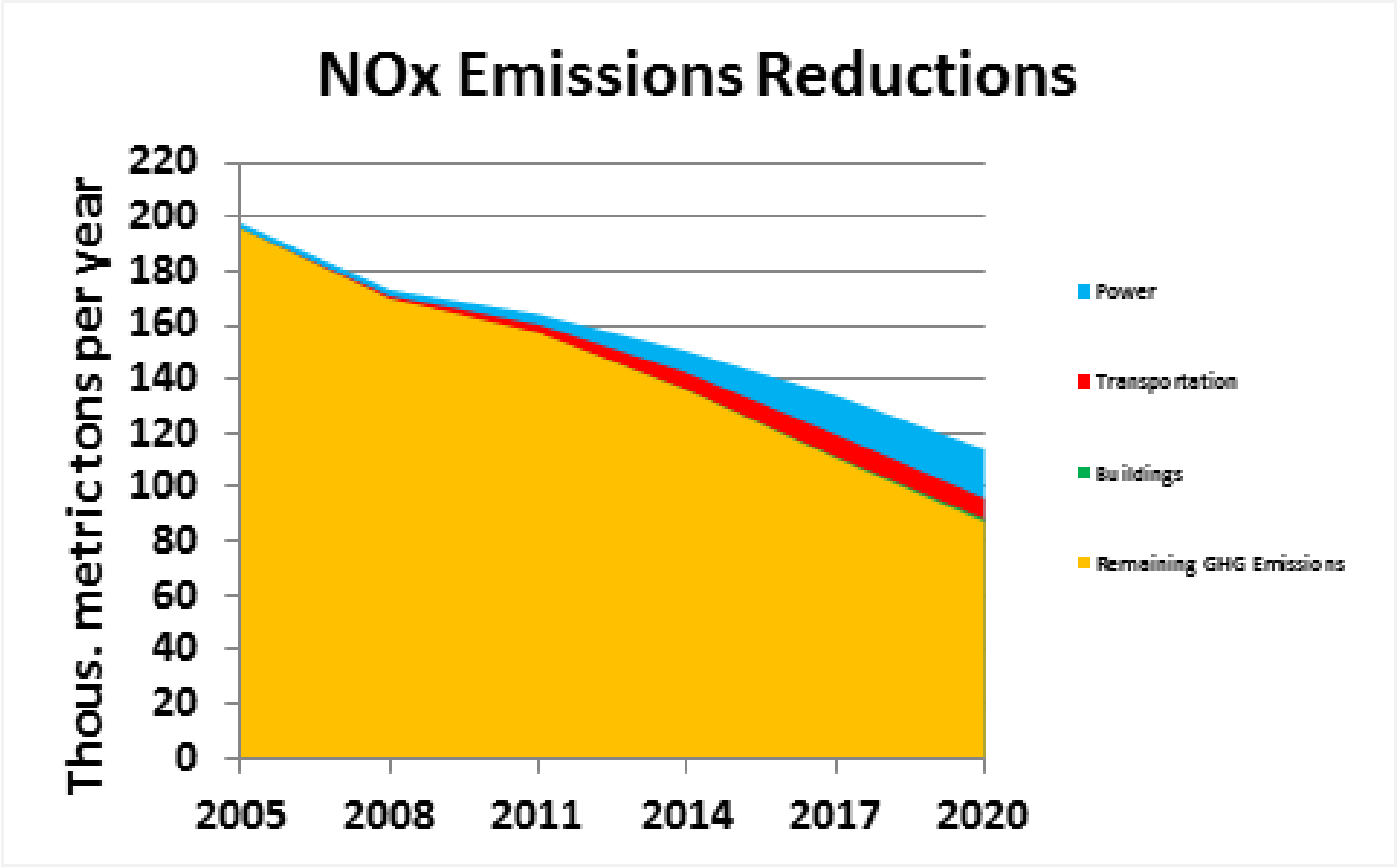
… including energy programs



Preliminary Results

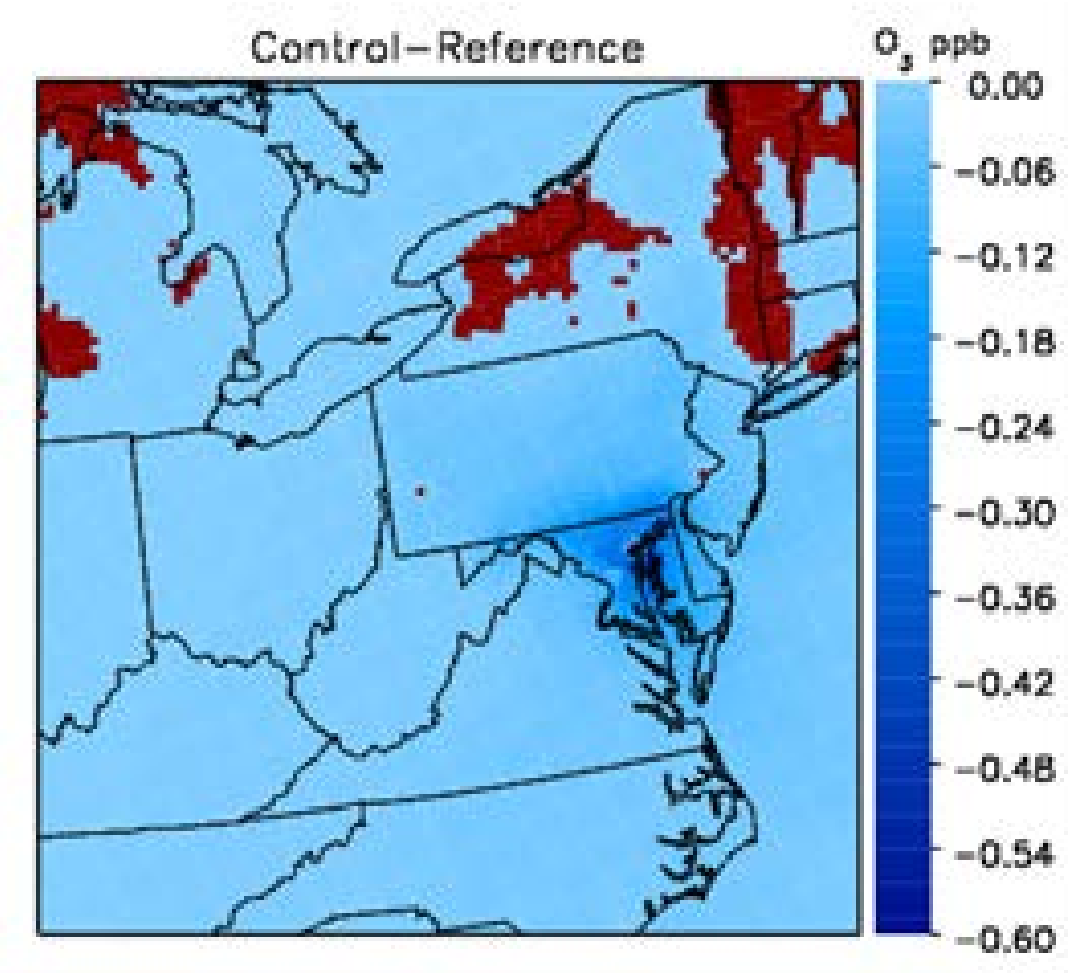
Additional Reductions from Energy Programs

- Current analyses indicate that the additional reductions from the non-traditional, “energy” programs are very meaningful
- Still a work in progress



Modeled Ozone Benefits

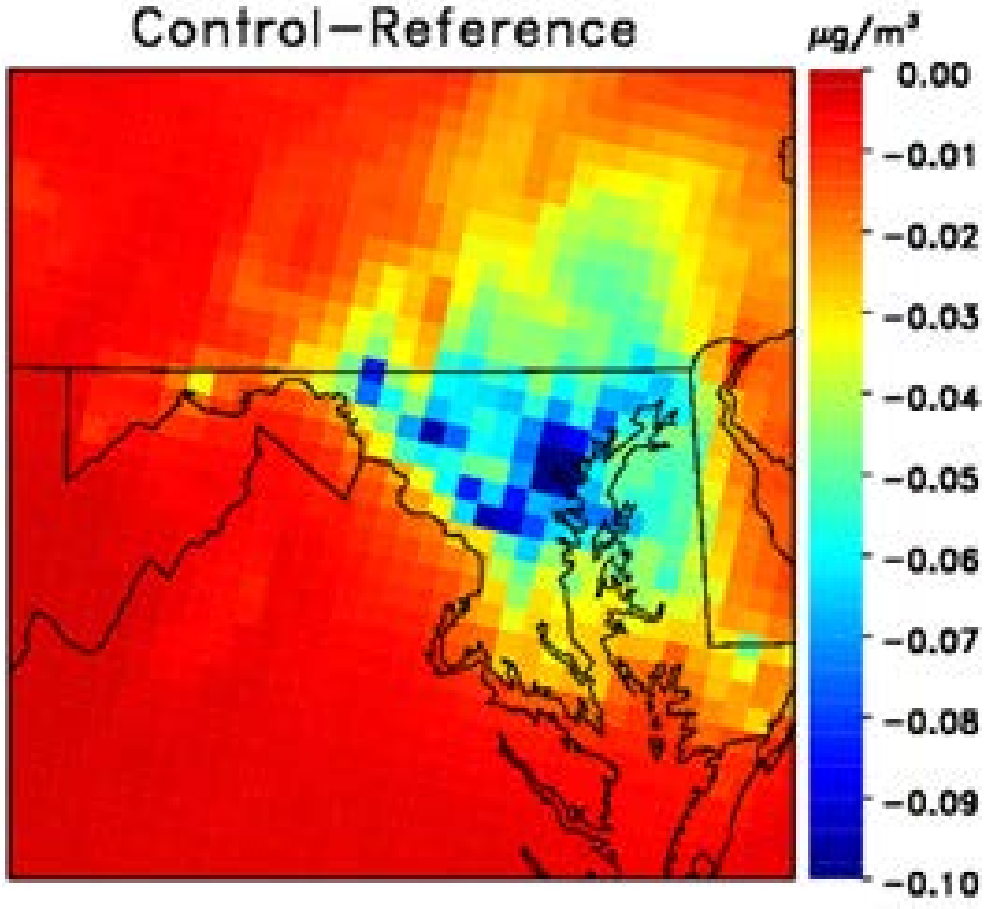
… from energy programs



Preliminary Results

Modeled Fine Particulate Benefits

… from energy programs



Preliminary Results

Public Health Impacts – Ozone

State (Abbrev.)	Incidence					Valuation (millions $)	
		Morbidity					
	Mortality (All Cause)	Acute Respiratory Symptoms	Emergency Room Visits, Respiratory	Hospital Admissions, Respiratory	School Loss Days	Mortality	Morbidity
CT	-	52	-	-	15 - 35	0.2 - 0.3	0.0
DC	-	260	-	0 - 1	76 - 181	1.0 - 1.4	0.0
DE	-	643	-	1 - 3	201 - 479	2.5 - 3.5	0.1
MA	-	12	-	-	3 - 8	0.1	0.0
MD	**3 - 5**	**6,853**	**3 - 6**	**3 - 20**	**2,107 - 5,020**	**24.9 - 35.1**	**0.6 - 0.7**
ME	-	(84)	-	-	(53) – (22)	(0.6) – (0.4)	0.0
NH	-	3	-	-	1 - 3	0.0	0.0
NJ	1	1,806	1 - 2	1 - 6	542 - 1,292	7.0 - 9.9	0.2
NY	2	3,731	3 - 6	2 - 10	1,095 - 2,613	12.2 - 17.2	0.3 - 0.4
PA	2 - 3	2,939	1 - 3	2 - 13	873 - 2,083	13.8 - 19.4	0.3
RI	-	-	-	-	2 - 5	0.0	0.0
VA	1	2,151	1 - 2	2 - 9	676 - 1,613	6.7 - 9.4	0.2 - 0.3
VT	-	(16)	-	-	(10) – (4)	(0.1)	0.0

Preliminary Results

Public Health Impacts – Fine Particulate

State (Abbrev.)	Incidence											Valuation (millions $)	
	Mortality (All Cause)	Acute Bronchitis	Acute Myocardial Infarction	Acute Respiratory Symptoms	Asthma Exacerbation	Emergency Room Visits, Respiratory	Hospital Admissions, Cardiovascular	Hospital Admissions, Respiratory	Lower Respiratory Symptoms	Upper Respiratory Symptoms	Work Loss Days	Mortality	Morbidity
CT	0 - 1	-	-	45	4 - 25	-	-	-	1	1	7	2.0 - 6.9	0.0 - 0.1
DC	1 - 3	1	-	180	19 - 103	-	-	-	4	3	30	8.0 - 27.1	0.1 - 0.2
DE	1 - 3	1	-	138	15 - 81	-	-	-	3	3	23	6.0 - 20.1	0.1 - 0.2
MA	1 - 3	1	-	157	15 - 85	-	-	-	4	3	26	6.3 - 21.2	0.1 - 0.2
MD	**21 - 71**	**32**	**0 - 5**	**4,067**	**431 - 2,394**	**2 - 4**	**1 - 2**	**1**	**102**	**77**	**687**	**168.4 - 568.2**	**1.5 - 5.0**
ME	-	-	-	(19)	(10) - (2)	-	-	-	-	-	(3)	(3.3) - (1.0)	0.0
NH	-	-	-	25	3 - 14	-	-	-	1	-	4	1.0 - 3.5	0.0
NJ	5 - 17	7	0 - 1	968	100 - 557	1	0 - 1	-	23	18	162	40.3 - 136.1	0.4 - 1.3
NY	0 - 2	-	-	61	5 - 25	-	-	-	1	1	10	3.6 - 12.3	0.0 - 0.1
PA	15 - 52	19	0 - 5	2,391	248 - 1,377	1 - 2	1 - 2	1	58	44	401	123.2 - 415.7	1.0 - 4.1
RI	(1) - 0	-	-	(40)	(22) - (4)	-	-	-	(1)	(1)	(7)	(5.9) - (1.7)	(0.1) - 0.0
VA	3 - 10	6	0 - 1	688	74 - 409	0 - 1	-	-	17	13	116	24.2 - 81.8	0.3 - 1.0
VT	-	-	-	5	0 - 2	-	-	-	-	-	1	0.3 - 1.1	0.0

Preliminary Results

Economic Benefits

- Jobs
  - On average a net increase of 4,300 jobs per year through 2020
- Wages
  - Average increase in direct wages of $131 million/year
    - Associated with technology transition
- Household Income
  - Average savings of $80 per year

Preliminary Results

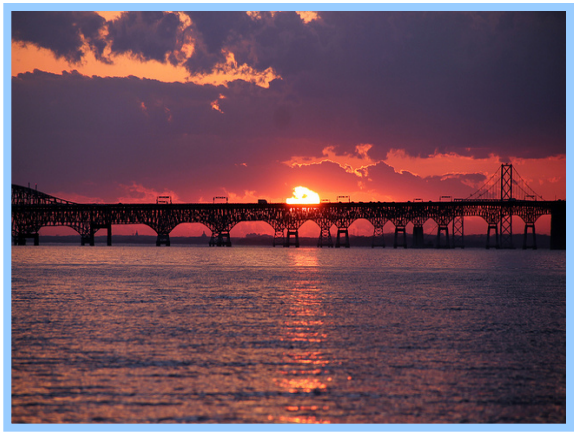
Next Steps

- Working with NESCAUM and other partners to enhance emission reduction calculations and modeling that identifies air quality and public heath benefits
  - Will be included in the June 2015 ozone SIP that Maryland must submit
  - Will also play a role in a 2015 update of GHG emission reduction progress required by State law
  - Also becoming an issue that will be included in Maryland's efforts to comply with new Section 111(d) requirements for reducing GHG emissions from existing power plants

Lessons Learned

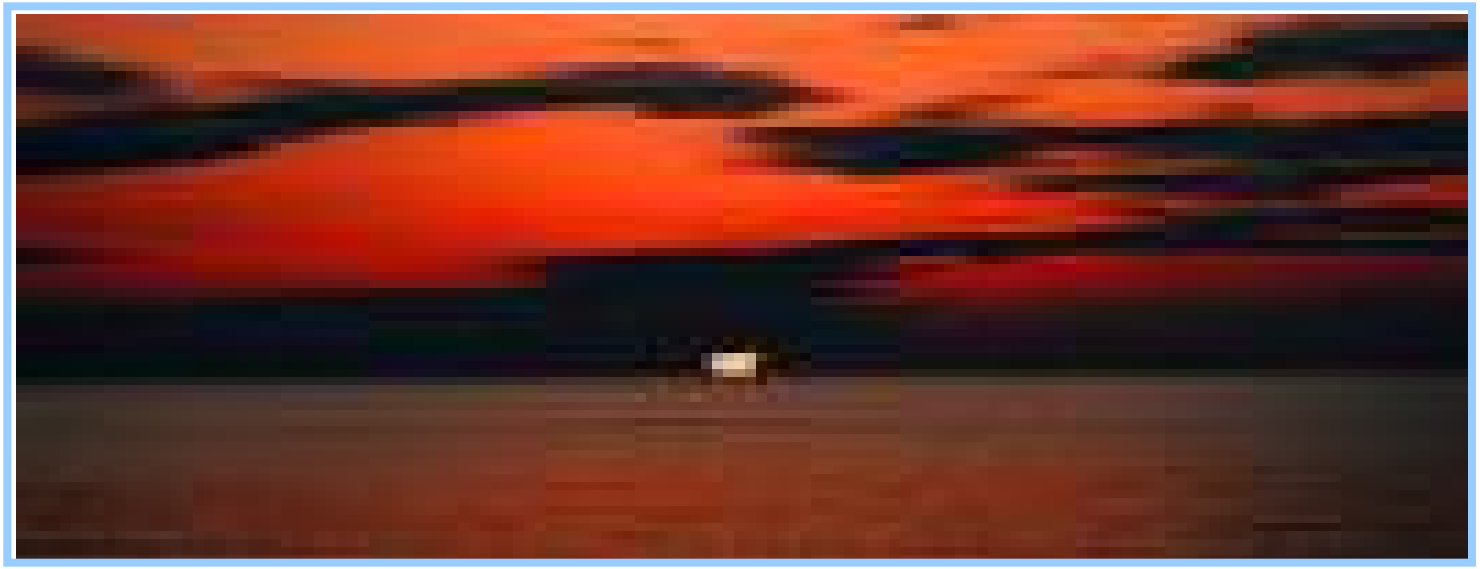
- It's a "win-win"
  - Enhancing EE/RE efforts is a theme across the U.S. – Build partnerships
    - Energy folks want to understand the environmental benefits
    - Air quality folks need all the help we can get in reducing emissions

- Looking at energy programs first may be an important piece of Multi-Pollutant Planning
- Our current work is not simple …
  - Having EPA continue to invest in analysis tools and to "bless" approaches like our NE-MARKAL driven "linked modeling" package will be important



MDE

Questions?



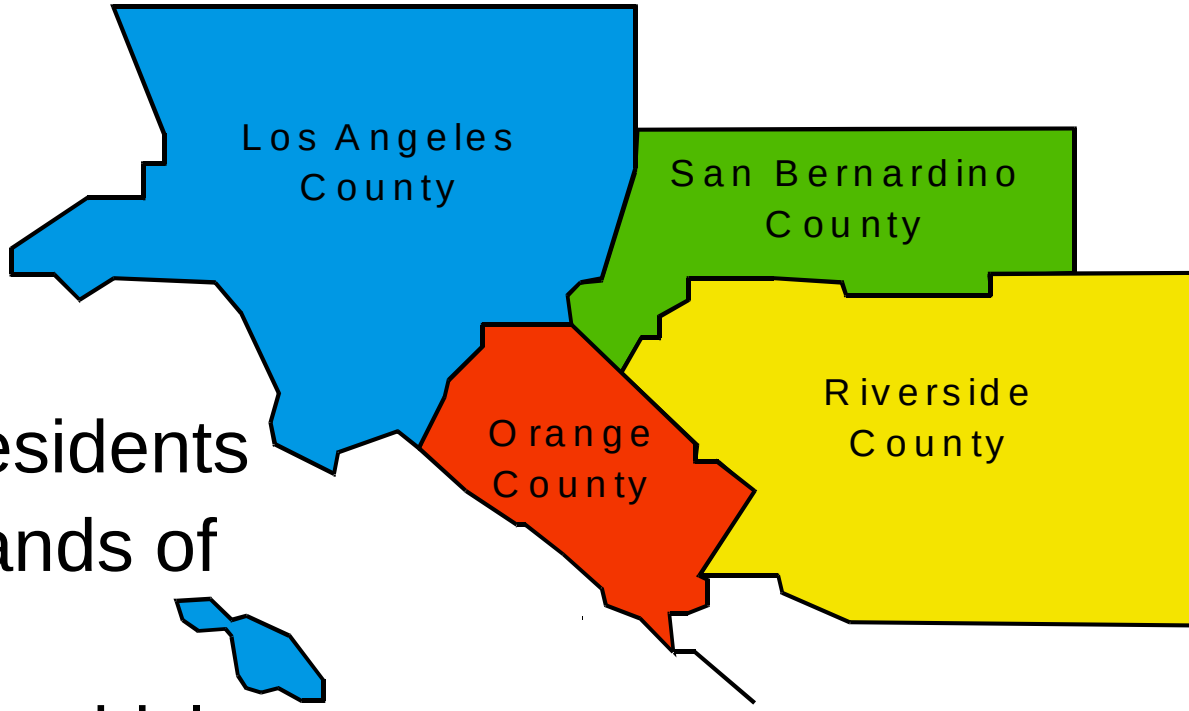
MARYLAND

Co-Benefits from Energy Planning And Energy Efficient Technology

U.S. Department of Energy
Better Buildings Summit
May 8, 2014

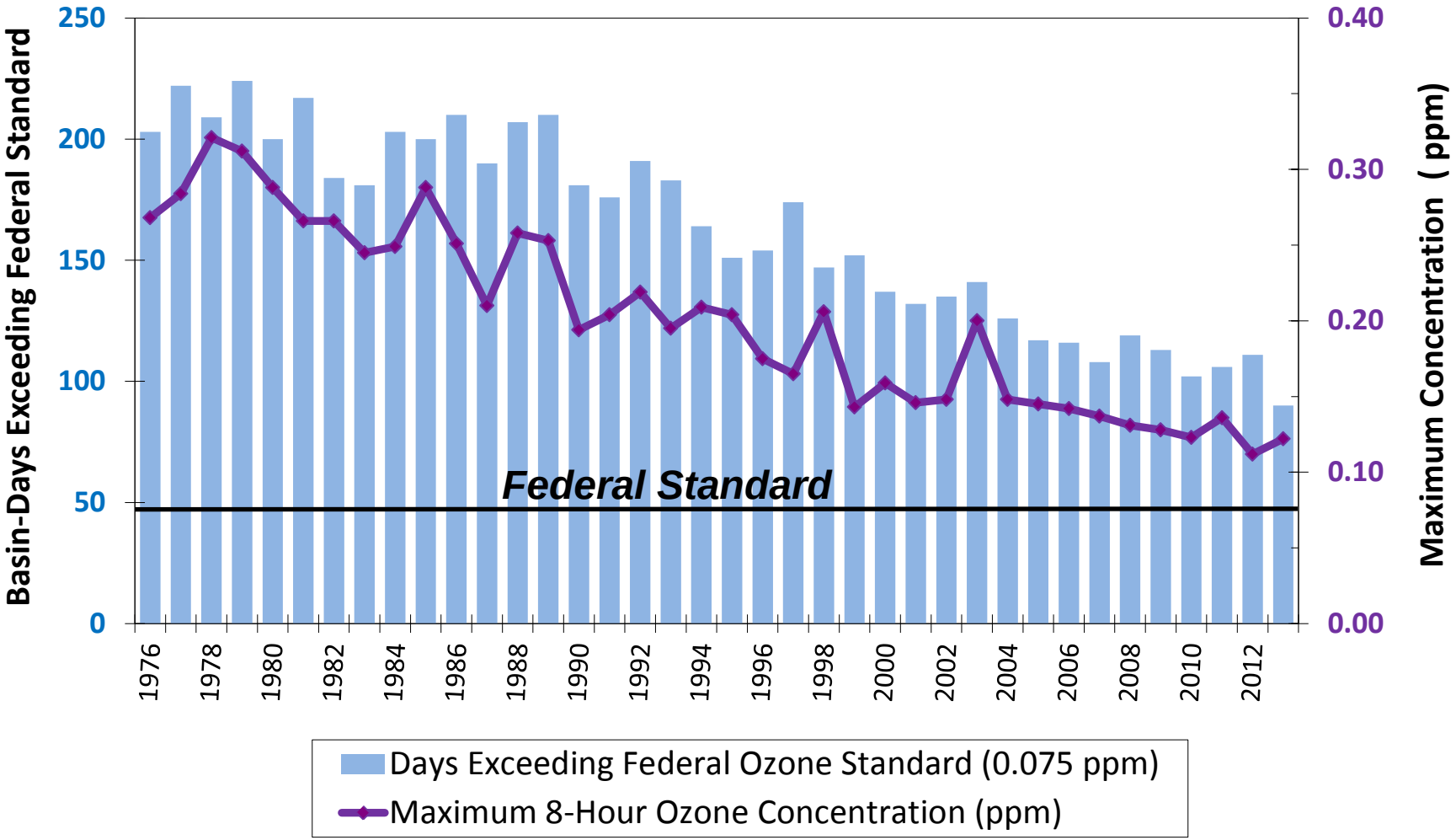
Elaine Chang, DrPH
Deputy Executive Officer
South Coast Air Quality Management District

South Coast Air Basin

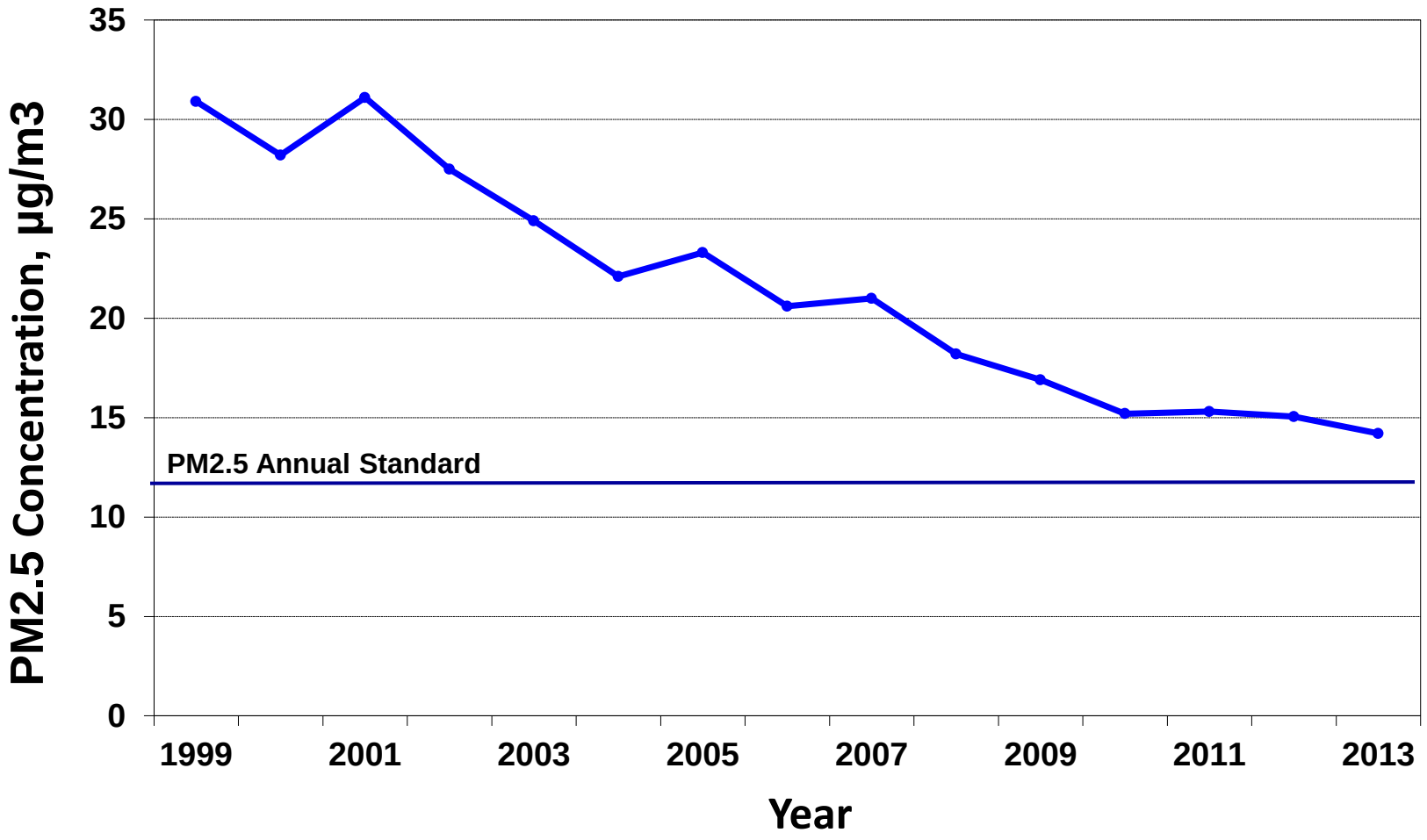


- 4-county region
- 10,000 sq. miles
- Almost 16 million residents
- Hundreds of thousands of diesel vehicles
- Millions of gasoline vehicles
- Combined Ports of Long Beach and Los Angeles = nation's largest cargo gateway

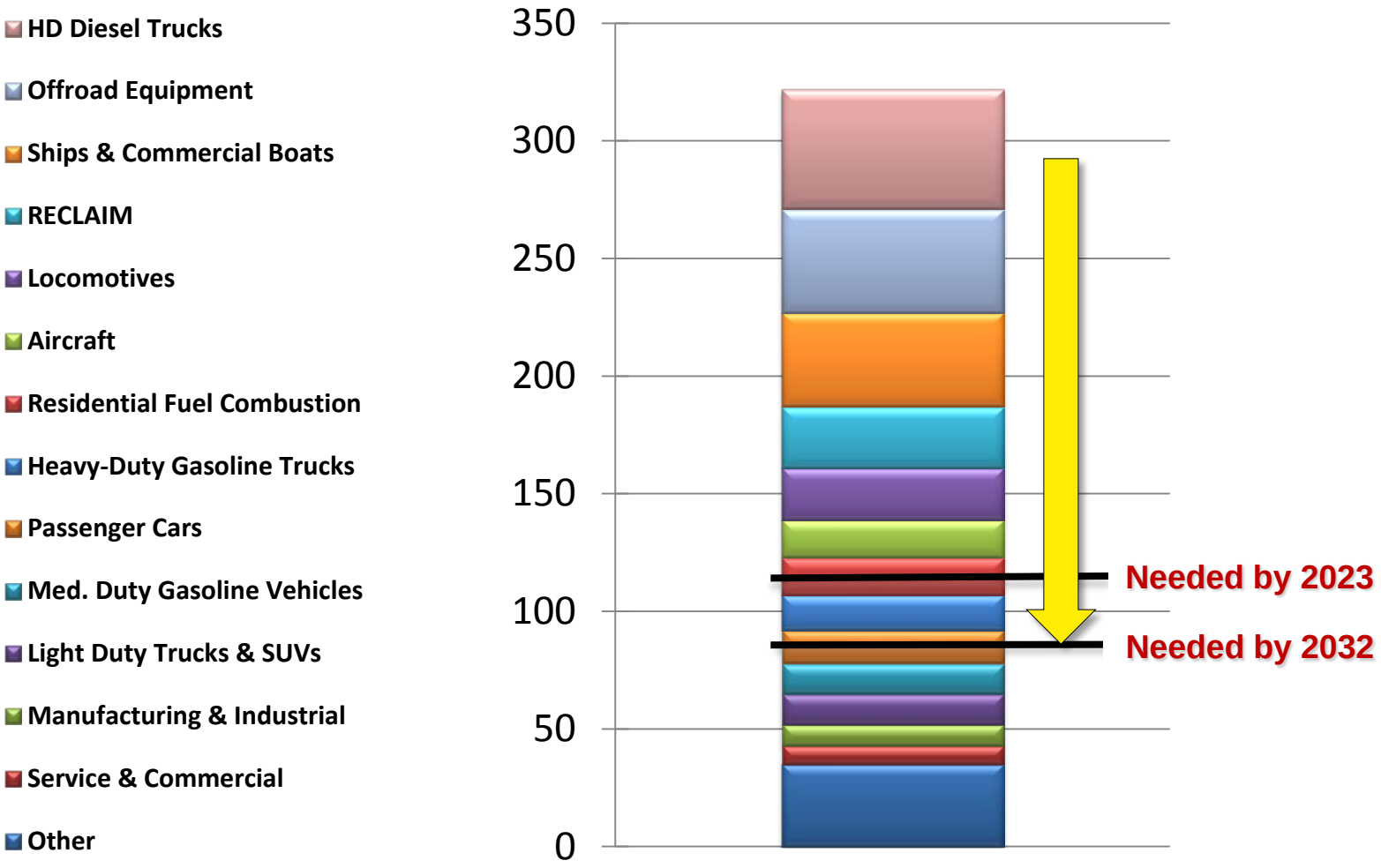
South Coast Air Basin Ozone Trend



Annual PM2.5 Trend

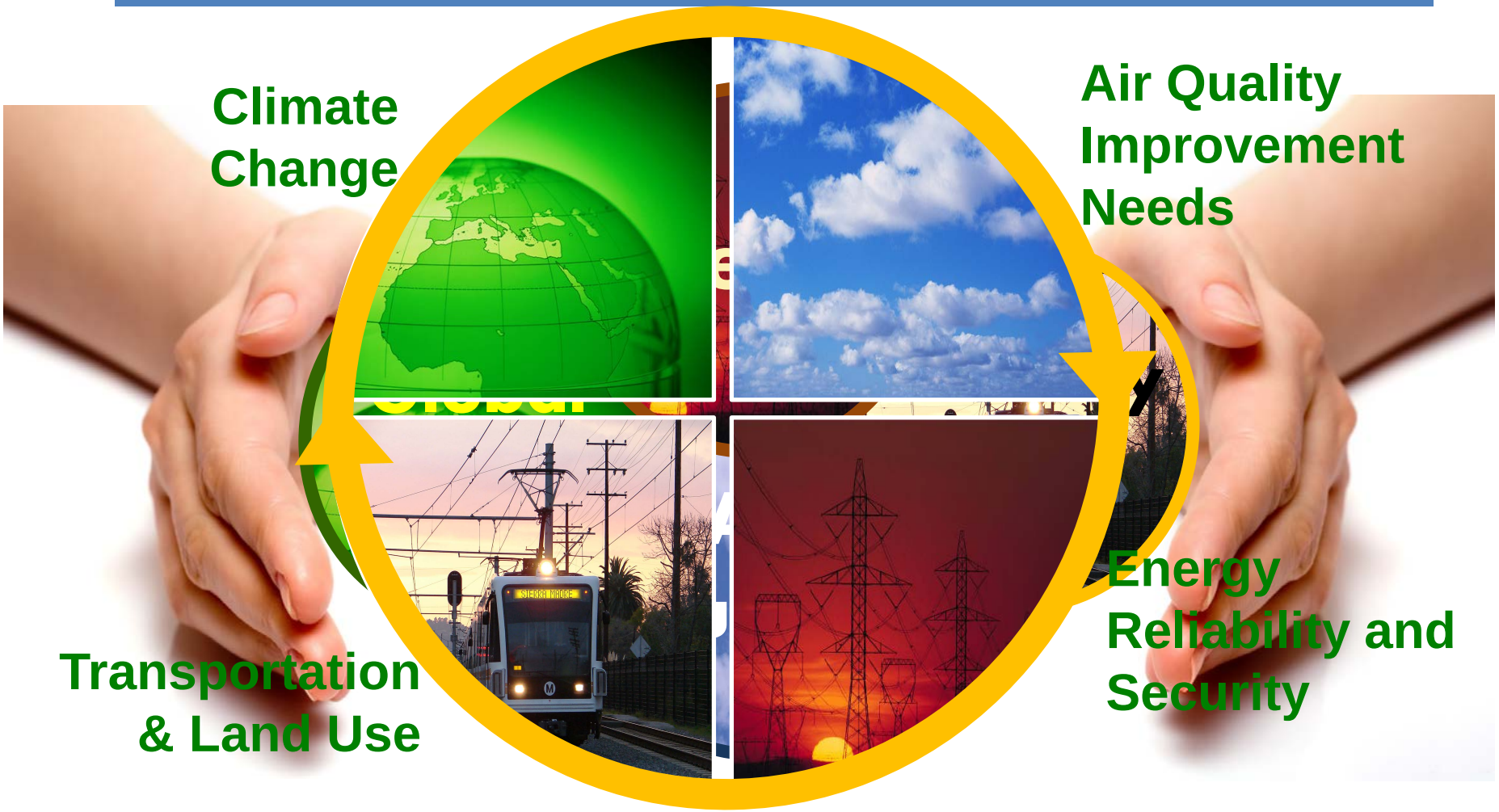


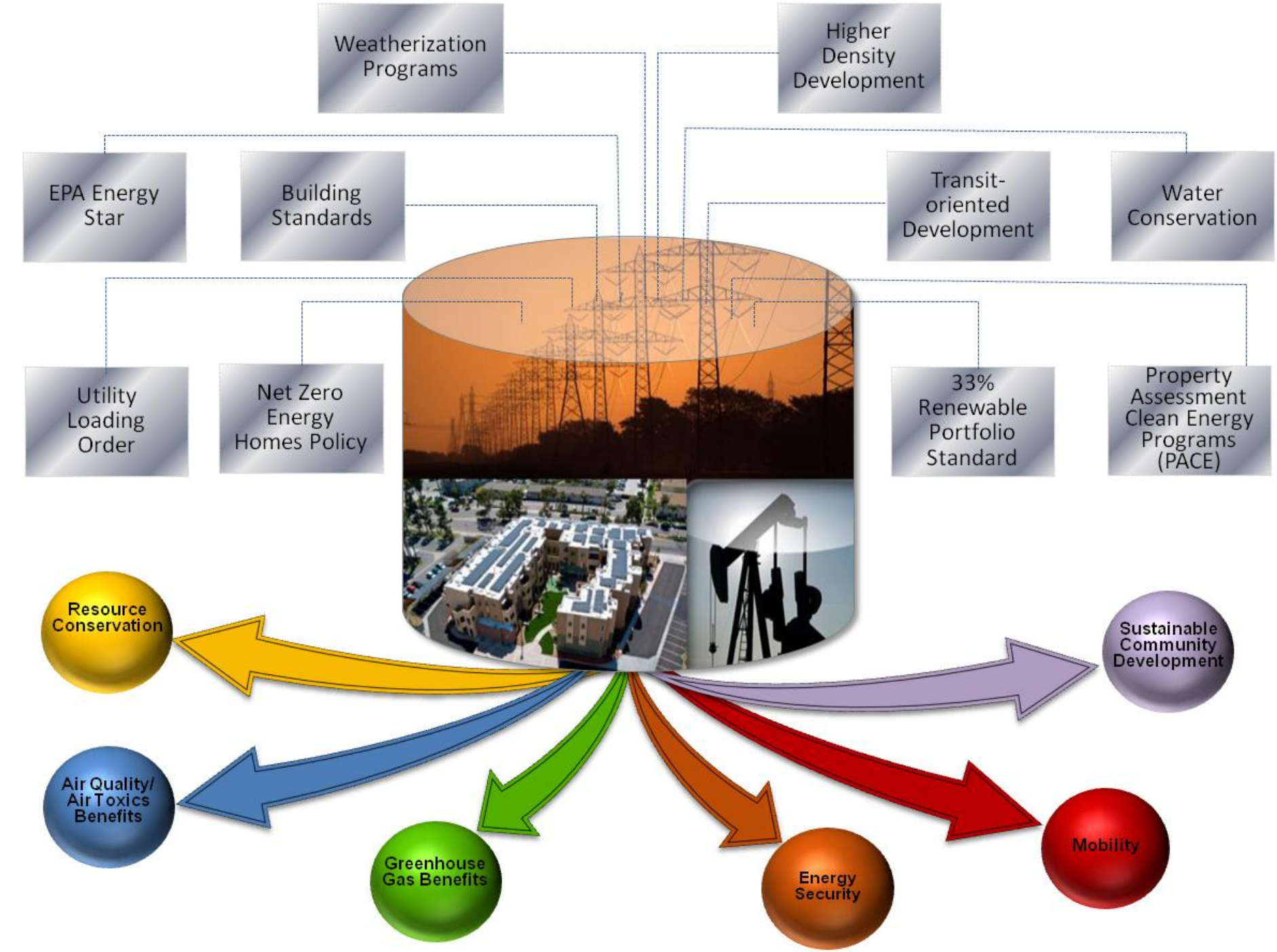
NOx Reductions Needed Beyond Adopted Standards



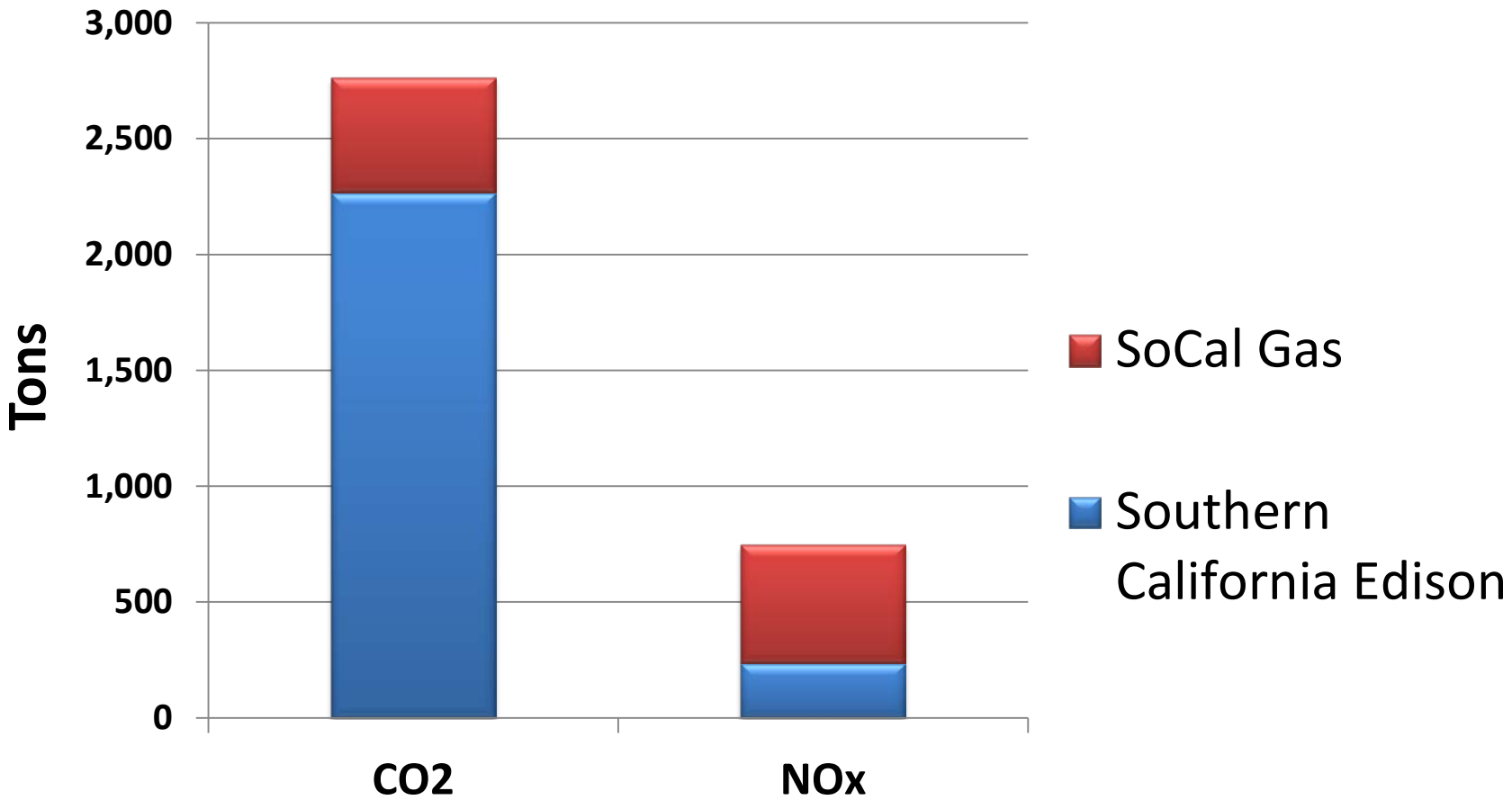
Separate Solutions

Integrated Solution




Weatherization Programs
Higher Density Development
EPA Energy Star
Building Standards
Transit-oriented Development
Water Conservation
Utility Loading Order
Net Zero Energy Homes Policy
33% Renewable Portfolio Standard
Property Assessment Clean Energy Programs (PACE)
Resource Conservation
Sustainable Community Development
Air Quality/ Air Toxics Benefits
Greenhouse Gas Benefits
Energy Security
Mobility

Emission Reductions from 2010-2012 CPUC Ratepayer Programs



Source: CPUC

What SCAQMD is Doing

- Projects ($45 million)
  - Residential Weatherization ($3.6 mil)
  - Renewable Energy Projects ($19.8 mil)
  - Boiler Economizers ($100k)
  - Thermal Load Shifting ($1 mil)
  - Storage ($12.4 mil)
  - Combined Heat and Power ($4.5 mil)
  - Tree Planting ($3.6 mil)
  - Heat Island

Lessons Learned

- Project Types
  - Information Sources
    - Independent auditors
    - Costs
  - Utility Rate Structures
    - Deciphering Utility Bills
  - Cost Effectiveness
    - Air Quality Benefits
- Project Oversight
  - 3rd Party Inspections
  - Monitoring Benefits

- Funding Mechanisms
  - Upfront Capital Costs
  - Financing Options
    - HEROES Program
  - Utility Rebates
  - Tax Incentives

Challenges

- Coordinating Efforts
  - SIP Credits
  - Local Programs
  - State Programs
  - Utility Needs
- Existing Buildings
  - Business Structures
    - Energy Disclosures
    - Distributed Generation
  - Electric Vehicle Integration
- Education and Outreach
  - Understanding Utility Bills
  - Low Income Assistance Programs and other financing programs

EPA's new tool to Incorporate Energy Efficiency & Renewable Energy (EE/RE) Programs in Air Quality Plans

State and Local Climate and Energy Program

Robyn DeYoung, US EPA

May 2014

AVERT
AVoided Emissions and geneRation Tool
www.epa.gov/avert

EPA United States Environmental Protection Agency

Enhancing EE/RE and Air Quality Plan Resources

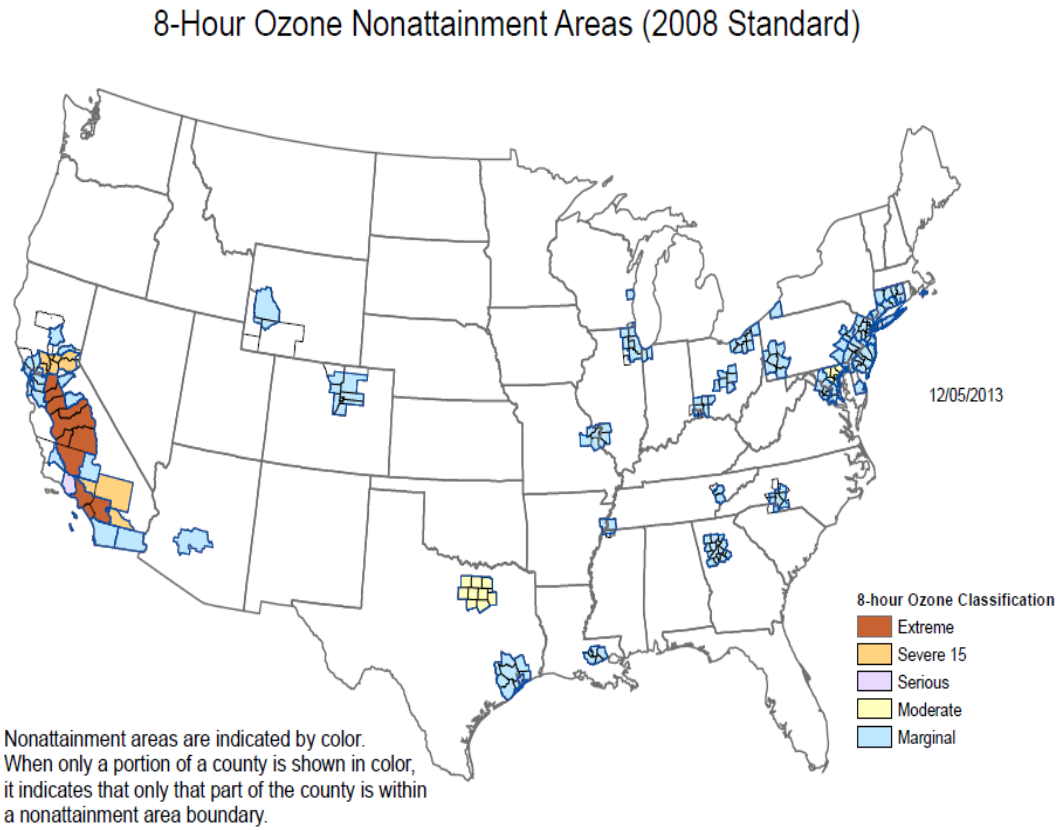
In 2009, EPA:

- Began to renew our effort to encourage and remove barriers to EE/RE and CHP
  - Initial effort started early 2000's
- Looked for ways to make it easier to include emission benefits of EE/RE and CHP to meet clean air goals
- Wanted to be clear that these are viable, cost effective emission reduction strategies
  - Focused our efforts on air quality plans (e.g., State Implementation Plans (SIPs) for National Ambient Air Quality Standards (NAAQS))

Many States Required to Develop State Implementation Plans

State Air Quality Planning

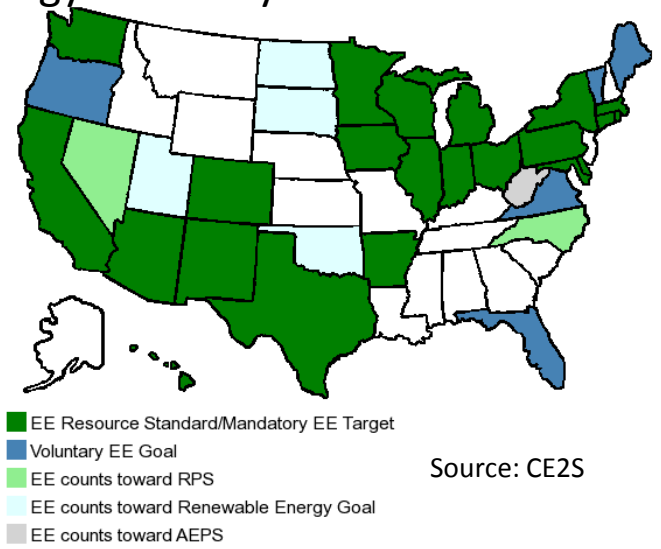
- EPA sets National Ambient Air Quality Standards (NAAQS)
- States with violating monitors are designated nonattainment
- States with nonattainment areas have to prepare State Implementation Plans (SIPs), to show how they'll meet each standard



Capturing the AQ Benefits of Energy Efficiency and Renewable Energy (EE/RE)

- State air regulators looking for new ways to lower emissions, improve air quality
- Meanwhile, PUCs and SEOs advancing proven EE/RE policies and programs
- Opportunity for states to include the emissions benefits in air quality plans
- In 2012, EPA released the EE/RE SIP Roadmap and began to develop AVERT.

Energy Efficiency Resource Standards



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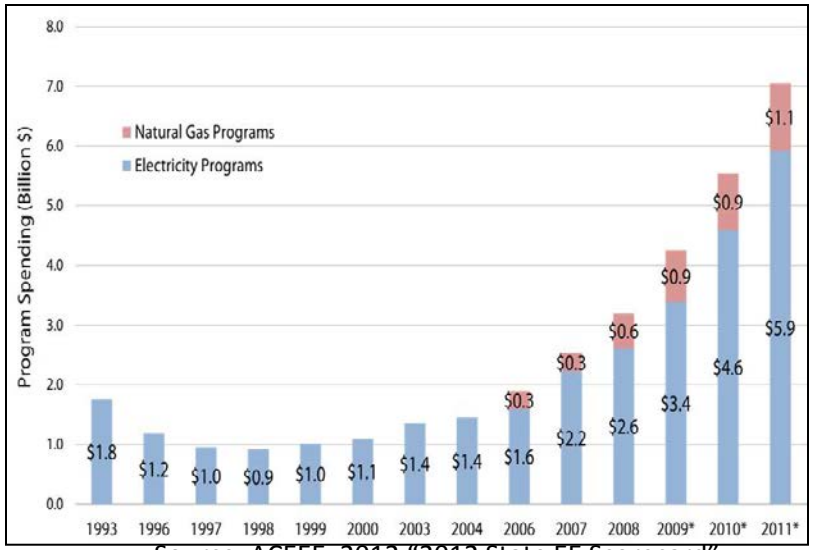


Source: ACEEE, 2012 "2012 State EE Scorecard"

Background on AVERT Development for EE/RE programs

- AVERT (AVoided Emissions and geneRation Tool) translates the energy savings of state EE policies into emission reductions for NAAQS compliance
  - It addresses a key reason states have not implemented previous EE/RE SIP guidance
- AVERT has been thoroughly reviewed, well documented and tested
  - Conducted external and internal peer review
  - Benchmarked AVERT against industry standard electric power sector model – PROSYM
  - States beta-tested tool for functionality, appropriate uses, and clarity of user manual
- AVERT was built to be
  - straightforward,
  - transparent and
  - credible

Emission Quantification Methods – Basic to Sophisticated

Basic Method

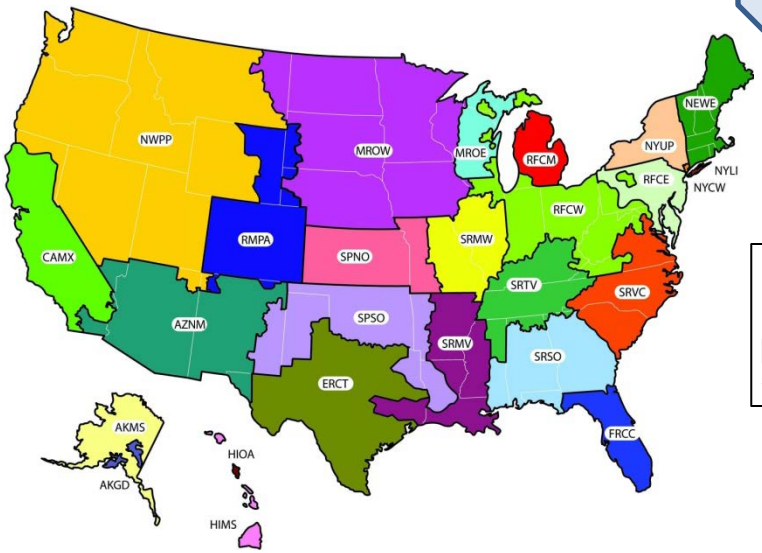
eGRID region non-baseload emission rates

Intermediate Method

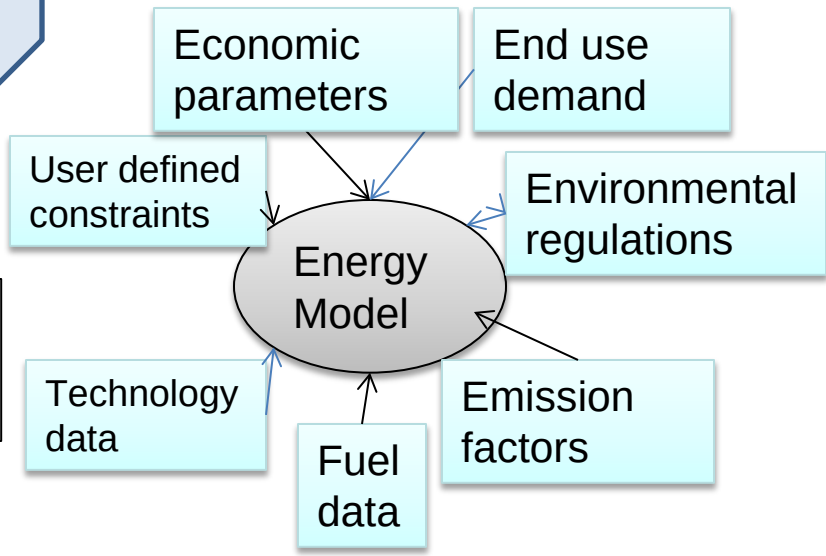
Historically Hourly emission rates

Sophisticated Method

Energy Modeling



AVERT
AVoided Emissions and geneRation Tool
www.epa.gov/avert



AVERT Avoided Emissions and geneRation Tool

Overview:

- Uses historical EGU behavior to simulate hourly changes in generation and air emissions (NO_x, SO_2 and CO_2) resulting from EE/RE policies and programs
  - AVERT processes actual data reported to CAMD through Acid Rain Program
  - Users enter annual MWhs or select from EE/RE options in tool
  - View emission outputs at regional, state and county level

When to Use:

- NAAQS SIP credit with the concurrence of EPA Regional office
- Analyze emission impacts of an EE/RE program portfolio
- Promote emission benefits of EE/RE with easy-to-interpret maps and charts

Status:

- Available on line at: www.epa.gov/avert

AVERT's Advantages and Limitations

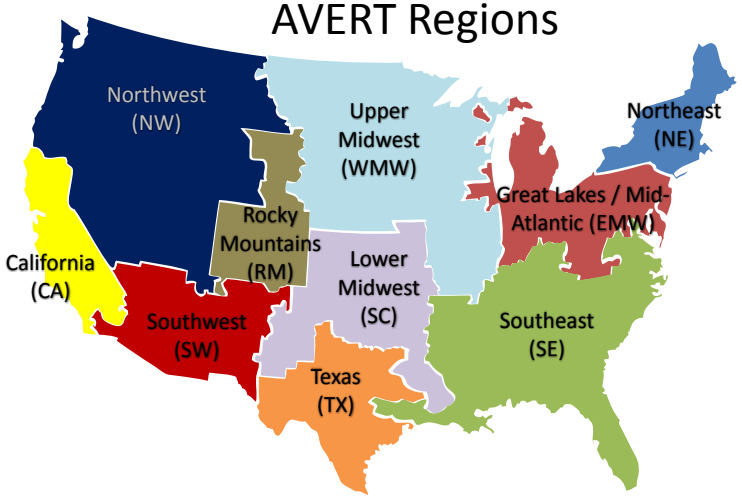
Advantages:

- Uses actual unit level historical generation behavior
- User can compare emission impacts of energy efficiency, wind and solar programs
- Analyze emissions during High Electric Demand Days

Limitations:

- Is not useful for small, local programs
- There are no transmission constraint assumptions
- This is not a projection tool, not intended for analysis more than 5 yrs from baseline.

AVERT Regions



AVERT Main Module
Step-by-Step Overview

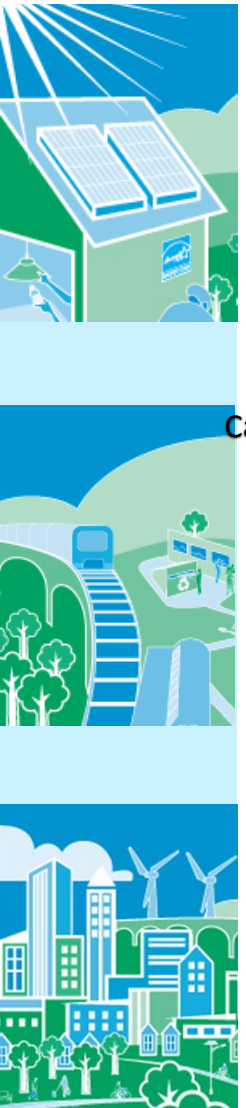
Step 1. Load Regional Data File for historical baseline year

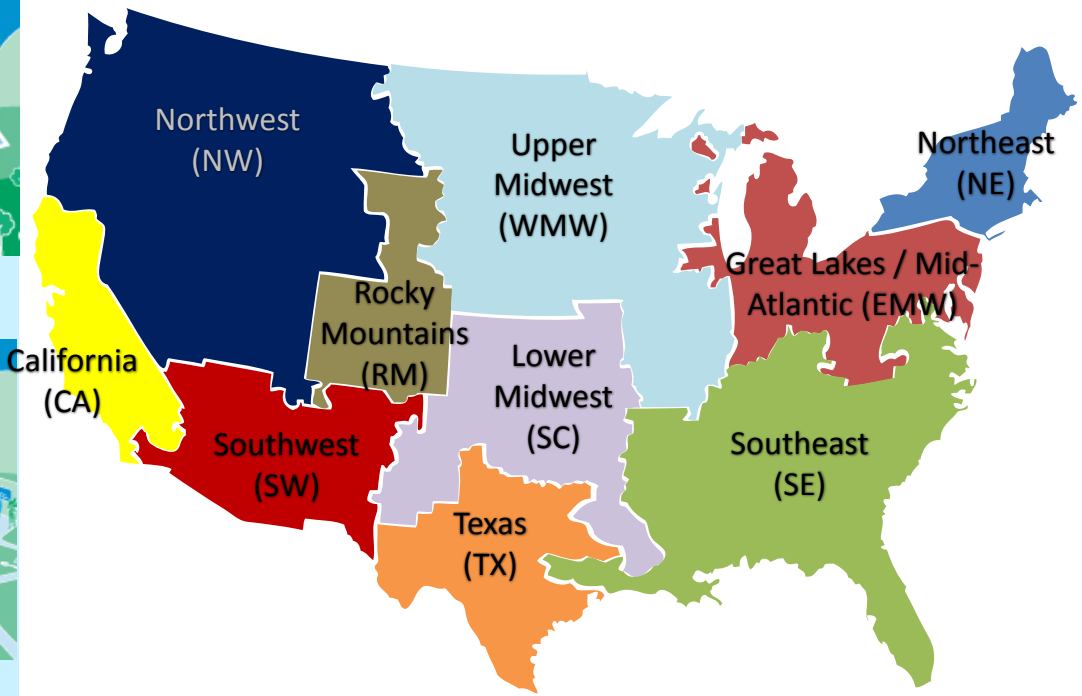
Step 2. Set energy efficiency and renewable energy data

Step 3. Run displacement

Step 4. Display outputs

AVERT Main Module
Step 1. Load Regional Data File





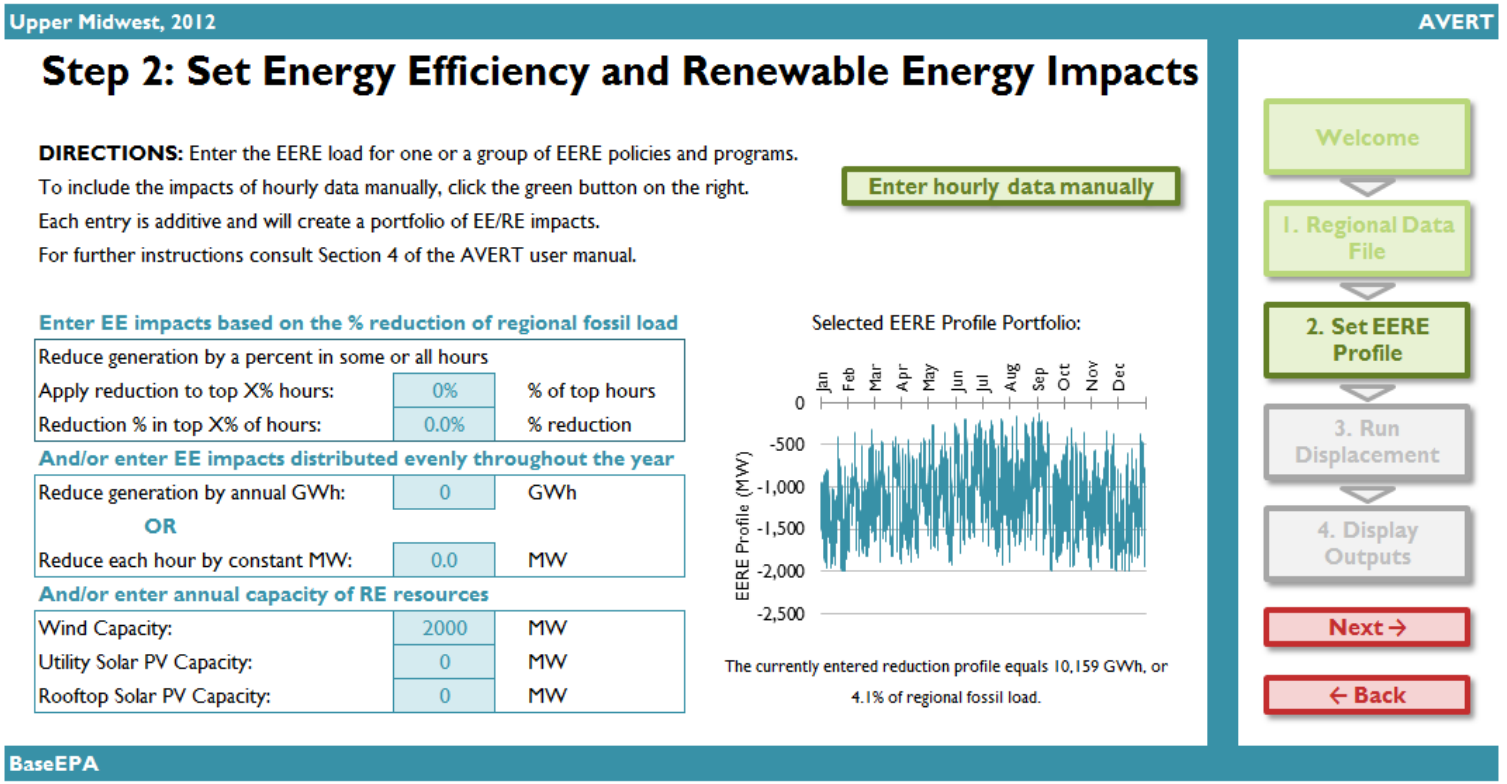
Regions represent relatively autonomous electricity production zones, and are based on electricity market module regions.

Regions include

- California
- Great Lakes/Mid-Atlantic
- Lower Midwest
- Northeast
- Northwest
- Rocky Mountains
- Southeast
- Southwest
- Texas
- Upper Midwest

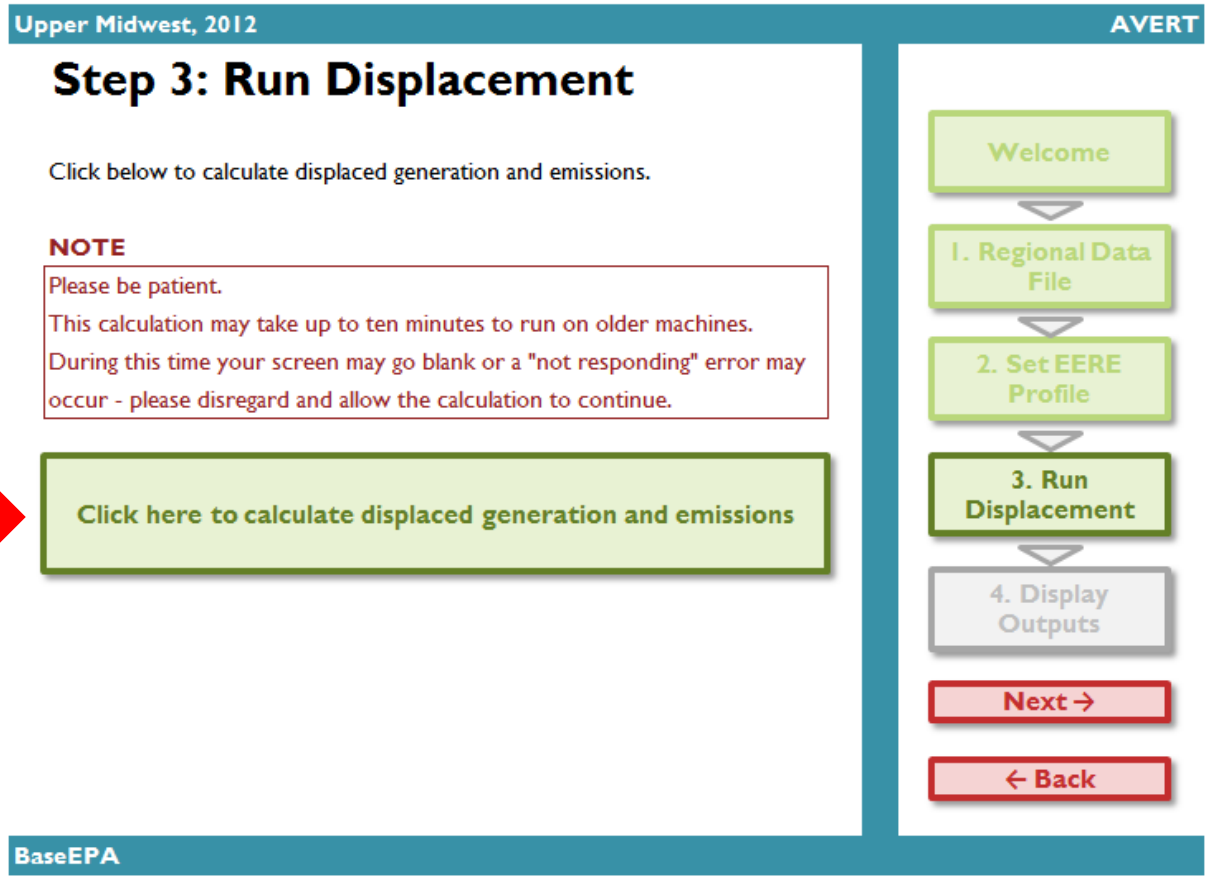
AVERT Main Module
Step 2. Set EE and RE Data

- This page leads you through the process of creating a load impact profile depicting the load reductions expected from an EE/RE program.



AVERT Main Module
Step 3. Run Displacement

- Run displacement by selecting the button entitled “Click here to calculate displaced generation and emissions.”



AVERT Main Module
Step 4. Display Outputs

Annual regional displacements

- This table displays the total annual generation and emissions as reported for the region in the base year ("Original") and as calculated by AVERT's Main Module after the EE/RE reduction ("Post-EERE").

Upper Midwest, 2012 **AVERT**

Output: Annual Regional Displacements

Click here to return to Step 4: Display Outputs

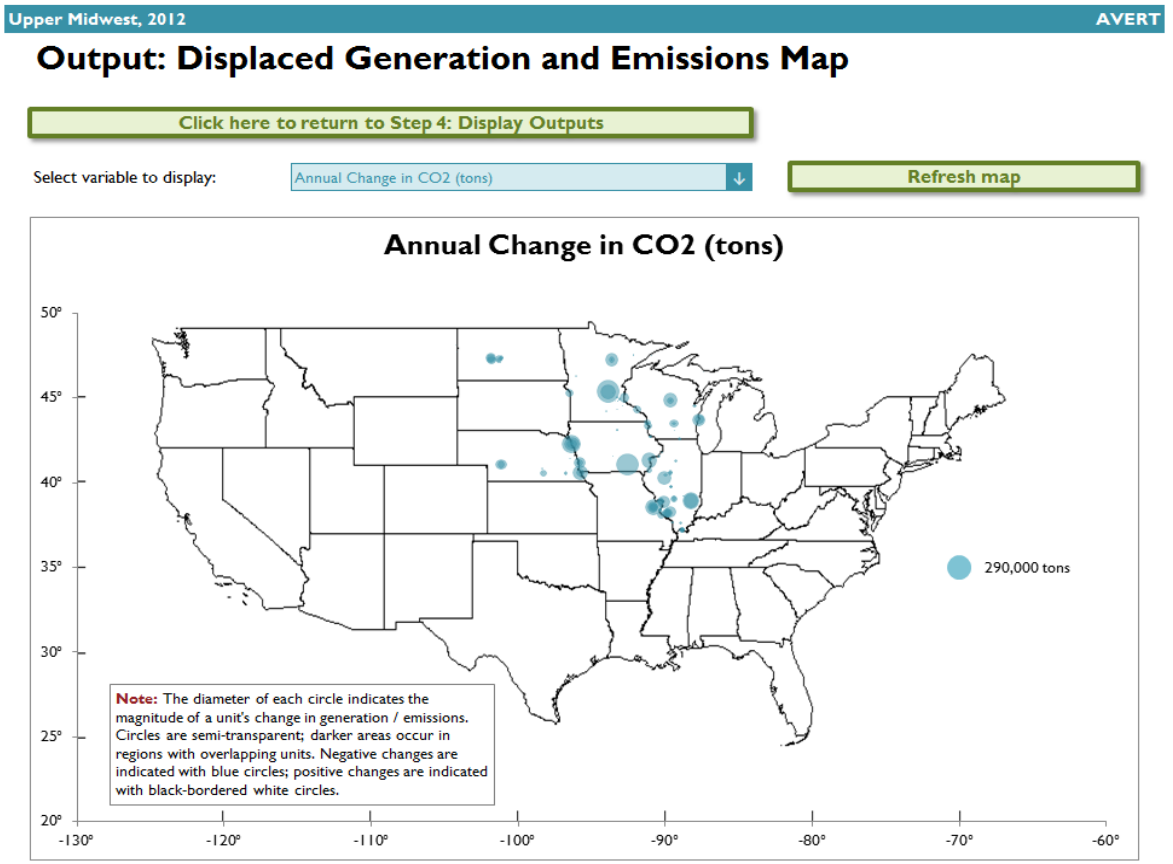
	Original	Post-EERE	Impacts
Generation (MWh)	245,694,500	235,514,500	- 10,180,000
Total Emissions			
SO_2 (lbs)	956,871,300	921,132,200	- 35,739,100
NO_x (lbs)	416,259,200	400,349,300	-15,909,900
CO_2 (tons)	246,098,700	236,856,400	- 9,242,300
Emission Rates			
SO_2 (lbs/MWh)	3.895	3.911	
NO_x (lbs/MWh)	1.694	1.700	
CO_2 (tons/MWh)	1.002	1.006	

All results are rounded to the nearest hundred. A dash ("—") indicates a result greater than zero, but lower than the level of reportable significance.

AVERT Main Module
Step 4. Display Outputs

Displaced generation and emissions map

- This dynamic map allows the user to view where emissions have been displaced within the selected region. Users can view changes in generation, heat input, SO_2, NO_X, and CO_2.

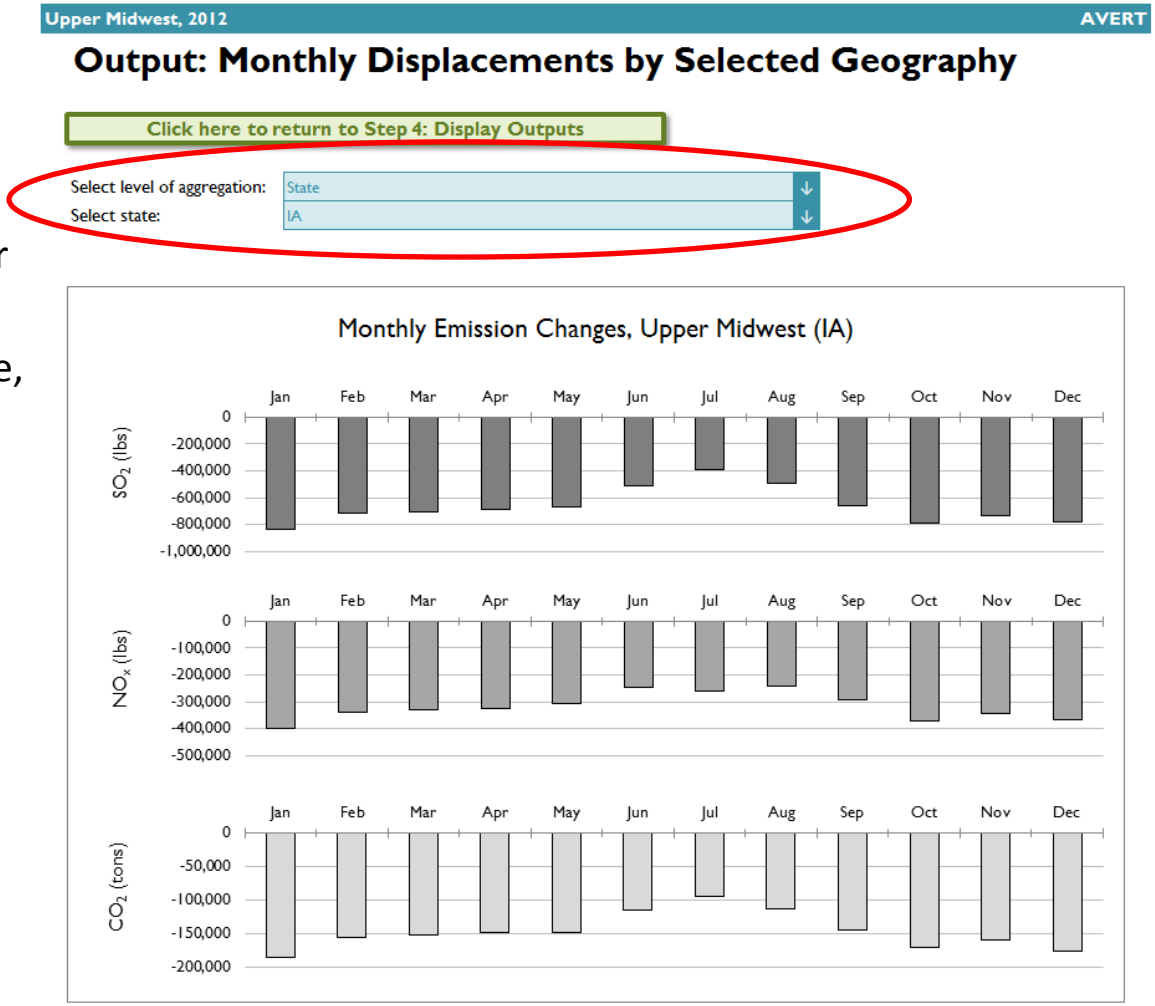


AVERT Main Module
Step 4. Display Outputs

Displacement data by month

Monthly output can be viewed over the entire region, or a specific state or county within the region.

- First select region, state, or county in the top dropdown menu.
- If selecting a state, choose the state in the next dropdown menu.
- If selecting a county, choose both the state and the county in the next two dropdown menus.



Key Considerations when Quantifying EE/RE Emission Impacts

- Understand baseline parameters to avoid double counting impacts
- Start a dialogue between state environment and energy agencies to:
  - Build common ground
  - Exchange data (e.g., energy impacts for EE, wind and solar programs)
- Focus on larger EE/RE policy impacts or bundle smaller EE/RE programs
- Analysis should cover a region – similar to grid operations

AVERT Outreach

Status:

- Publically released on Feb 18, 2014
- Over 200 downloads
- National Webinar Tuesday March 18th
  - Recording: http://epa.gov/statelocalclimate/web-podcasts/forum.html
- Online training available in late May 2014
- Available on line at: www.epa.gov/avert

Thank you

AVERT

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ACEEE
American Council for an Energy-Efficient Economy

Change is in the Air: How States Can Harness Energy Efficiency to Fortify the Economy and Reduce Pollution

Sara Hayes

May 8, 2014

The American Council for an Energy-Efficient Economy (ACEEE)

- ACEEE is a nonprofit 501(c)(3) that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments & behaviors
- Nearly 50 staff based in Washington, D.C.
- Focus on end-use efficiency in industry, buildings, utilities & transportation
- Other research in economic analysis; behavior; national, state, & local policy
- Funding:
  - Foundation Grants (52%)
  - Contract Work & Gov. Grants (20%)
  - Conferences and Publications (20%)
  - Contributions and Other (8%)

The Opportunity

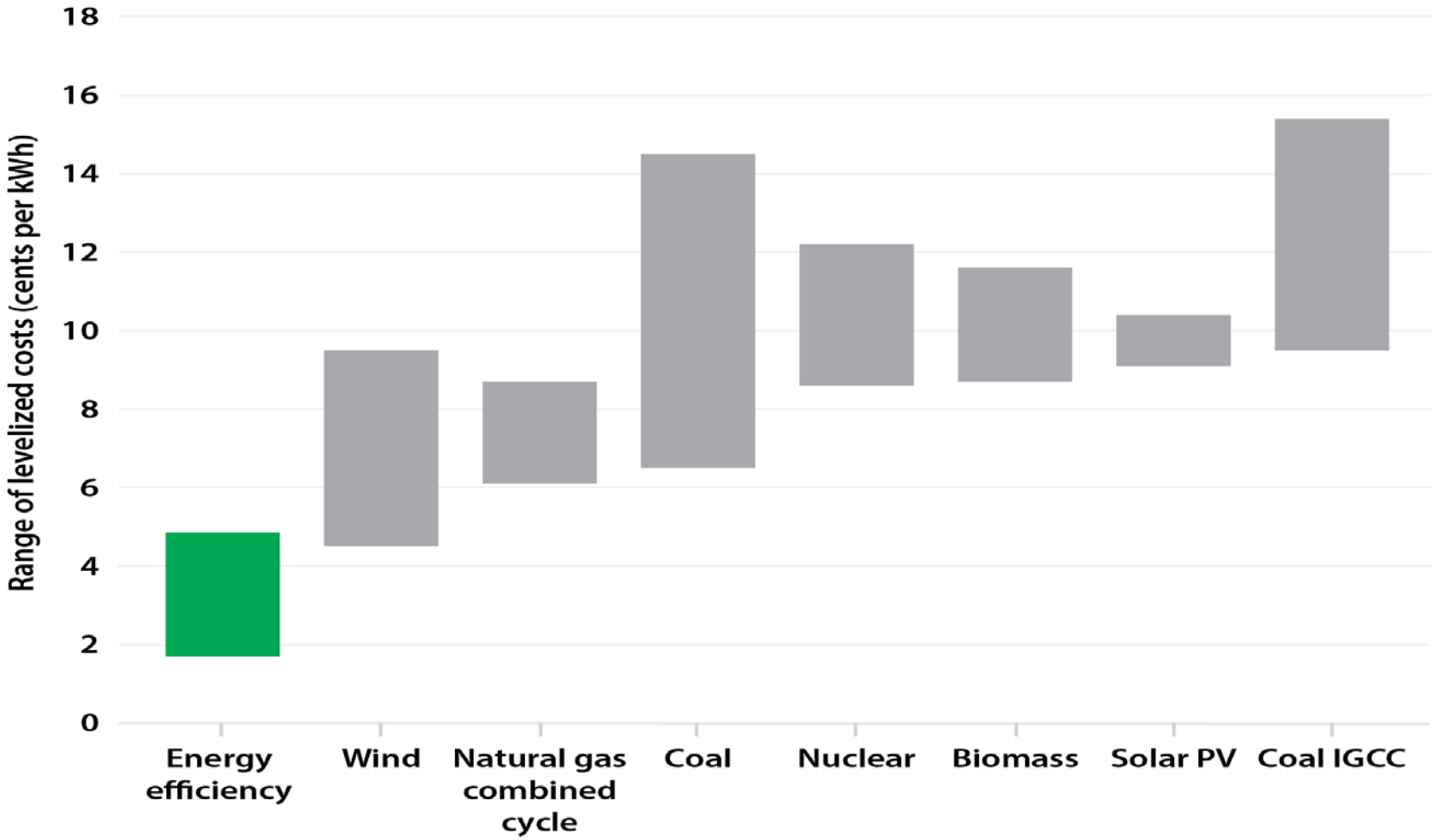
EPA will regulate CO_2 from the power sector

- Proposal early June

Potential role for end-use energy efficiency

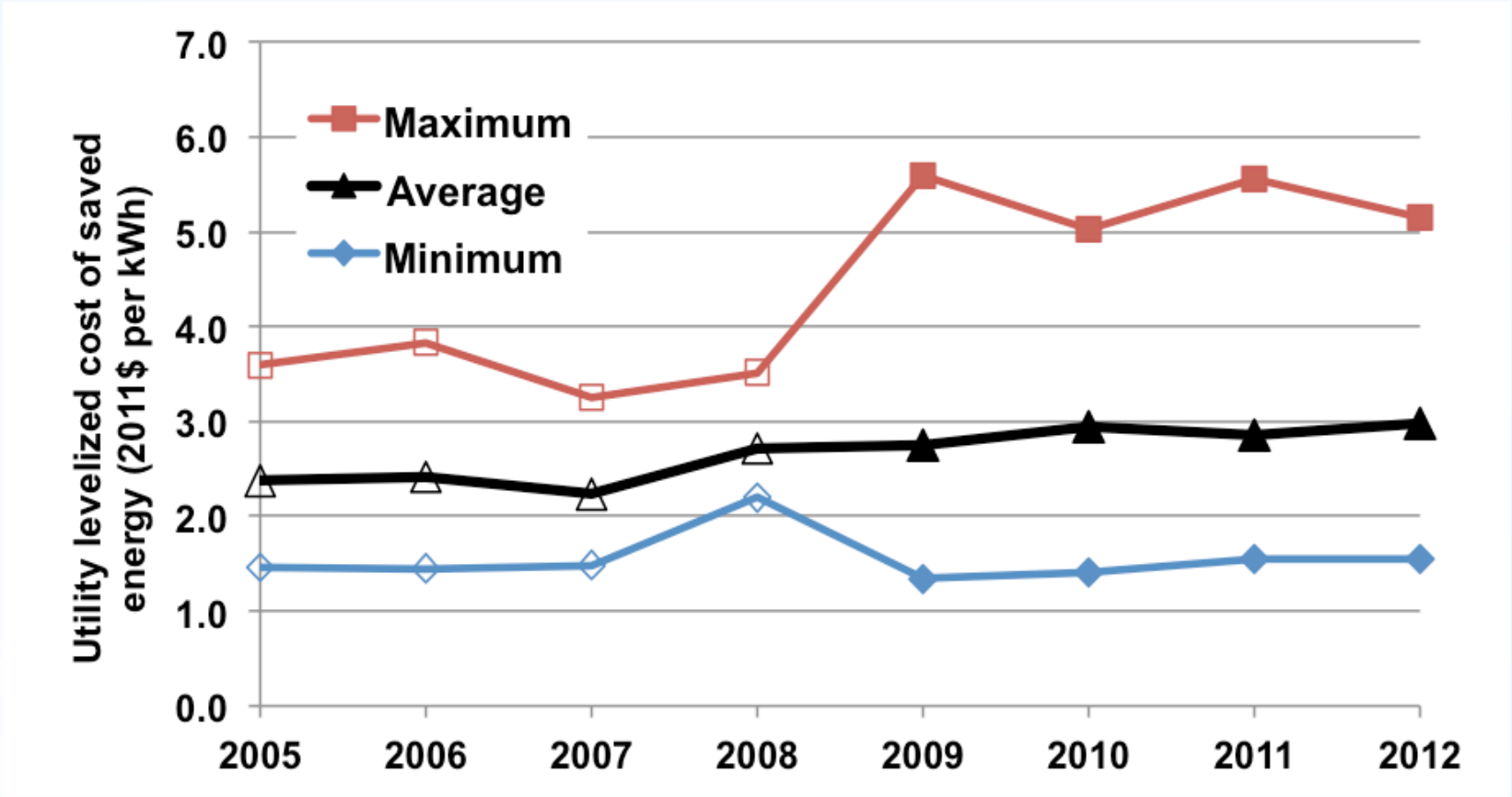
- Could be used to set the standard - “beyond the fence-line”
- Could be used for compliance with rule

Levelized electricity resource costs



Source: Energy efficiency data represent the results from Molina 2014 for utility program costs (range of four-year averages for 2009-2012); supply costs are from Lazard 2013.

Levelized Utility CSE 2005-2012



Source: Data for 2005-2008 are from Friedrich et al. 2009 (designated by unfilled markers). Data for 2009-2012 are from Molina 2014.

What We Did and Why

Top down policy analysis of EE potential in all 50 states

To find out:

- Electricity savings available from proven, in-practice technologies and policies
- Cost, economic impact, jobs and pollution

Approach

Evaluated biggest EE opportunities available to states

- Energy savings target of 1.5% annually
- Building codes for residential and commercial buildings
- Combined heat and power
- Appliance standards adopted by states for 5 products

Results - Electricity savings

- 925 million MWh in 2030
  - Note: this is not all EE possible, but is based on what is tested and proven in states
- Savings in 2030 are a 25% reduction relative to 2012 consumption
- 247 GW of avoided capacity
  - nearly 500 power plants

Percentage of electricity savings relative to 2012 consumption, by census region

Region	Total (all four policies)
New England	30%
Middle Atlantic	28%
South Atlantic	24%
East South Central	23%
West South Central	24%
East North Central	22%
West North Central	22%
Mountain	30%
Pacific	27%

Jobs and Economic Analysis

Dynamic Energy Efficiency Policy Evaluation Routine, or DEEPER model.

- An ACEEE input-output model
  - National and state-by-state net jobs impact
  - National and state GDP/GSP impacts

- The model has a 20-year history of use and development,
  - 15-sector input-output (I/O) model
  - Core data based on IMPLAN
  - Energy consumption and cost data from AEO
  - Labor and employment data from the Bureau of Labor Statistics

Results – Costs and Economic Benefits

EE scenario costs less than generation

- Efficiency investments required to generate 2030 savings: $47 billion
- Retail price of avoided electricity: $95 billion
- Net savings of $48 billion

Economic impacts

- 17.2 billion increase in GDP in 2030
- 611,000 jobs in 2030

Results – Pollution Reductions

Carbon dioxide

- 3 high-level approaches used to develop a range
- >25% reduction from 2012 levels
- About 600 million tons avoided in 2030
- Range 23-30% in 2030, relative to 2012 baseline

Sulfur dioxide: 980,000 tons in 2030

Nitrogen oxides: 527,000 tons in 2030

A SNAPSHOT OF THE U.S. IN 2030

Following the current energy path will have devastating economic, environmental, and health impacts. Enacting energy efficiency policies would avoid 600 million tons of carbon dioxide emissions.

CURRENT ENERGY PATH

An additional 494 power plants would be maintained

NOx

527,000 tons* of additional nitrogen oxide pollution

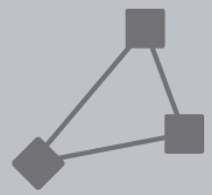
SO_2

980,000 tons* of additional sulfur dioxide pollution

CO_2

600 million tons* of additional carbon dioxide pollution

Transmission and distribution cost increases



Erosion of energy grid reliability

$95 billion in electricity generation costs

*i.e., the amount of pollution that would be avoided by choosing the energy efficiency scenario

ENERGY EFFICIENCY SCENARIO

Energy efficiency policies would save 925 million MWh of electricity

Environmental impacts:

26%
reduction in carbon emissions relative to 2012

25%
reduction in power demand relative to 2012

Economic impacts:

611,000
new jobs created

$17.2 billion
increase in GDP in 2030

$47 billion in energy efficiency investments

ACEEE
American Council for an Energy-Efficient Economy

Conclusions

If states adopt EE policies and programs already in use, we could reduce 2030 electricity demand and carbon dioxide emissions by 25% or more (relative to 2012)

- States can begin implementing immediately, and many are already doing many of these things
- Policies aren't a guarantee (Indiana, Ohio) and even states that have taken action could benefit from a "back stop"

The economic and employment impacts of this amount of EE would be positive in all states.

- Note: There are market barriers to EE and if the standard isn't aggressive enough states could fall back to more expensive compliance options (as they have done in NAAQS SIPs)

Resources for States

Change Is in the Air: How States Can Harness Energy Efficiency to Strengthen the Economy and Reduce Pollution: http://aceee.org/research-report/e1401

ACEEE 123 Solutions for States website: http://aceee.org/123-solutions

State Toolkit: http://aceee.org/sector/state-policy/toolkit

Coming soon…

- State by state results available
- Working on Excel-based calculator for states
- Developing website and technical resources on 111(d) with NASEO

Questions?

Contact Sara Hayes at ACEEE

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