



G8/IEA/CSFL Workshop on Near Term  
Opportunities for Carbon Capture and  
Storage

August 22-23, 2006, San Francisco, CA, USA

Panel 1: Near-Term Opportunities and  
Emerging Economies

A view from Mexico

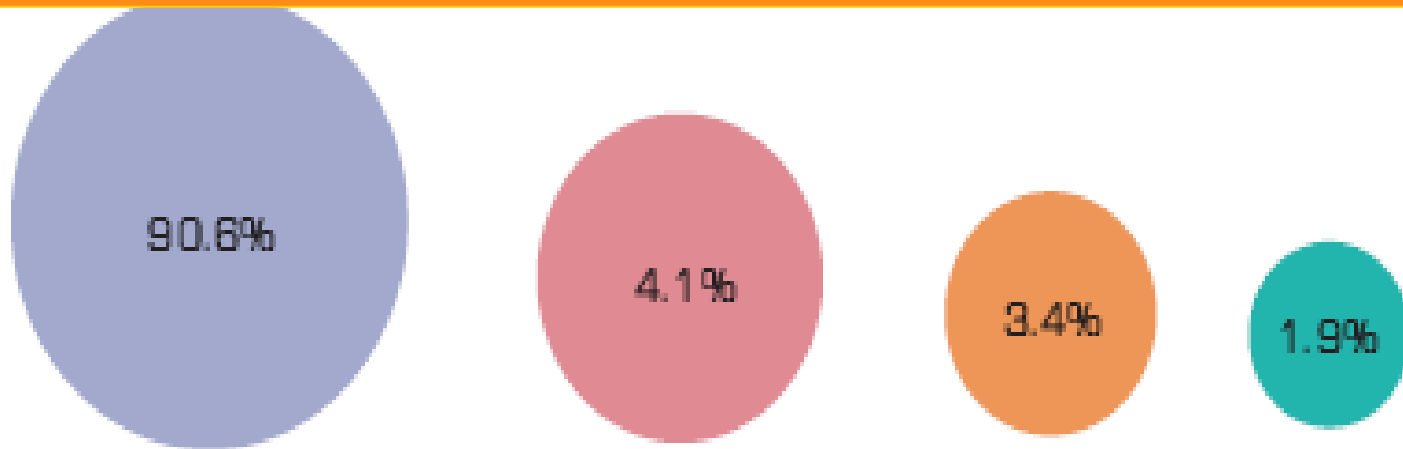
Mariano Bauer  
Instituto de Física - UNAM

# **MEXICO and Climate Change**

- **Signatory of the UNFCCC and the Kyoto Protocol**
- **As non Annex 1 country, no commitment to a specific reduction of GHG**
- **Creation of an Intersecretarial Committee for Climate Change in 1997**
- **2001: 2nd Country Report on GHG; 3d report coming up shortly**
- **2004: Mexican Committee for Emission Reductions and GHG Capture Projects**



## Primary energy production structure 2004 (10'330 PJ)



Hydrocarbons

Electricity <sup>1</sup>

Biomass <sup>2</sup>

Coal

1: includes hydro (2.5%), nuclear (1%), geo (0.6%) and wind

2: includes sugar cane bagasse (0.9%) and wood (2.5%)

# Mexico CO<sub>2</sub>eq Emissions %

- 2002 -



• Land use changes	27.5
• Transport	14.6
• Oil&gas sector	11.5
• - fugitive emissions	6.2
• Power sector	11.4
• Waste	9.0
• Agriculture	8.1
• Industry	5.1

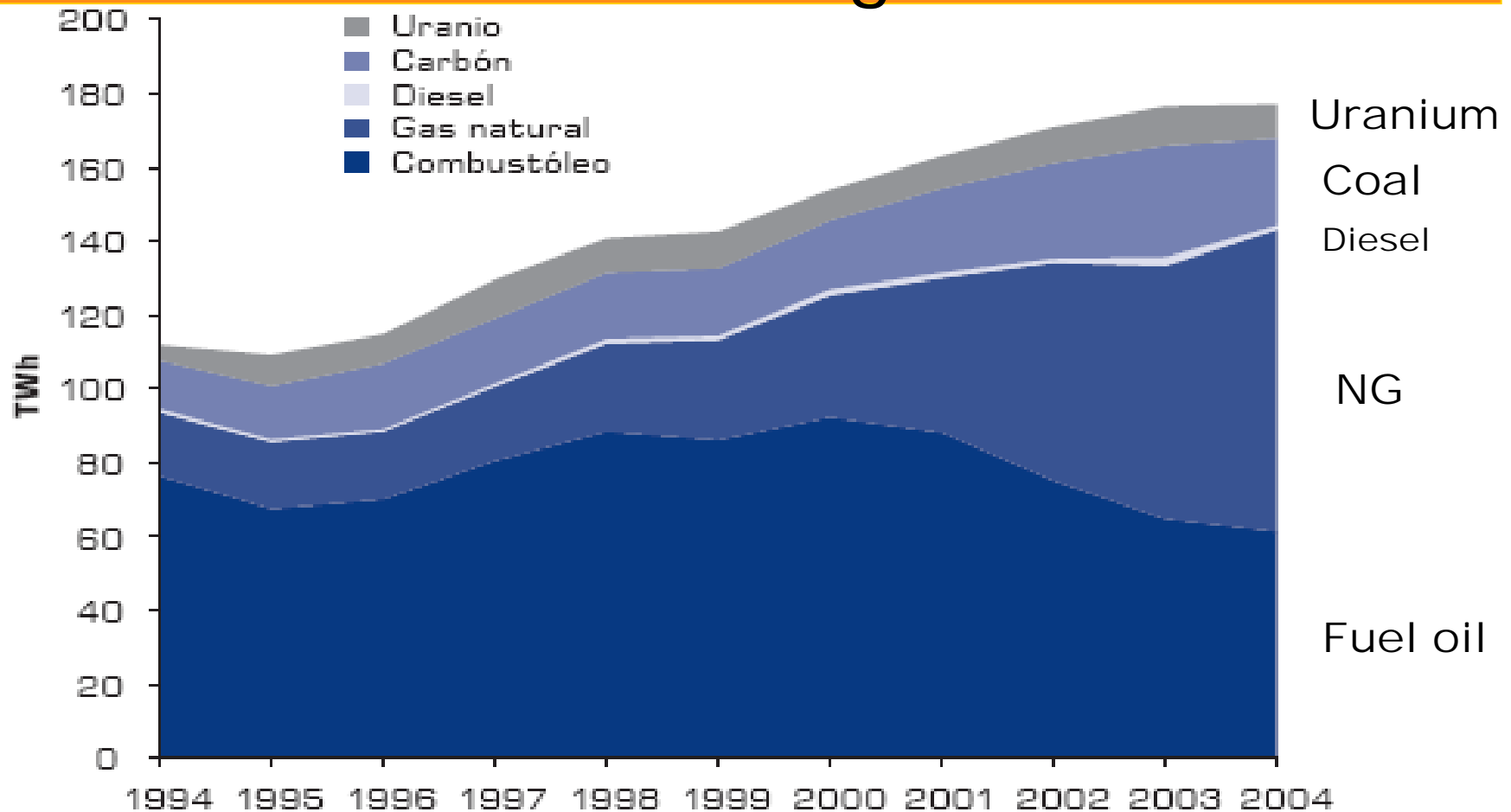
# Mexico CO<sub>2</sub>eq Emissions %

- 2002 -



• Combustion	44.0
• - Transport	14.6
• Land use changes	27.5
• Fugitive emissions	6.2
• Wastes	9.0
• Agriculture	8.1
• Industrial processes	6.3

# Power sector: substitution of fuel oil by natural gas



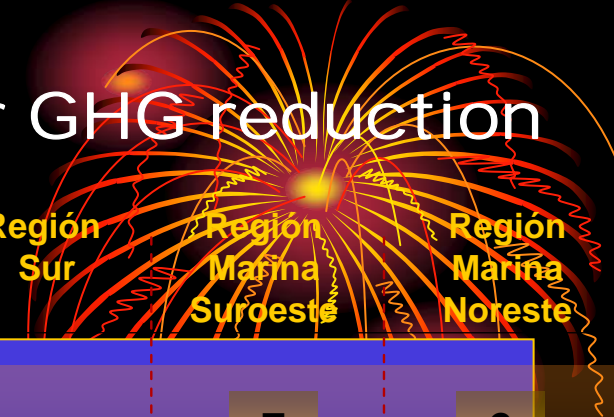
Nota: No incluye las fuentes renovables (viento, agua y vapor del subsuelo).  
Fuente: Comisión Federal de Electricidad.



Oil & Gas sector:

PEMEX

# PEMEX identified opportunities for GHG reduction



**Total  
22**

	Range MtCO2eq			Región			
		Max	Min	Norte	Sur	Marina Suroeste	Marina Noreste
<b>CO2 and CH4</b>	10	3,296	2,241	1		7	2
<b>Injection CO2</b>	2	1,039	707	1	1		
<b>Cogeneration</b>	2	215	147		1		1
<b>Fugitive Emissions</b>	1	92	62	1			
<b>Fuel Substitution</b>	3	242	165		2		1
<b>Vapors</b>	4	701	476		3	1	
<b>Total</b>		<b>5,585</b>	<b>3,798</b>	<b>3</b>	<b>7</b>	<b>8</b>	<b>4</b>

# Carmito Artesa field

- first CO<sub>2</sub> injection experience -



## Project

- Ecological project to avoid burning gas from the Carmito field (120 Mcfd with 72% CO<sub>2</sub>)
- Inject 40Mcfd of CO<sub>2</sub> (two injection wells and four production wells)
- CO<sub>2</sub> separation plant
- Injection plant at 112 kg/cm<sup>2</sup> pressure

# Carmito Artesa field

- first CO<sub>2</sub> injection experience -



## Development

- Begun November 2000 with injection of 6Mcf/d at 113 kg/cm<sup>2</sup>– two injection wells
- Suspended February 2001 to increase pressure to 210 kg/cm<sup>2</sup> and inject 30 Mcf/d
- July 2001 begun injection of 28 Mcf/d on average

# Carmito Artesa field

- first CO2 injection experience -



## Benefits

- CO2 to atmosphere avoided 30 Bcf
- Additional oil (as of Nov-05) 1 Mbl
- Additional gas (as of Nov-05) 2.4 Bcf
- recuperation factor increment 0.4%
- Oil vs CO2 injected ratio 39 bl/mcf
- Experience in CO2 handling and injection

# Sitio Grande field

Stimulated recovery through CO<sub>2</sub> injection



Emission reduction  
range  
MtCO<sub>2</sub>e\*

Investment  
Mpesos

Starting date

854 - 581

1460

2005

- Installed CO<sub>2</sub> compression and injection system of 51 Mcfd
- to be submitted as a CDM project, including the registration of a CO<sub>2</sub> injection methodology

# Tamaulipas Constituciones field

Stimulated recovery through CO2 injection



Emission reduction  
range

MtCO2eq

Investment  
Mpesos

Starting date

185 - 126

1969

2006

- will alternate CO2 and water injection
- will avoid burning 14 mcf/d of gas
- to be submitted as a CDM project



PEMEX has currently identified  
75 projects that could be  
submitted to the CDM