



# **London's Contribution to Smog**

## An Interpretation of Environment Canada's Criteria Air Contaminants Inventory

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# Overview

- 2005 CAC Inventory from Env. Canada
- What We Modified and Why
- Results (Top 5 Sources)
- Limitations
- Conclusions



# Environment Canada's 2005 CAC Inventory

- Over 160 sources of emissions
- Very detailed
- Used to support airshed modelling
- At first look, data is what you expect

REPCATNAME	PM25	SOX	NOX	VOC	PM25	SOX	NOX	VOC
<b>Industrial Sour Total</b>	317	210	940	791	11%	23%	13%	7%
<b>Non Industrial Total</b>	920	434	944	1,243	31%	48%	13%	11%
<b>Transportation Total</b>	382	232	5,346	3,452	13%	26%	74%	30%
<b>Incineration Total</b>	1	28	2	6	0%	3%	0%	0%
<b>Miscellaneous Total</b>	108	-	13	5,427	4%	0%	0%	48%
<b>Open Sources Total</b>	1,204	0	2	424	41%	0%	0%	4%
<b>Grand Total</b>	2,931	904	7,248	11,342				

*Quantities are tonnes per year*



# Interesting Details in the 2005 CAC Inventory

REPCATNAME	SICNAME	PM25	SOX	NOX	VOC
<b>Industrial Sour Total</b>		317	210	940	791
<b>Non Industrial Total</b>		920	434	944	1,243
Transportation	Tire Wear	3	-	-	-
Transportation	Brake Lining	1	-	-	-
Transportation	Light Duty Gasoline Trucks 1	0	0	17	19
Transportation	Off-road Use of Diesel	266	159	2,910	305
Transportation	Light Duty Diesel Vehicles	0	0	3	1
Transportation	Light Duty Gasoline Trucks 2	1	1	127	90
Transportation	Light Duty Gasoline Trucks 3	0	0	52	46
Transportation	Light Duty Gasoline Trucks 4	0	0	22	16
Transportation	Heavy Duty Diesel Vehicle Classe 2B - HDDV2B	0	1	14	1
Transportation	Heavy Duty Diesel Vehicle Classe 3 - HDDV3	0	1	17	1
Transportation	Heavy Duty Diesel Vehicle Classe 4 - HDDV4	0	0	11	1
Transportation	Heavy Duty Diesel Vehicle Classe 5 - HDDV5	0	0	10	0
Transportation	Heavy Duty Diesel Vehicle Classe 6 - HDDV6	2	3	87	5
Transportation	Heavy Duty Diesel Vehicle Classe 7 - HDDV7	1	1	24	1
Transportation	Heavy Duty Diesel Vehicle Classe 8A - HDDV8A	4	4	199	6
Transportation	Heavy Duty Diesel Vehicle Classe 8B - HDDV8B	4	4	204	6
Transportation	Heavy Duty Gasoline Vehicle Classe 2B - HDGV	0	0	8	2
Transportation	Heavy Duty Gasoline Vehicle Classe 3 - HDGV3	0	0	10	3
Transportation	Heavy Duty Gasoline Vehicle Classe 4 - HDGV4	0	0	1	0
Transportation	Heavy Duty Gasoline Vehicle Classe 5 - HDGV5	0	0	1	0
Transportation	Heavy Duty Gasoline Vehicle Classe 6 - HDGV6	0	0	2	0
Transportation	Heavy Duty Gasoline Vehicle Classe 7 - HDGV7	0	0	1	0
Transportation	Heavy Duty Gasoline Vehicle Classe 8A - HDGV8A	0	0	1	0
Transportation	Heavy Duty Gasoline Vehicle Classe 8B - HDGV8B	0	0	1	0
Transportation	Light Duty Diesel Trucks 12	0	0	1	0
Transportation	Light Duty Diesel Trucks 34	0	1	6	2
Transportation	Gasoline Bus	0	0	0	0
Transportation	Urban Bus	0	0	0	0
Transportation	School Bus	0	0	11	1
Transportation	Gasoline Powered Automobiles	1	2	215	210
Transportation	Gasoline Powered Motorcycles	0	0	3	10
Transportation	Off-road Use of CNG	0	0	19	17
Transportation	Off-road Use of LPG	1	0	216	58
Transportation	Off-road Use of Gasoline - 2 STROKE	74	0	26	2,005
Transportation	Off-road Use of Gasoline - 4 STROKE	4	1	185	551
<b>Transportation Total</b>		382	232	5,346	3,452
<b>Incineration Total</b>		1	28	2	6
<b>Miscellaneous Total</b>		108	-	13	5,427
<b>Open Sources Total</b>		1,204	0	2	424
<b>Grand Total</b>		2,931	904	7,248	11,342

*Off-road diesel?  
(bulldozers, portable generators)*

*Off-road gasoline?  
(lawnmowers, snowblowers)*

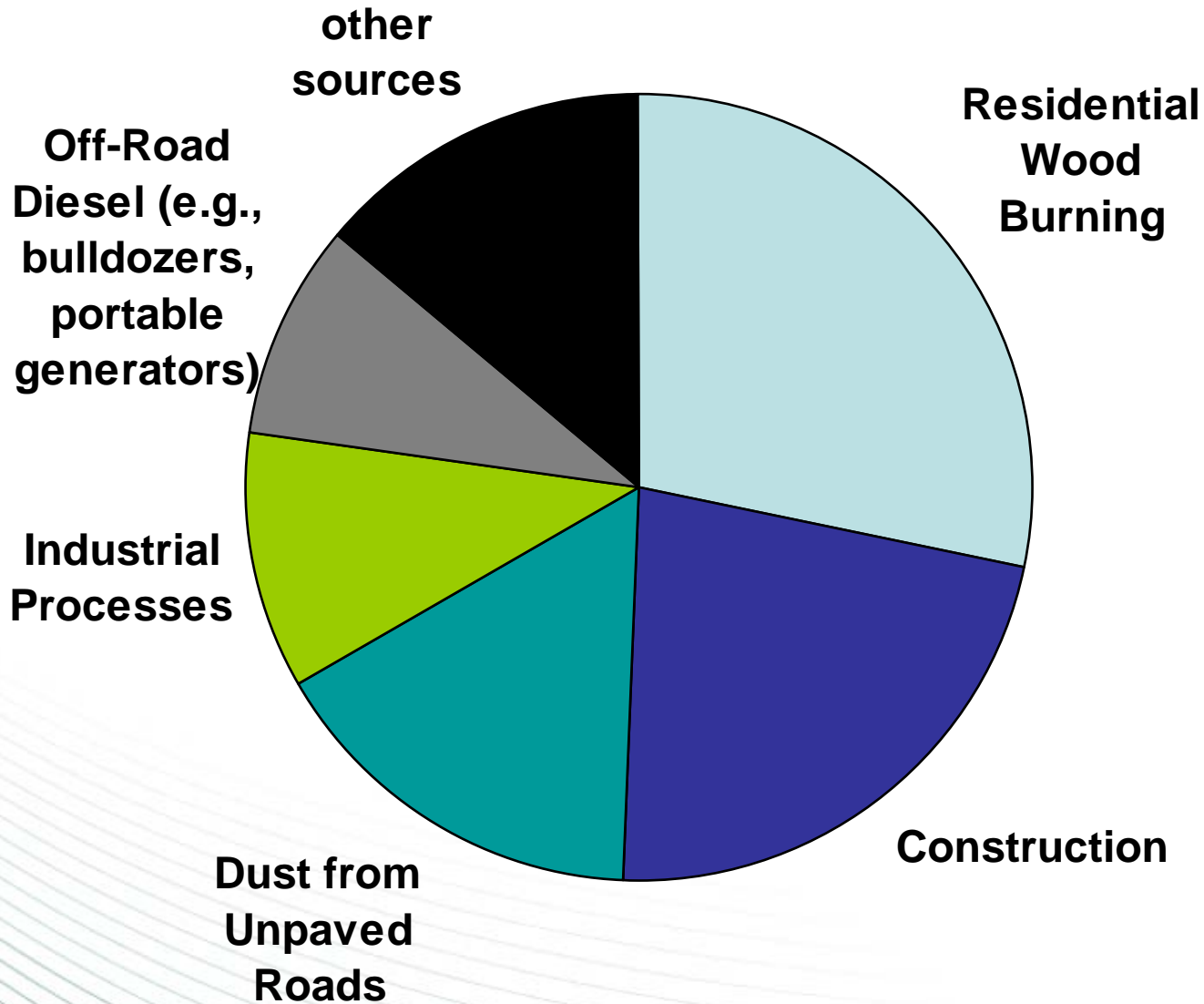


# What We Modified and Why?

- Combined similar sources, such as:
  - 16 types of trucks
  - All vehicle-related emissions (tire & break wear)
- Reallocated sources, such as:
  - Off-road gasoline (lawnmowers) to ‘Residential’
  - Off-road diesel to ‘Local Employers’
- Added “Indirect Emissions” from electricity
  - London’s share of OPG’s emissions

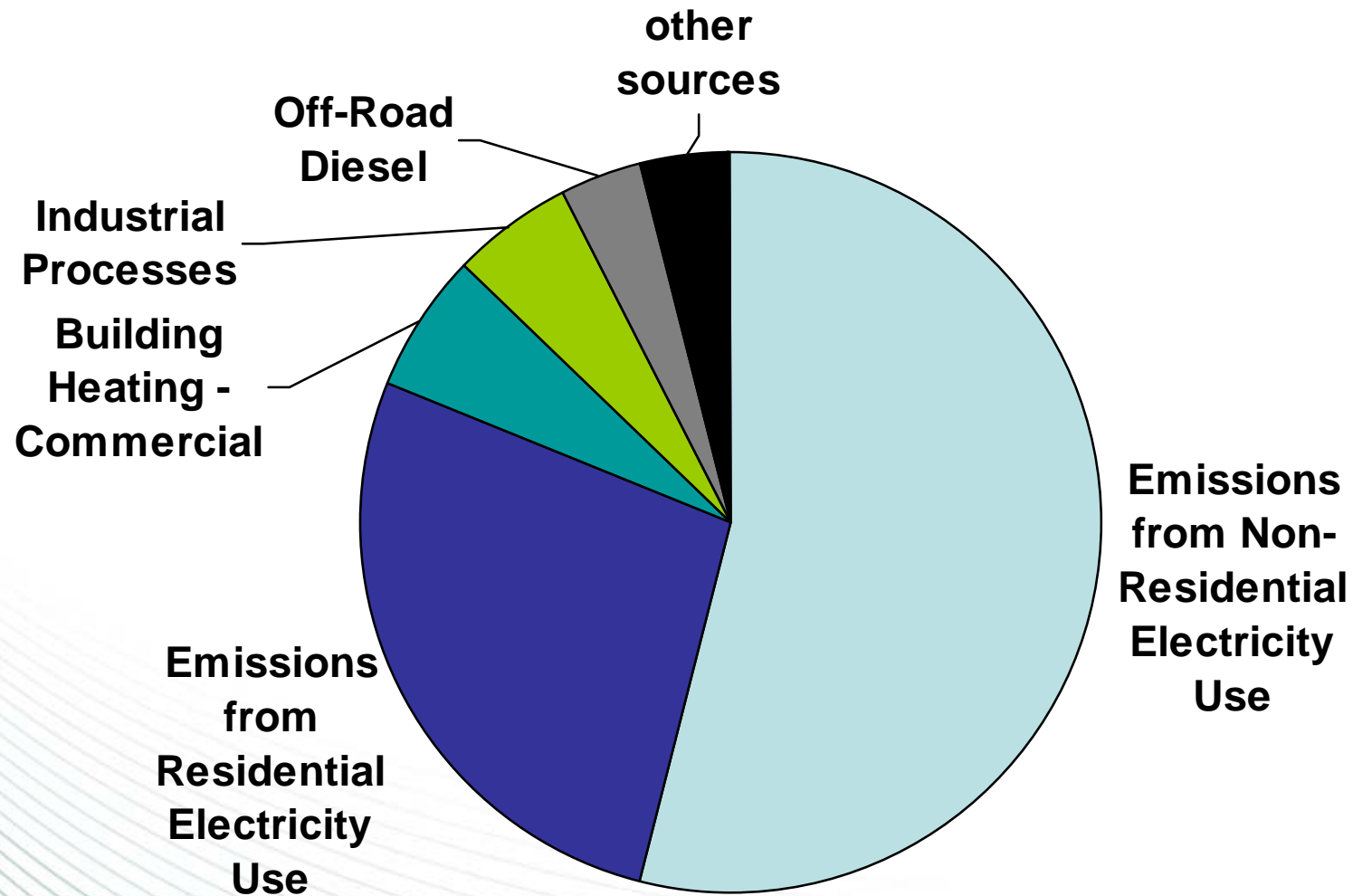


# Results? “Top 5” for PM<sub>2.5</sub>



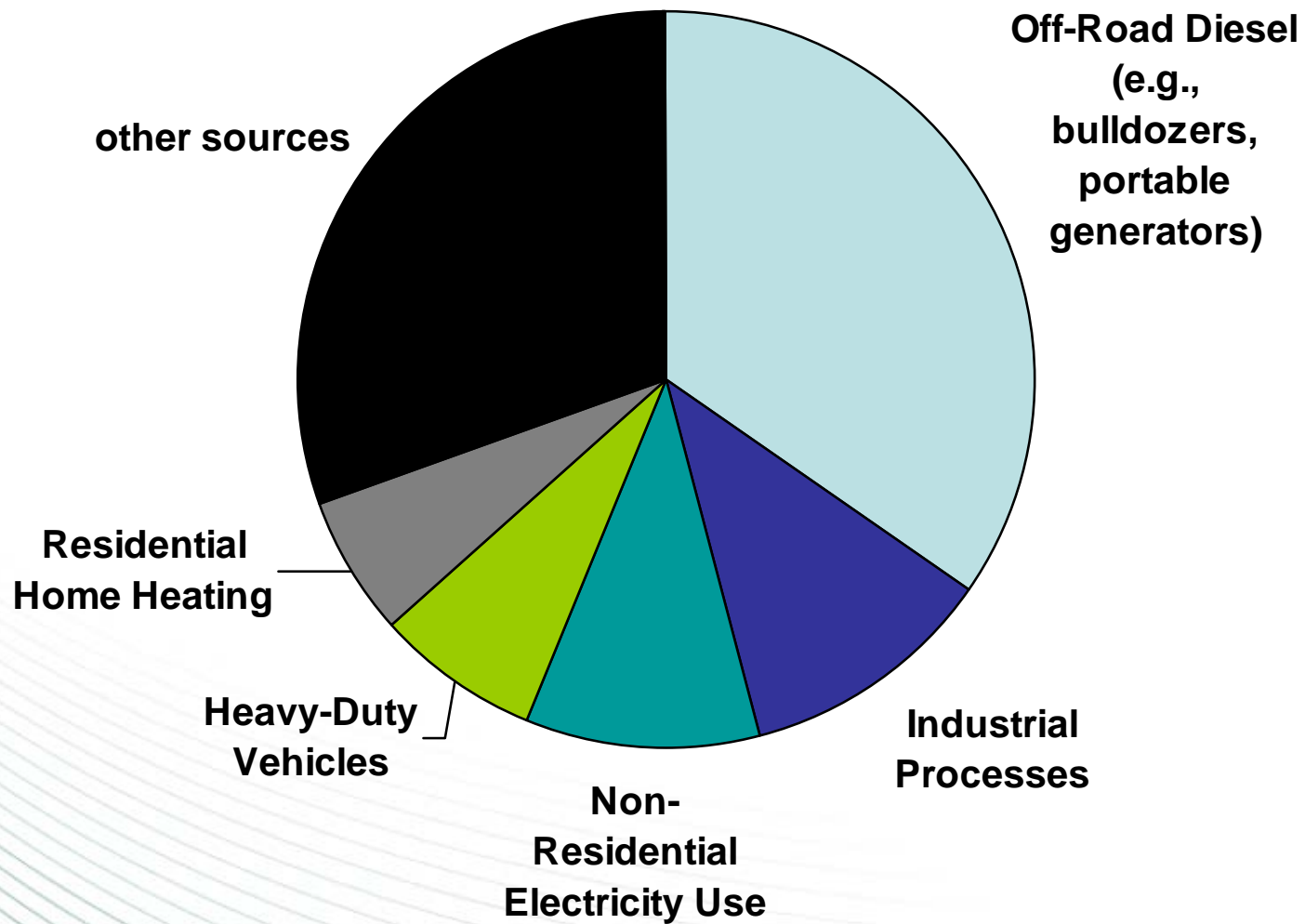


# The “Top 5” for Sulphur Oxides



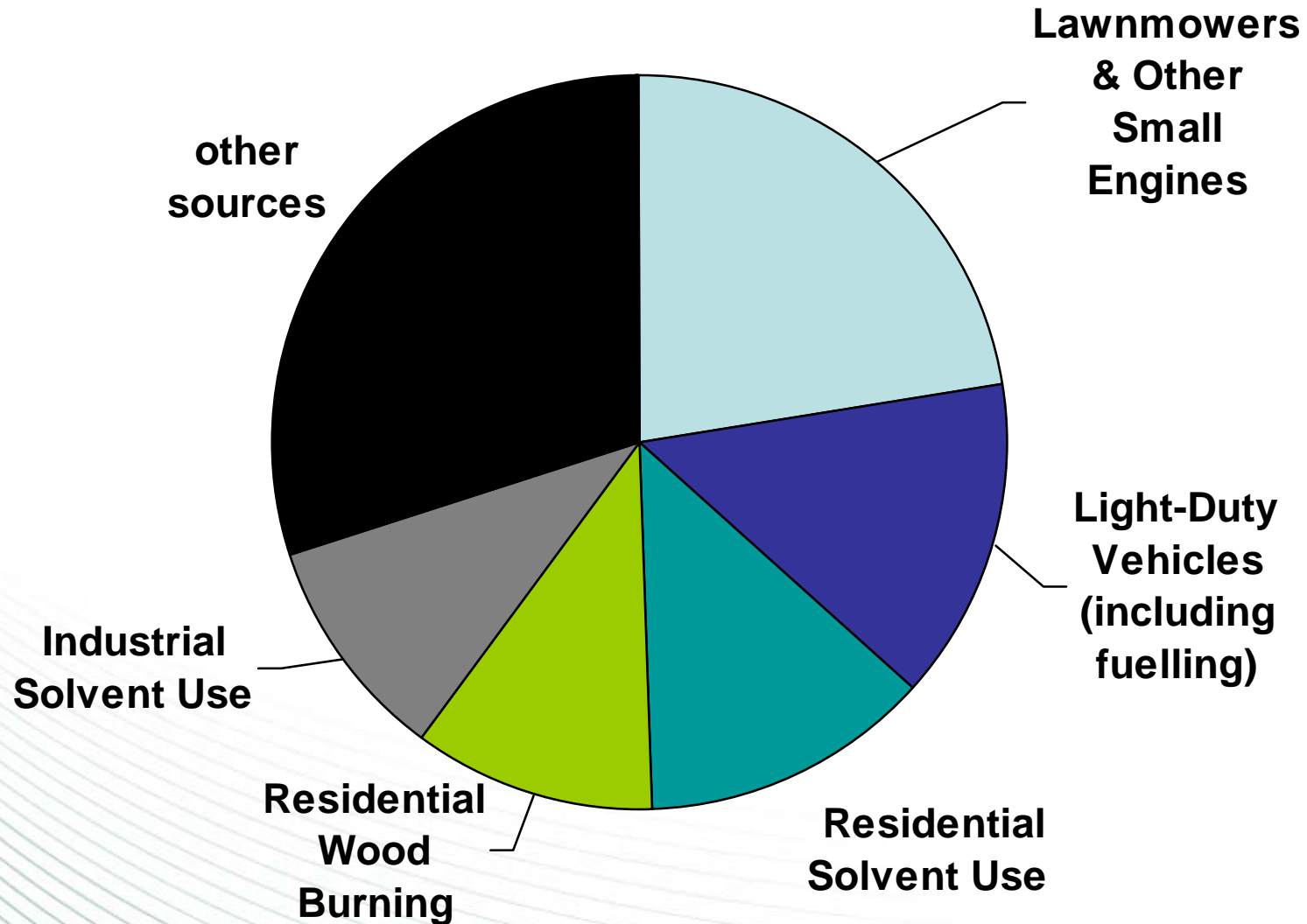


# The “Top 5” for Nitrogen Oxides





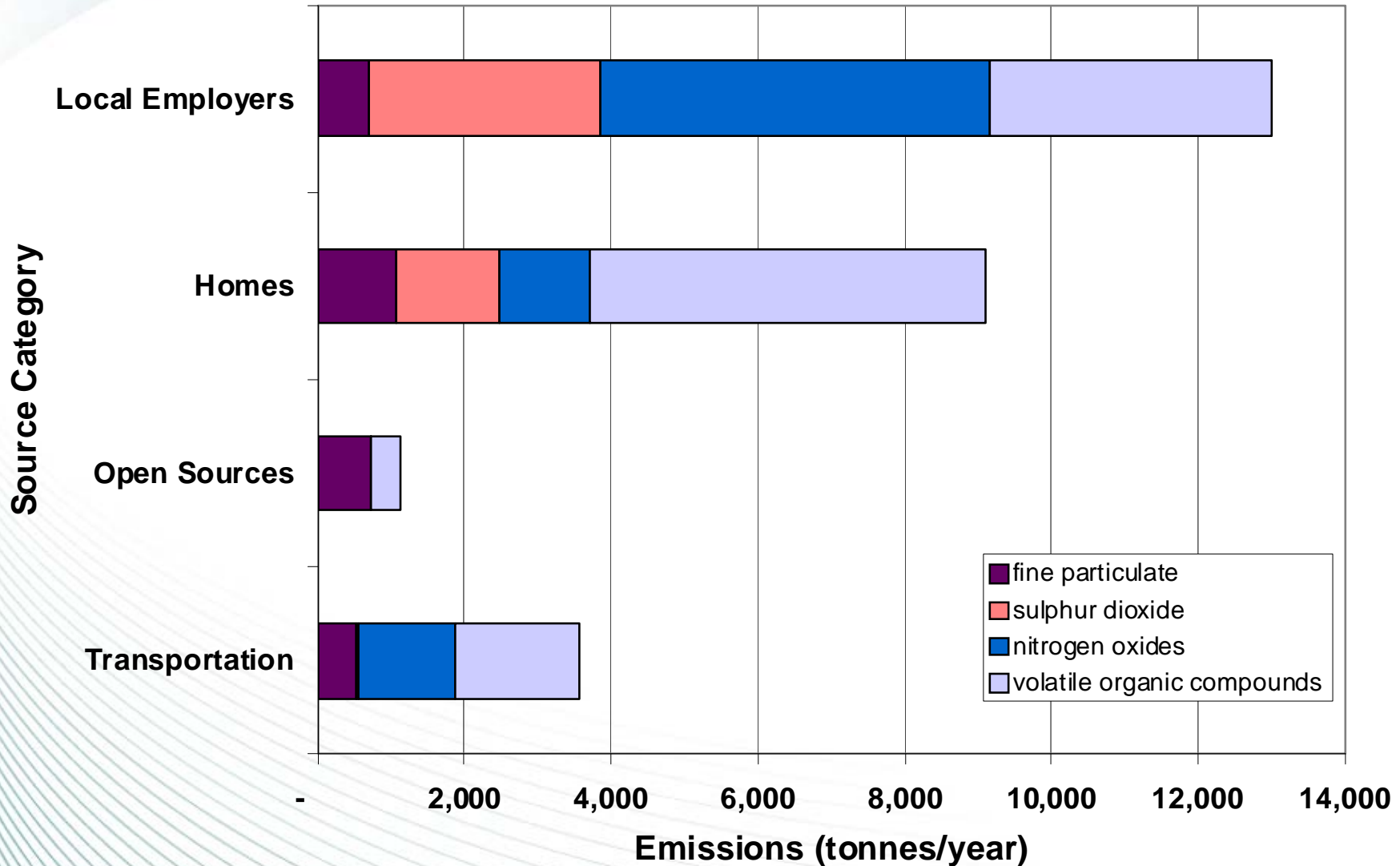
# The “Top 5” for Volatile Organic Compounds





# Contribution by Sectors

## 2005 Inventory of Smog-Forming Emissions





# Limitations of CAC Inventory

- Annual data only
  - Fine for GHGs, due to global impact
- For smog, season & time of day matter
  - Summer, daytime most critical
  - Winter less critical, unless inversion
- Some sources are intermittent
  - Personal vehicles in “rush hour” (bigger share)



# Conclusions

- Electricity use is a major contributor to smog
  - Also major contributor to climate change
- Vehicle contribution to smog is shrinking
  - Due to tougher tailpipe standards
  - Need to get old vehicles off the road
  - Shift emphasis to climate change
- The “small stuff” is starting to matter
  - Wood-burning; balance with climate change



# Thank You!

Questions?

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