Construction of a SIP Inventory for Modeling

Mark Janssen – LADCO/MWRPO

15th Annual Emissions Inventory Conference

New Orleans, LA

May 18th 2006

Overview

- Alternate Growth Options
- Defining “On the Books” Strategy
- Beyond “On the Books” Strategy
- Constructing Strategies
- Modeling Results!!!

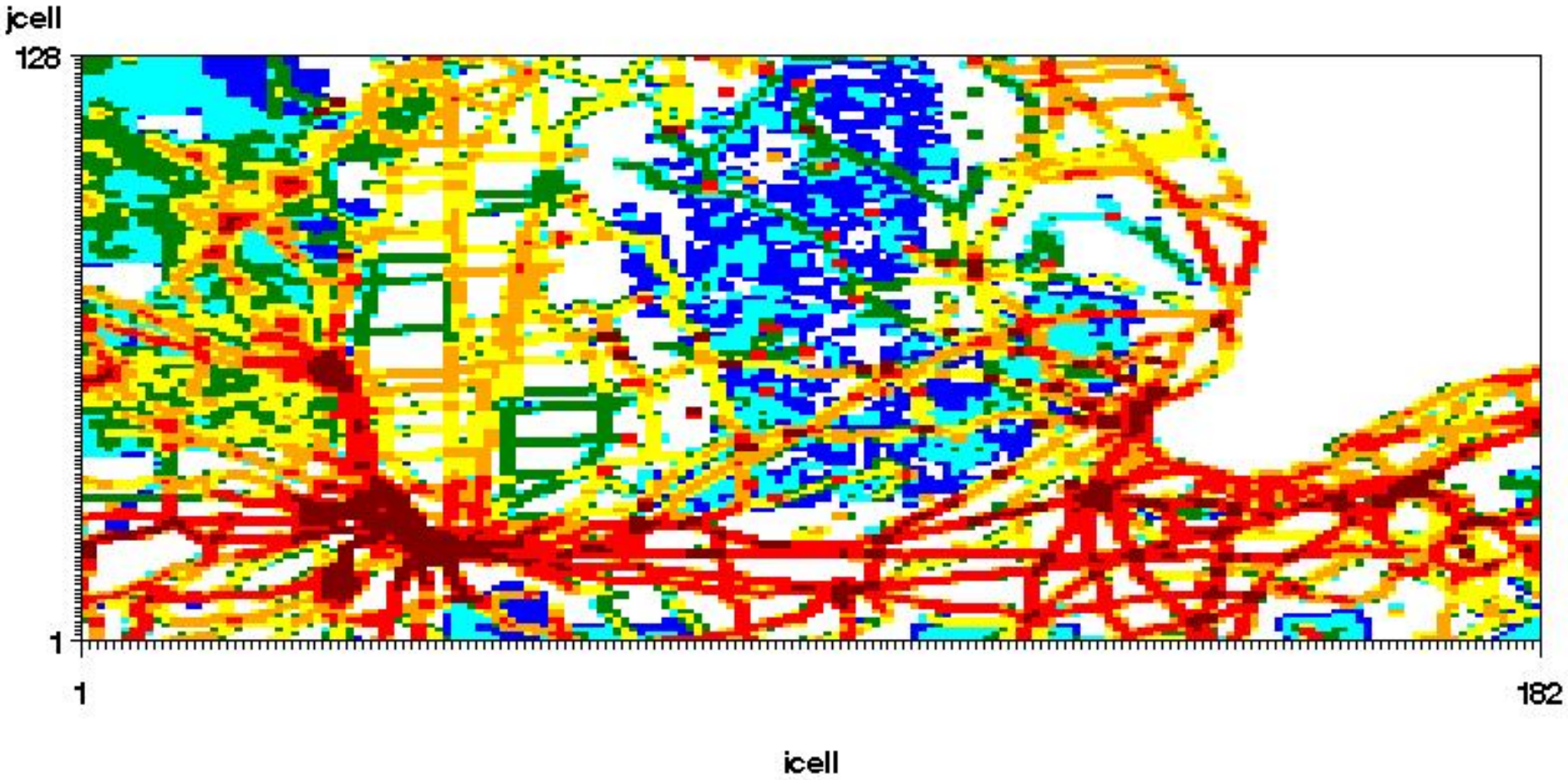
Important LADCO Improvements For 2002 Base Year

- Nonroad(Rec Marine, Rail, Marine, Construction, Agricultural)
- EGU Separated from Non-EGU Point and temporally adjusted with CEM Data
- NH3 from CMU Model and UC-Davis Temporal
- Area Source Comparability Study
- Improved Temporal and Speciation

Gridded Area Source Emissions: ROG

File Used for Summary: ems_run.areaemis

Total Emissions: 18.81



Legend values represent the midpoint of a range. Values chosen at the 0th, 5th, 20th, 35th, 50th, 65th, 80th and 95th percentiles.

Growth Modifications

- EGAS is the foundation
- Identify alternate sources of growth for problematic categories
- Use historical trends instead of EGAS projections for high growth(+2.8%/Year) growth rates.

		Historical Energy Data		LADCO Throughput Data	
SCC	1994-2001 LADCO Cement Production	1990-2001 Growth Rate	Growth Rate Used*	Annual Growth Rate	Comment
10200401		-10.4	0.0		
10200902		0.6	0.6		
20200201		-0.1	0.0		
30500606	2.0				
30500623	2.0				
30500706	2.0				
30501402				-3.8	Held constant after 2009
30501403				-7.2	Held constant after 2009
30501404				-7.5	Held constant after 2009
30501604				-1.9	Hold constant after 2009
30501618				-1.7	Hold constant after 2009
30600106		-1.4	0.0		
30600906		-0.1	0.0		
39000689		-0.1	0.0		
39000699		-0.1	0.0		
39001389		0.6	0.6		
39999999				-8.3	Held constant after 2009
40200110				-0.7	Held constant after 2009
40201625				-11.6	Held constant after 2009
40202201				-12.7	Held constant after 2009
40202501				-13.2	Held constant after 2009
40299998				-4.9	Held constant after 2009

SCC	Previous Growth Indicator	Updated Growth Indicator	Annual Growth % 2002 to 2018 Previous	Updated
2103004000	AEO2004-Commercial/Distillate fuel consumption for East North Central (ENC) region	No growth	3.3	0.0
2104008001	AEO2004- Residential/ Renewable energy consumption for ENC region and Pechan projections of % of wood consumption in fireplaces (projection from extrapolation of historical estimates derived from Census of Housing data, # of units per home, etc.)	Similar to previous, but with updated Pechan projections of % of wood consumption in fireplaces based on incorporating more recent Census of Housing data.	1.4	1.5
2275020000	REMI Output - Air Transportation-SIC 45	Federal Aviation Administration (FAA) State-level Air Carrier Landing and Take-off Operations (LTOs)	IL: 3.3; IN: 3.4; MI: 3.3; OH: 3.2; WI: 3.6	IL: 1.3; IN: 0.5; MI: 1.7; OH: -1.8; WI: 2.9
2275050000	REMI Output - Air Transportation-SIC 45	FAA State-level General Aviation LTOs	IL: 3.3; IN: 3.4; MI: 3.3; OH: 3.2; WI: 3.6	IL: 0.1; IN: 0.2; MI: 0.0; OH: 0.1; WI: 0.5
2401015000	REMI Output - Sawmills and Planing Mills-SIC 242	Employment projections for SICs 242, 243, 244, 245, and 249 given employee-based EF in Emission Inventory Improvement Program (EIIP) guidance	IN: 2.8; OH: 2.8; WI: 2.7	IL: 0.9; IN: 0.9; MI: 0.4; OH: 0.9; WI: 0.6
2401020000	REMI Output - Furniture Fixtures-SIC 25	Employment projections for SIC 25 given employee-based EF in EIIP guidance	IN: 3.4; MI: 3.2; OH: 4.0; WI: 3.4	IL: 3.0; IN: 1.7; MI: 1.5; OH: 2.3; WI: 1.7
2401040000	REMI Output - Metal Cans and Shipping Containers-SIC 341	Employment projections for SIC 341 given employee-based EF in EIIP guidance	IN: 3.2; MI: 2.8; OH: 2.8; WI: 3.2	IL: -2.7; IN: -2.5; MI: -2.8; OH: -2.8; WI: -2.4

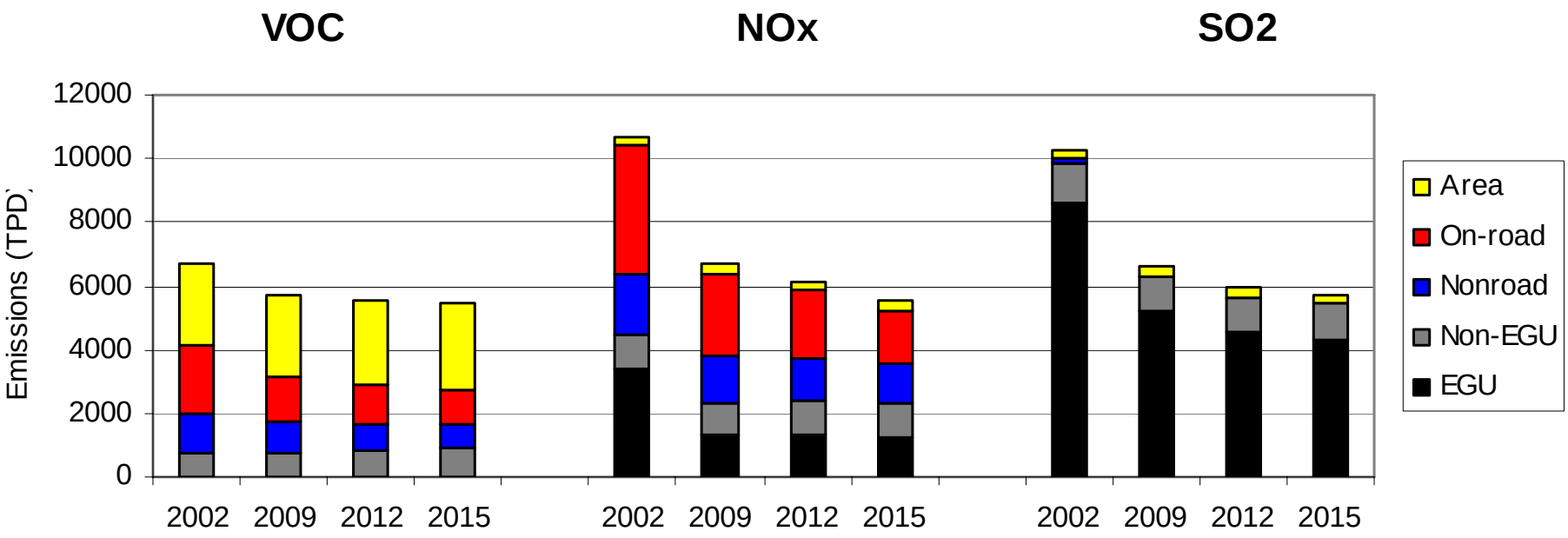
Running IPM

- Series of Eastern RPO Funded IPM runs to reflect Future Years
- Contain ~3800 source specific modifications not reflected in previous EPA modeling.
- Test Alternate fuel cost curves
- Had IPM to NIF conversion tool built so IPM outputs would run in our model.

OTB Strategies Modeled

Strategy	Description
S1A	On The Books CAIR w/ Full Trading
S1B	S1A + Updated Fuel Cost Curves(IPM)
S1C	S1A + Restricted Trading(IPM)

OTB Effects In the Future



EGU Strategies Modeled

Strategy	Description
S2A	S1A+EGU2 For Top 20 Sources
S2B	EGU2 in 100 km From NAA
S2C	EGU2 in 5-state region
S2D	EGU2 in 12-state Midwest region
S2E	EGU1 in 5-state region
S2F	EGU1 in 5-state run through IPM(Not Complete)
S2G	EGU2 in 5-state run through IPM(Not Complete)

EGU1= 2009 - SOx:0.36 lb/MMBTU, NOx: 0.15 lb/MMBTU

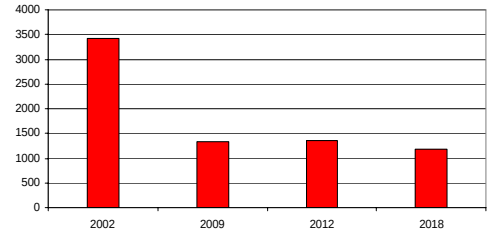
2012/13 - SOx:0.15 lb/MMBTU, NOx: 0.10 lb/MMBTU

EGU2= 2009 - SOx:0.24 lb/MMBTU, NOx: 0.12 lb/MMBTU

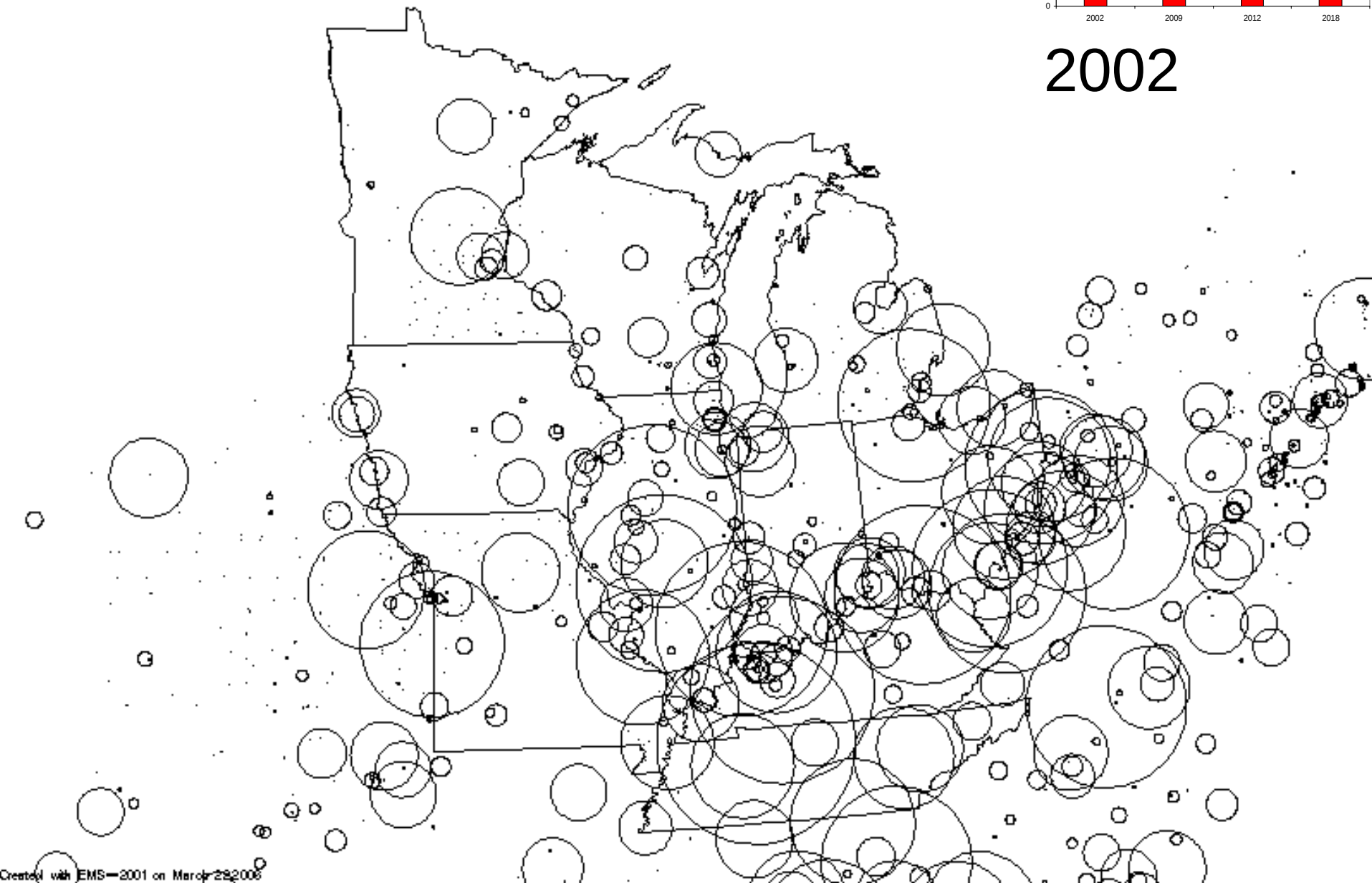
2012/13 - SOx:0.10 lb/MMBTU, NOx: 0.07 lb/MMBTU

Circle Plot of NOX Sources

CASE: egu_baseKv2



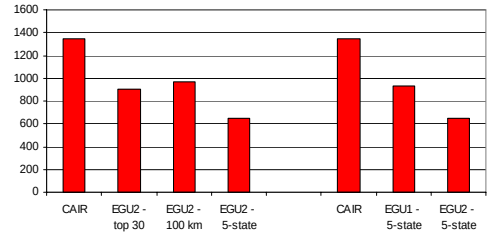
2002



Created with EMS—2001 on March 28 2006

Circle Plot of NOX Sources

CASE: r4s1av2_egu_2012



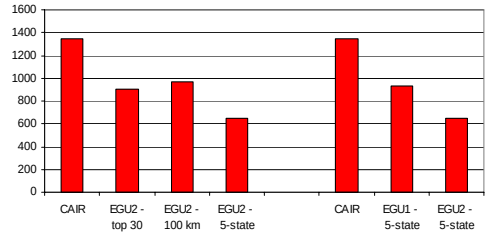
2012-CAIR

(full trading)

Created (via) EMS—2001 on March 222006

Circle Plot of NOX Sources

CASE: r4s2e_egu_2012



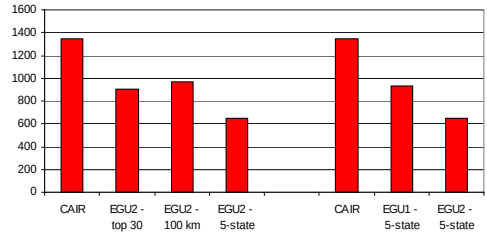
2012-EGU1

(5-state region)

Created (via) EMS—2001 on March,22,2006

Circle Plot of NOX Sources

CASE: r4s2c_egu_2012



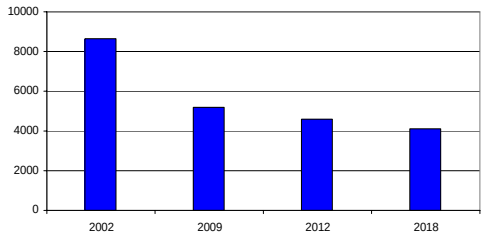
2012-EGU2

(5-state region)

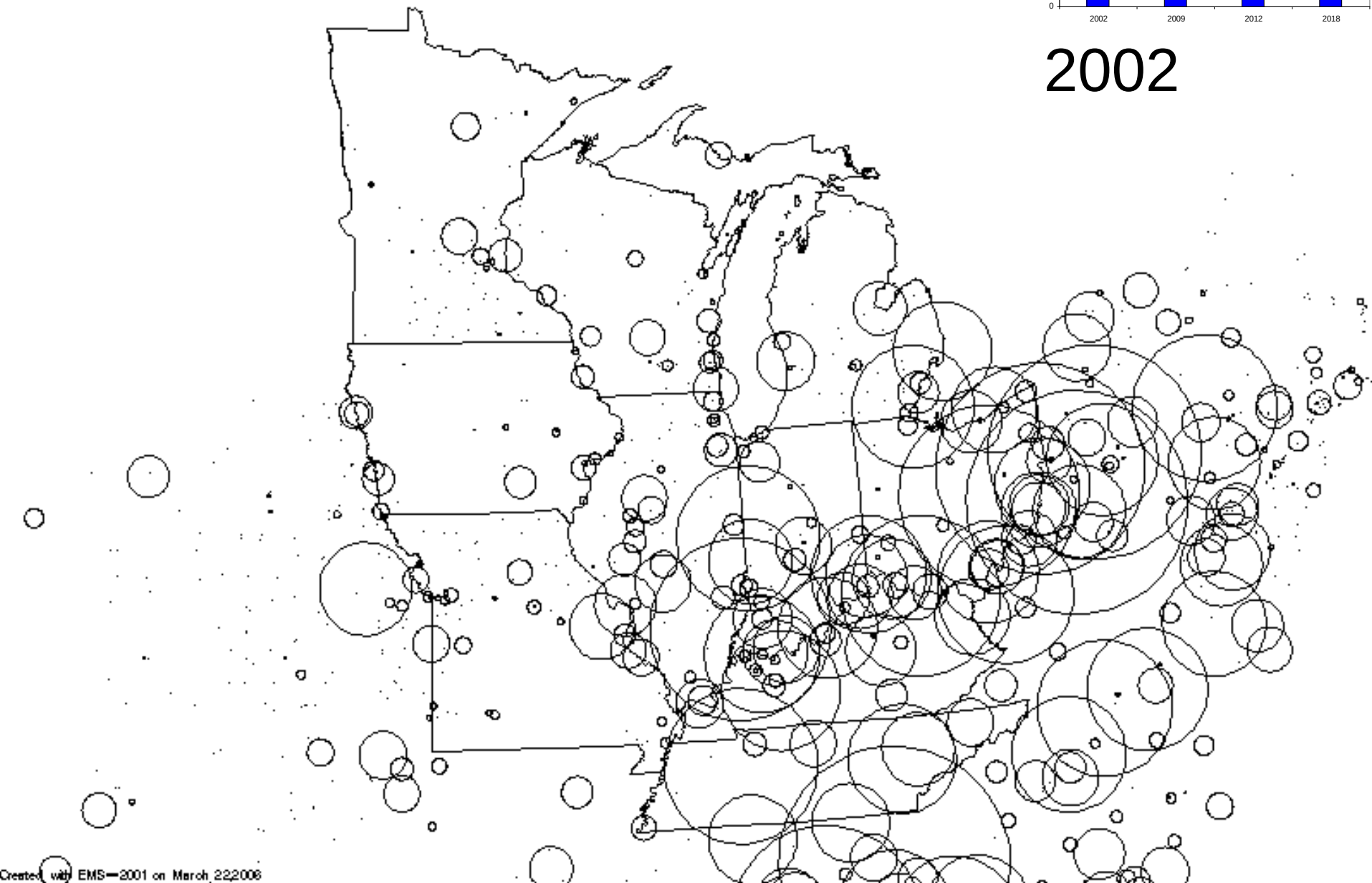
Created (via) EMS—2001 on March,22,2006

Circle Plot of SO2 Sources

CASE: egu_baseKv2



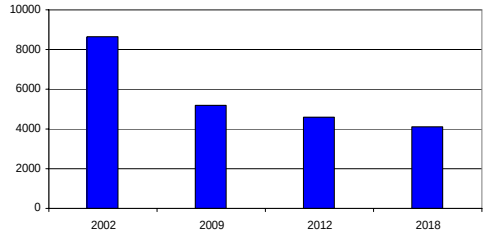
2002



Created with EMS-2001 on March 22,2006

Circle Plot of SO2 Sources

CASE: r4s1av2_egu_2012



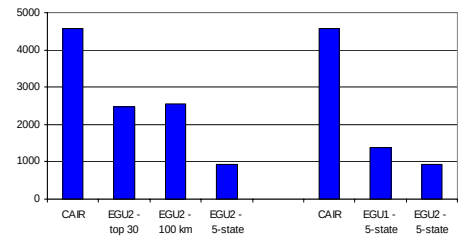
2012-CAIR

(full trading)

Created with EMS—2001 on March 22,2006

Circle Plot of SO2 Sources

CASE: r4s2e_egu_2012



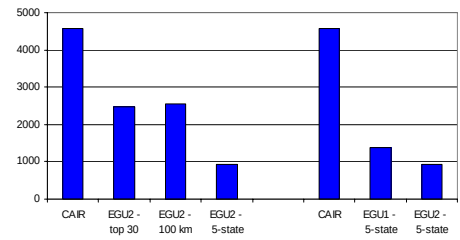
2012-EGU1

(5-state region)

Created with EMS-2001 on March 22,2006

Circle Plot of SO2 Sources

CASE: r4s2c_egu_2012



2012-EGU2

(5-state region)

Created with EMS-2001 on March 22,2006

White Paper Controls

- Identified top ~15 Categories in the inventory
- Had Contractor develop whitepapers looking at various level of controls
- Find Them at www.ladco.org
- Can Be Seen as Low/High Cost per Ton

Scenario 3A – Low White Paper

a. Scenario 2 (a, b, c, and/or d) plus "low" control level for non-EGU, area, and mobile sources throughout 5-state region

Non-EGU Point Sources

- *ICI Boilers - 40% SO2, 60% NOx reduction*
- *Cement kilns –*
- *Petroleum refineries*
- *Iron & steel plants*
- *Asphalt plants*
- *Glass manufacturing - 30% NOx reduction*
- *Chemical plants*
- *BART for non-EGU sources (beginning in 2013)*

Area Sources

- *Consumer products - OTC model rule (SOLV2A)*
- *AIM coatings - OTC model rule (SOLV1A)*
- *Portable fuel containers - OTC model rule (SOLV3A)*
- *Auto refinishing - extend IL.IN,WI RACT rules (SOLV4A)*
- *Industrial surface coating - more stringent RACT (SOLV5A)*
- *Degreasing - more stringent RACT (SOLV6A)*
- *Gasoline dispensing facilities - enhanced vapor recovery (SOLV7A)*
- *Asphalt paving applications (assume no additional control ???)*

- *Mobile Sources*
- *HDDV – vol. measures (or base on lower cost-effectiveness value)*
- *Construction Equipment – vol. measures (or base on lower c-e value)*
- *Agricultural Equipment – vol. measures (or base on lower c-e value)*
- *Low RVP fuel (IN, MI, OH counties – see Table 2)*

Scenario 3B – High White Paper

Scenario 2 (a, b, c, d, and/or e) plus "high" control level for non-EGU, area, and mobile sources throughout 5-state region

Non-EGU Point Sources

- *ICI Boilers - 90% SO2, 80% NOx reduction*
- *Cement kilns - 90% SO2, 50% NOx reduction*
- *Petroleum refineries*
- *Iron & steel plants Asphalt plants - 25% NOx reduction*
- *Glass manufacturing - 75% NOx reduction*
- *Chemical plants - ????*
- *BART for non-EGU sources (beginning in 2013)*

Area Souces

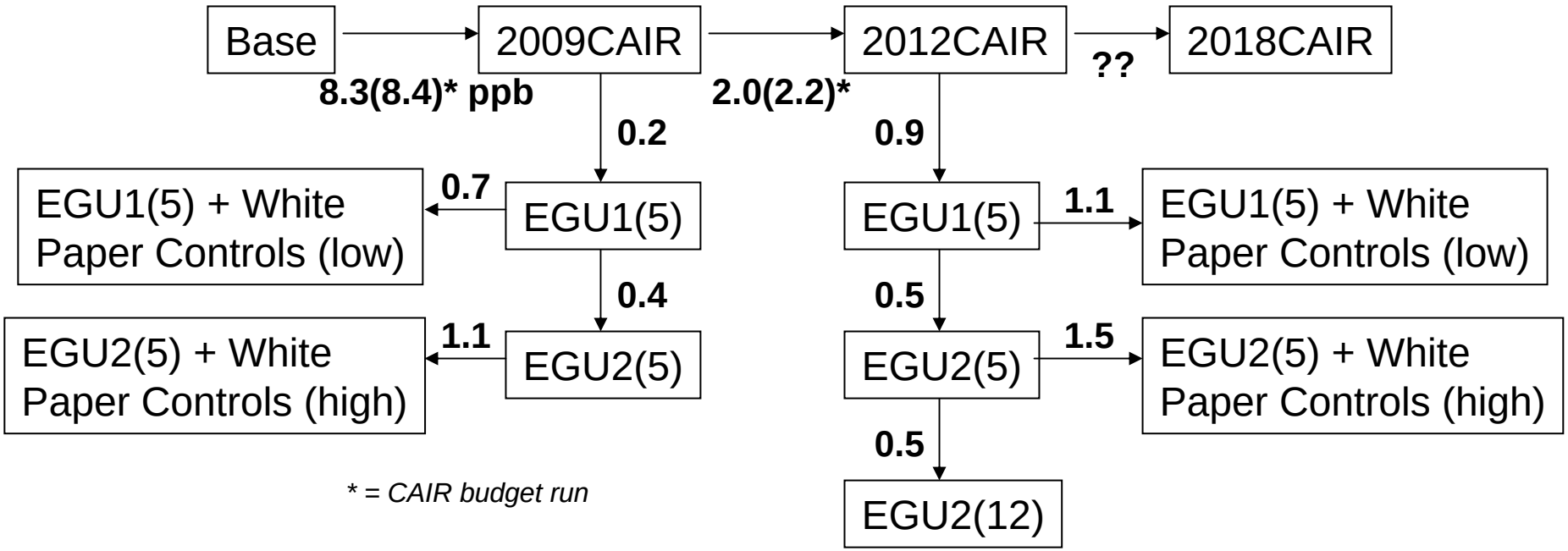
- *Consumer products - SCAQMD rule (SOLV2B)*
- *AIM coatings - CARB 2003 rule (SOLV1BA)*
- *Portable fuel containers - Accelerated phase in (SOLV3B)*
- *Auto refinishing - SCAQMD rule (SOLV4B)*
- *Industrial surface coating - more stringent RACT (SOLV5A)*
- *Degreasing - more stringent RACT (SOLV6A)*
- *Gasoline dispensing facilities - enhanced vapor recovery (SOLV7A)*
- *Asphalt paving applications - low VOC formulations*

Mobile Sources

- *HDDV - voluntary + mandatory measures*
- *Construction Equipment - voluntary + mandatory measures*
- *Agricultural Equipment - voluntary measures*
- *Low RVP fuel (IN, MI, OH counties – see Table 2)*

Air Quality Improvement: Ozone

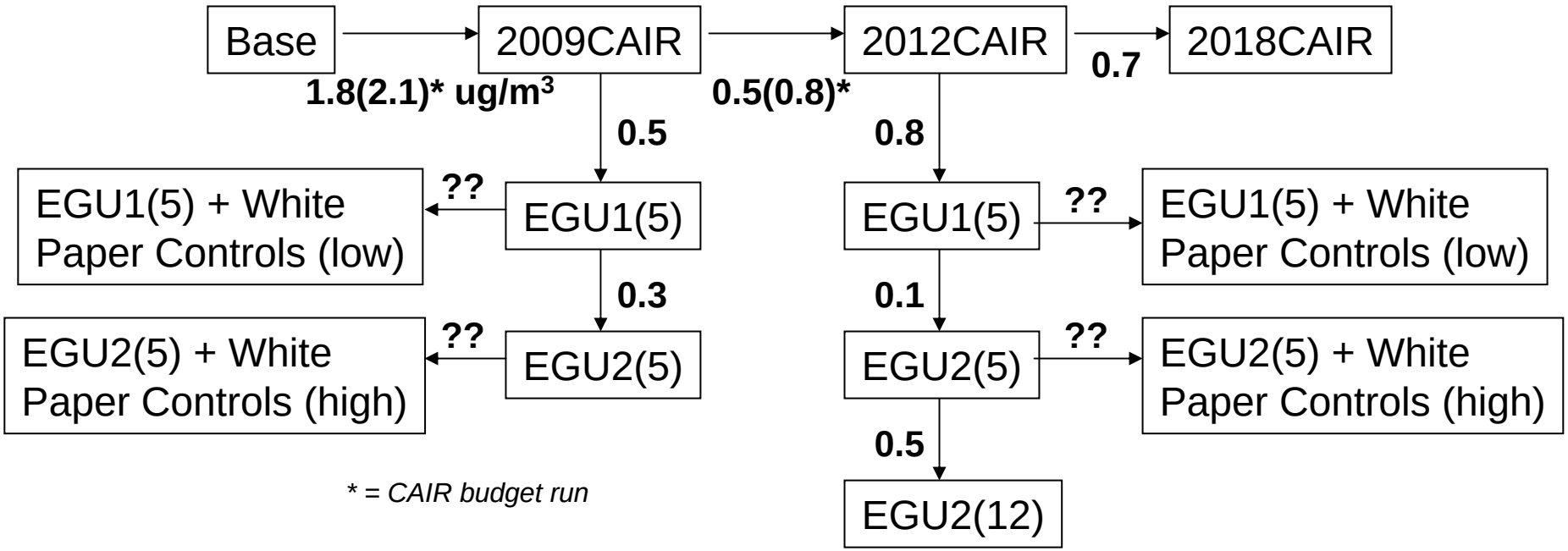
Degree of Nonattaiment: 7 ppb (average for sites ≥ 89 ppb);
up to 9-14 ppb in Cleveland, Lake Mich.



Example: 2012-EGU1(5) provides a 11.2 ppb (ave) improvement from observed base year concentrations

Air Quality Improvement: $PM_{2.5}$

Degree of Nonattaiment: 1.3 ppb (average for sites ≥ 15.5 ug/m³);
up to 3-4 ug/m³ in Detroit, Cleveland, Steubenville

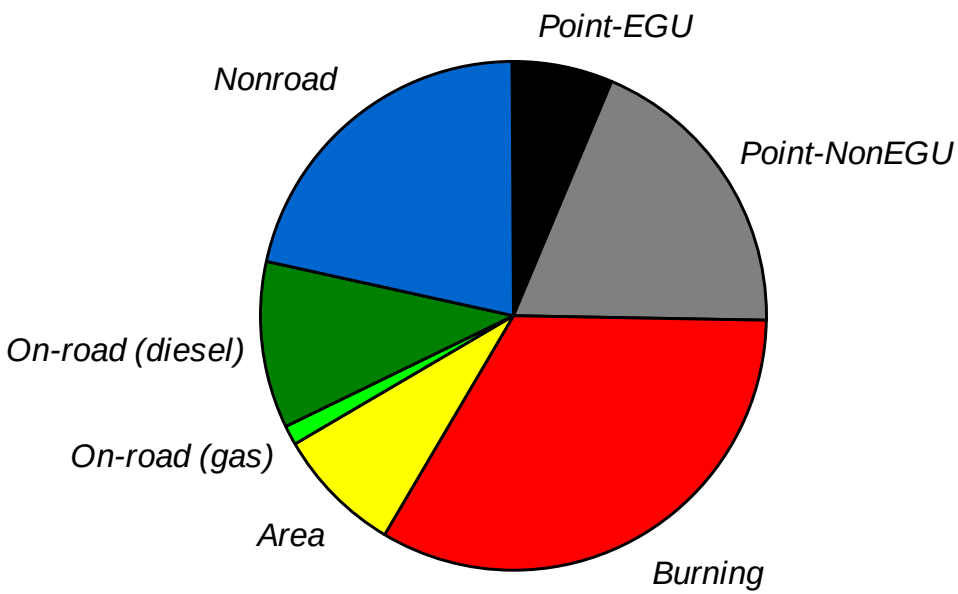


Example: 2012-EGU2(12) provides a 3.7 ug/m³ (ave) improvement from observed base year concentrations

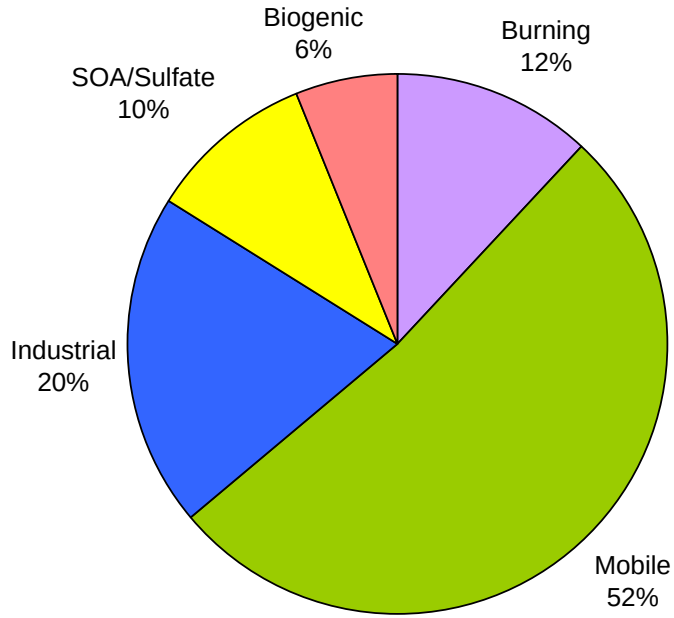
Base L Inventory Improvements

- Incorporate State/MPO transportation networks
- Apply CONCEPT for on-road, nonroad, and biogenics
- Update biogenic emissions and SOA treatment in CAMx
- Incorporate state base year updates
- Adjust on-road OC emissions (??)
- Update EGU (IPM) projections (??)
- Update non-EGU point, area growth factors (??)

Need to Improve On-Road OC (Primary) Emissions



LADCO Regional Emissions



Typical Monitor-Based Source Apportionment Result