

Western Ozone Precursor Sources

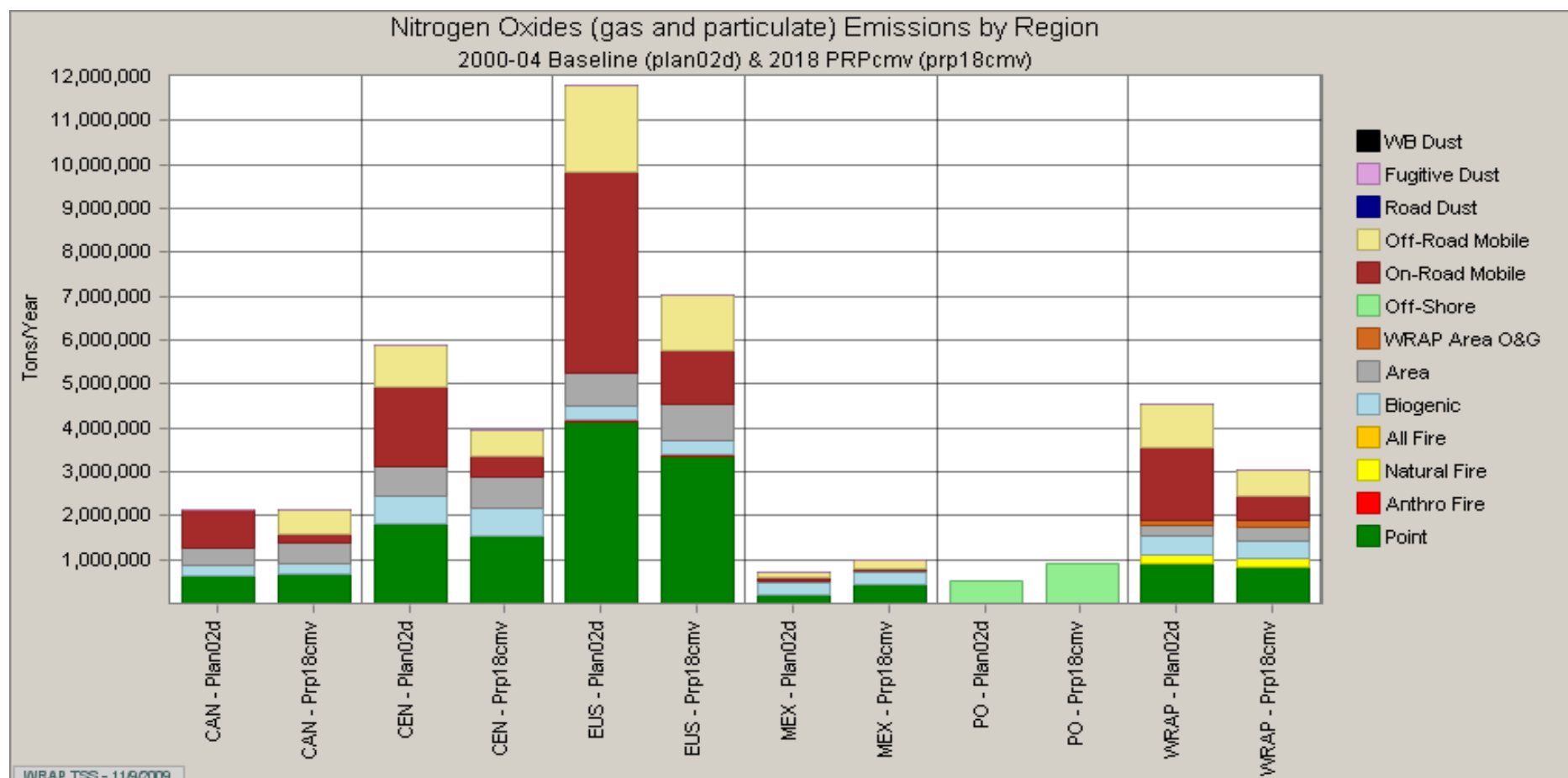
WRAP Membership meeting

September 30, 2010

Portland, OR

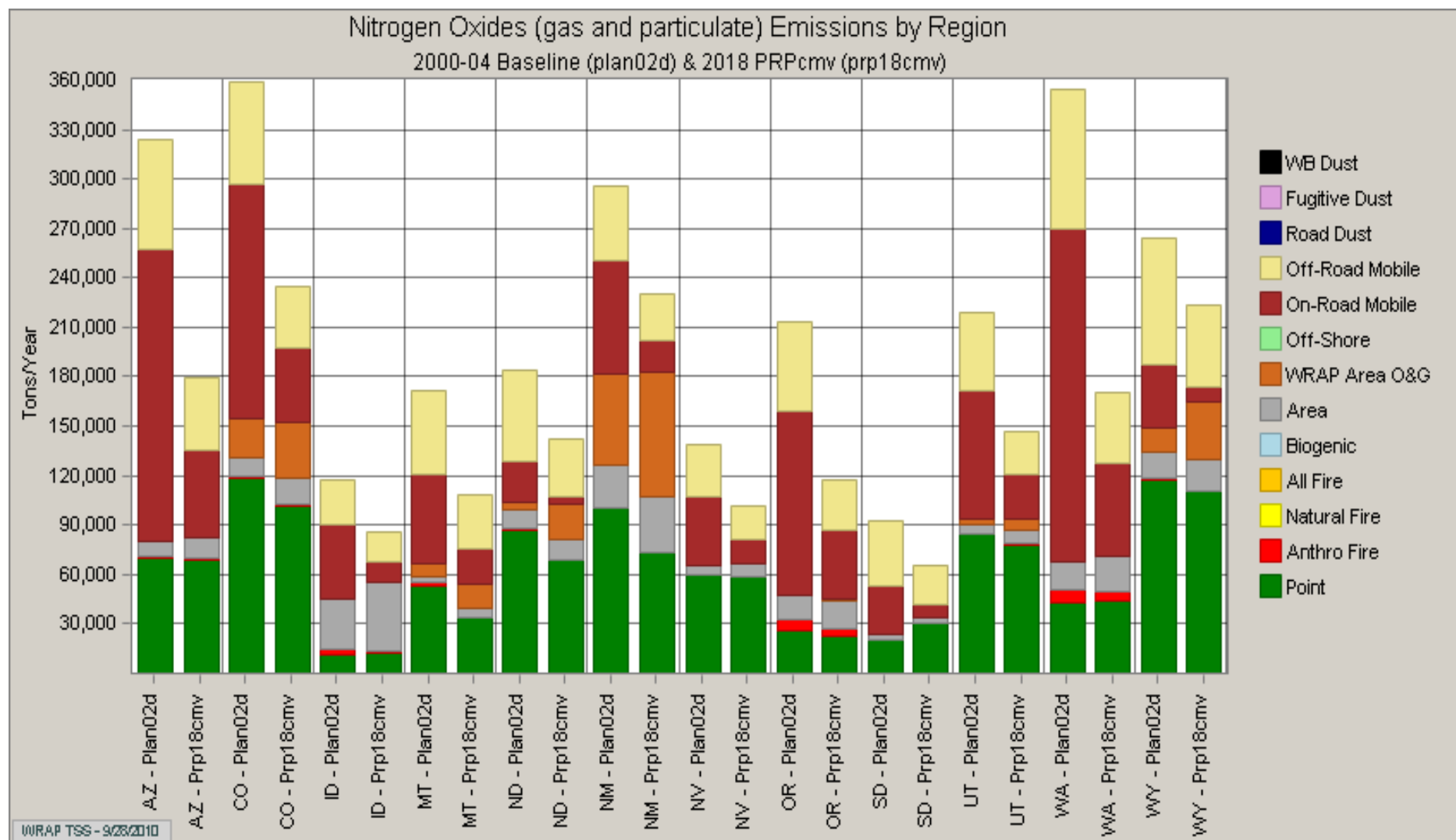
- Ozone precursor emission sources
 - Nationwide vs. the West
- Overview of source mix in the West
- Anticipated changes/emission reductions from controls “on the way”
 - Mobile sources
 - BART for NO_x sources
 - Oil and gas
- Discuss likely sources and regions for further control strategy evaluation

Projected Change 2002 to 2018 in NO_x Emissions for North American regions



All NO _x Sources 2002 to 2018	Canada	CENRAP	Eastern US	Mexico	Pacific Off-Shore	WRAP (Spring 2009 BART)
Tons/year	-17,043	-1,947,438	-4,765,494	+280,697	+391,972	-1,518,746
%	-1%	-33%	-40%	+39%	+76%	-33%

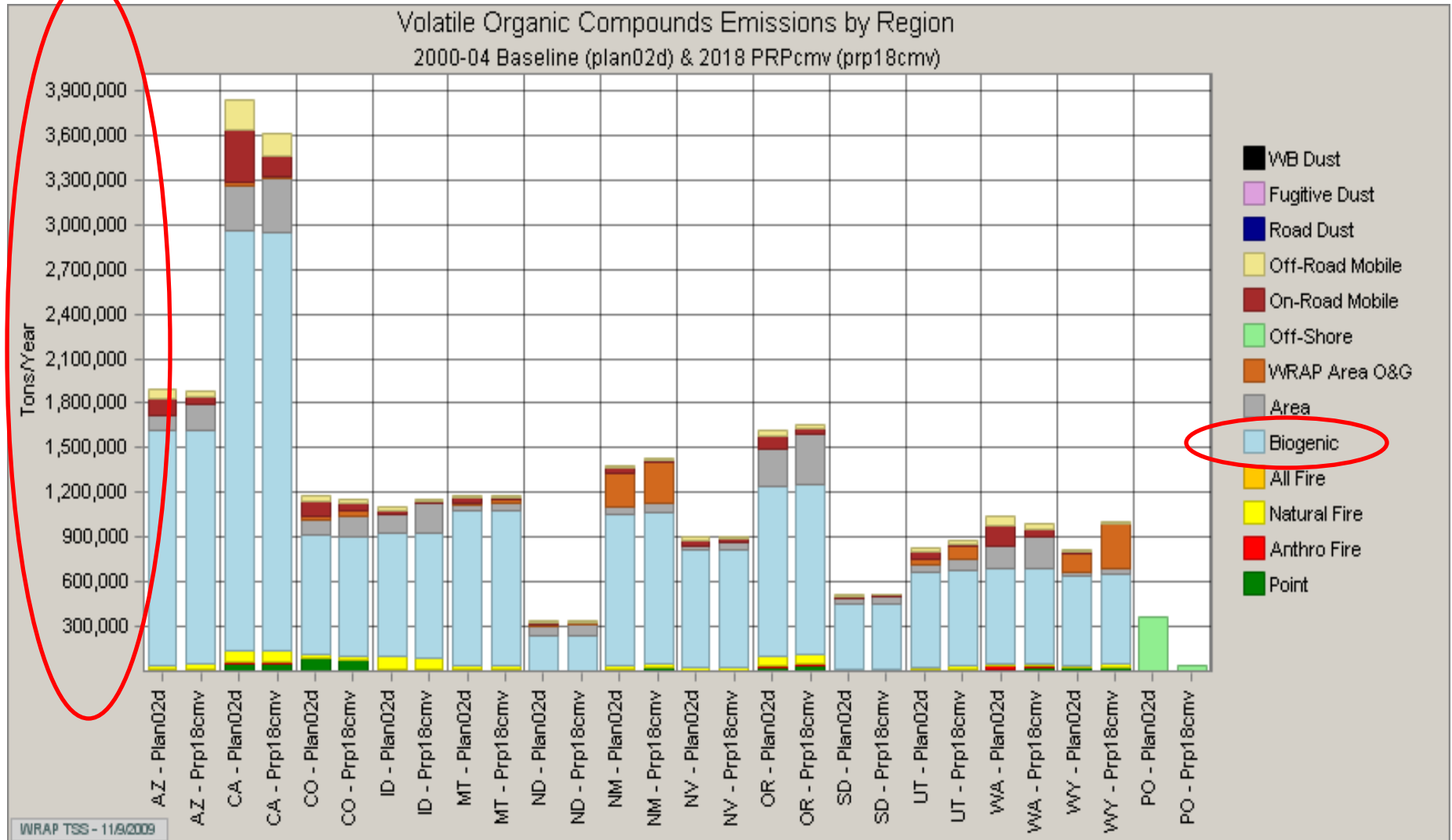
Projected Change in WRAP Region Anthropogenic NO_x Emissions* from 2002 to 2018 (California removed**)



* Does not reflect NO_x BART after Spring 2009, O&G growth/controls after Spring 2007, & state/local rules after Spring 2009

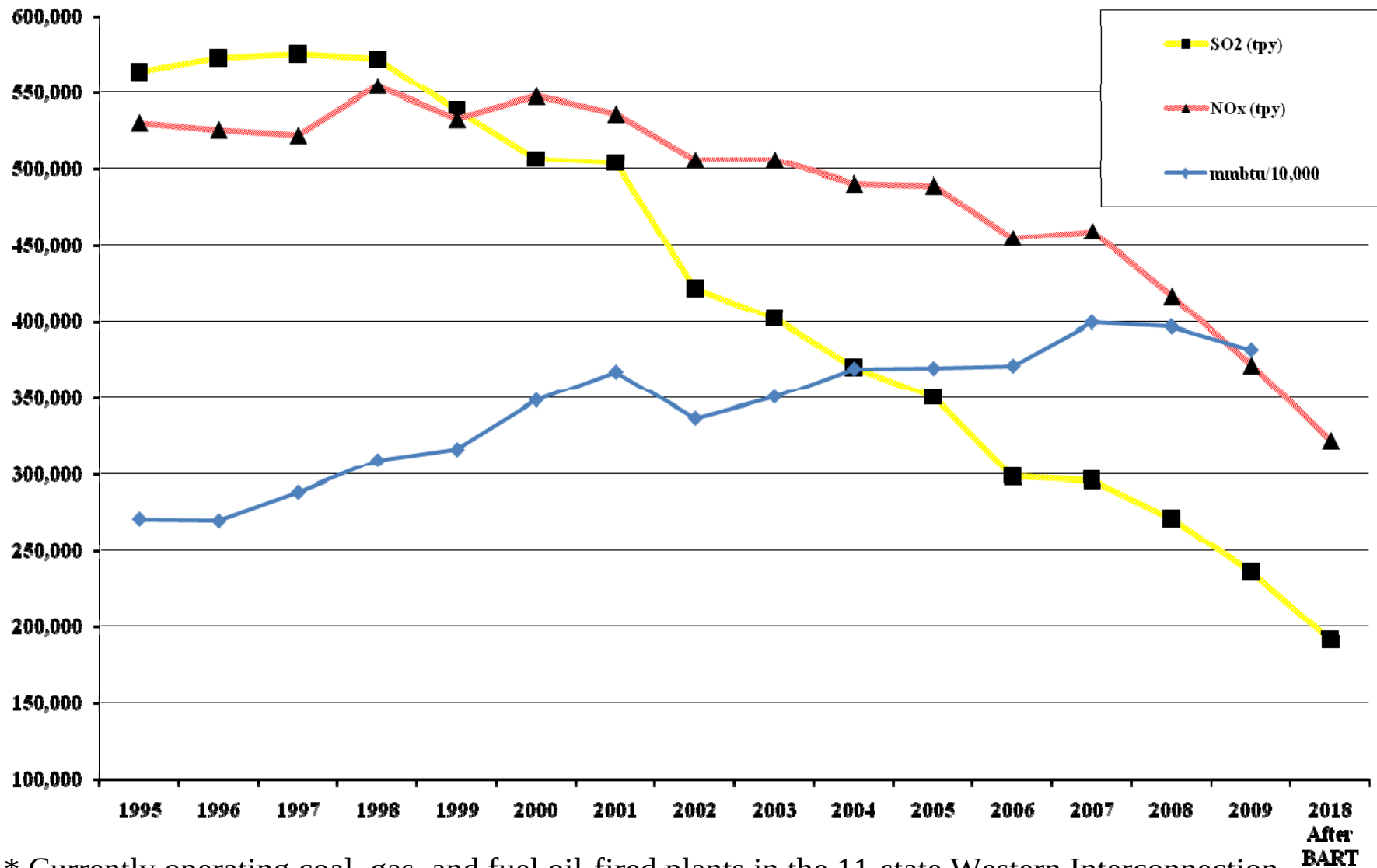
** California too large to show

Change in WRAP region Gaseous Volatile Organic Compound Emissions (tpy) 2002 to 2018 - *Mobile down 785,779 tons (-50%), Point up 40,176 tons (+15%), Area up 499,144 tons (+38%), WRAP O&G Area up 310,648 tons (+71%)*



Questions & more work needed on methane, speciation, spatial/temporal/source type allocation

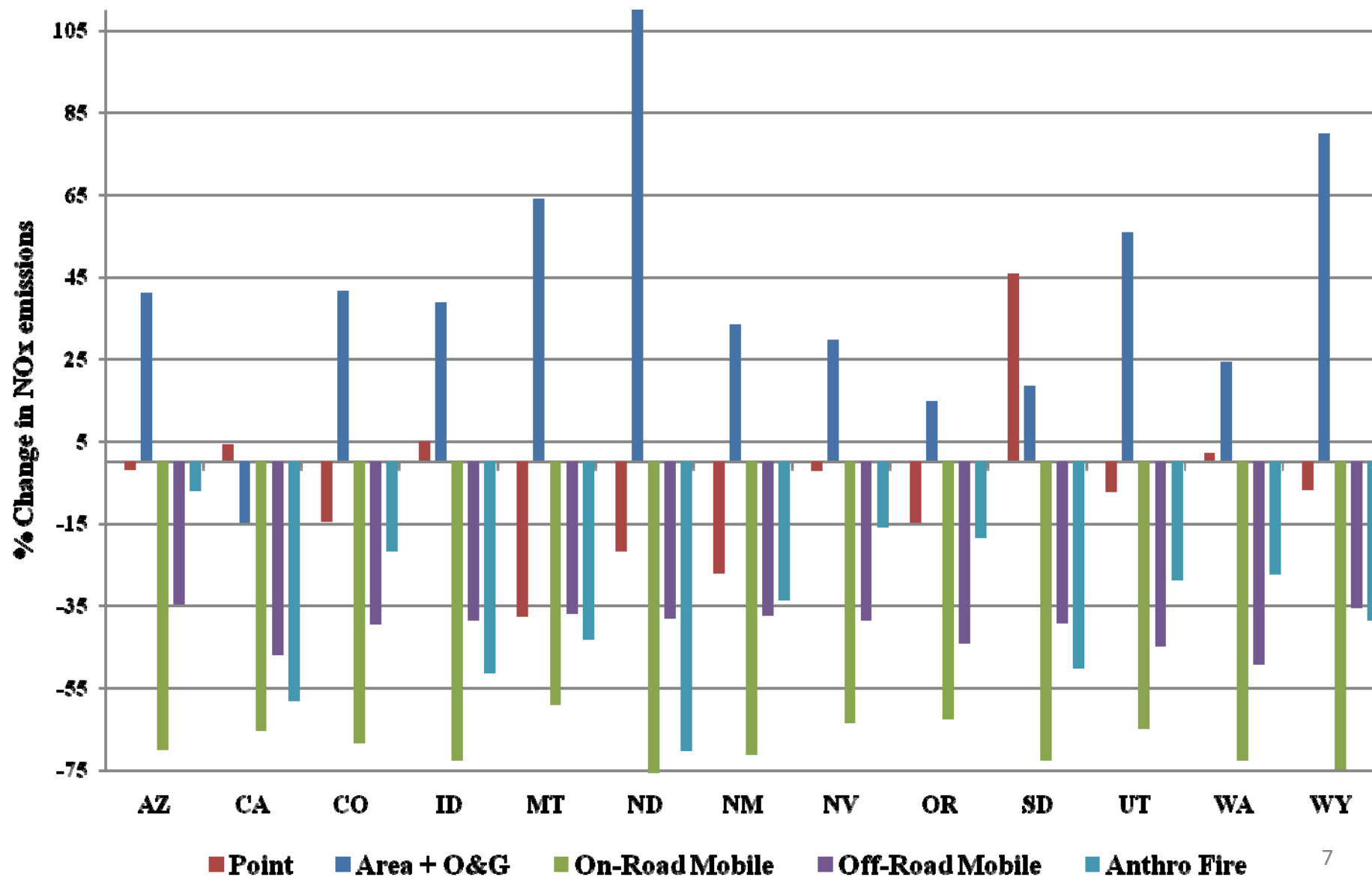
Western State Power Plant Emissions* (1995-2009) and After BART**

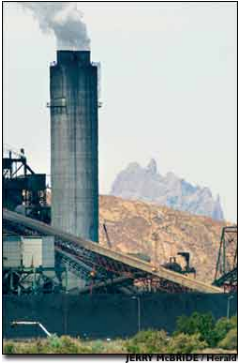


* Currently operating coal, gas, and fuel oil-fired plants in the 11-state Western Interconnection

** Estimates for BART controls are from WRAP PRP18b emissions analysis (Spring 2009) at:
[\[http://www.wrapair.org/forums/ssjf/pivot.html\]](http://www.wrapair.org/forums/ssjf/pivot.html)

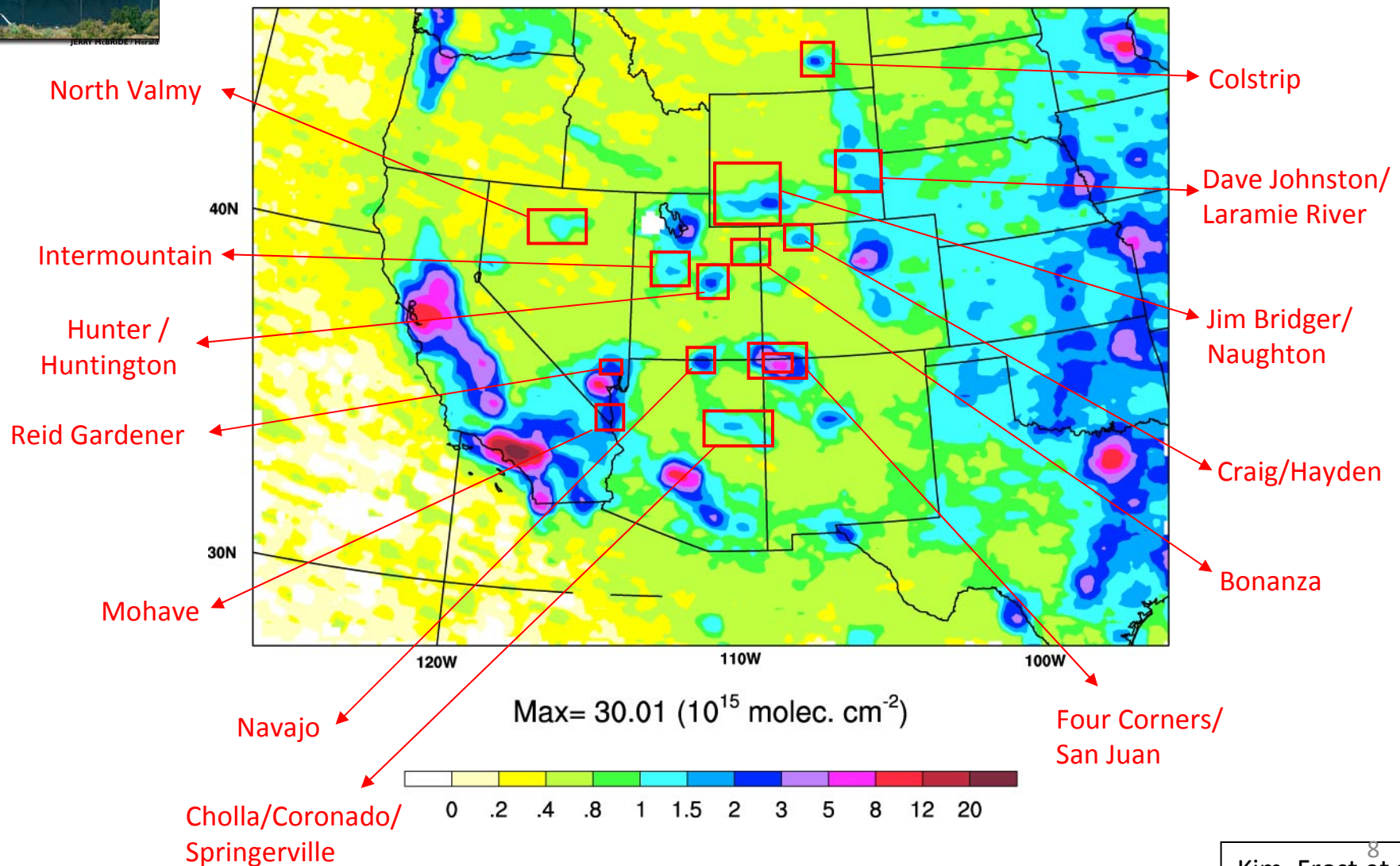
Projected Change in Anthropogenic NO_x Emissions from 2002 to 2018





NO_x Emissions from Western US Power Plants

- *Isolated plants have discrete signatures in satellite retrievals*
- *Power plant emissions are measured continuously at each stack*
- *Post-combustion NO_x controls on large coal-burning plants are now proposed*

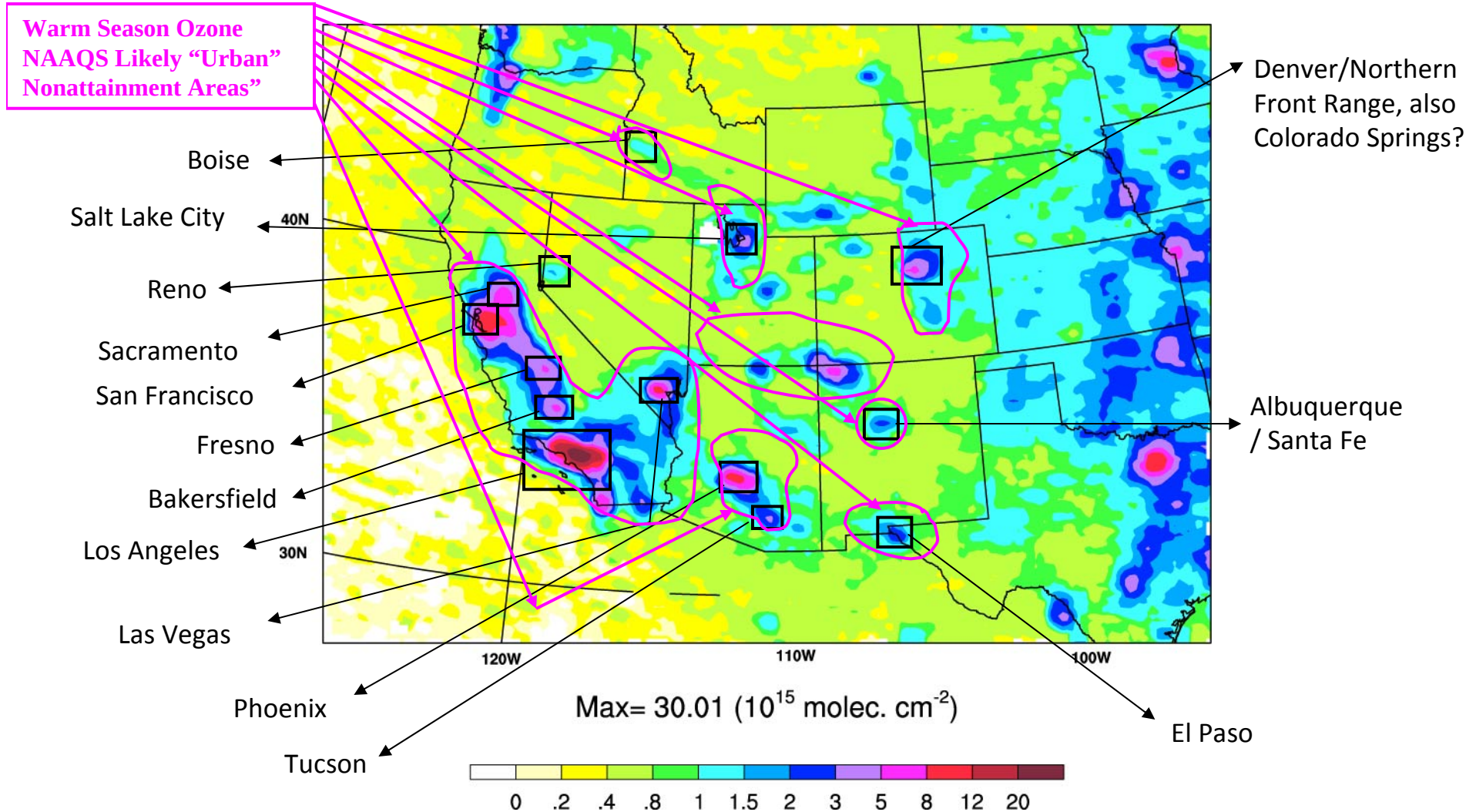




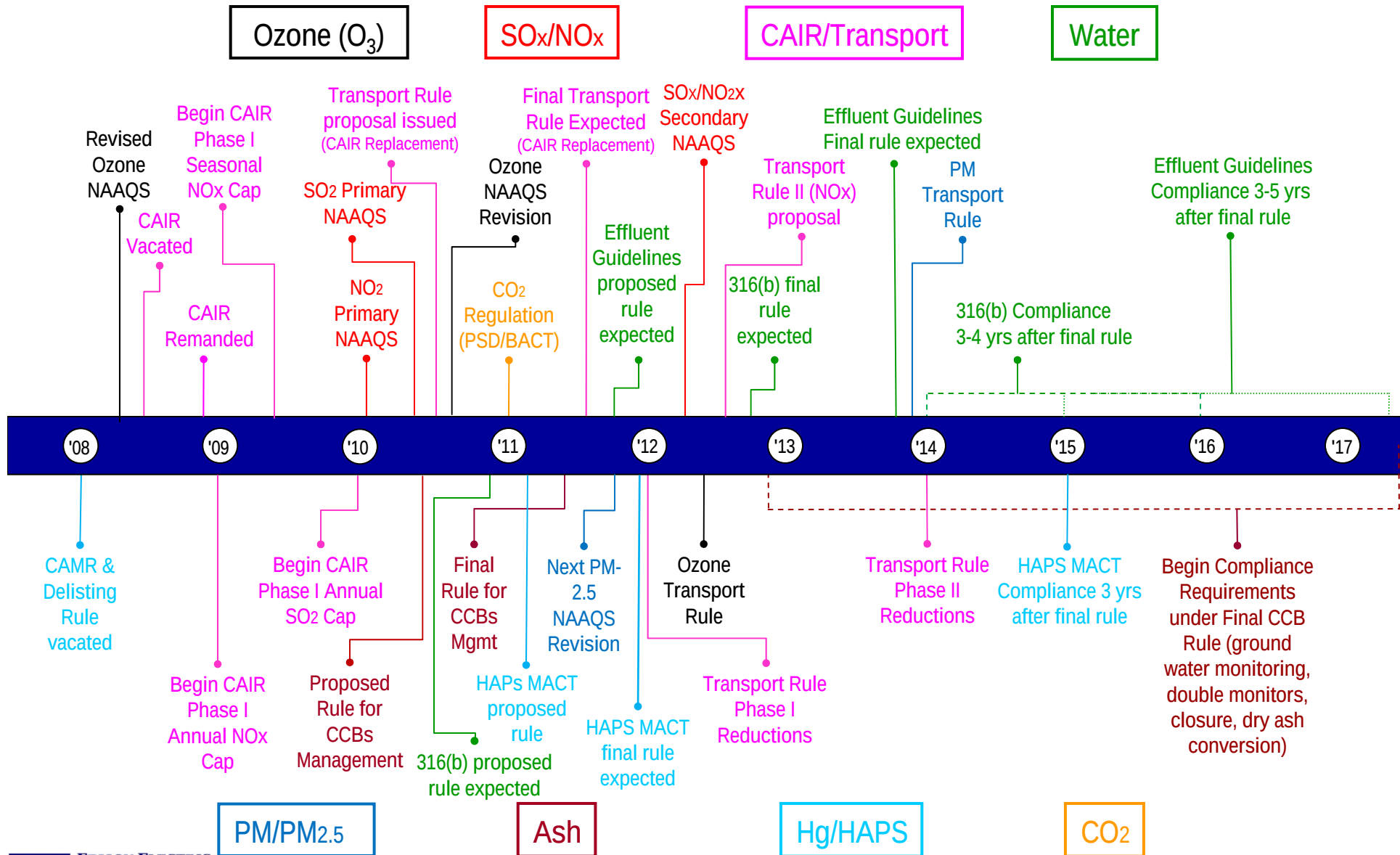
NO_x Emissions from Western US Urban Areas + Likely Ozone Urban and/or High Ambient Concentration Areas

Build on satellite-model comparisons for power plants

➤ *Evaluate urban area emission inventories and monitor changes*



Possible Timeline for Environmental Regulatory Requirements for the Utility Industry





Fire

The Big Picture

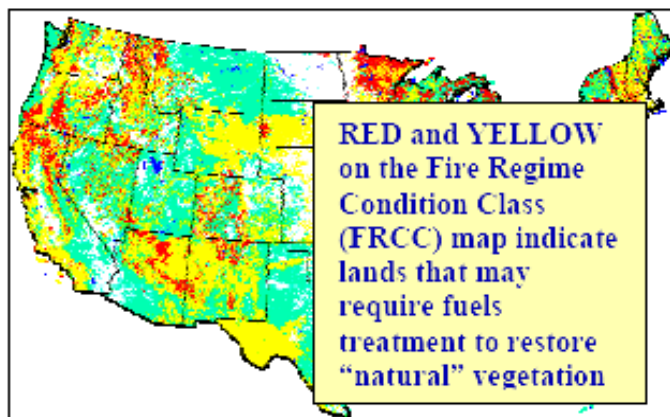
Smoke/Fire & the Ozone and PM
NAAQS, Regional Haze Rule

Technical Products for air
quality planning &
management as required by
the Clean Air Act

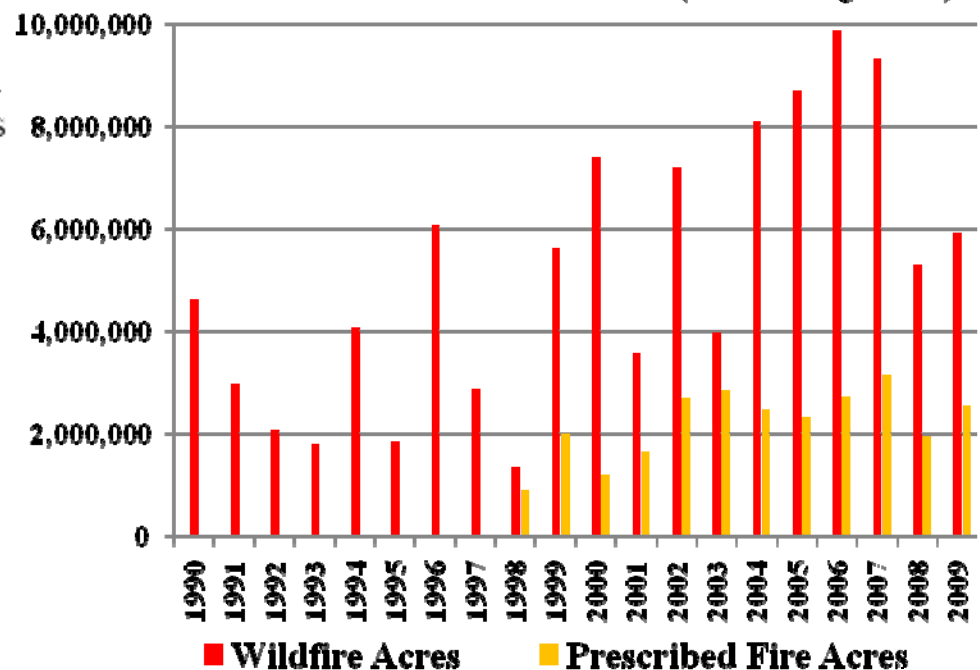


Future emissions, efforts to
avert emissions &
health/visibility impacts, &
adapt to a changing/varying
climate

The quantity of forest fuels and composition of vegetation in the wildlands of the Western U. S. motivate the land managers to increase the application of prescribed fire to the landscape (from 650,000 acres in 2002 to a projection of up to 3.6 MM acres in 2018).



U.S. Wildfire & Prescribed Fires Acres Burned (1990 through 2009)

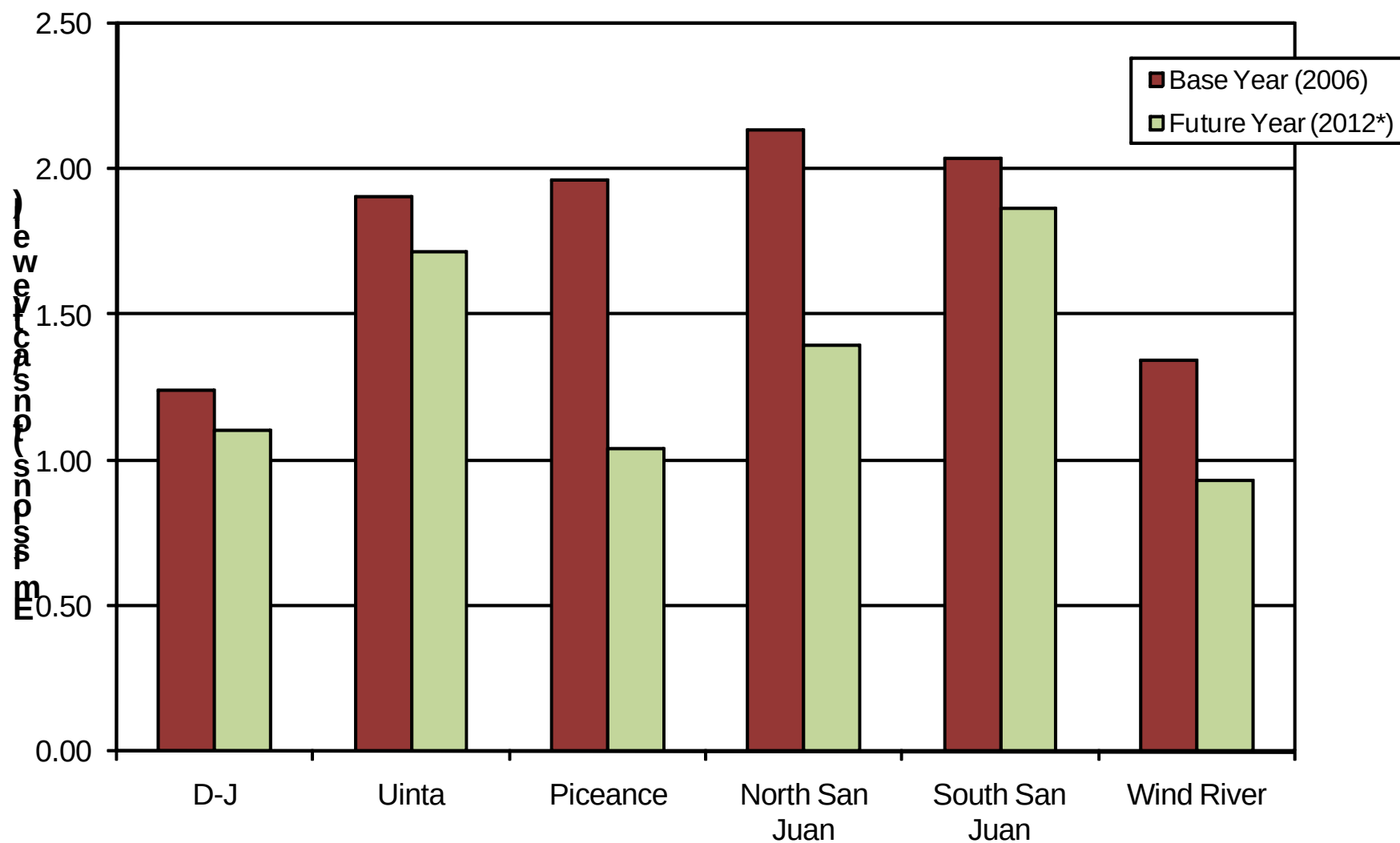


Oil and Gas Production in the Rocky Mountains

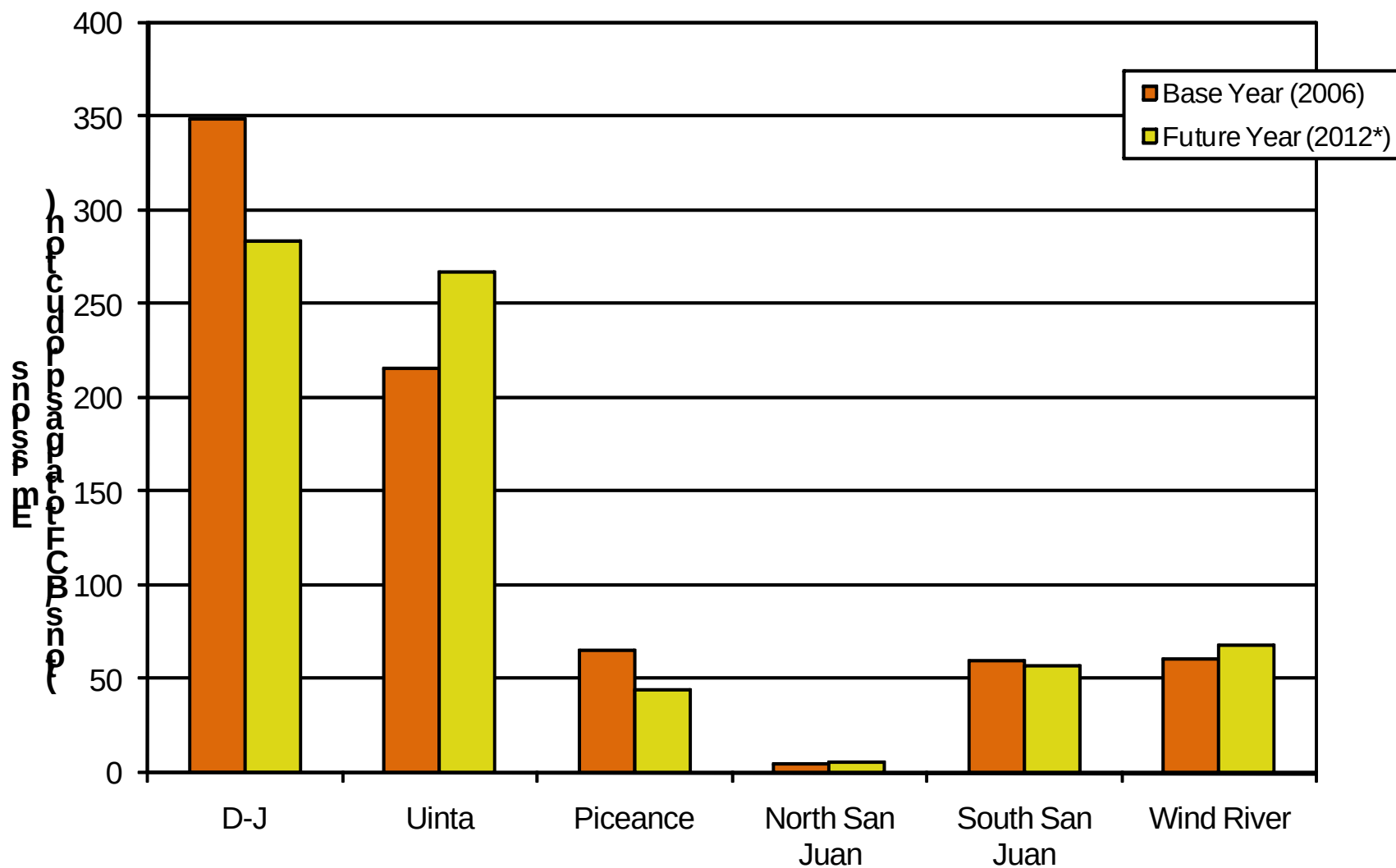


- Boom in oil and gas production in this region over the last ten years driven by record prices for crude oil and natural gas
 - Colorado gas production in 1996: 572 billion cubic feet
 - Colorado gas production in 2006: 1.2 trillion cubic feet
- Activity supported by large fleet of equipment at thousands of individual well sites
- Partial inventory of this equipment through state permitting databases
- Wide state-to-state variation in permitting thresholds and source categories permitted

Phase III Results – Per-Well NO_x Emissions



Phase III Results – Per-Unit-Gas-Production VOC Emissions



Thanks -