Implications of Emerging Climate Programs for Air Quality Management

EPA's Air Quality Management Plan Workshop

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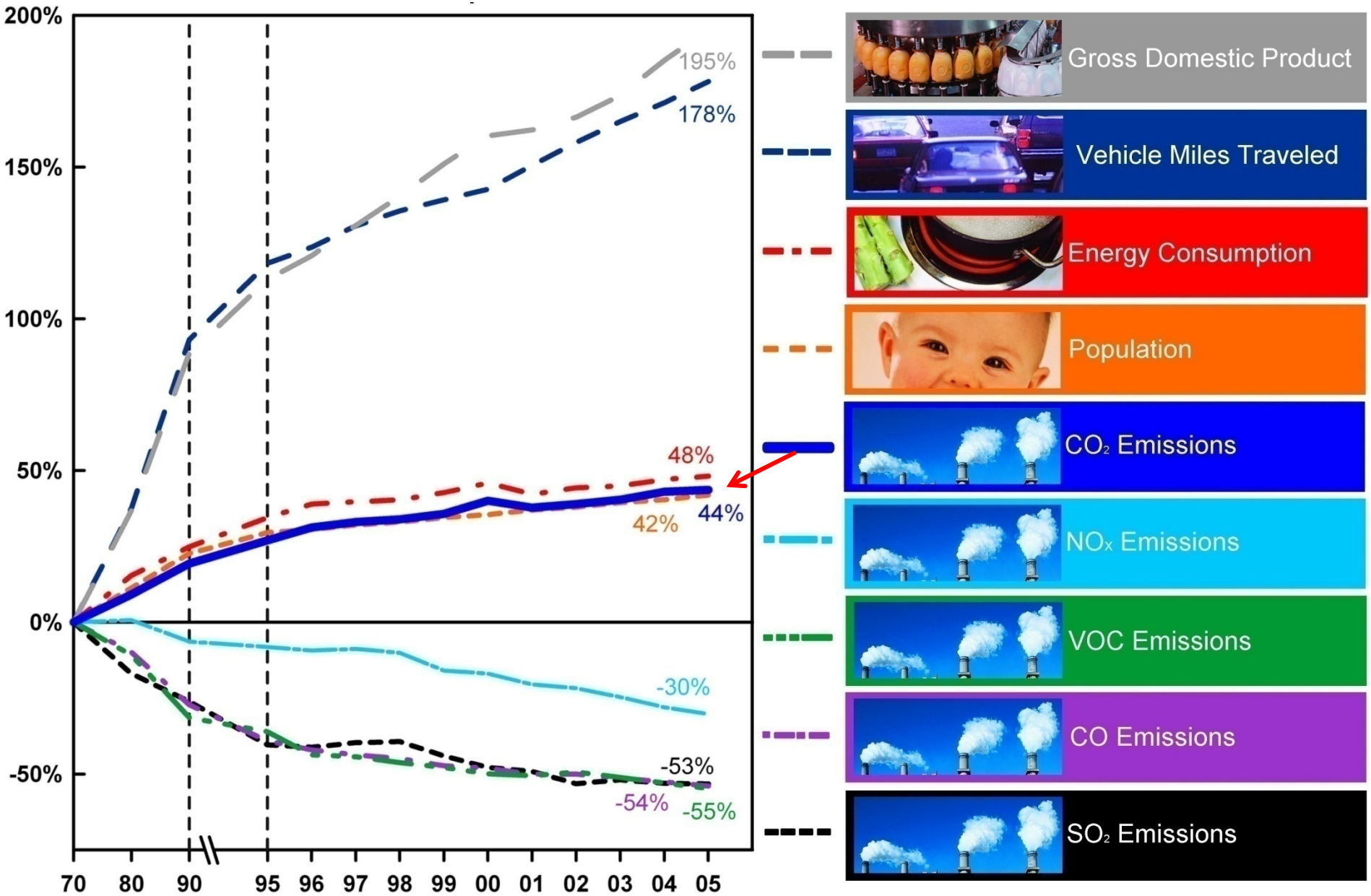
A changing policy environment

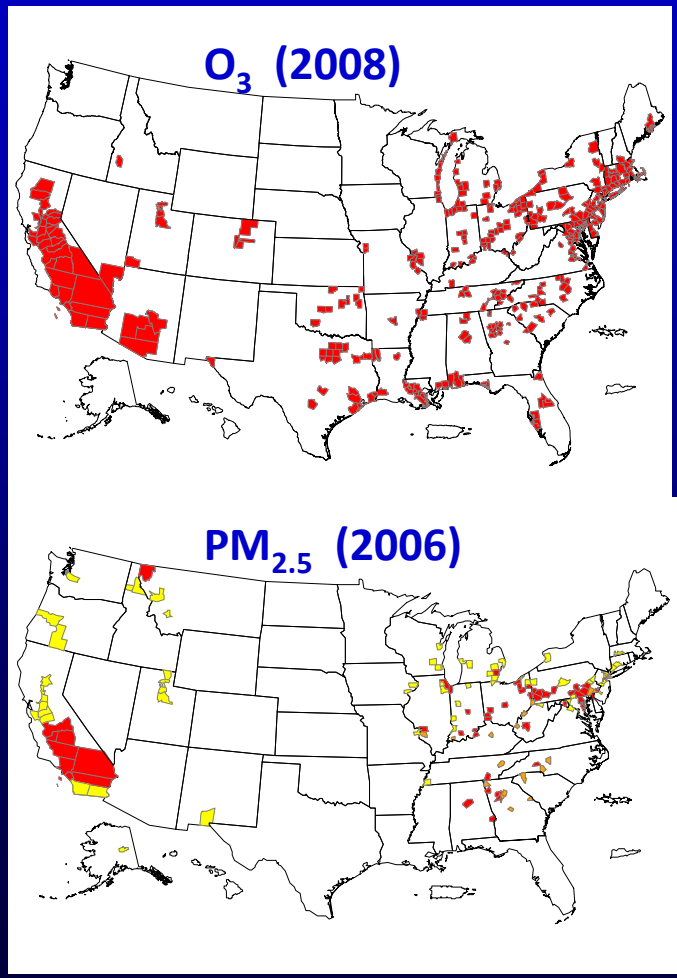
- Addressing climate change is becoming a national as well as global priority at all levels
- Despite major progress, 'traditional' air quality management (AQM) remains important
- Air programs are stagnant or shrinking, climate programs are growing
- Old paradigm: air pollution programs can help push climate programs
- New paradigm: with proper leverage, climate programs will provide significant air quality benefits; without explicit consideration , both AQM and climate programs will be suboptimal

A new look at a progress…



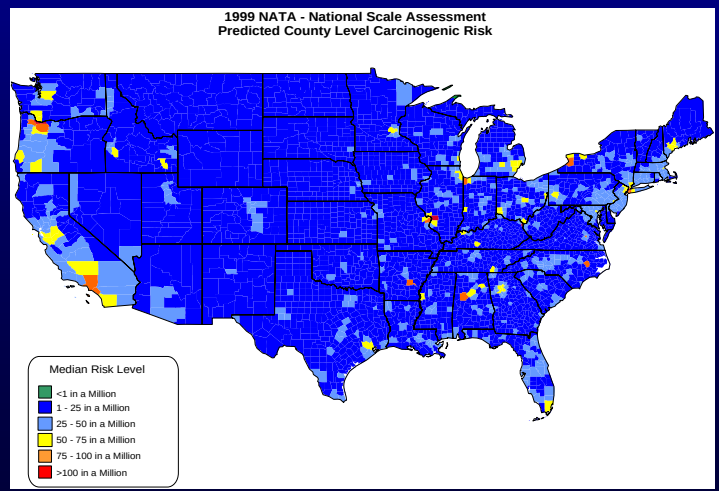
Still, air quality will remain important

Counties Violating the New NAAQS



- Growing evidence for significant health risks prompted tightening the NAAQS
- Thousands of premature deaths/year; multi- $billions in benefits of control
- Growing evidence for near roadway risk
- PBTs, background, urban air toxic risk

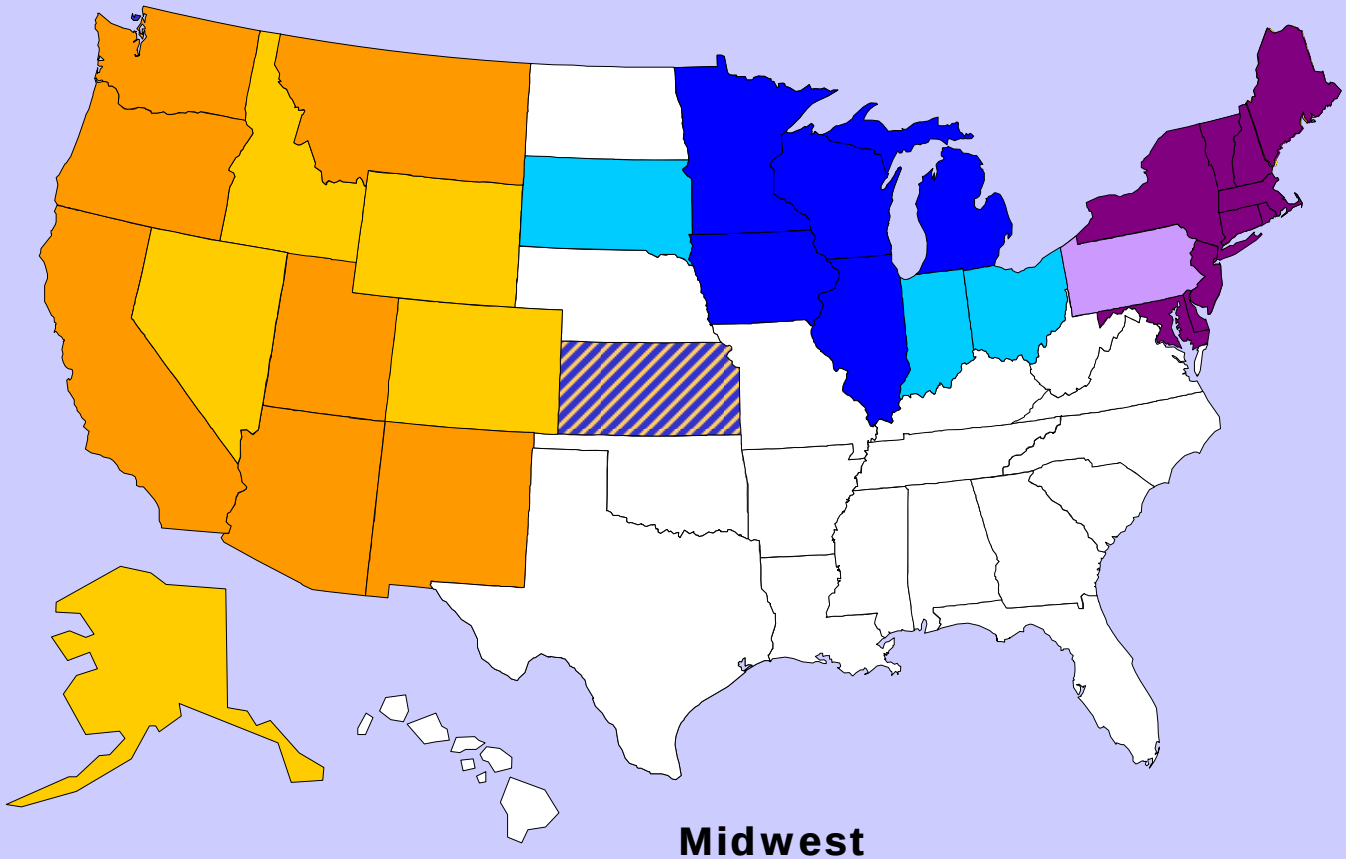
NATA High Risk Counties



Climate Programs are coming…

- State programs
- City/county programs
- Voluntary registries, stakeholders, ‘enablers’ ; e.g. Pew, Center for Climate Strategies, ICLEI, pssst - EPA
- Federal Legislation
  - All three major Presidential Candidates support action

Regional Climate Initiatives



Western Climate Initiative

Western Climate Initiative - Observer

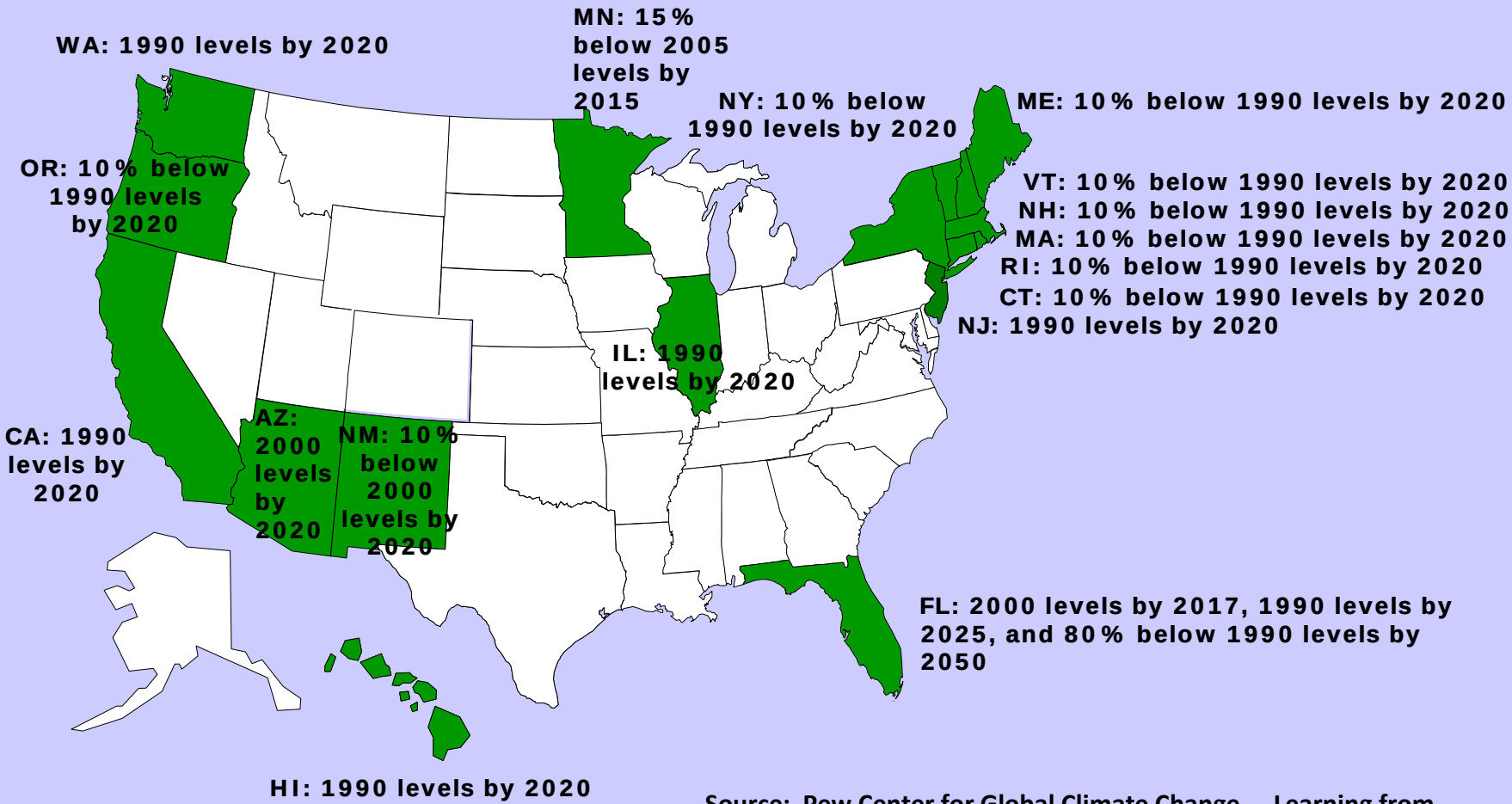
Midwest Greenhouse Gas Reduction Accord

Midwest Accord - Observer

RGGI

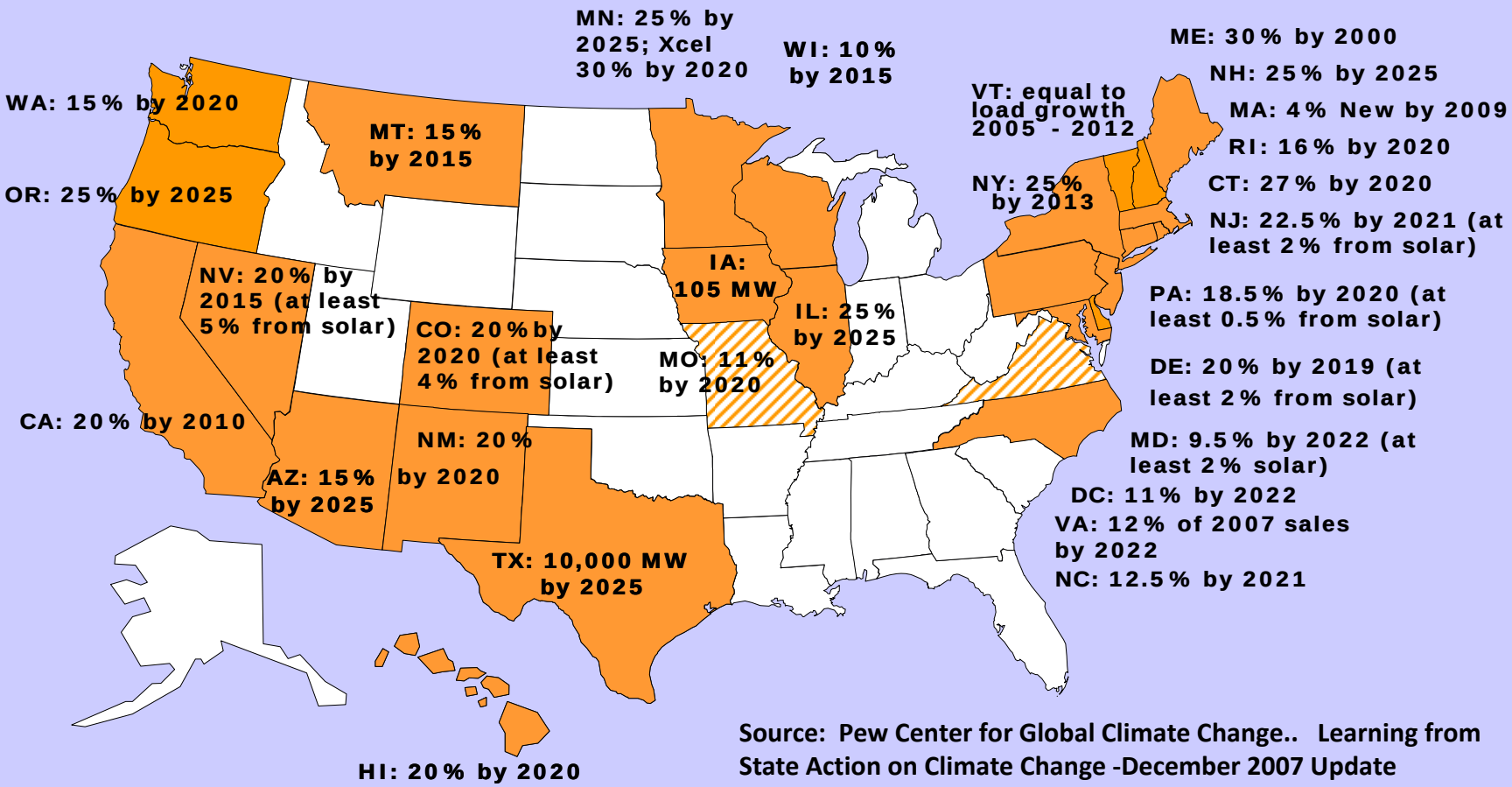
RGGI - Observer

State GHG Emission Targets



Source: Pew Center for Global Climate Change.. Learning from State Action on Climate Change -December 2007 Update

Renewable Energy Portfolio Standards



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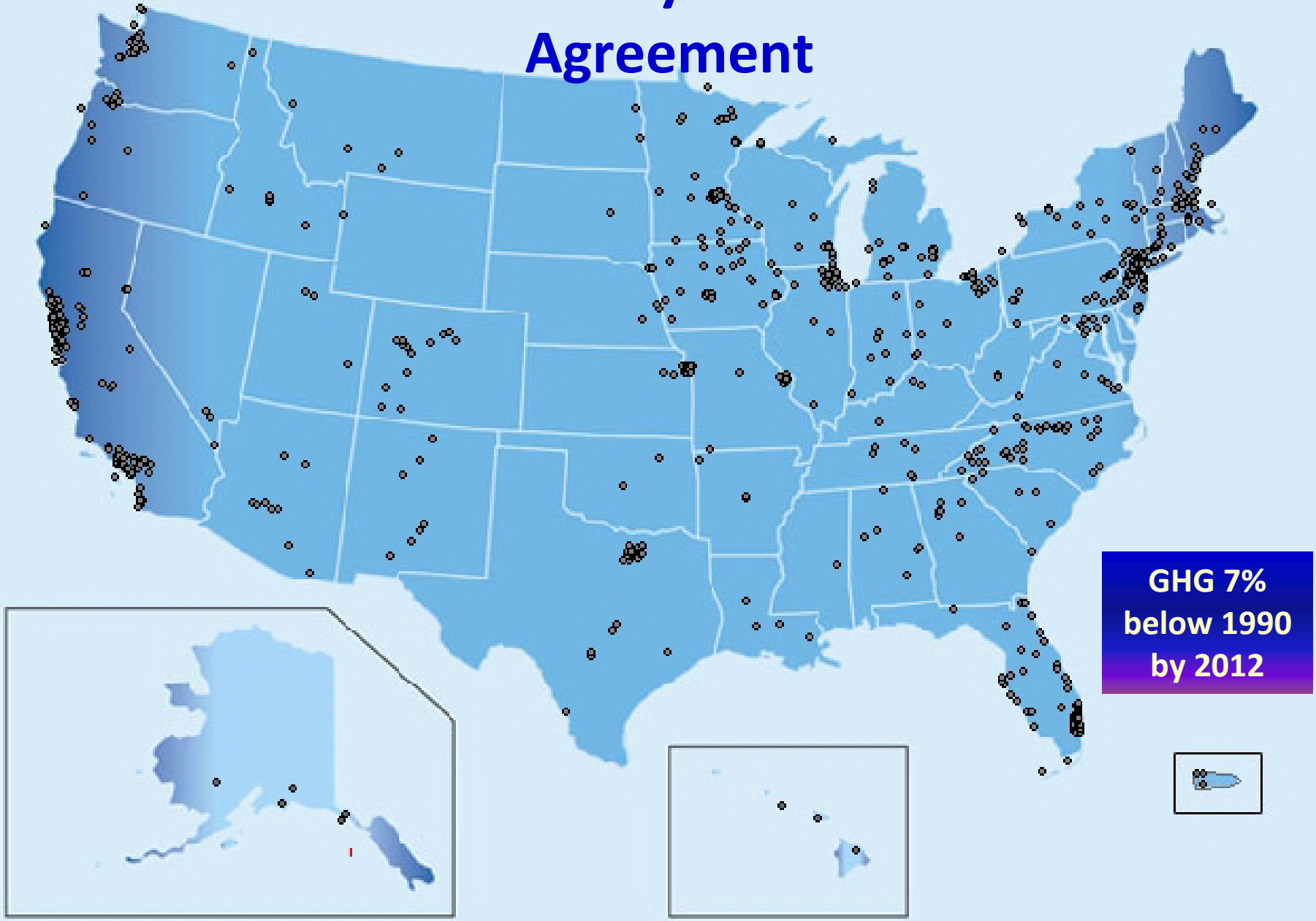
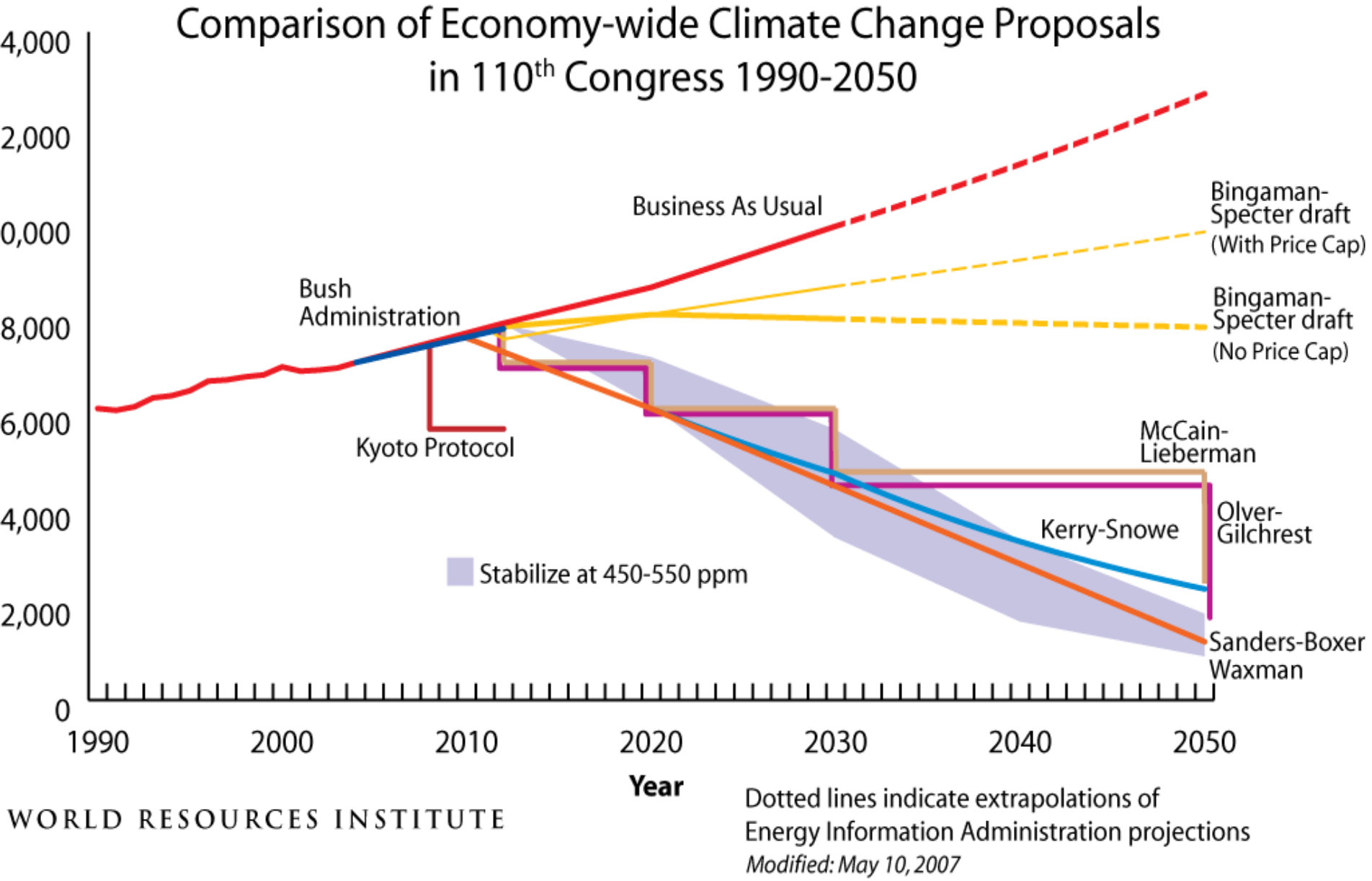
U.S. Conference of Mayors Climate Protection Agreement





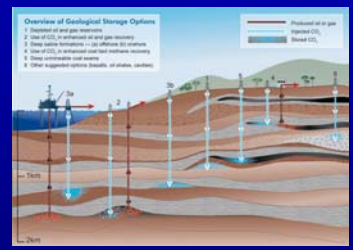
See http://www.wri.org/climate/topic_content.cfm?cid=4265

State/Local Roles under Federal Legislation

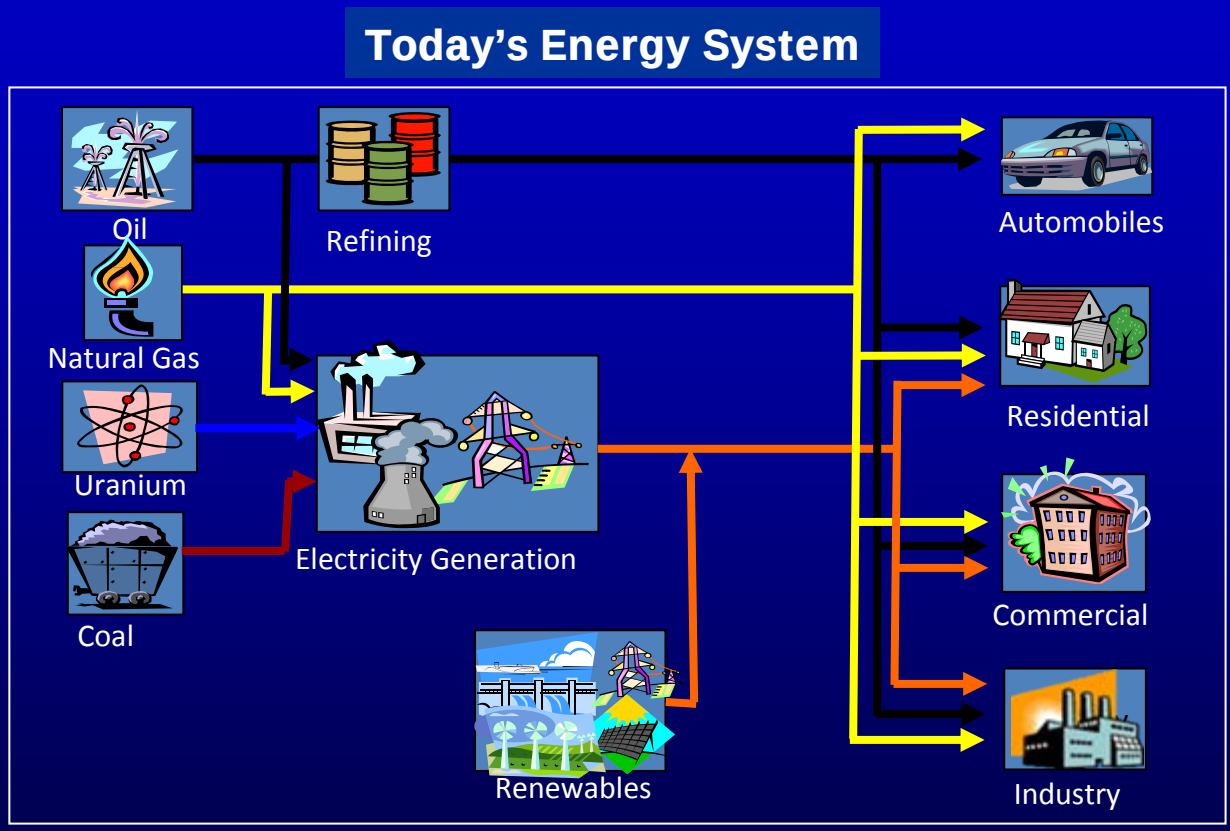
- Legislative proposals envision strong federal role, generally silent on role of states/localities
- NACAA believes states will continue play a major role
  - State climate plans – implement aspects of Federal (permitting, enforcement, plan development)
  - Federal program alone will be insufficient to meet ultimate GHG reduction targets; accordingly, states/localities will need to adopt programs for energy efficiency, RPS, land use, transportation, etc.
  - NACA: States/localities will need significant revenue from the auctioning of allowances to implement these programs

Climate Strategies 101

- Energy production, transmission and use
- Stationary
  - Energy efficiency (EE) and Renewable energy (RE)
  - Nuclear
  - Carbon Capture and Sequestration (CCS)
  - Methane recovery, use
- Transportation
  - Vehicle technology
  - Low carbon fuels (biodiesel, alcohol, hydrogen)
  - Vehicle use
- Agriculture and forestry



Why Climate Programs will matter to AQM



Air Pollution

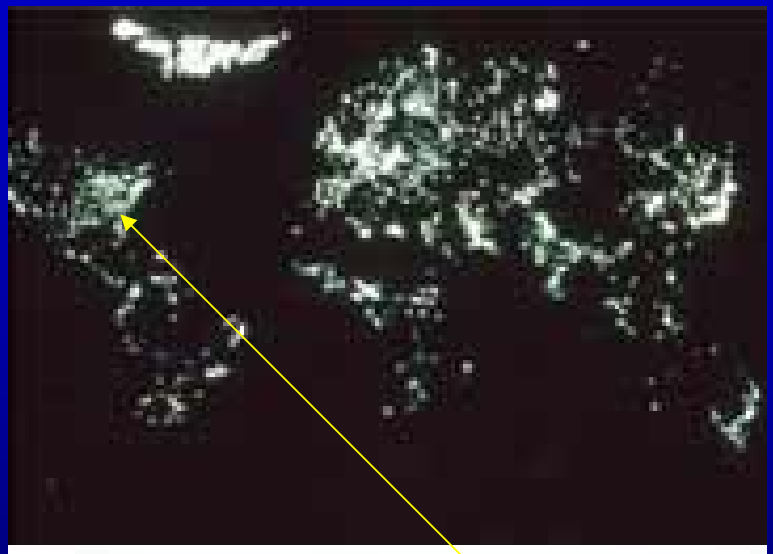
Contribution to anthropogenic emissions:

NOx ~ 95%
SOx ~ 89%
CO ~ 95%
Hg ~ 87%
CO_2 ~94%

Air Quality Concerns:
Ozone
PM2.5
Acid deposition
Toxics

Source: EPA ORD

Multipollutant scales matter



Global –climate change (GHG), O_3, $PM_{2.5}$, persistent toxic pollutants (Hg, dioxins)
Regional – O_3, $PM_{2.5}$, acid rain, visibility, nutrient loadings, benzene
Local – O_3, $PM_{2.5}$, air toxics
Personal –near roadway risk, indoor air/outdoor penetration, asthma

What can EE, RE do for air quality?

- Most climate specialists: It's all good
- Mostly right, but:
  - It's not *all* good, e.g. biodiesel, ethanol, woodstoves
  - It's not as good as it could be
    - Reducing energy demand theoretically deceases SOx, NOx, Hg from power generation, but where they are capped (CAIR, Title IV), other sources may emit more unless allowances are retired
    - AQ benefits greatest in populated non-attainment areas, but climate benefit not sensitive to location.
      - E.g. Big benefit for reducing traffic emissions in populated areas
- Location-specific AQ benefits are often very difficult to quantify either in foresight or hindsight
  - Improved tools a critical priority for multipollutant planning

Win-Win Climate/AQ Policies

- Measures that reduce fuel use – energy efficiency, reduced, more efficient transportation
- Lower carbon intensity energy generation – 'pure' renewables, nuclear
- Hybrid vehicles and electric (if low carbon electricity)
- Hydrogen economy if generation is low carbon
- Reducing aviation and shipping NOx, PM
- Reducing global ozone (through methane control)

Big Bang Multipollutant Example – Truck Stop Electrification

- Diesel idling emits an estimated 11 million tons of CO_2, 180,000 tons of NOx, and 5000 tons of $PM_{2.5}$ annually, in addition to consuming more than 1 billion gallons of fuel

EMISSIONS REDUCTIONS ACHIEVABLE BY TRUCK ELECTRIFICATION (PERCENT)

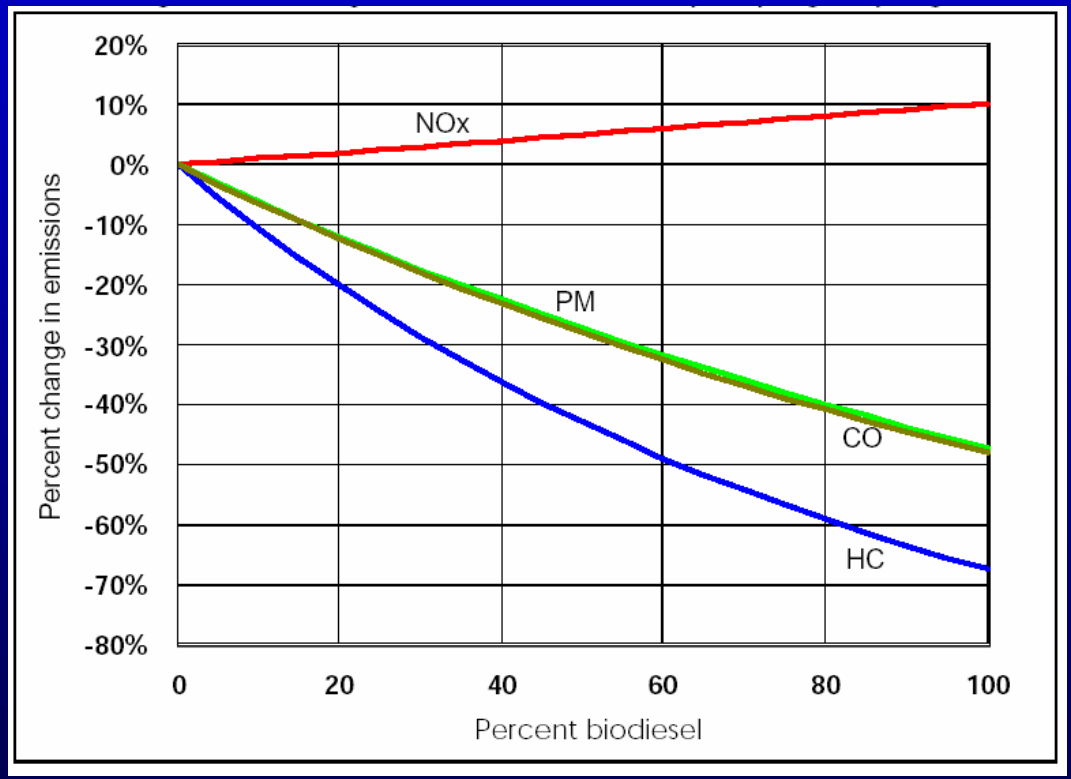
Type	NOX	PM	VOC	CO	CO2
Idling Emissions (grams/truck/hour)	122	2.19	36.4	118	10,070
Emissions to generate equivalent electrical power (grams/hr)4	6.04	0.035	0.054	0.481	3,014
Percent emissions reduction	95.0%	98.4%	99.9%	99.6%	70.1%

- With net long-term savings , lower cost to drivers
- What if other EE/RE SOx/NOx reduction allowances could be used to pay for this, diesel retrofits, and related programs in cities?

Potential Trade offs and conflicts

- Diesel vehicles – lower CO_2, higher PM and NOx
  - Black carbon (BC) warming uncertain, but significant
  - Likely a net warming for diesels despite lower CO_2
  - Critical to minimize PM and NOx from diesels to ensure climate and maximize air quality benefits
- SOx reductions – AQ benefits, but net warming
  - Significant health, acidification, visibility benefits
  - Some argue for injecting sulfate into the stratosphere, but no one seriously suggests rolling back SOx program
- Combined Heat and Power (CHP)
  - Significant energy savings
  - Moves combustion sources nearer populations
- Biomass Fuels – too much of a good thing?
  - Wood burning for domestic use creates localized AQ problems
  - Ethanol – carbon benefits smaller than expected, net AQ benefits modest
  - Potential biodiversity and food price issues from wholesale cultivation, second generation biofuels more attractive

Biodiesel: clear energy and GHG benefits, positive, mixed air quality results



- OTAQ Analysis
  - PM, HC, CO, and, generally, toxics reduction
  - NOx increase, 2-4% for B20, insignificant for B5

Data from EPA420-P-02-001, heavy-duty engines

Where we stand on climate/AQM

- State capacity is severely limited
- Schedules for new O_3 and PM NAAQS implementation are not coordinated
- Rapidly growing climate-related initiatives will affect emissions from traditional air sources
- Currently, these climate initiatives are often decoupled from AQM programs
- A number of EPA and other groups are focused on ways to integrate AQM and some climate-related programs (OAP, OTAQ, OAQPS, NACA, NESCAUM, States, DOE)
- While progress has been made, EE and RE have seen limited use as formal measures in SIPs

Guidance on SIP Credit for EE/RE and "Bundling" Measures (2004,2005)

Examples:

Washington DC SIP

- Measure: Montgomery County Wind Power Purchase
  - 5% of electricity use = 28,000 MWh/year
- Analysis: Dispatch analysis of a new wind plant to meet power demand in PJM West (mostly coal-fired)
- How much credit: 0.05 tons NOx per day
  - 50% of estimated emission reductions (of 5.72 #NOx per MWh) sought for SIP credit
- Other: Cap and trade area, commitment to retire allowances

EPA Region III issued final approval (See May 12, 2005, 70 FR 24987)

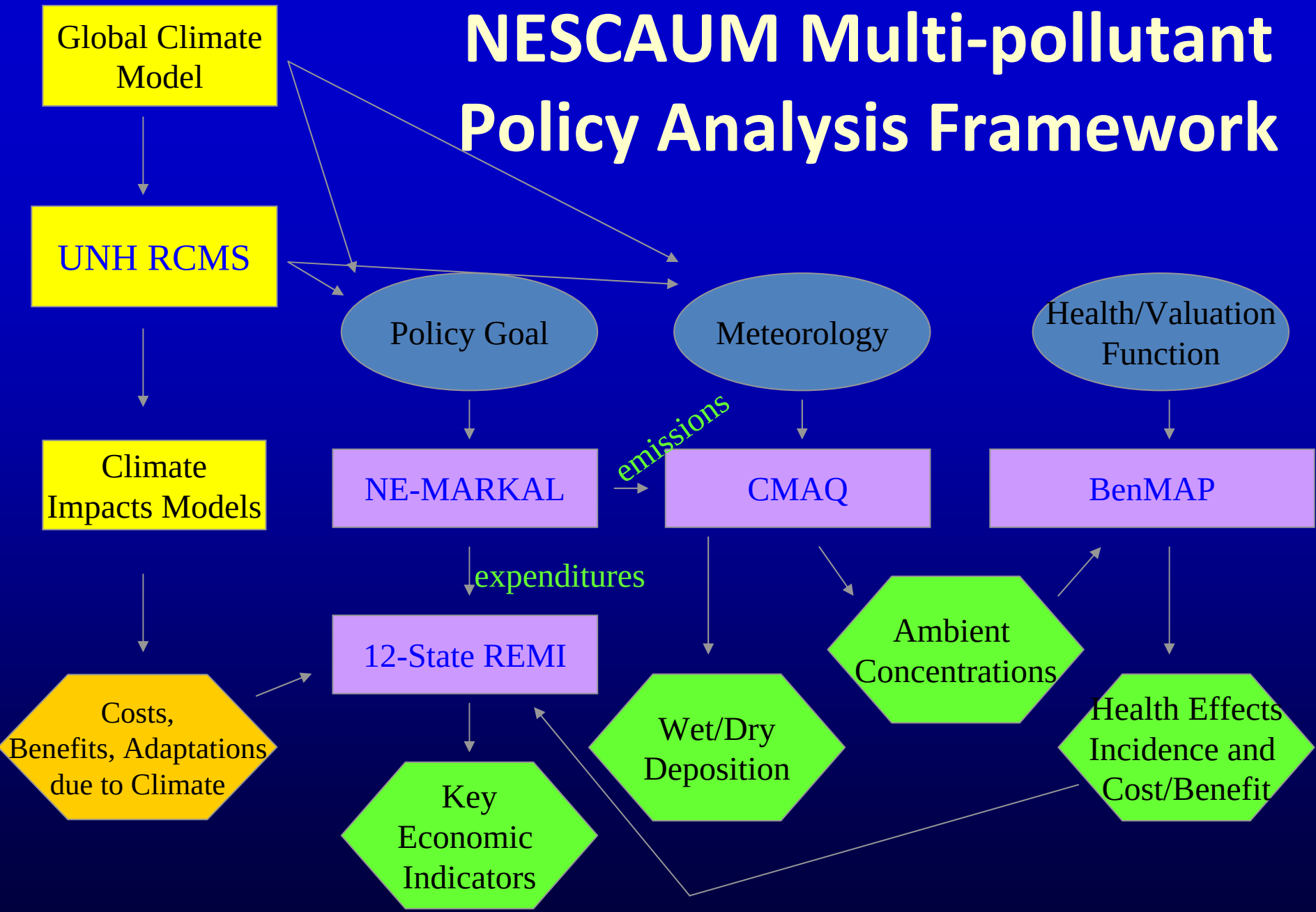
Dallas-Fort Worth TX SIP

- Measure: Senate Bills 5 and 7 EE Grant Programs and Utility EE Programs
  - 912,000 MWh in 2007
- Analysis: ERCOT wide analysis on non-baseload fossil-fuel fired units (mostly natural gas)
- How much credit: 0.7 tons NOx per day in 12 county non-attainment area

Decision on approval pending

- Not many takers – quantification can be difficult; SIP revisions still a difficult process

NESCAUM Multi-pollutant Policy Analysis Framework



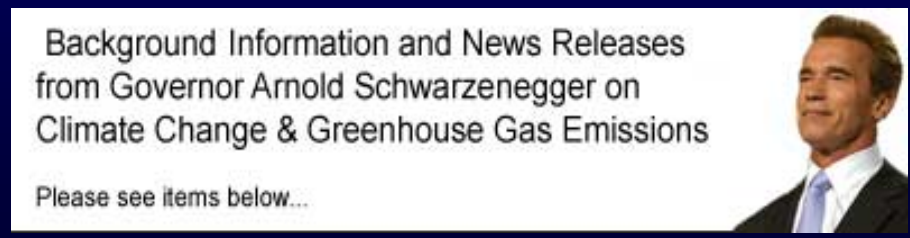
OTC High Electricity Demand Day MOU

- EE and RE as strategies to reduce peak electricity demand
  - HDD associated with high ozone, high emissions from peaking electric generators
  - RE/EE measures
    - Energy efficiency
    - Demand response
    - Solar photovoltaic (PV) technology
    - Combined heat and power (CHP) technology
  - EPA (OAP) modeled NOx reductions
    - A portfolio of enhanced clean energy initiatives could reduce peak day NOx emissions by 8% across the OTC states by 2010, and by more than 20% by 2015.

California Climate Program

- AB32 Legislation Administered by the Air Resources Board
- Secretary of the California Environmental Protection Agency oversees a climate action team
  - Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission and President of the Public Utilities Commission
  - State Agency Greenhouse Gas Reduction Report Card (March 2008)
    - 2020 target – 173 million metric tons CO2 equivalent
    - Sum of Agency targets to date – 128 MMTCO2E

CALIFORNIA Climate ACTION TEAM



Many Places to Look for More Information and Assistance

http://www.epa.gov/cleanenergy/

EPA, DOE, ISOs, PUCs, Energy Offices, National and Regional Organizations,