

# Assessment methodology for the Portuguese National Air Strategy for 2030

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# Context



**The New University of Lisbon was contracted by the Portuguese Environment Agency for the main studies of:**

- **NAPCC - National Action Plan for Climate Change 2030 - revision 2014**
- **National Air Strategy for 2030**

# Context

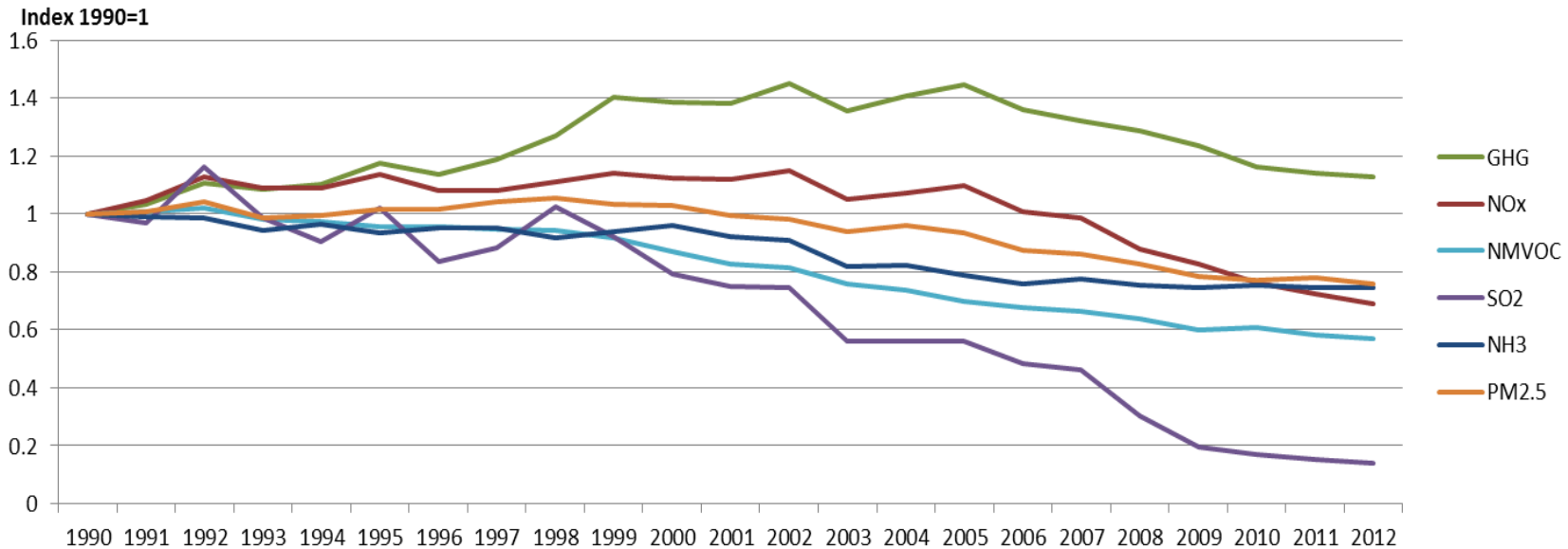
## **National Air Strategy for 2030**

- **Gothenburg Protocol (2020)**
- **NEC (2030)**
  
- **Air quality levels for 2020 and 2030**  
*(modelling by University of Aveiro)*
  
- **Definition of policies and measures**

# Context

## Greenhouse gases and air pollutants emissions historic evolution

Pollutant	$\Delta 2012-1990$	$\Delta 2012-2005$
GHG	13%	-32%
NOx	-31%	-41%
NMVOG	-43%	-13%
SO2	-86%	-42%
NH3	-25%	-4%
PM2.5	-24%	-18%
PM10	-16%	-29%
TSP	7%	-73%
CO	-61%	-20%



# Methodology

**NAPCC - National Action Plan  
for Climate Change 2030 -  
revision 2014**



**National Air Strategy for 2030**

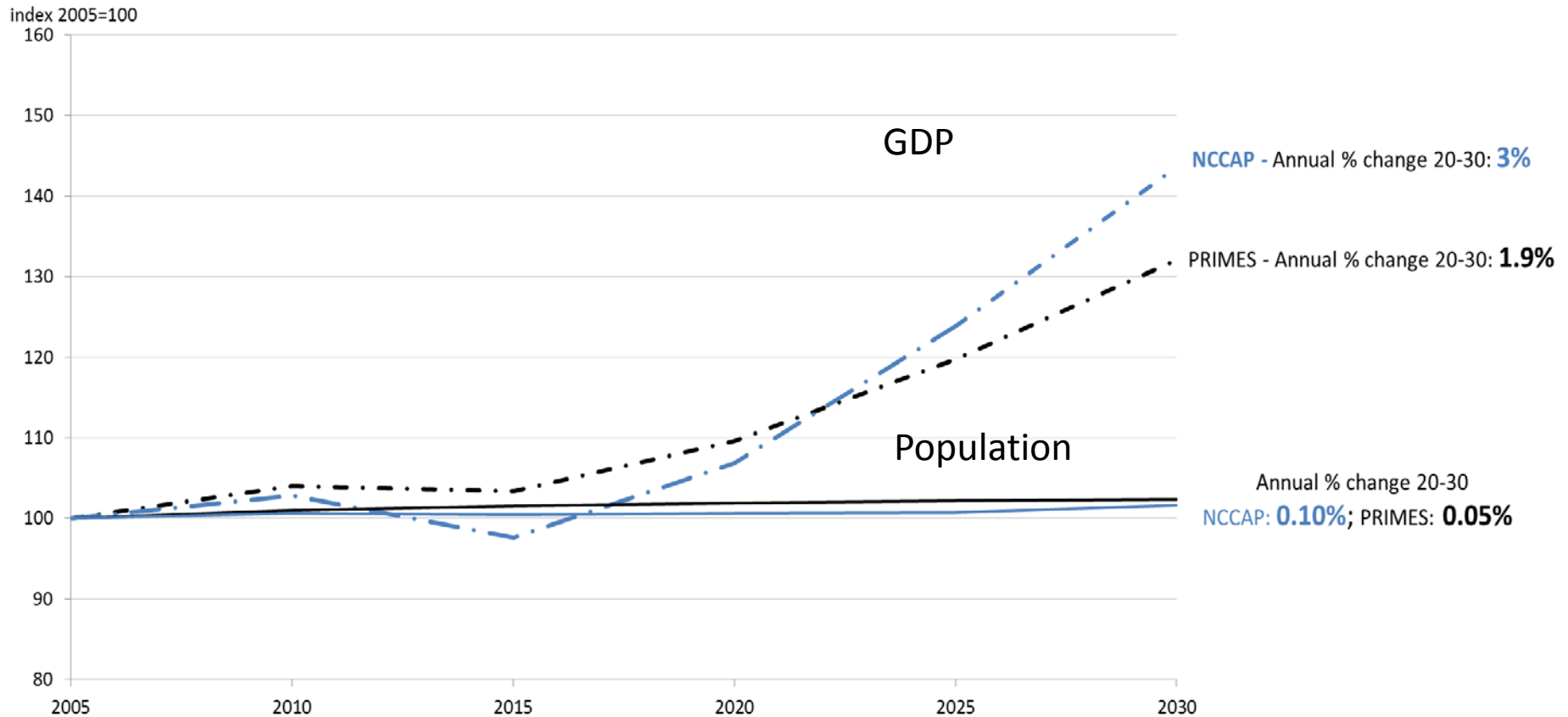
## Information used:

- Primary energy consumption by fuel type
- Final energy consumption by fuel type and sector
  - Materials and service demands
    - Macroeconomic drivers

# Methodology

## NAPCC - National action plan on climate change 2030 - revision 2014

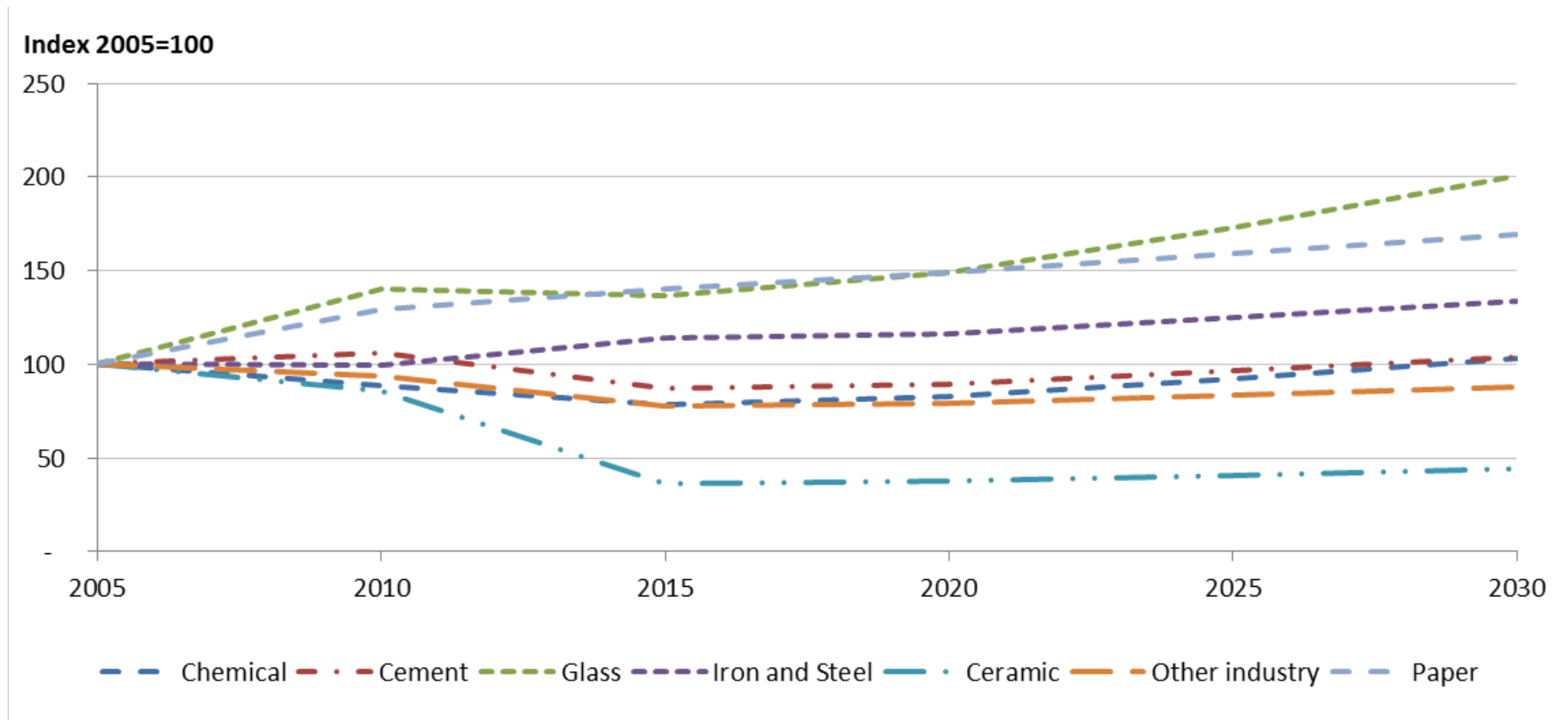
- Main drivers: GDP and population



# Methodology

## NAPCC - National action plan on climate change 2030 - revision 2014

- Main drivers: Materials demand in industry



# Methodology

## NAPCC - National action plan on climate change 2030 - revision 2014

- Main drivers: Primary energy



2030

### Renewable energy sources:

- Hidropower: max. 8,8GW
- Solar: 1,2 GW
- On-shore wind: 6,1 GW
- Off-shore wind: 27 MW
- Biomass: 0,88 GW
- FER-TRANS: 10% (min)

### Fossil powerplants

- Phase-out of the two coal power plants in 2021 (Sines) and 2026 (Pego)

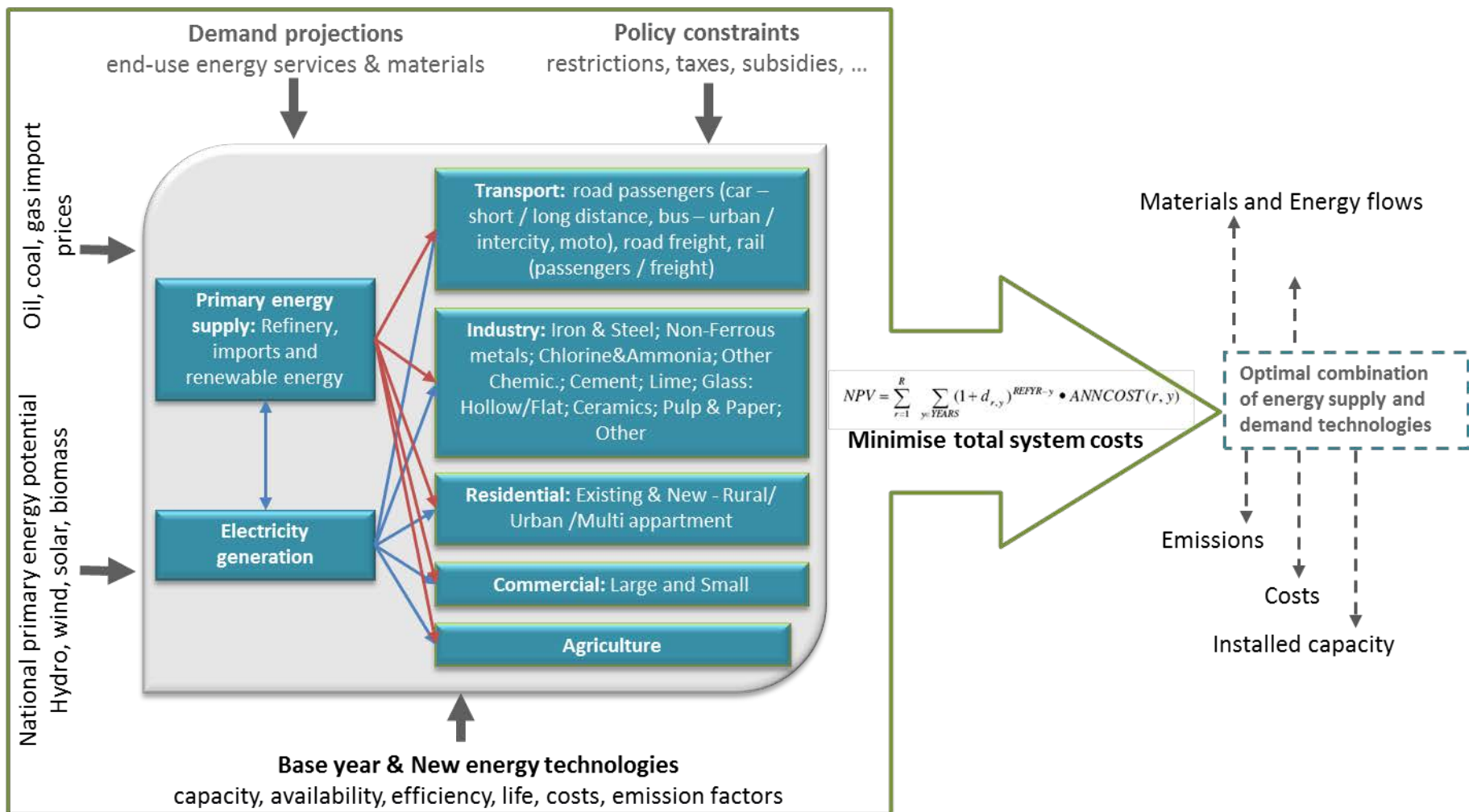
### Other:

- Solar thermal: 4,7 Mm<sup>2</sup> (annual growth: 11,5% between 2020 and 2030)
- Heat pumps: 6% of the demand for space heating.



# Methodology

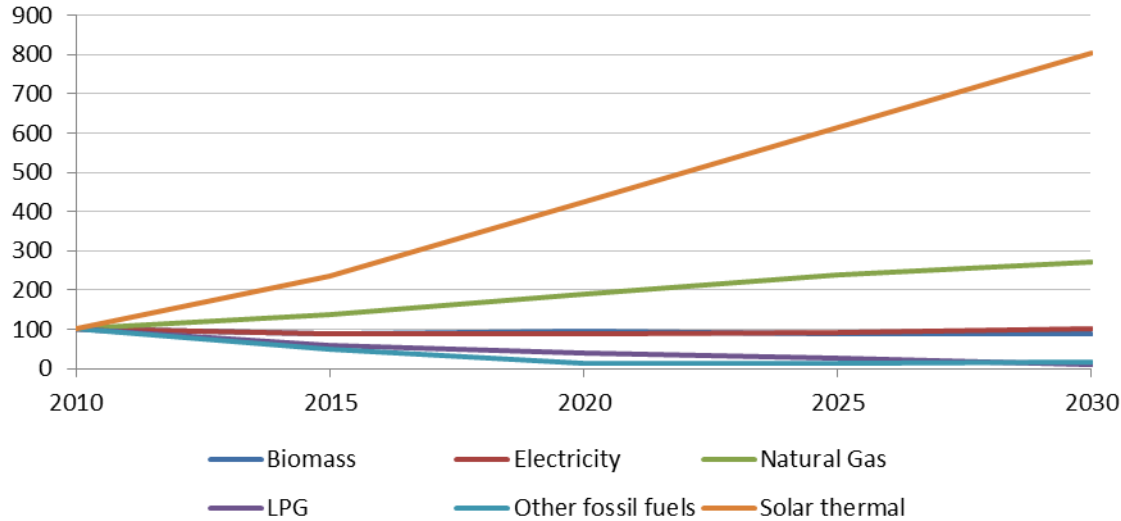
## Model Use: bottom-up TIMES\_PT



Simões, S., Cleto, J., Fortes, P., Seixas, M., Huppés, G., (2008). Cost of energy and environmental policy in Portuguese CO2 abatement—scenario analysis to 2020. Energy Policy 36, 3598–3611.

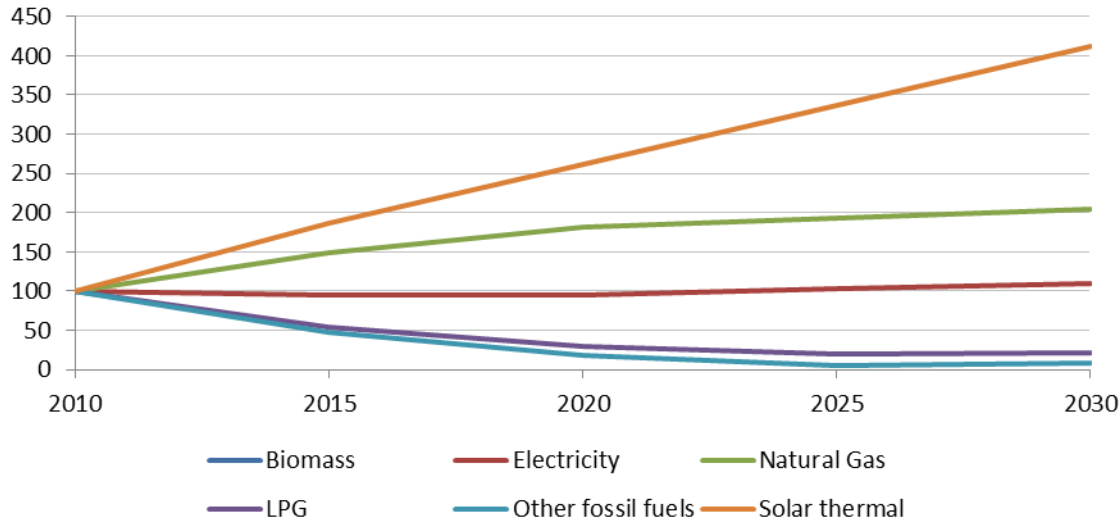
# Methodology

index 2010=100



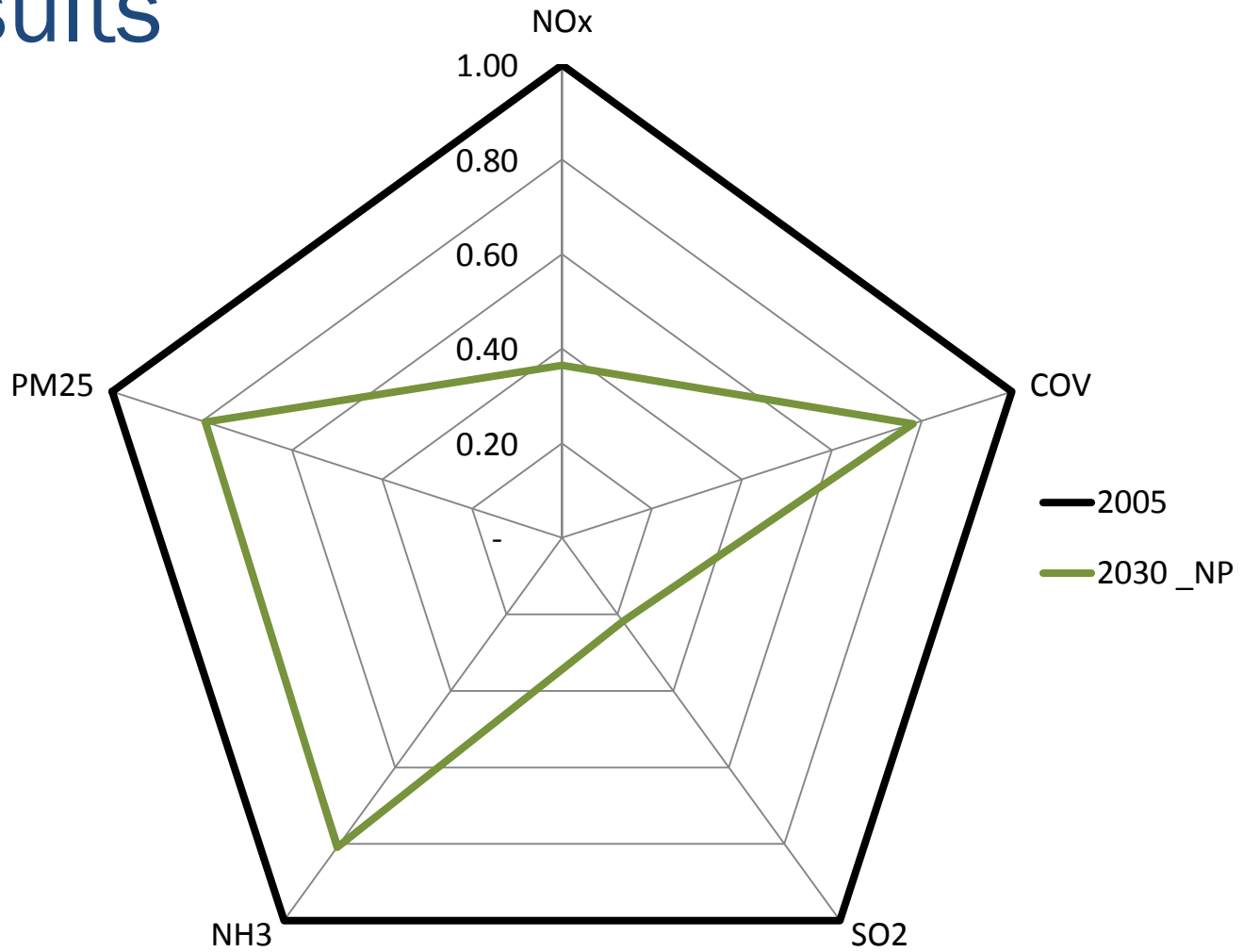
**Final energy consumption in the residential sector**

index 2010=100



**Final energy consumption in the commercial/institutional sector**

# Results



2005 official values – National emission inventory report 2014

# Results

## National Air Strategy 2030

### Emissions reductions

	<i>Gg</i>	<b>2005</b>	<b>2030</b>	<b>Δ2005-2030</b>
NO <sub>x</sub>		256	93	-64%
VOC		207	162	-22%
SO <sub>2</sub>		177	39	-78%
NH <sub>3</sub>		50	41	-19%
PM <sub>2.5</sub>		69	55	-21%

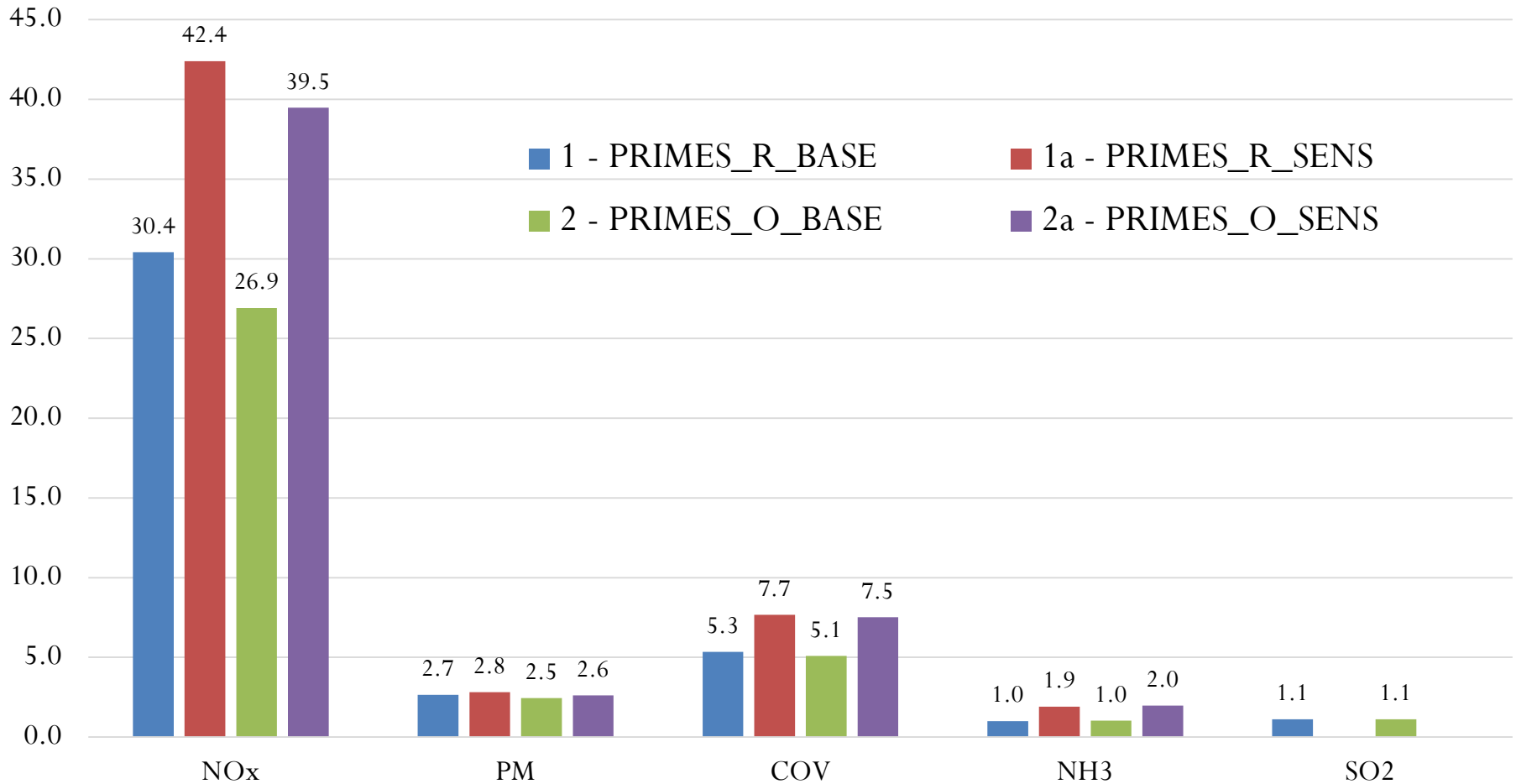
2005 official values – National emission inventory report 2014

# Results

	$\Delta 2005-2030$ (%)			
	<b>NAQS 2030</b>	<b>CLE 2030</b>	<b>B7 2030</b>	<b>MTFR 2030</b>
<b>NO<sub>x</sub></b>	-64	-65	-71	-79
<b>VOC</b>	-22	-40	-46	-60
<b>SO<sub>2</sub></b>	-78	-56	-77	-84
<b>NH<sub>3</sub></b>	-19	3	-16	-29
<b>PM<sub>2.5</sub></b>	-21	-35	-70	-74

# EMISSIONS - TRANSPORT

## Transport Emissions 2030 (kton)

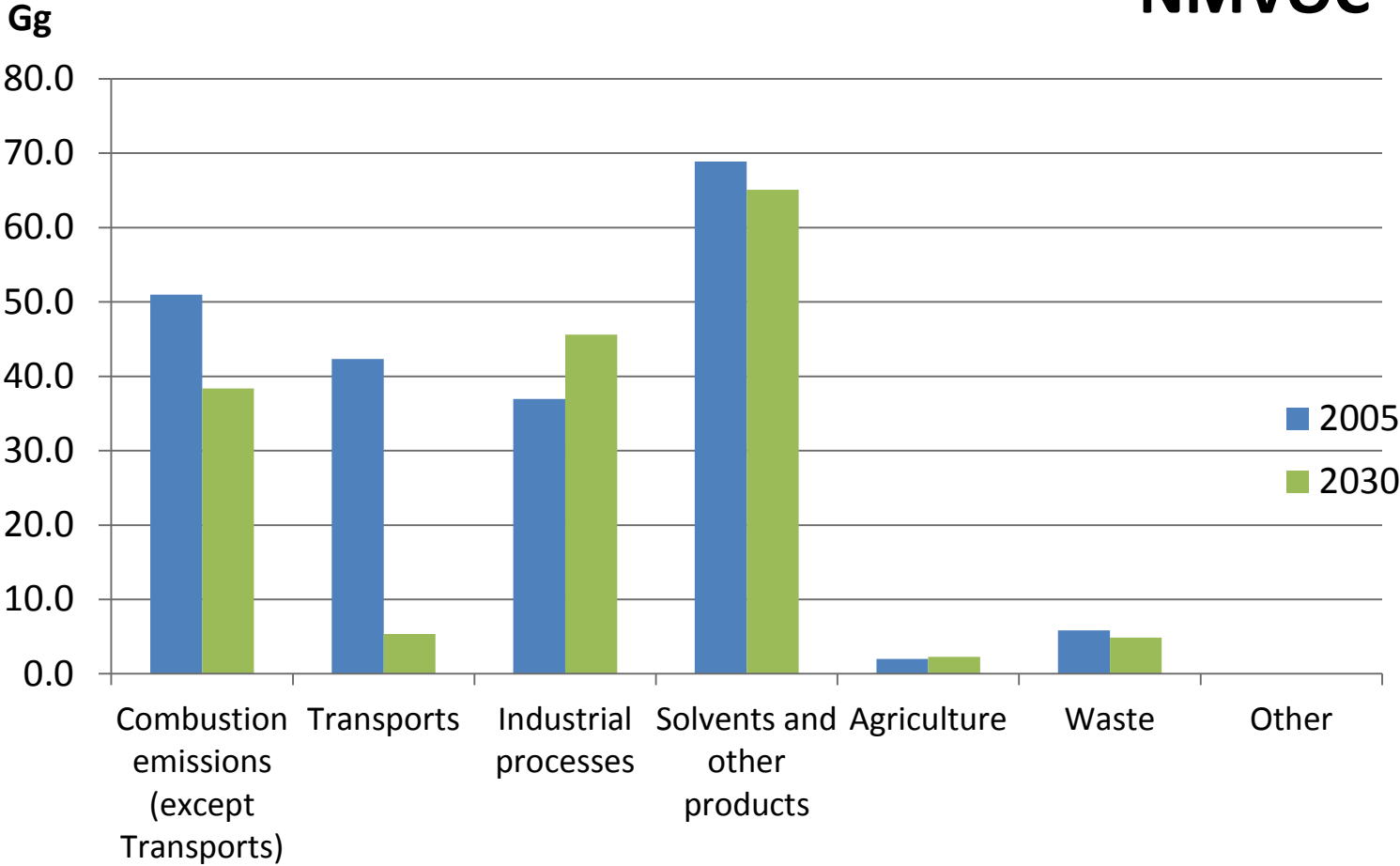


## EMISSIONS - TRANSPORT

2030	Scenario			
	1 - PRIMES_R_BASE	1a - PRIMES_R_SENS	2 - PRIMES_O_BASE	2a - PRIMES_O_SENS
Nox (kton)				
Aviation	4,6	4,6	4,6	4,6
Cars	7,6	12,5	7,0	12,1
LDV	10,0	15,7	9,4	15,3
HDV	5,1	6,5	2,9	4,4
Motorcycles	0,4	0,4	0,4	0,4
Railways	0,8	0,8	0,8	0,8
Navigation	1,9	1,9	1,9	1,9
<b>TOTAL</b>	<b>30,4</b>	<b>42,4</b>	<b>26,9</b>	<b>39,5</b>

# Results

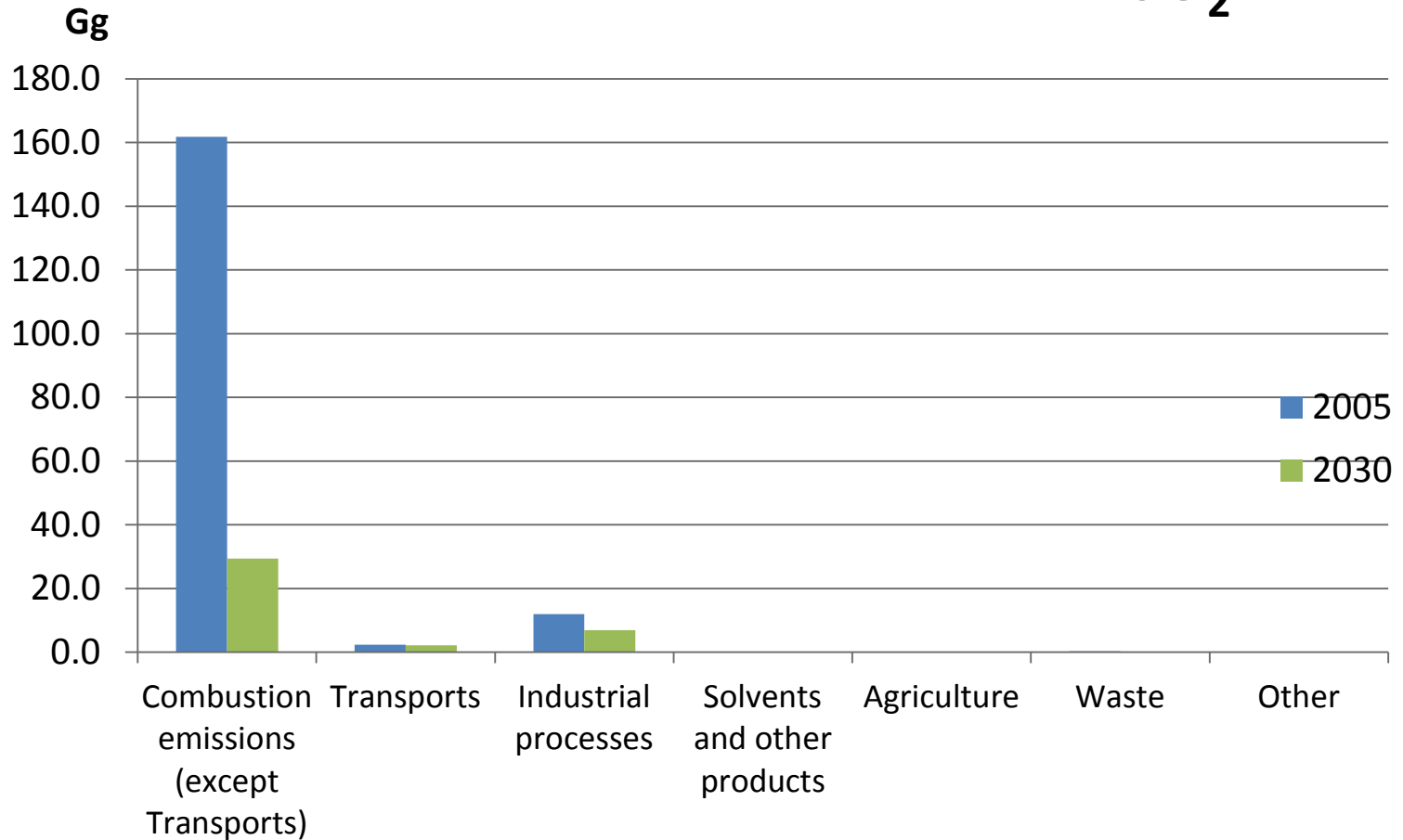
## NMVOG





# Results

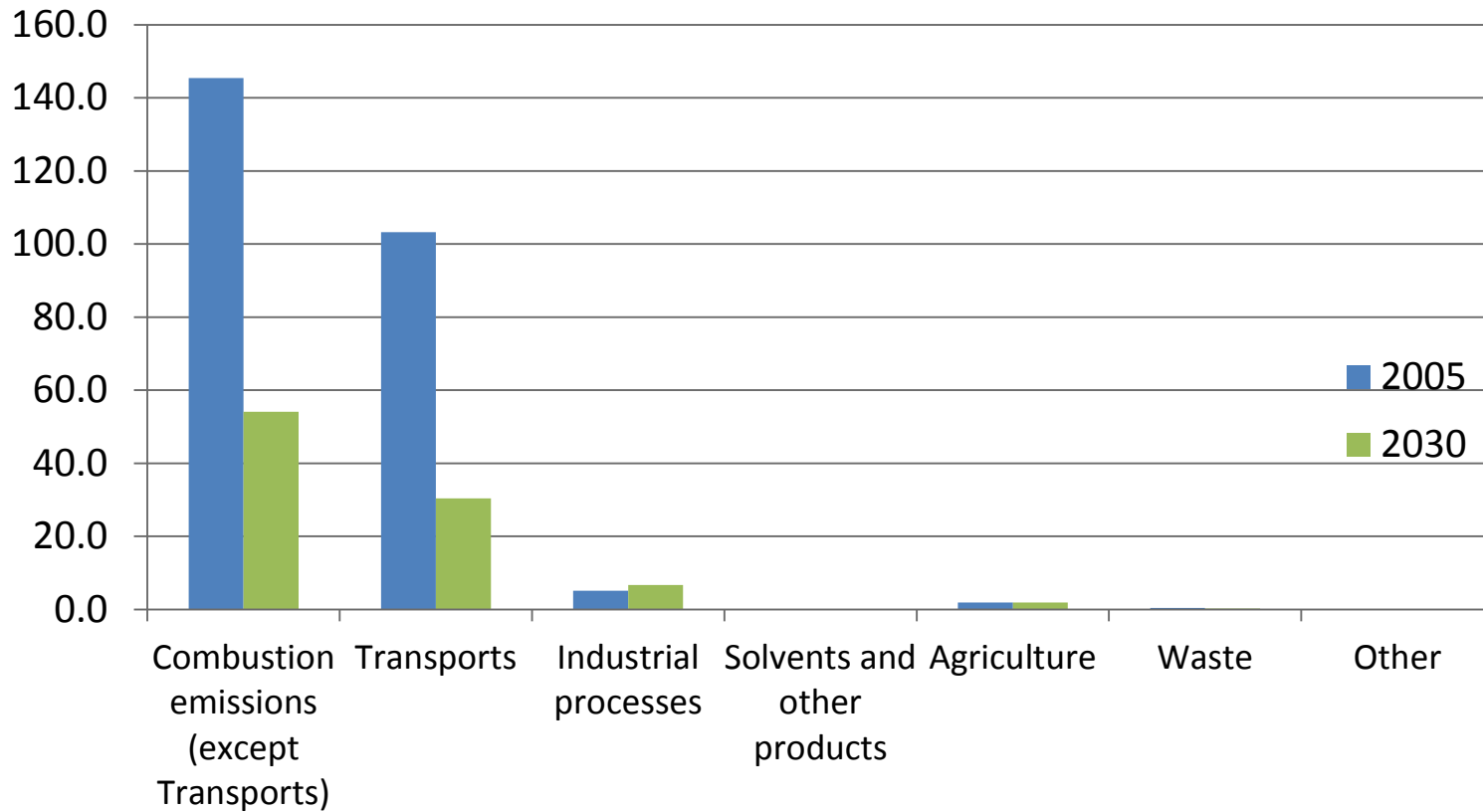
SO<sub>2</sub>



# Results

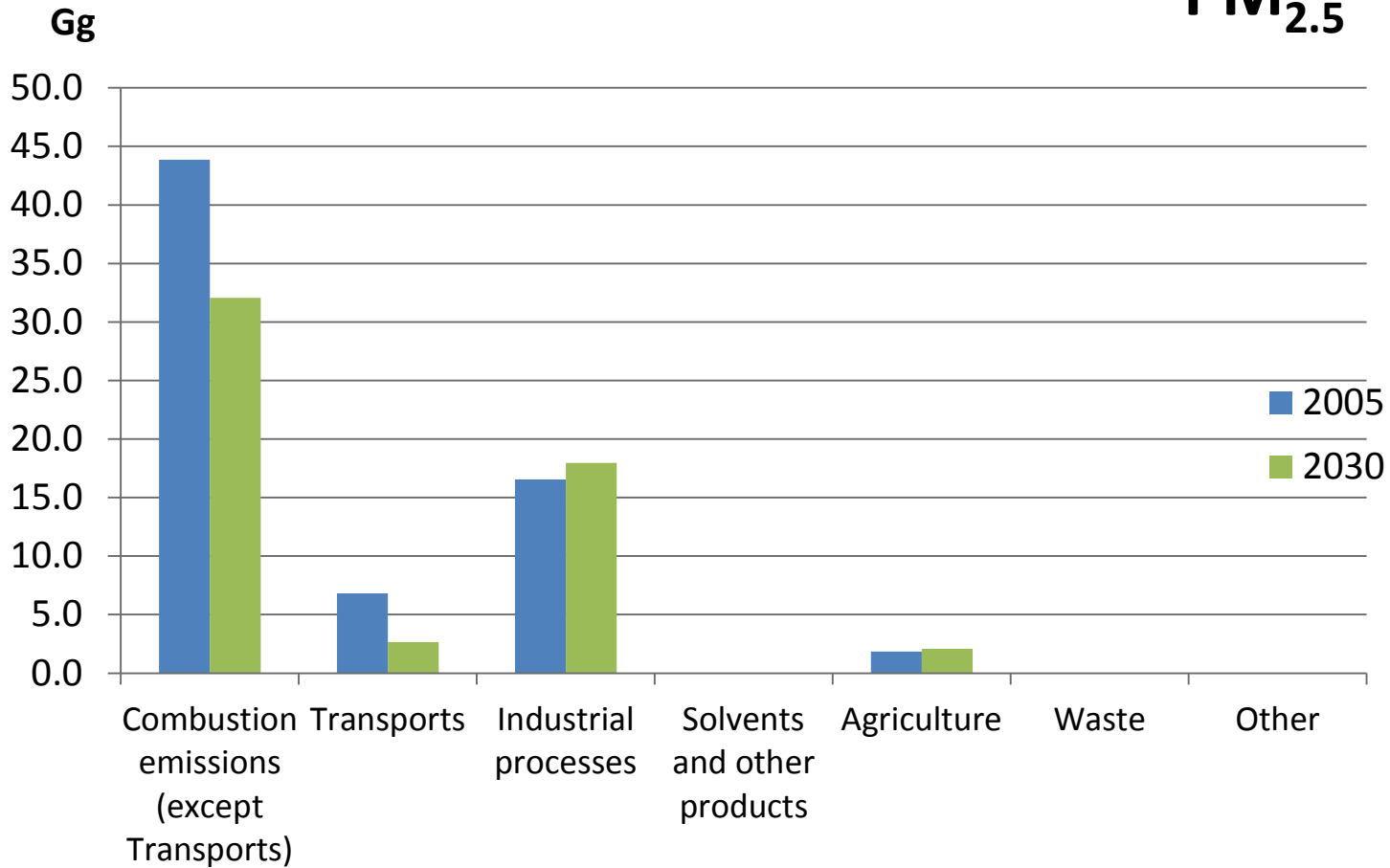
**NO<sub>x</sub>**

**Gg**

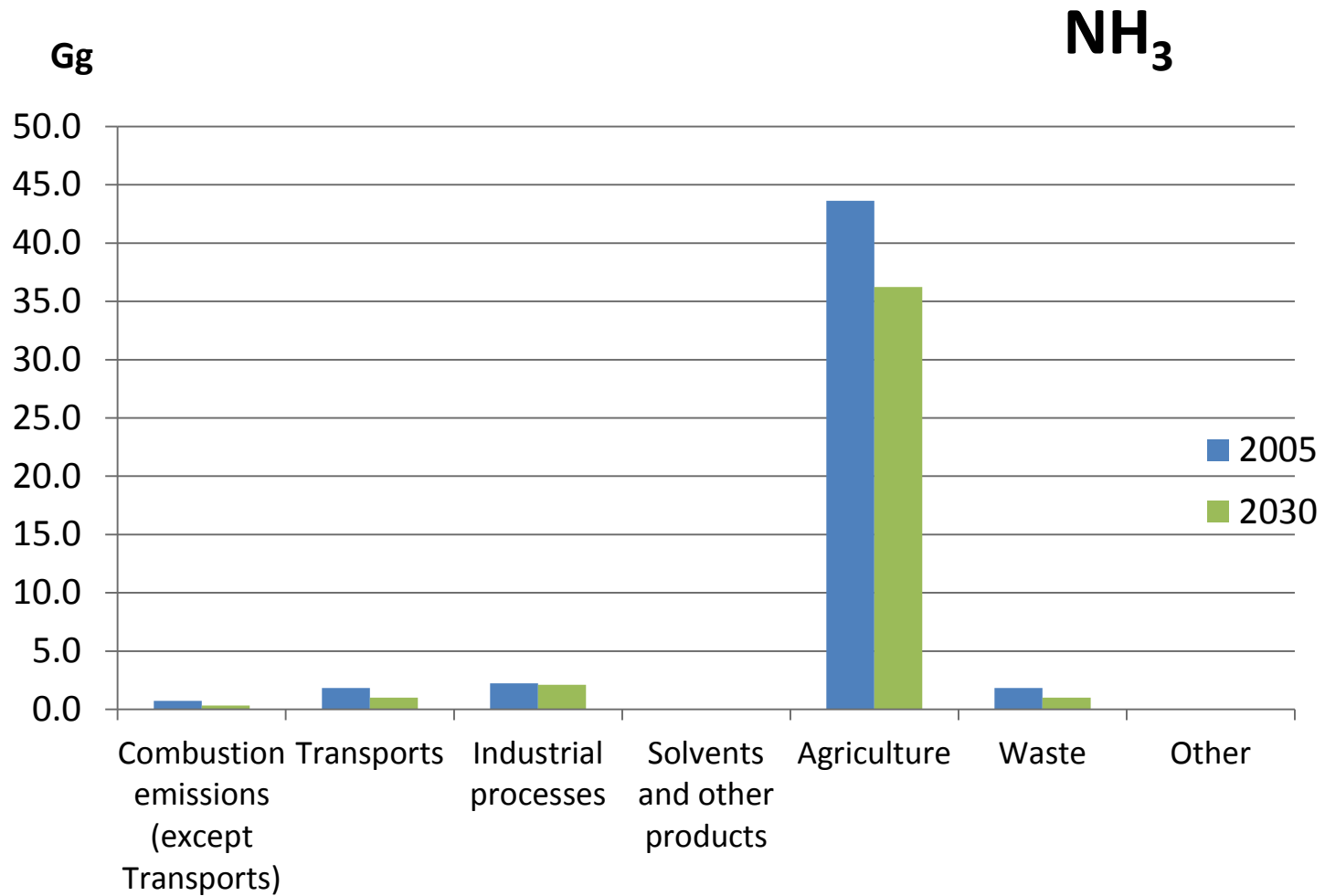


# Results

PM<sub>2.5</sub>



# Results



# Results

- All results should be seen as provisional and other revision
- Major differences:
  - 2005 emission inventories (eg. coal power plants)
  - N fertilizer application
  - Biomass burning (domestic)
  - Transport
  - Azores and Madeira