Greenhouse Gas Emissions Scenarios

(Executive Brief)

ARGENTINA - 2012

Argentine Business Council for
Sustainable Development – CEADS.

Introduction

This report summarizes the methodology and results of the Greenhouse Gases Emissions Scenarios project developed by the Argentine Business Council for Sustainable Development (CEADS). This project aims at developing a number of Argentine scenarios with internal consistency, describing the possible future regarding Greenhouse Gas (GHG) Emissions. This project arose in response to the CEADS's Scenarios Unit concern for undertaking a practical approach of the Scenario methodology.

Scenario Methodology:

The first step in the construction of Scenarios consists of defining the key question for which an answer is sought precisely through those scenarios. The question for these scenarios was: How will this country's GHG emissions evolve in the future considering the different development patterns that Argentina may adopt?

In order to answer this question, three scenarios describing the country's possible future were proposed. Future GHG emissions will result from complex dynamic systems, such as the demographic, socioeconomic and technological development. Scenarios were constructed defining and quantifying each one of these variables in a different way for each of them, giving them a distinctive nature in each Scenario, so as to foster the diversification of results.

The final result of this process has produced three GHG emissions scenarios for 2012, in a framework of different social, economic, political and technological forces. These scenarios do not seek to predict the future of Argentina, but rather to become a tool for the analysis of consequences on GHG emissions deriving from different growth patterns. There is not only one scenario, with a higher degree of likelihood; but no probability value is associated to any of these scenarios as well.

* Complete document can be found on our web page: www.ceads.org.ar

1 Schwartz, Peter. "The art of the Long View". Doubleday. 1991:ISBN 0-385-26731-2.
[2] General and Strategic Management at Graduate Business Shcool of Strathclyde University, UK.

Scenarios

- ***Base Scenarios:***

They represent the future condition of society and the environment that is likely to develop, if no sustainable development policy is applied for the explicit purpose of mitigating GHG emissions.

- ***Quantitative Scenarios:***

Three gas emissions were quantified, namely carbon dioxide (CO_2), methane gas (CH_4) and nitrous oxide (N_2O) making a distinction of the same according to their source.

- ***Discrete Scenarios***

Instead of differing in terms of GDP evolution, they differ as to the growth pattern that prevails in each, in accordance with the production sector that is most important in each one.

The scenarios developed do not represent scenarios in opposition, but rather scenarios that respond to a type of discrete scenarios. This implies that the events determining the scenarios are framed within a logical sequence, which is consistent with the time frame of this survey.

Industrial Model

The country's economic development adopts an industrial growth, as this economic sector increases its share in the national GDP at a rate higher than the remaining sectors, reaching 19% in 2012.

Industry recovers the leadership based on the momentum gained by foreign demand as a consequence of a high actual foreign exchange rate that has only declined at a slow pace during the last decade.

Agro-exporting Model

Under this type of expansion, primary activities expand at a higher rate. The primary agro-exporting sector is not the only one to expand, mining also does. An almost non-existent internal market, however, does not allow for the development of an associated industry that may foster a vertical integration with the primary sector. The economy is an export led growth, with no generation of a higher value added.

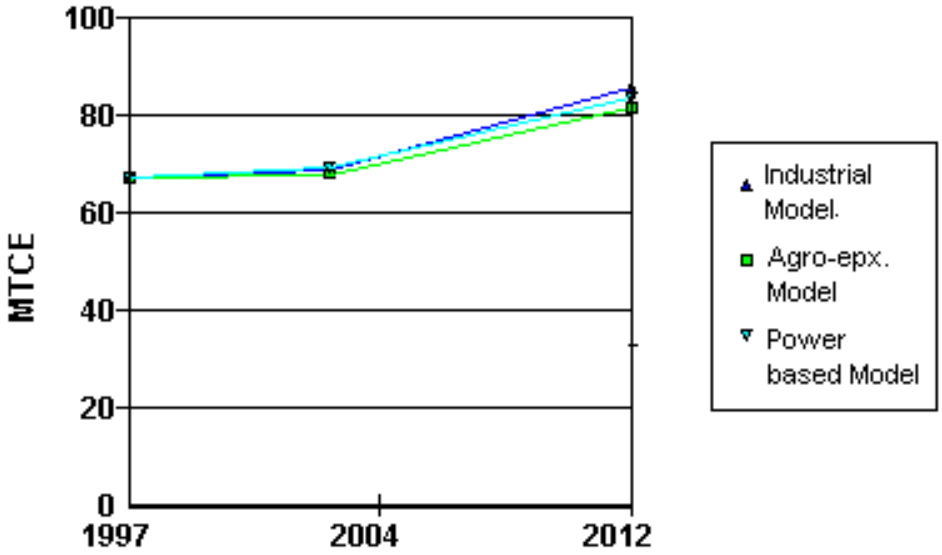
Power Based Model

The benefit of energy resources and infrastructure available in this sector and in the service area, in general, together with a low domestic absorption, allow for an exporting expansion of energy intensive intermediate goods. In many cases, this takes place with a vertical integration of energy companies.

Greenhouse Gas Emissions

The following graph specifies the resulting GHG emissions for 2012 for each Scenario. Values are stated in Million Tonnes Carbon-Equivalent (MTCE).

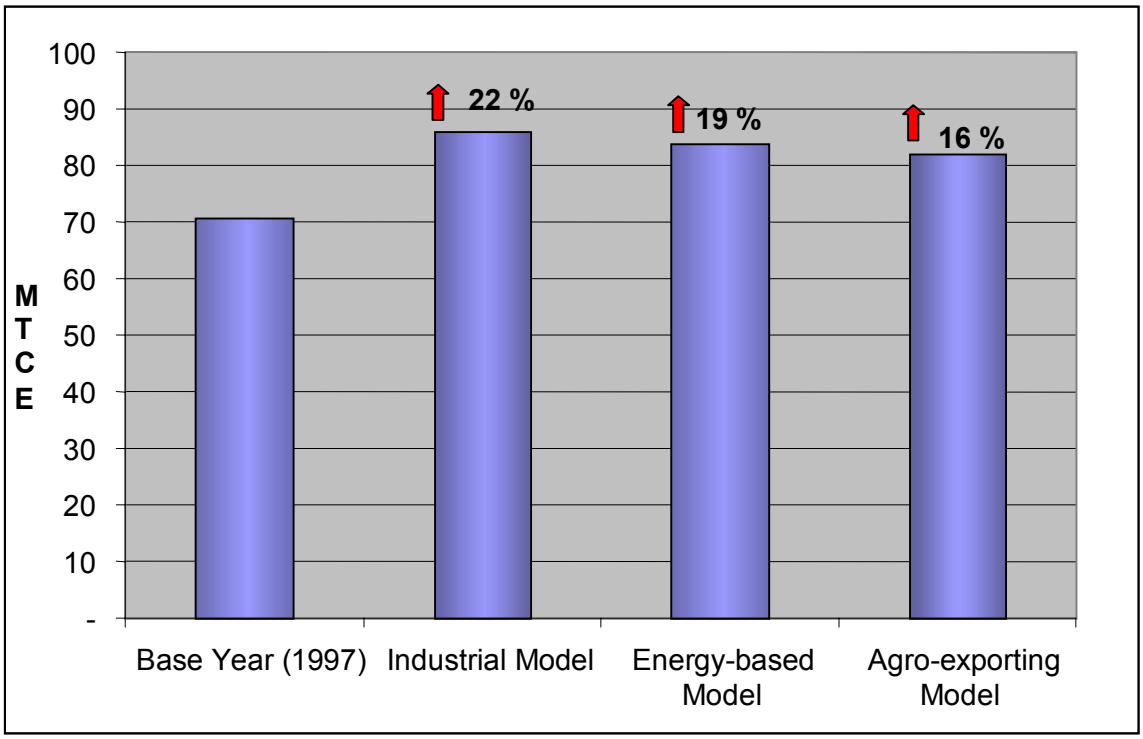
GHG emissions in year 2012



Under the **Industrial Model**, the highest increase of emissions is generated, from 70.5 MTCE in 1997 to 86 MTCE in 2012. This represents a 22% increase with respect to 1997.

The **Power Based Model** shows a 19 % increase amounting to 84 MTCE in year 2012.

Finally, in the **Agro-exporting Model**, emissions amount to 82 MTCE, accounting for 16 % with respect to the base year.



Emissions per Economy Sector

The distribution of emissions according to each emitting sector was evaluated in each Scenario, first as aggregated economic sectors, and then, as disaggregated activities within each sector.

GHG emissions per economy sector in different Scenarios (in MTCE)

	Industrial Model	*Energy-based Model*	*Agro-exporting Model*
Agriculture	26.7	26.6	28.3
Energy Industry	21.8	22.9	19.9
Transport	12.9	12.3	12.5
Industry	12.4	10.4	9.7
Household	6.0	5.6	5.5
Solid Wastes	5.4	5.4	5.4
Services	0.7	0.6	0.7
TOTAL	**86**	**84**	**82**

- **Household Sector:** emissions deriving from burning fossil fuel for household energy purposes.

- **Service Sector:** emissions deriving from burning fossil fuel for energy purposes in the service production sectors, including the public administration.

- **Transport Sector:** emissions from fossil fuels used by the different means of transportation: road, railway, ocean and airway, both for passengers and cargoes.

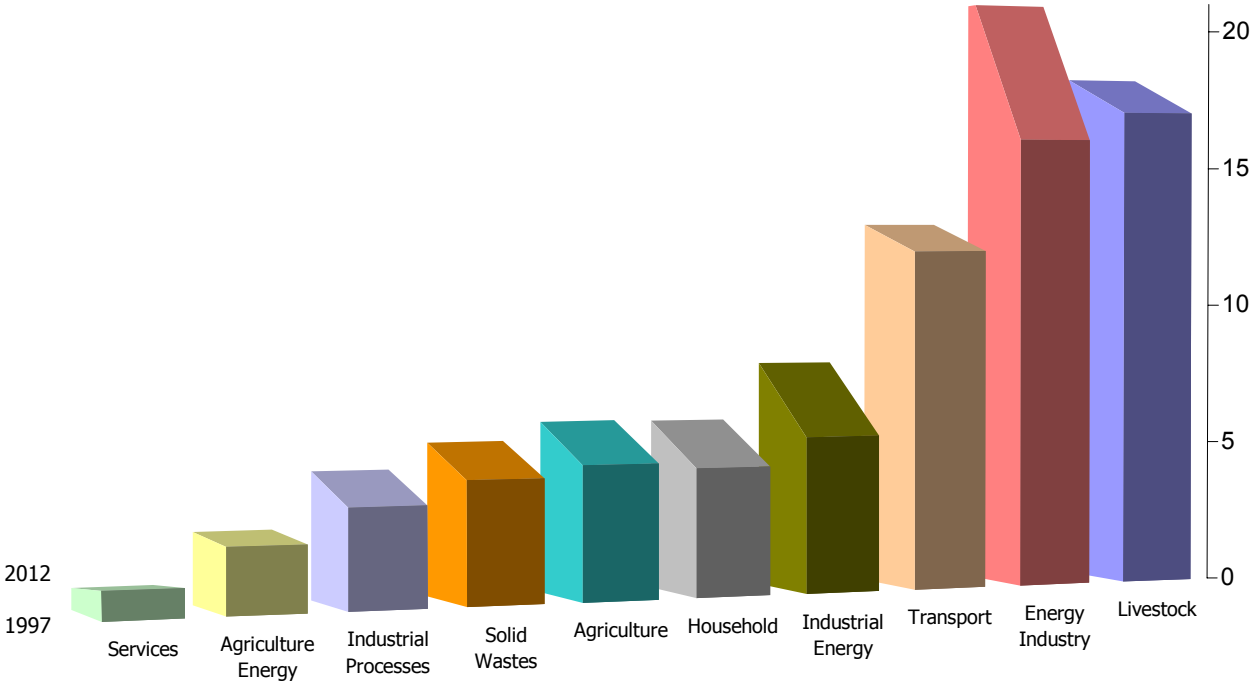
- **Industry Sector:** This sector accounts for two different emission sources: emissions deriving from burning fossil fuel for the sector energy purposes and emissions from industrial processes in the mains industrials branches.

- **Agriculture/ Livestock Sector:** emissions generated by agricultural and livestock activities. The livestock sector includes methane emissions from cattle enteric fermentation and methane and nitrous oxide emissions generated by manure treatment. The agricultural sector includes nitrous oxide emissions from manure treatment and agricultural soil management, and methane emissions generated by rice cultivation.

- **Energy Sector:** This sector considers the emissions generated throughout the power product generation, storage, transportation and distribution process.

- **Waste Sector:** Methane emissions from urban solid waste. It was not considered neither Industrial or hazardous waste treatment emissions, nor domestic effluents.

Emissions trends from 1997 to 2012 (MTCE)

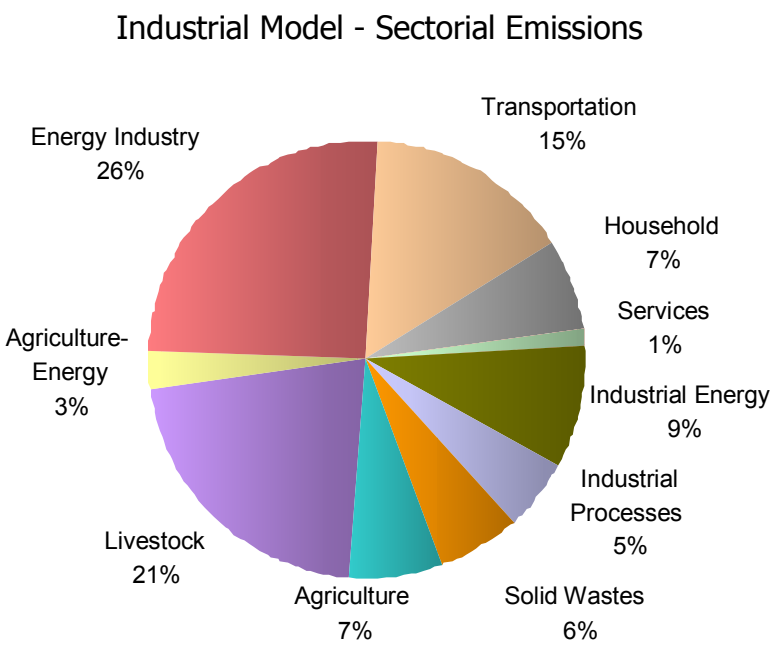


GHG emissions per sector activities (in MTCE)

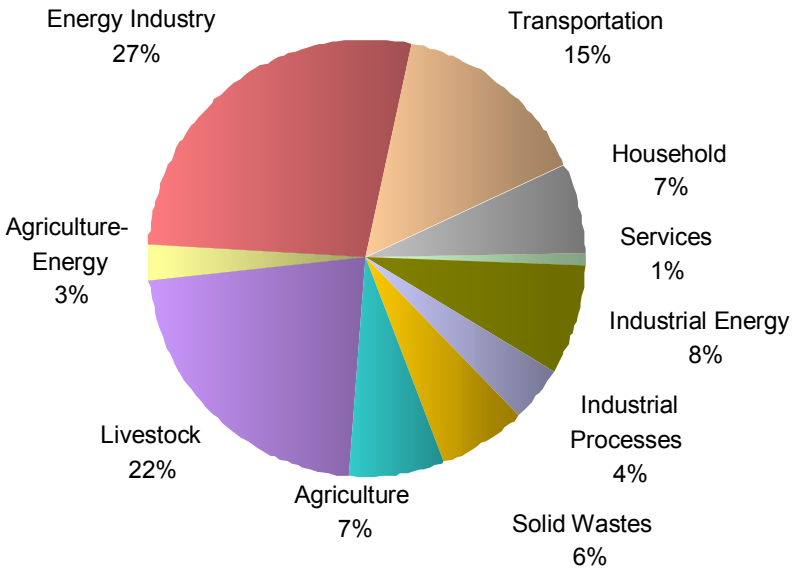
Activities	*Industrial Model*	*Energy-based Model*	*Agro-exporting Model*
Energy Industry	21.82	22.89	19.90
Transportation	12.94	12.28	12.50
Industrial Energy	7.96	6.87	6.70
Industrial Processes	4.45	3.52	3.04
Livestock	18.33	18.40	18.50
Agriculture	5.87	5.87	7.00
Agriculture Energy	2.48	2.32	2.84
Household	5.96	5.62	5.52
Solid Wastes	5.35	5.35	5.35
Services	0.74	0.63	0.67
TOTAL	85.90	83.75	82.02

In general, almost the same percentage share for the different sectors in the total emissions is observed in all three scenarios. The sector that generates most emissions, in all scenarios, are the Energy Industry and Livestock sectors, followed by the Transport, Industrial Energy, Households, Agriculture, Solid Waste and Services sectors.

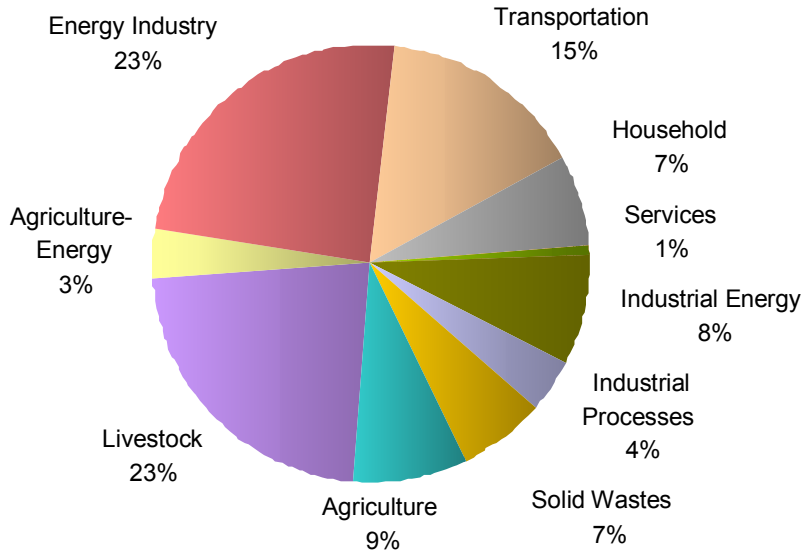
GHG emissions per sectors in different Scenarios



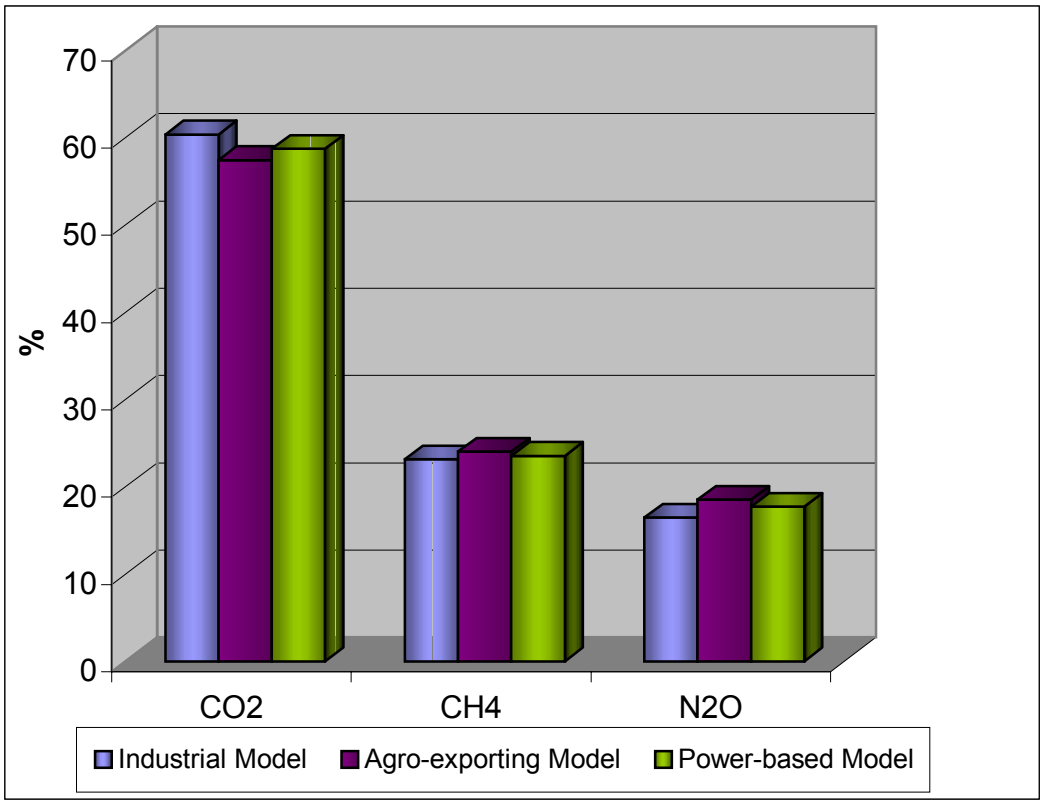
Energy-based Model - Sectorial Emissions



Agroexporting Model - Sectorial Emissions



Emissions according to GHG type



Conclusion

The first conclusion arising from scenarios is that GHG emissions in Argentina will increase in the next years, regardless of the prevailing economic model. This, depending upon the scenario basic assumption whereas the national economy will have a growth with respect to the base year. Under the Industrial Model, a 22 % increase is generated with respect to 1997. Under the Energy Based Model, emissions increase by 19 % and under the Agro-exporting Model, there is a 16 % increase in year 2012.

In all of them, the higher emission generation are found in the Energy Industry, Livestock and Transport sectors. Aside from them, it can be observed that the shares of the other sectors in the total emissions within Argentina are of a similar magnitude. Despite every sector has a different impact on total national emissions, all of them should analyze measures to reduce emissions

These scenarios not only constitute a tool for analysis and decision-making affecting the future evolution of GHG emissions, but also represent a platform for future studies aimed at the search for better mitigation alternatives for each one of the sectors involved.

ANNEX 1: Economic Scenarios for 2012.

GDP Argentina Historical Evolution			BASE SITUATION		INDUSTRIAL MODEL		PRIMARY MODEL		ENERGY BASED MODEL	
Economic Sector *	**GDP YEAR 1992**		**GDP YEAR 2001**		**GDP YEAR 2012**		**GDP YEAR 2012**		**GDP YEAR 2012**	
	%	Value $	%	Value $	%	Value $	%	Value $	%	Value $
Services (Rest)	59.0%	120,169	59,8%	147,351	56.0%	181,246	57.8%	173,572	57.7%	176,988
Agriculture, Livestock, For-estry and Fishing.	5.8%	11,785	6,1%	15,148	6.3%	20,525	8.5%	25,371	6.8%	20,969
Mines and Quarries	1.6%	3,204	2,1%	5,105	2.1%	6,917	2.6%	7,859	2.6%	7,859
Manufacturing Industry	18.2%	37,006	14,9%	36,732	18.4%	59,610	13.9%	41,882	15.2%	46,666
Electricity, Gas and Water	2.0%	4,040	2,9%	7,188	3.0%	9,636	3.0%	8,937	3.6%	11,065
Construction	5.9%	12,039	5,1%	12,627	4.7%	15,200	4.6%	13,784	4.6%	14,088
Transport and Com.	7.5%	15,293	9,1%	22,446	9.4%	30,414	9.6%	28,826	9.5%	29,137
Total GDP	100.0%	203,537	100,0%	246,597	100.0%	323,547	100.0%	300,230	100.0%	306,772
Taxes	8.6%	19,054	6,6%	17,399	6.6%	21,354	6.6%	19,788	6.6%	20,219
Total		**222,591**		**263,997**		**344,902**		**321,414**		**328,417**
(**) at 1993 constant prices	Annual GDP growth average =			**1.91%**		**2.5%**		**1.8%**		**2.0%**

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