



# *2004 CEC Air Quality Project*

Annual Meeting of the Consultative Group for the PRTR  
Project

Montréal, Québec

20 October 2004

Paul J. Miller

Commission for Environmental Cooperation



# Talk Outline

1. 2004 CEC air activities
2. NA power plant report



# 2004 CEC Air Activities

1. Air monitoring
2. Air emissions inventories
3. Best available technologies
4. Health databases
5. NA Air Working Group
6. Professional exchanges



# NA power plant report

- Four pollutants
  - $\text{SO}_2$
  - $\text{NO}_x$
  - Hg
  - $\text{CO}_2$
- 2002 data
- Includes elec. generation
- Individual sources
  - ~70 PPs in Canada
  - ~90 PPs in Mexico
  - ~900 PPs in USA





# Information sources

## 1. Canada

- NPRI
- Company reports

## 2. Mexico

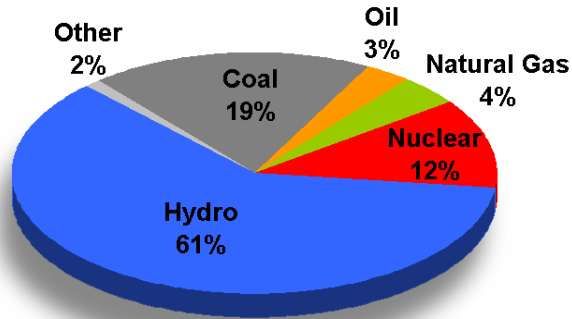
- MIT study

## 3. USA

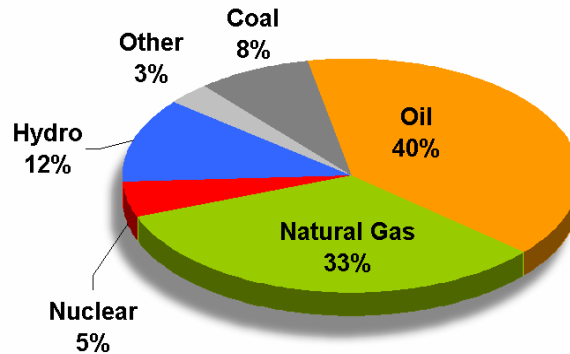
- US DOE reports
- Hg ICR
- US EPA Acid Rain Program



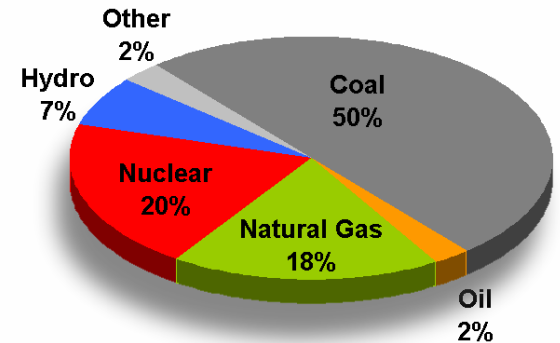
# NA Generation 2002



576 billion kWh  
111 GW\*



221 billion kWh  
37 GW\*

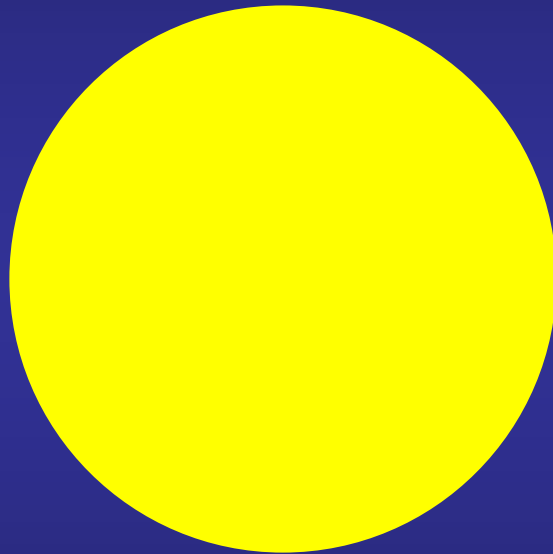


3,858 billion kWh  
819 GW\*

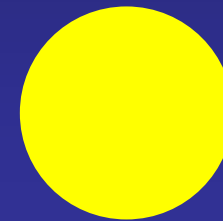
\* 2000 generation capacity from NA Energy WG



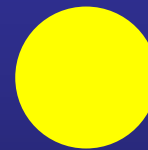
# 2002 Power plant SO<sub>2</sub>



US = 9,253



Mexico = 1,558

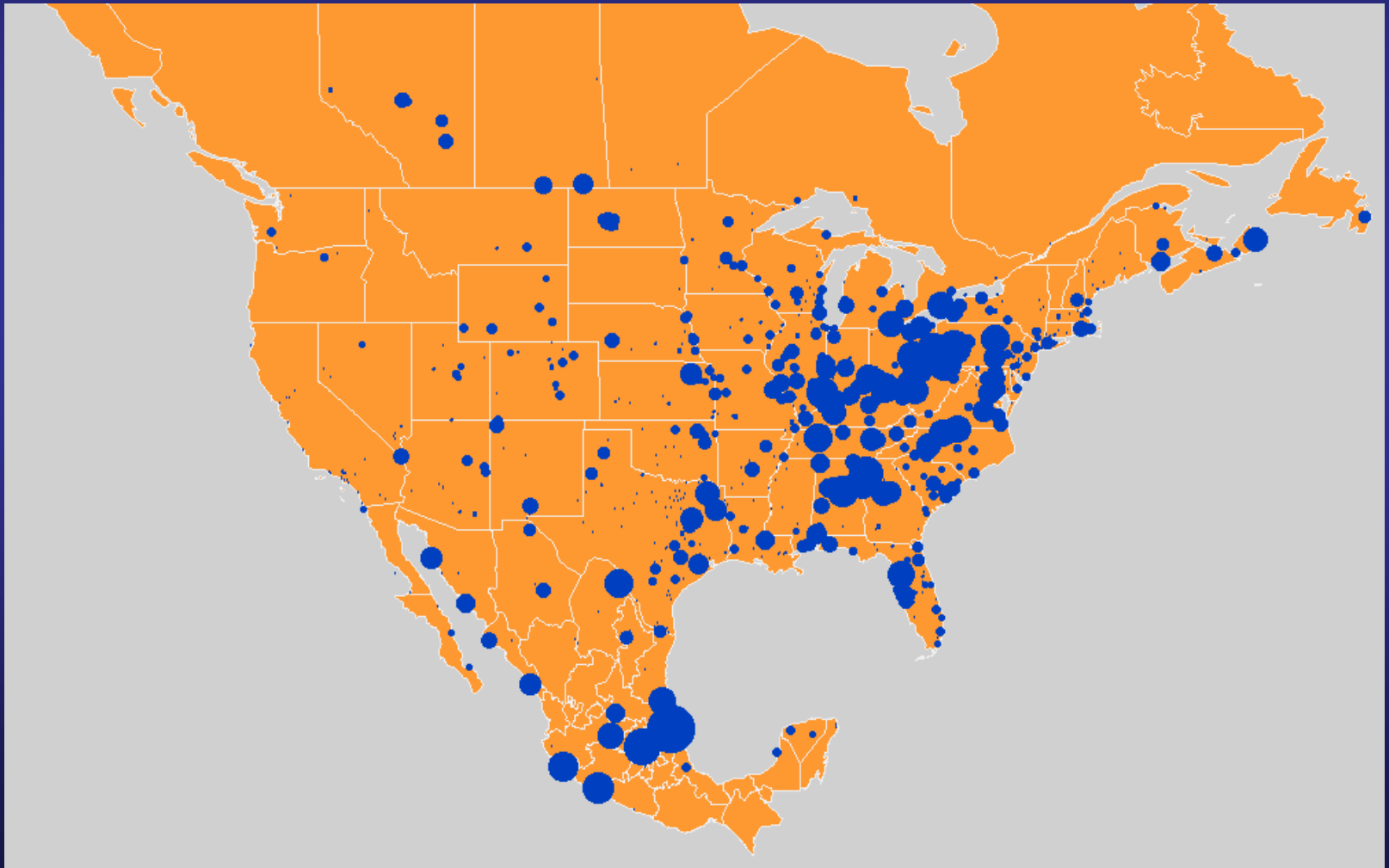


Canada = 620

Thousand metric tonnes



# SO<sub>2</sub> Power Plant Map

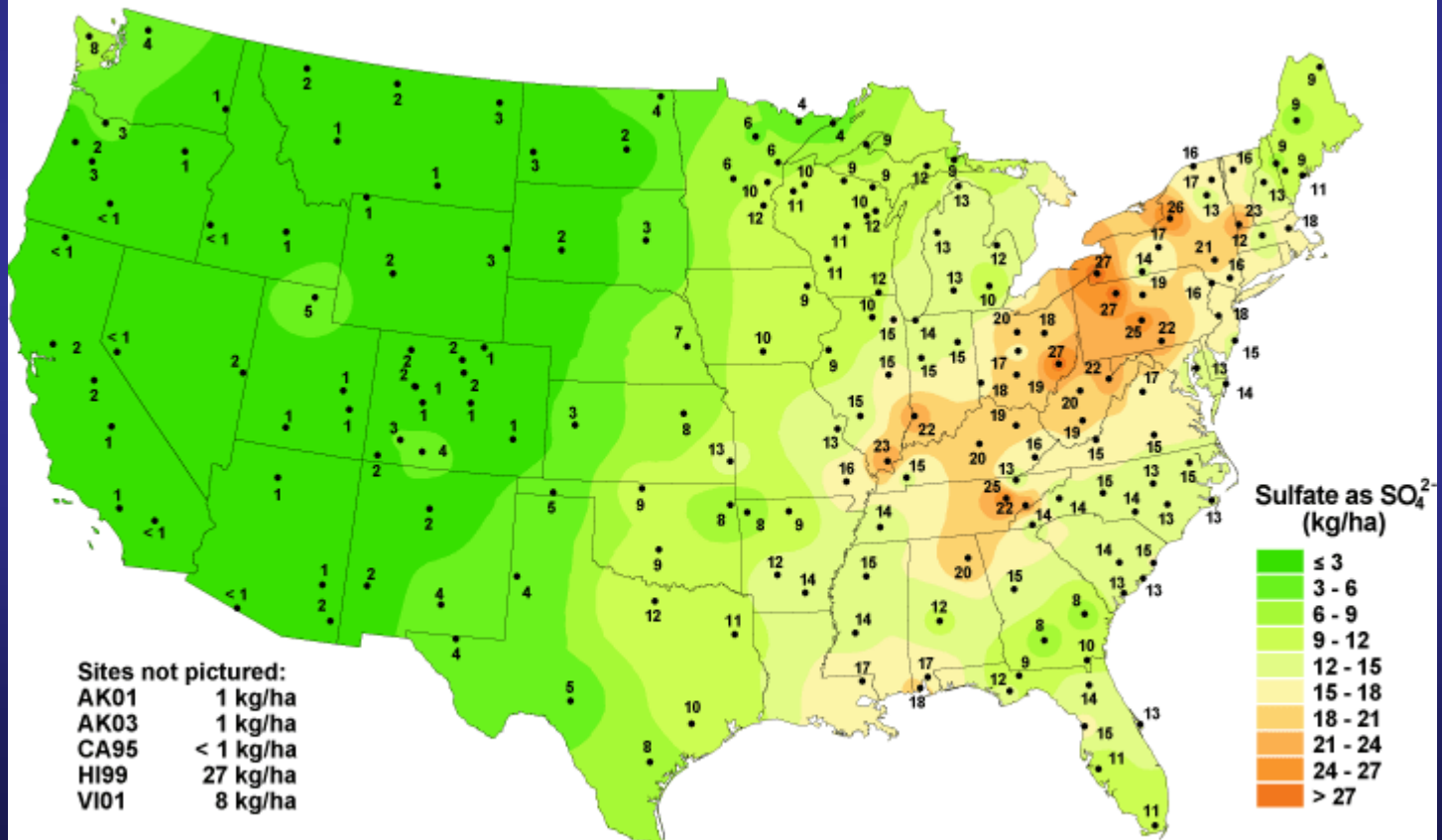






# Sulfate deposition

Sulfate ion wet deposition, 2002



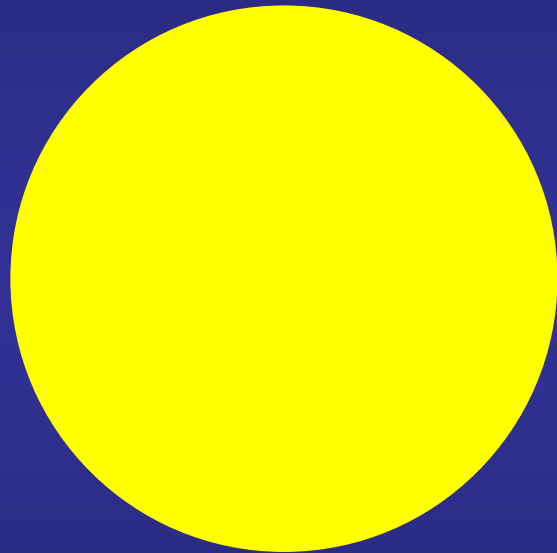


# NA Top 10 SO<sub>2</sub> PPs - 2002

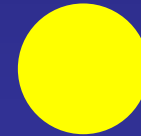
1.	Tuxpan, Veracruz	México	oil	253,000 tonnes
2.	Tula, Hidalgo	México	oil	158,000
3.	Bowen, Georgia	USA	coal	146,000
4.	Hatfields Ferry, Penn.	USA	coal	144,000
5.	Keystone, Pennsylvania	USA	coal	137,000
6.	W.H. Sammis, Ohio	USA	coal	132,000
7.	Conesville, Ohio	USA	coal	123,000
8.	E.C. Gaston, Alabama	USA	coal	115,900
9.	Gibson, Indiana	USA	coal	115,500
10.	Petacalco, Guerrero	México	coal/oil	113,000
Top Canada PP - #24 Nanticoke, Ontario			coal	87,000



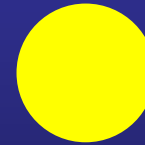
# 2002 Power plant NOx



US = 4,082



Mexico = 251

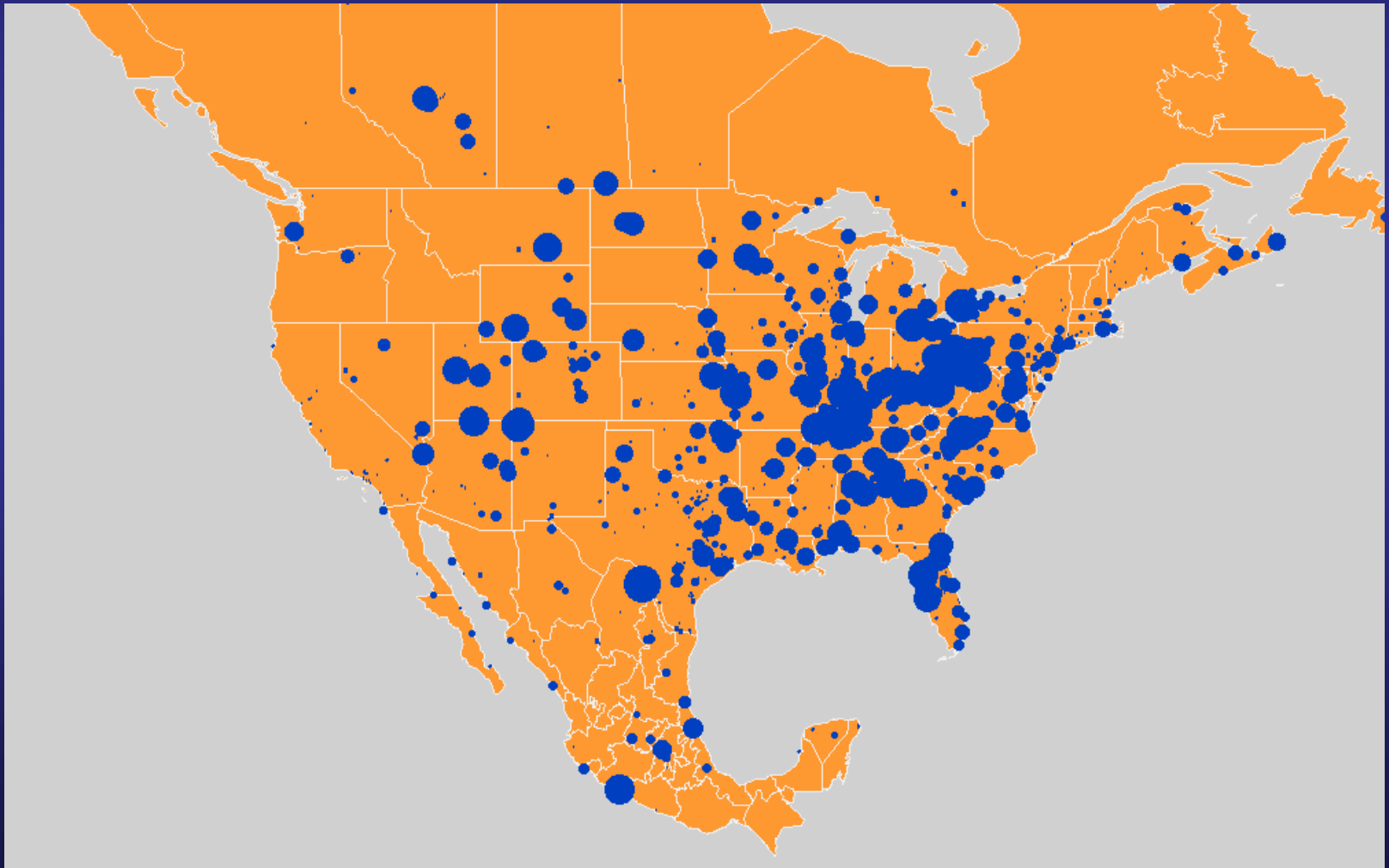


Canada = 262

Thousand metric tonnes

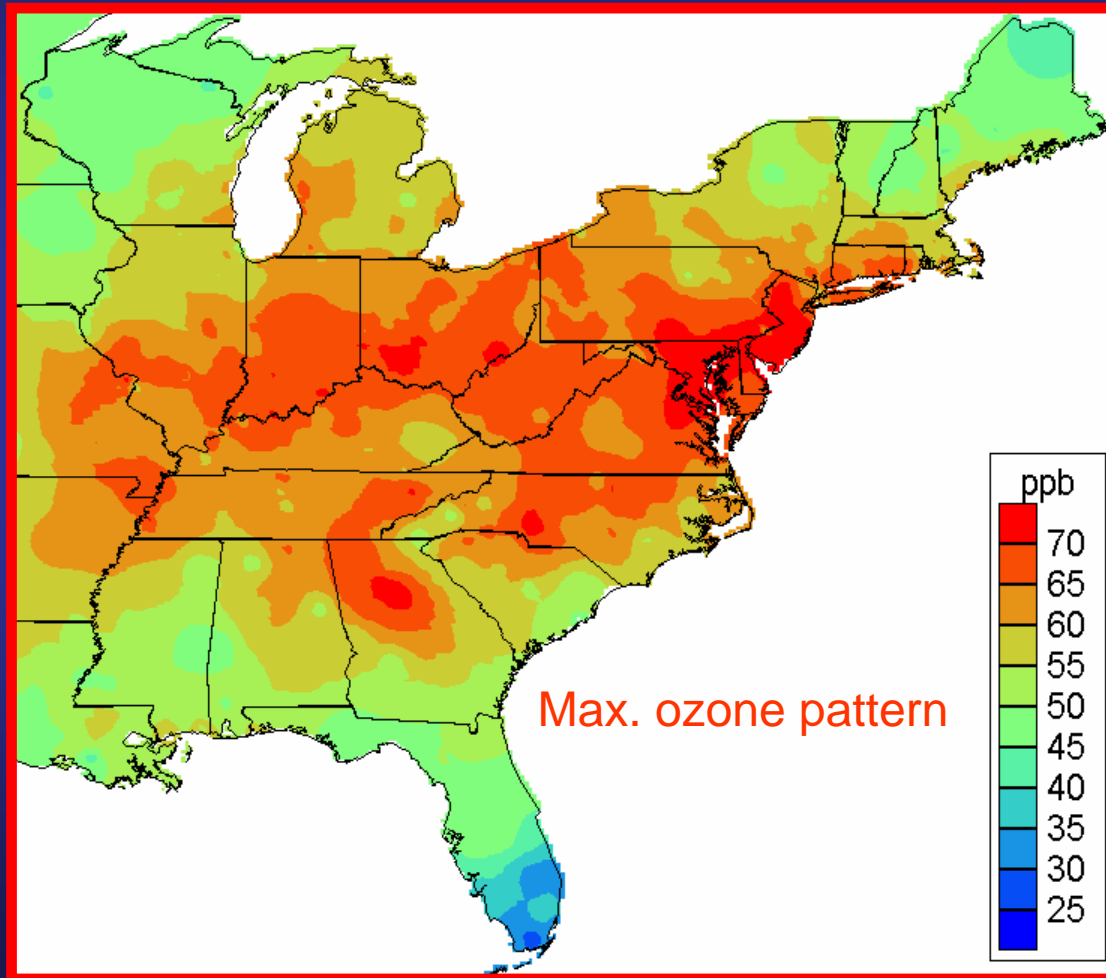


# NOx Power Plant Map





# NO<sub>x</sub> makes ozone



Based on daily 1-hour maximum O<sub>3</sub> 1991-95 monitoring data from AIRS, CASTNet, and other sources

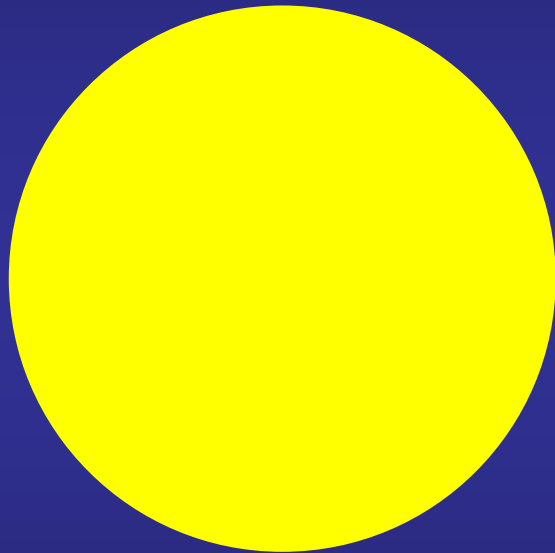


# NA Top 10 NO<sub>x</sub> PPs - 2002

1.	Rio Escondido, Coahuila	México	coal	45,900 tonnes
2.	Cumberland, Tennessee	USA	coal	45,300
3.	Paradise, Kentucky	USA	coal	42,700
4.	J.M. Stuart, Ohio	USA	coal	42,400
5.	Belews Creek, N.C.	USA	coal	40,700
6.	Carbón II, Coahuila	México	coal	40,100
7.	Gen. J.M. Gavin, Ohio	USA	coal	39,800
8.	John E. Amos, W.V.	USA	coal	39,500
9.	Nanticoke, Ontario	Canada	coal	38,200
10.	Monroe, Michigan	USA	coal	37,800



# 2002 Power plant mercury



US = 44.2

Metric tonnes



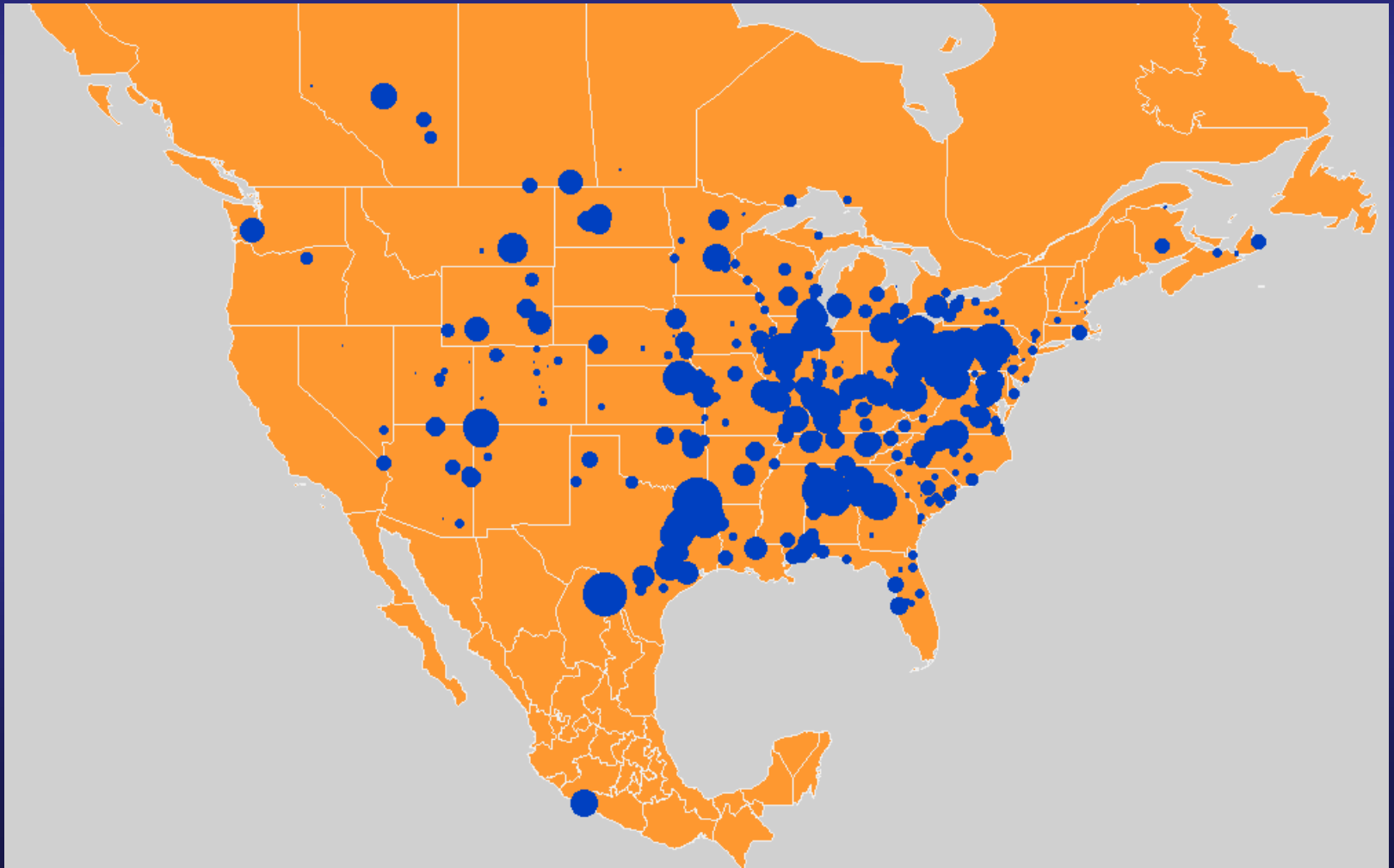
Mexico = 1.3



Canada = 2.0



# Hg Power Plant Map





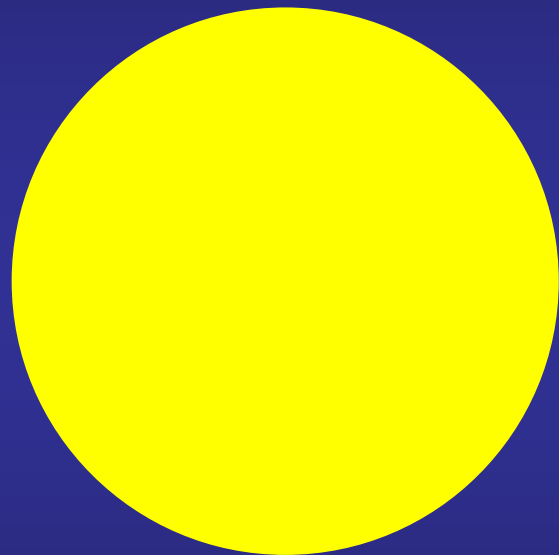


# NA Top 10 Hg PPs - 2002

1.	Monticello, Texas	USA	coal	849 kilograms
2.	Keystone, Pennsylvania	USA	coal	787
3.	Homer City, Penn.	USA	coal	743
4.	James H. Miller Jr., Ala.	USA	coal	717
5.	Montour, Pennsylvania	USA	coal	634
6.	Powerton, Illinois	USA	coal	584
7.	Martin Lake, Texas	USA	coal	547
8.	Bruce Mansfield, Penn.	USA	coal	528
9.	Mt. Storm, West Virginia	USA	coal	521
10.	Scherer, Georgia	USA	coal	515
Top Mexico PP - #26 Carbón II, Coahuila			coal	361
Top Canada PP - #41 Sundance, Alberta			coal	275



# 2002 Power plant CO<sub>2</sub>



US = 2,240

Million metric tonnes



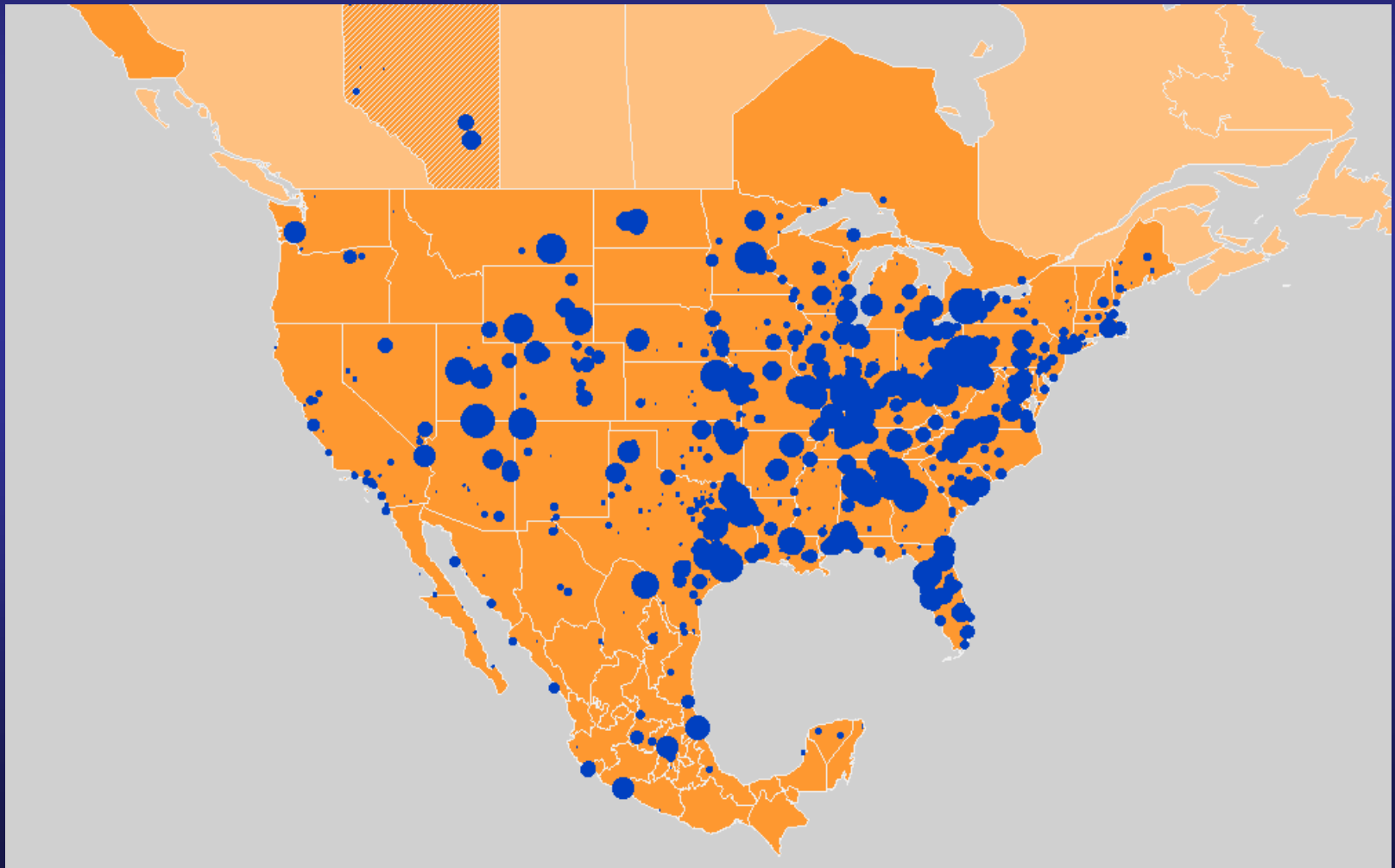
Mexico = 94



Canada = 128



# CO<sub>2</sub> Power Plant Map





# NA Top 10 CO<sub>2</sub> PPs - 2002

1.	Nanticoke, Ontario	Canada	coal	21,370,000 tonnes
2.	Bowen, Georgia	USA	coal	19,970,000
3.	Scherer, Georgia	USA	coal	19,940,000
4.	W.A. Parrish, Texas	USA	coal	18,790,000
5.	Navajo, Arizona	USA	coal	18,560,000
6.	James H. Miller, Jr., Ala.	USA	coal	17,800,000
7.	Gibson, Indiana	USA	coal	17,460,000
8.	Cumberland, Tennessee	USA	coal	17,290,000
9.	Jeffrey, Kansas	USA	coal	16,990,000
10.	Sherburne County, Minn.	USA	coal	16,530,000
	Top Mexico PP - #46 Tuxpan, Veracruz		oil	10,600,000



# Electricity share of national air pollution

Country (% coal gen.)	SO <sub>2</sub>	NOx	Mercury	CO <sub>2</sub>
Canada (19%)	20% (86%)	11% (81%)	25%	22% (?)
Mexico (8%)	55% (21%)	27% (47%)	3%	30% (22%)
USA (50%)	69% (97%)	22% (93%)	40%	39% (87%)

Yellow text is coal's share of electricity sector contribution to national totals.



# Power Plant Output Rates\*

Country	SO <sub>2</sub> (kg/MWh)	NO <sub>x</sub> (kg/MWh)	Mercury (kg/GWh) [coal only]	CO <sub>2</sub> (kg/MWh)
Canada	N/A	N/A	N/A	831
Mexico	11.4	1.8	0.034	688
U.S.	3.8	1.7	0.023	893

\*Based on fossil fuel plants in CEC report. Canada CO<sub>2</sub> output rate from Canada government.



# Per Capita Power Plant Air Pollution\*

Country	SO <sub>2</sub>	NOx	Mercury	CO <sub>2</sub>
Canada	19	8	63	4,012
Mexico	15	2	13	901
U.S.	32	14	151	7,787

\*kg per individual or kg per million individuals (mercury)



# Per GDP Power Plant Air Pollution\*

Country	SO <sub>2</sub>	NO <sub>x</sub>	Mercury	CO <sub>2</sub>
Canada	663,000	280,000	2	119,000
Mexico	1,685,000	271,000	1	102,000
U.S.	885,000	391,000	4	218,000

\*Kilograms or metric tonnes (CO<sub>2</sub>) per billion US\$





# 2002 Power Plant Total Emissions

Country	SO <sub>2</sub> (tonnes)	NOx (tonnes)	Mercury (kg)	CO <sub>2</sub> (tonnes)
Canada	620,000	262,000	1,990	128,000,000
Mexico	1,558,000	251,000	1,030	94,000,000
United States	9, 253,000	4,082,000	44,200	2,240,000,000



# Summary

- 1<sup>st</sup> ever NA report at individual power plant level
- Uses new PRTR data and other public sources
- Coal dominates NA emissions from power plants
- Baseline for looking at future NA trends



# 2002 NA PP Report in progress

Paul J. Miller

CEC Air Quality Program

393 rue St-Jacques Ouest, Bureau 200

Montréal, Québec H2Y 1N9 (CANADA)

Tel: 514-350-4326

Fax: 514-350-4314

Email: [pmiller@ccemtl.org](mailto:pmiller@ccemtl.org)