

The Economics of Climate Change: What to Do



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Economic Commission for Latin America and the Caribbean
(ECLAC)**

The Future of Energy: Latin America's Path of Sustainability

ECLAC

Santiago, August 19, 2015



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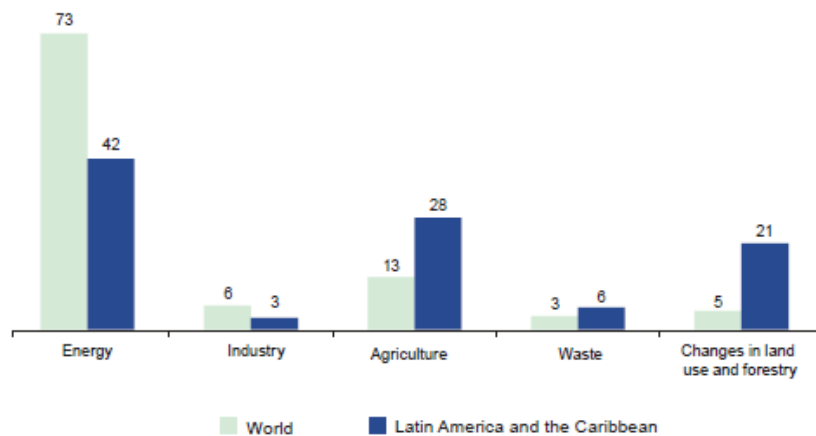
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Introduction

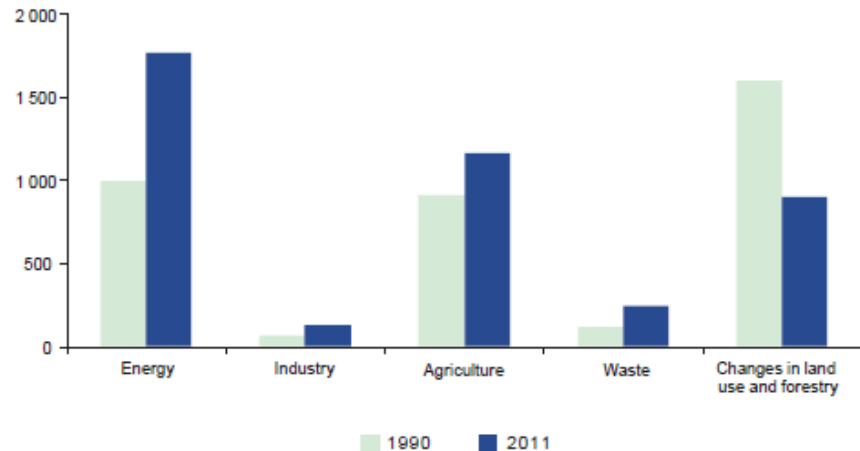
- Over the past decade, the Latin American and Caribbean region has displayed greater economic dynamism thanks, in part, to booming exports of renewable and non-renewable natural resources.
- This increased dynamism has been coupled with improvements in employment, consumption and investment, a reduction in poverty and in income distribution
- These consumption patterns have a strong influence on economic dynamics and are associated with significant negative externalities, such as the generation of waste, air pollution, environmental deterioration or destruction, increased use of renewable and non-renewable resources, and emissions of the greenhouse gases that are driving climate change.
- The expansion of consumption —deriving from rapid economic growth— also reflects the formation of new groups of low- and middle-income consumers.
- The limiting factor in CC is the sink function of the atm....not energy availability. Pressure on cost reduction of renewable technologies.

In Latin America and the Caribbean, the main source of emissions is the energy sector, which accounts for 42% of the region's total emissions.

World and Latin America and the Caribbean: share of greenhouse gas emissions, by sector, 2011
(Percentages)



Latin America and the Caribbean: greenhouse gas emissions, by sector, 1990 and 2011
(Megatons of CO₂ equivalent)



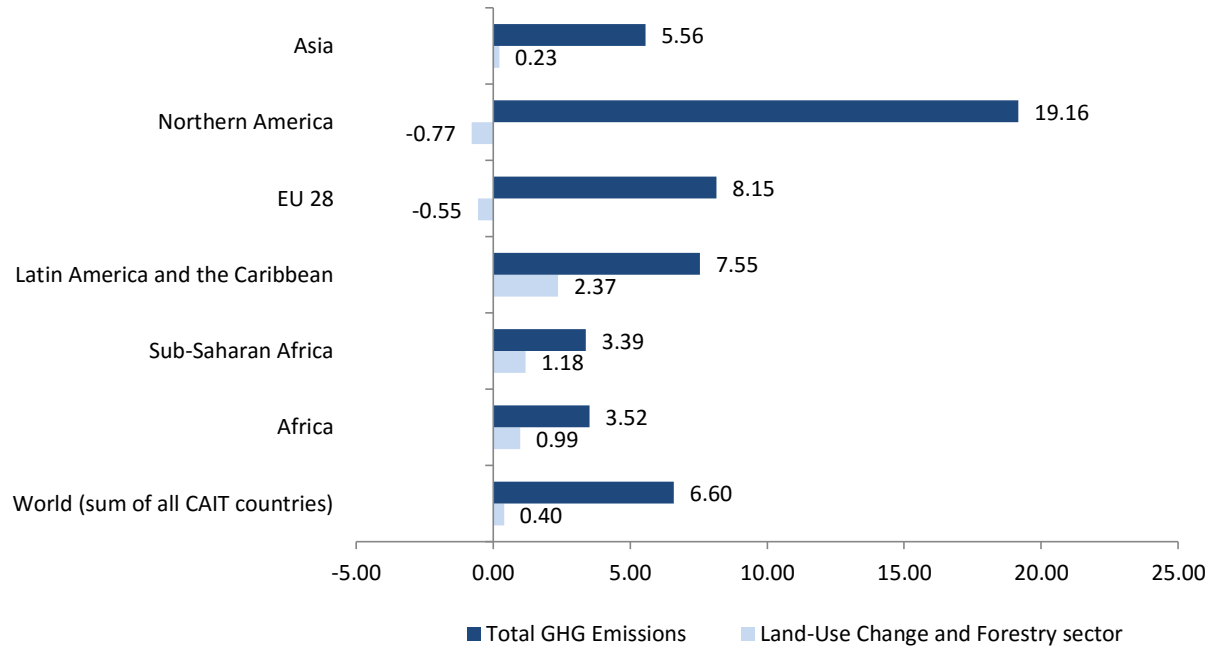
Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of World Resources Institute (WRI), Climate Analysis Indicators Tool (CAIT) 2.0. ©2014. Washington, D.C. [online] <http://cait2.wri.org>.

In Latin America and the Caribbean, the main source of emissions is the energy sector (electricity and heating, manufacturing and construction, transport, other activities that use fossil fuels and fugitive emissions), which accounts for 42% of the region's total emissions, followed by agriculture (28%) and changes in soil use and forestry activities (21%).



In 2012, per capita GEI emissions in LAC were 7.6 tons of CO₂-eq including land use change and forestry, as compared to a world average of 6.6 tons.

Per capita greenhouse gas emissions including land use change and forestry, 2012
(Tons of CO₂ equivalent)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of World Resources Institute (WRI), Climate Analysis Indicators Tool (CAIT) 2.0. ©2014. Washington, D.C. [online] <http://cait2.wri.org>.

The economic of climate change: Impacts in LAC

Potential impacts and risks associated with climate change in Latin America

Impacts	Key risks	Climatic factors
Agriculture	Decreases in food production and quality, lower revenues and rising prices	<ul style="list-style-type: none"> • Temperature extremes • Precipitation extremes • CO₂ concentration • Precipitation
Water	Water supply in semi-arid and glacier-melt-dependent regions; flooding in urban areas associated with extreme precipitation	<ul style="list-style-type: none"> • Upward trend in temperature • Increased droughts • Snow cover
Biodiversity and forests	Land-use changes, disappearance of forests, coral reef bleaching, loss of biodiversity and of ecosystem services	<ul style="list-style-type: none"> • Increased deforestation • CO₂ concentration • Upward trend in temperature • Acidification of the oceans
Health	Spread of vector-borne diseases to other altitudes and latitudes	<ul style="list-style-type: none"> • Upward trend in temperature • Temperature extremes • Precipitation extremes • Precipitation
Tourism	Loss of infrastructure, rising sea levels, extreme events in coastal areas	<ul style="list-style-type: none"> • Rising sea levels • Temperature extremes • Precipitation extremes and flooding
Poverty	Reductions in the incomes of vulnerable groups, especially in the agricultural sector; increased income inequality	<ul style="list-style-type: none"> • Temperature extremes • Increased droughts • Precipitation

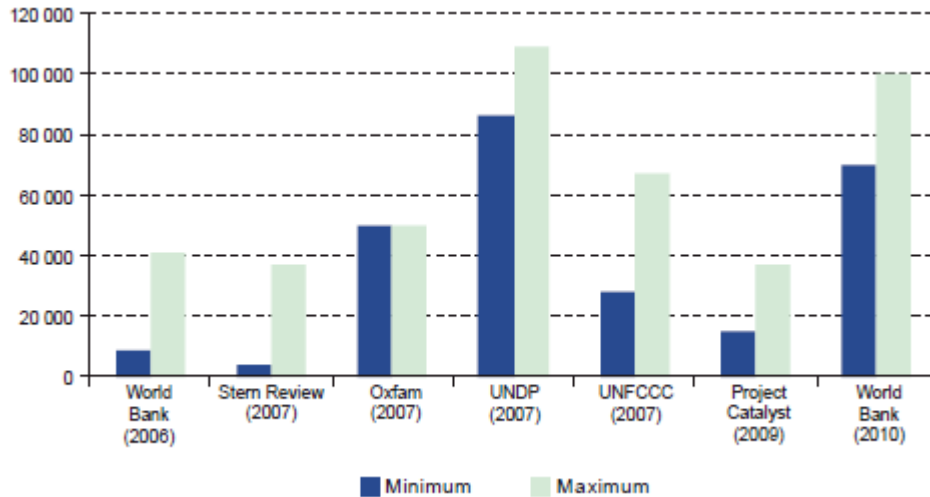
Impacts of climate change on the Latin American and Caribbean region assuming a 2.5°C temperature increase, second half of the twenty-first century (Percentages of regional GDP)



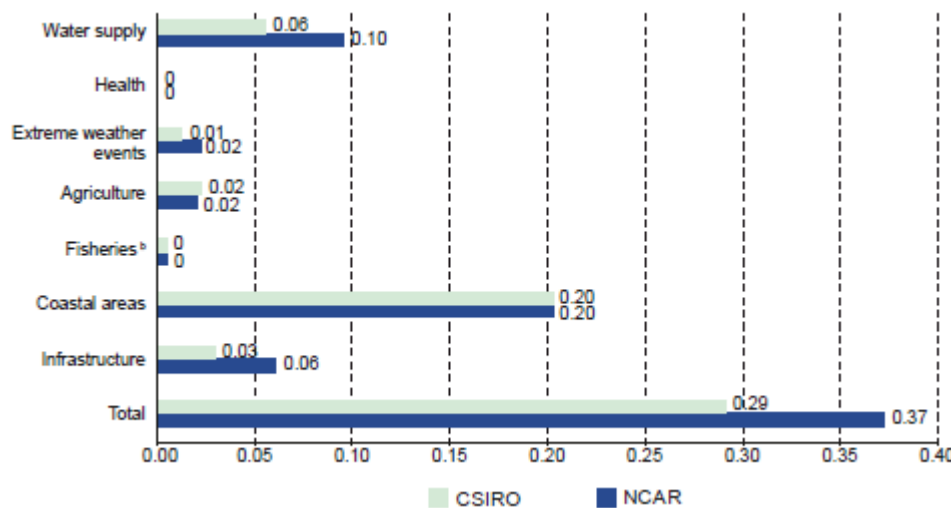
Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of F. Bosello, C. Carraro and E. De Cian, "Market- and policy-driven adaptation", in *Smart Solutions to Climate Change: Comparing Costs and Benefits*, Bjørn Lomborg (ed.), Cambridge University Press, 2010.

The adaptation costs estimated for the Latin American and Caribbean region are below 0.5% of the region's current GDP

Developing countries: estimated adaptation costs ^a
(Millions of dollars per year)



Latin America and the Caribbean: annual costs of adaptation, to 2050 ^a
(Percentages of regional GDP)

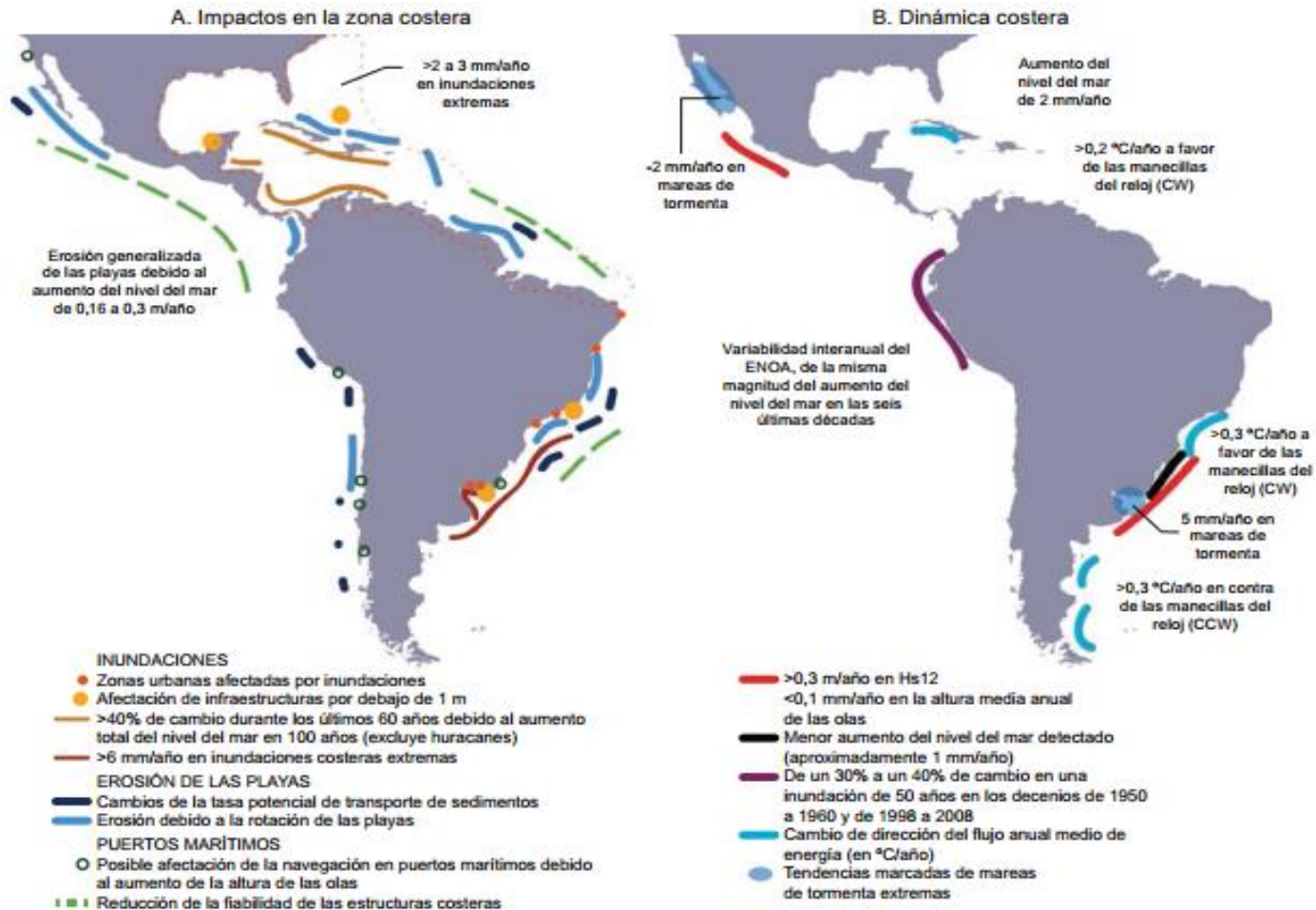


These estimates entail a high level of uncertainty and will very probably increase (World Bank, 2010c; Vergara and others, 2013)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of World Bank, *The Cost to Developing Countries of Adapting to Climate Change. New Methods and Estimates*, Washington, D.C., June 2010.
^a NCAR: National Centre for Atmospheric Research (wettest scenario); CSIRO: Commonwealth Scientific and Industrial Research Organization (driest scenario).
^b In the fisheries sector, the average range is between 0.18 and 0.36 (NCAR) and between 0.18 and 0.35 (CSIRO).

An additional cost, independent of energy future...

Summary of the dynamics and impacts on coastal areas



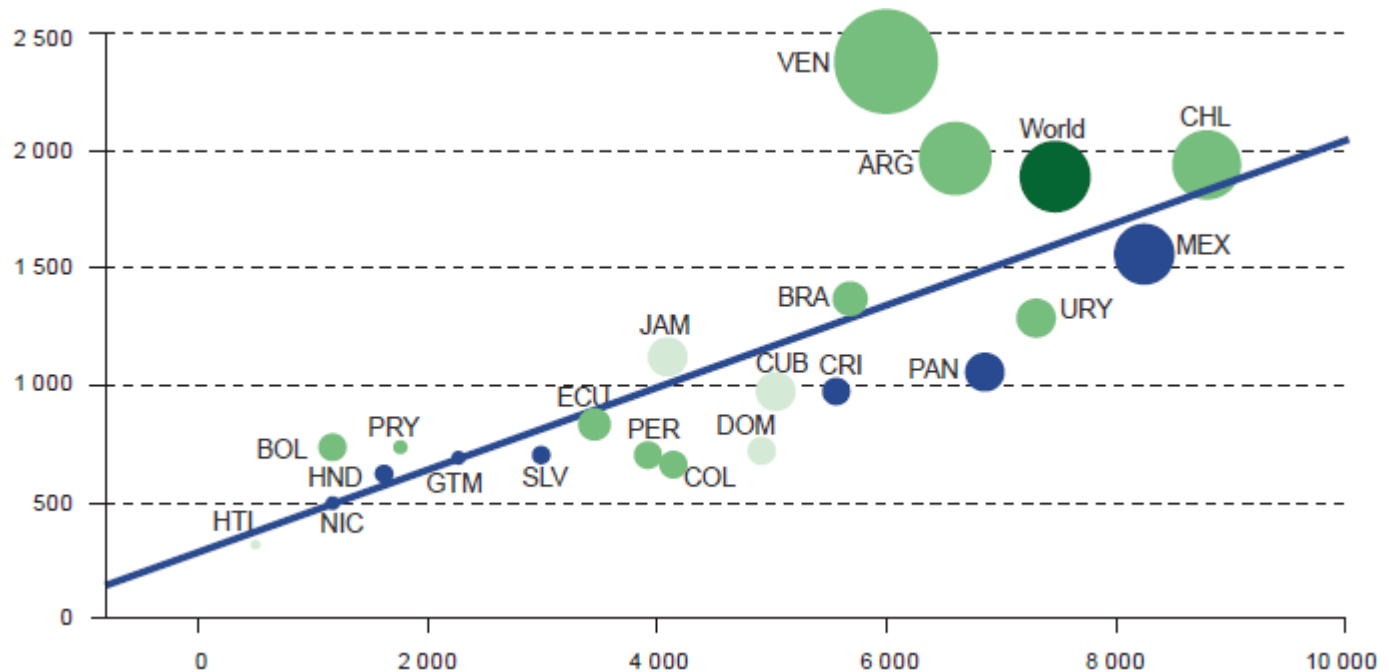
Fuente: Graciela Megrin y otros, "Chapter 27. Central and South America," *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, V. R. Barros y otros (eds.), Cambridge, Cambridge University Press, 2014.

Chile: Aggregated costs of C.C to 2100

	Discount rate		Discount rate		Discount rate		Discount rate	
	6%		4%		2%		0.5%	
	A2	B2	A2	B2	A2	B2	A2	B2
Agriculture	-10 599	-9 734	-26 505	-26 639	-79 165	-86 730	-201 361	-232 875
Fruit	36 104	21 037	77 902	40 248	208 685	96 459	503 568	219 311
Forest	-5 305	-4 610	-12 019	-10 738	-32 308	-29 609	-76 349	-71 068
Cattle	2 036	962	3 147	298	6 807	-2 051	16 119	-6 853
Hidroelectric	7 733	6 367	15 026	12 475	35 641	29 593	78 976	65 172
Water (drinking)	75	88	137	144	290	253	570	400
Total impactos (millon dólares)	30 044	14 110	57 689	15 787	139 950	7 913	321 522	-25 914
Total impacts (% present value of base DGP)	0.73	0.34	0.82	0.23	0.96	0.06	1.09	-0.09

Economic growth, energy consumption and emissions

Latin America and the Caribbean: per capita GDP and per capita energy consumption, 2011 ^a
(Dollars at constant 2005 prices and kilograms of petroleum equivalent)



Source: Economic Commission for Latin America and the Caribbean (ECLAC). The data on energy use are from the World Bank World Development Indicators (WDI) database. Per capita GDP data are from CEPALSTAT. Data on the energy sector's emissions are from the Climate Analysis Indicators Tool (CAIT) 2.0. ©2014. Washington, DC: World Resources Institute. Available online at: <http://cait2.wri.org>.

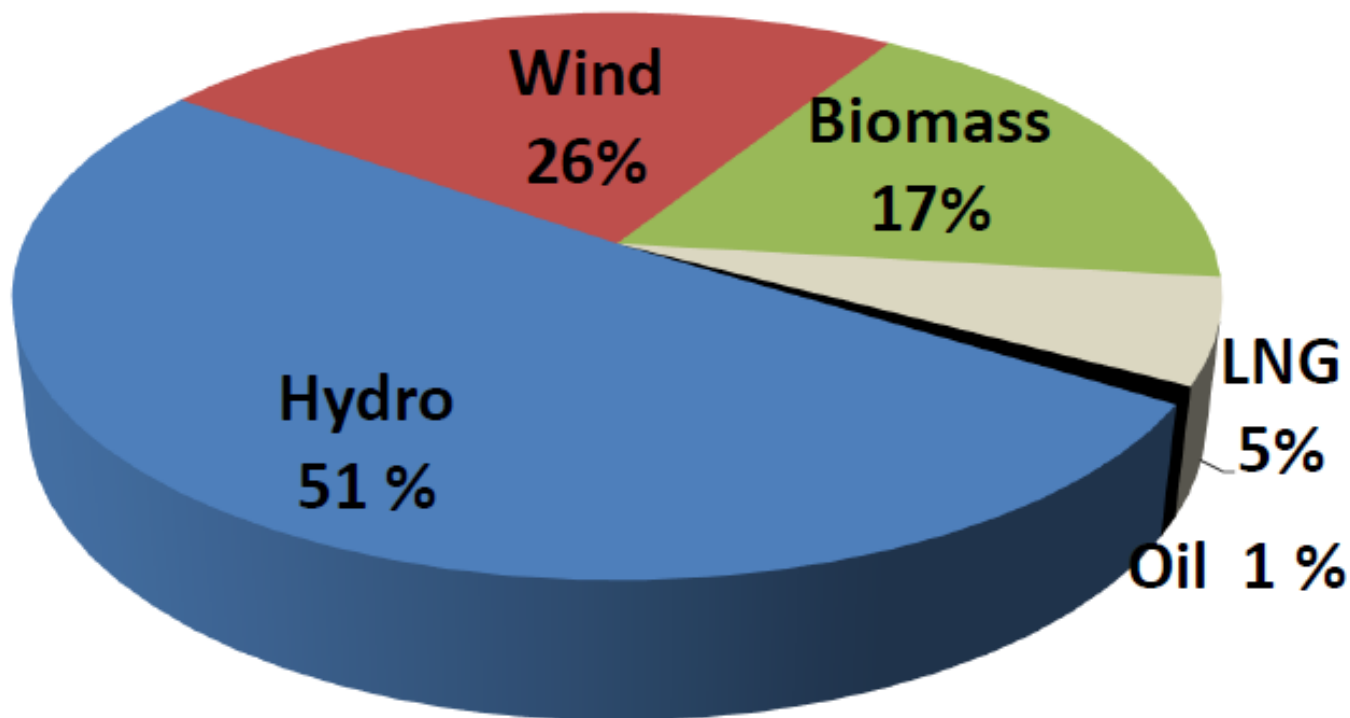
^a The size of the circles represents the level of per capita emissions of greenhouse gases from the energy sector. The colours denote the different subregions: South America, green; Central America and Mexico: blue; and the Caribbean, light green. The horizontal axis represents per capita GDP in dollars at constant 2005 prices, and the vertical axis energy use in kilograms of petroleum equivalent.



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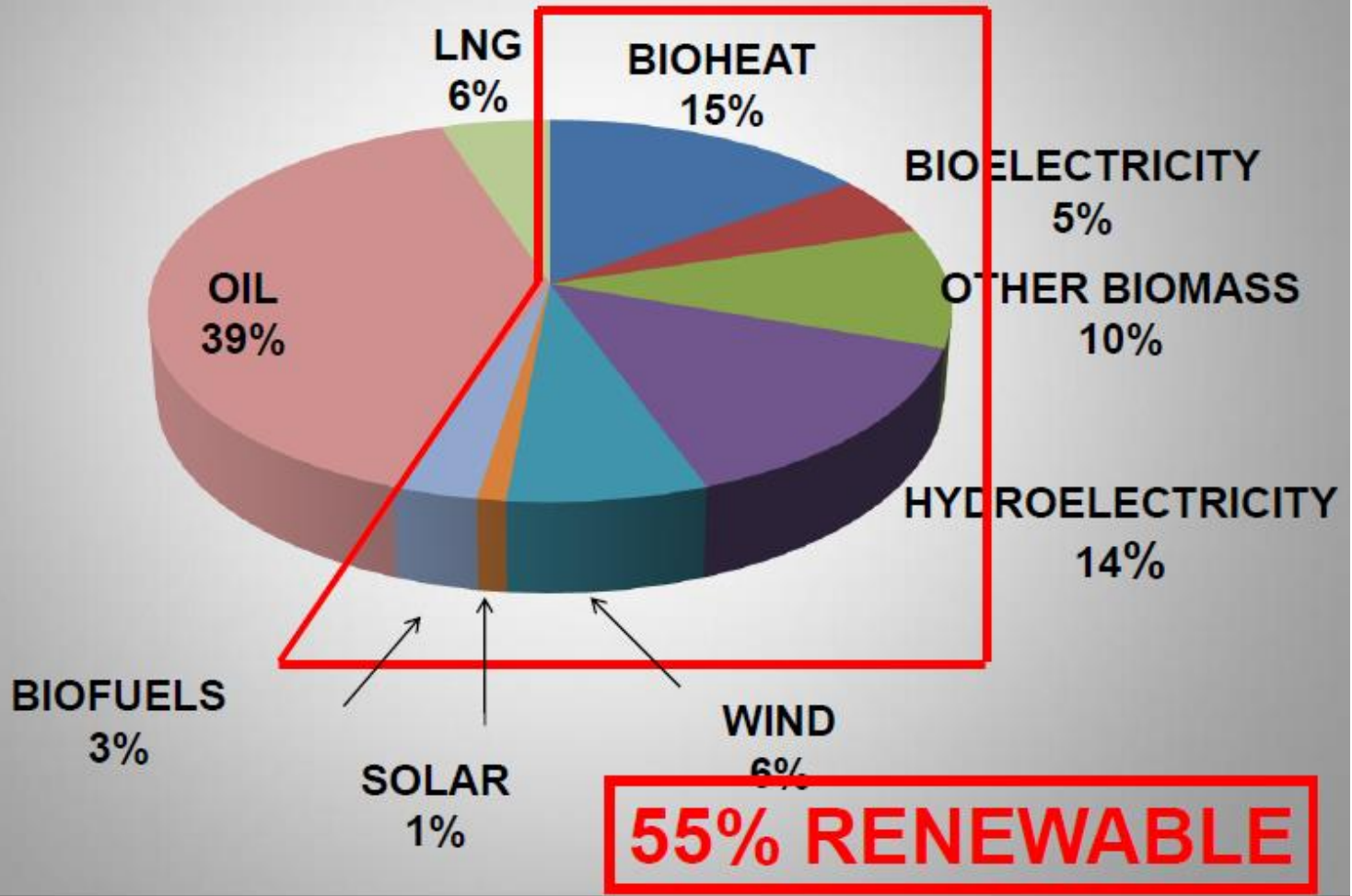
The Electricity Matrix of Uruguay



94% RENEWABLE

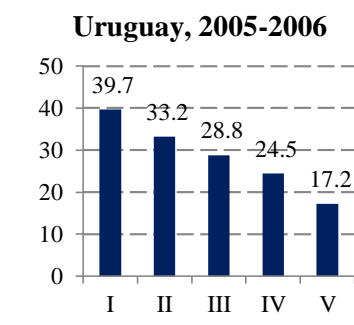
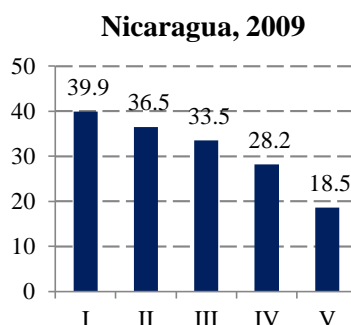
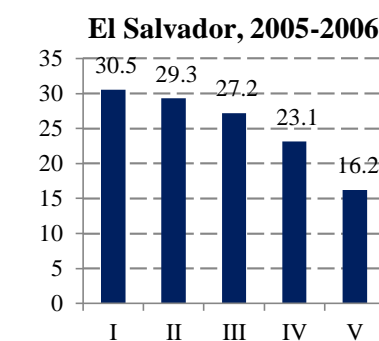
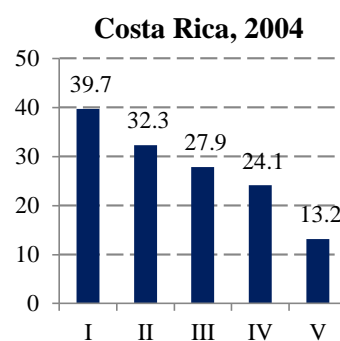
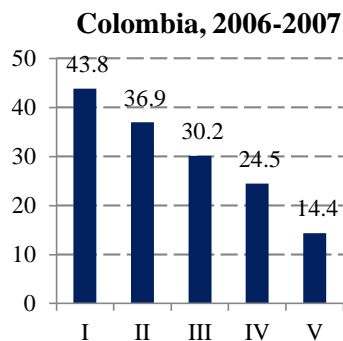
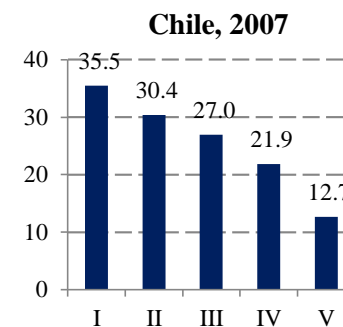
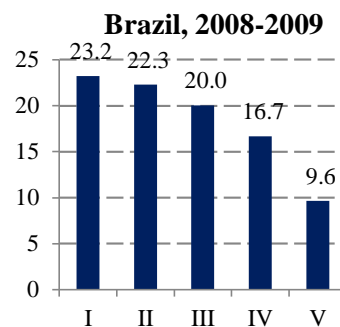
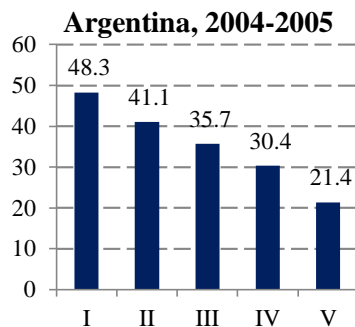
The Energy Matrix in Uruguay: is road transportation the problem.?

GLOBAL PRIMARY MIX 2016

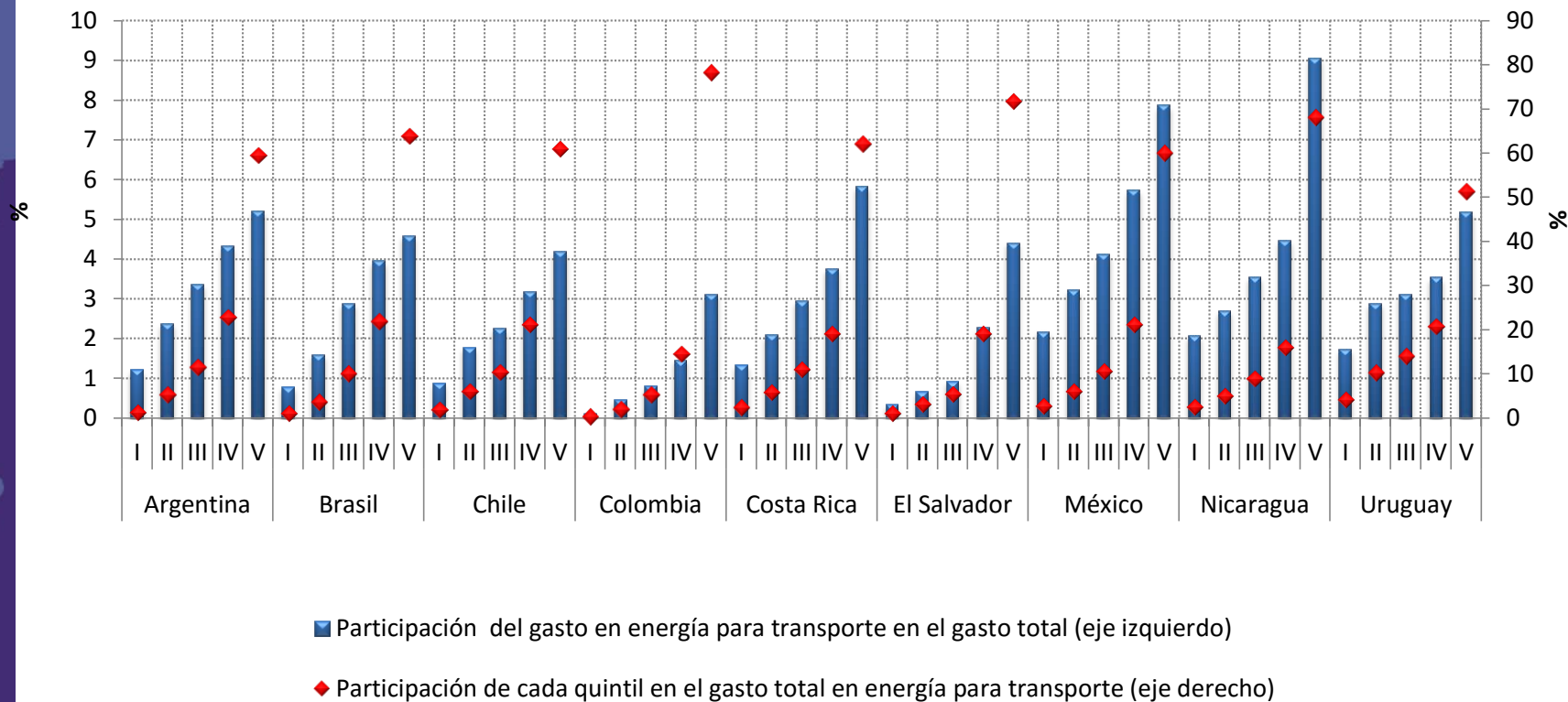


Household spending on food

Latin America (9 countries): proportion of total household expenditure represented by expenditure on food and beverages, by income quintile
(Percentages)



Household expenditure in fossil fuels: gasoline, diesel and biodiesel



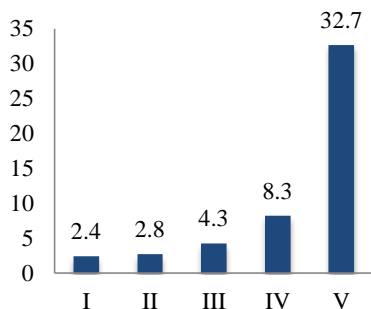
Fuente: CEPAL 2014 con base en encuestas de hogares, varios años. Pactos para la Igualdad.

Nota: La barra azul muestra para cada quintil, el porcentaje del gasto total destinado a energía, mientras que el punto rojo muestra la participación de cada quintil en el gasto total en energía.

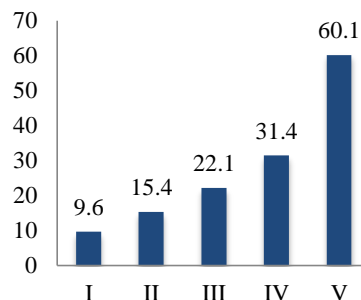
The concentration of expenditure on gasoline is in line the high rates of private automobile ownership in the region's middle- and high-income groups

Latin America (6 countries): automobile ownership, by income quintile

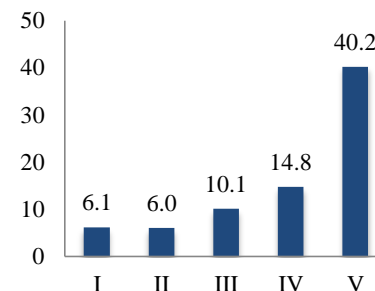
Colombia, 2007



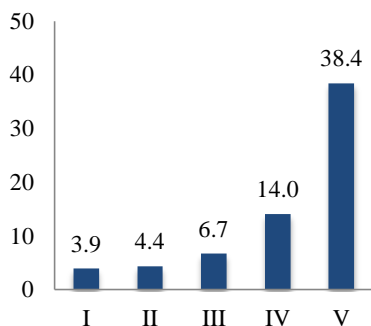
Costa Rica, 2004



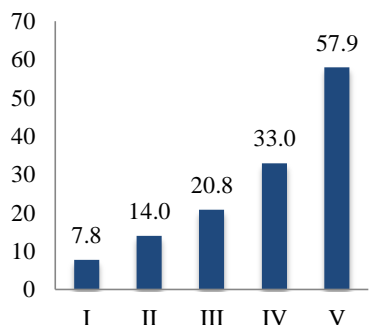
Ecuador, 2009



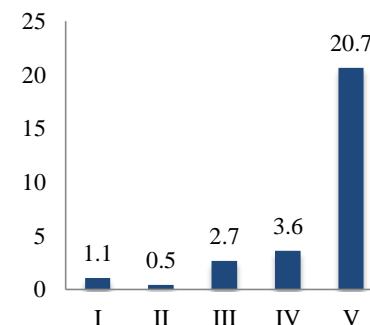
El Salvador, 2006



Mexico, 2008

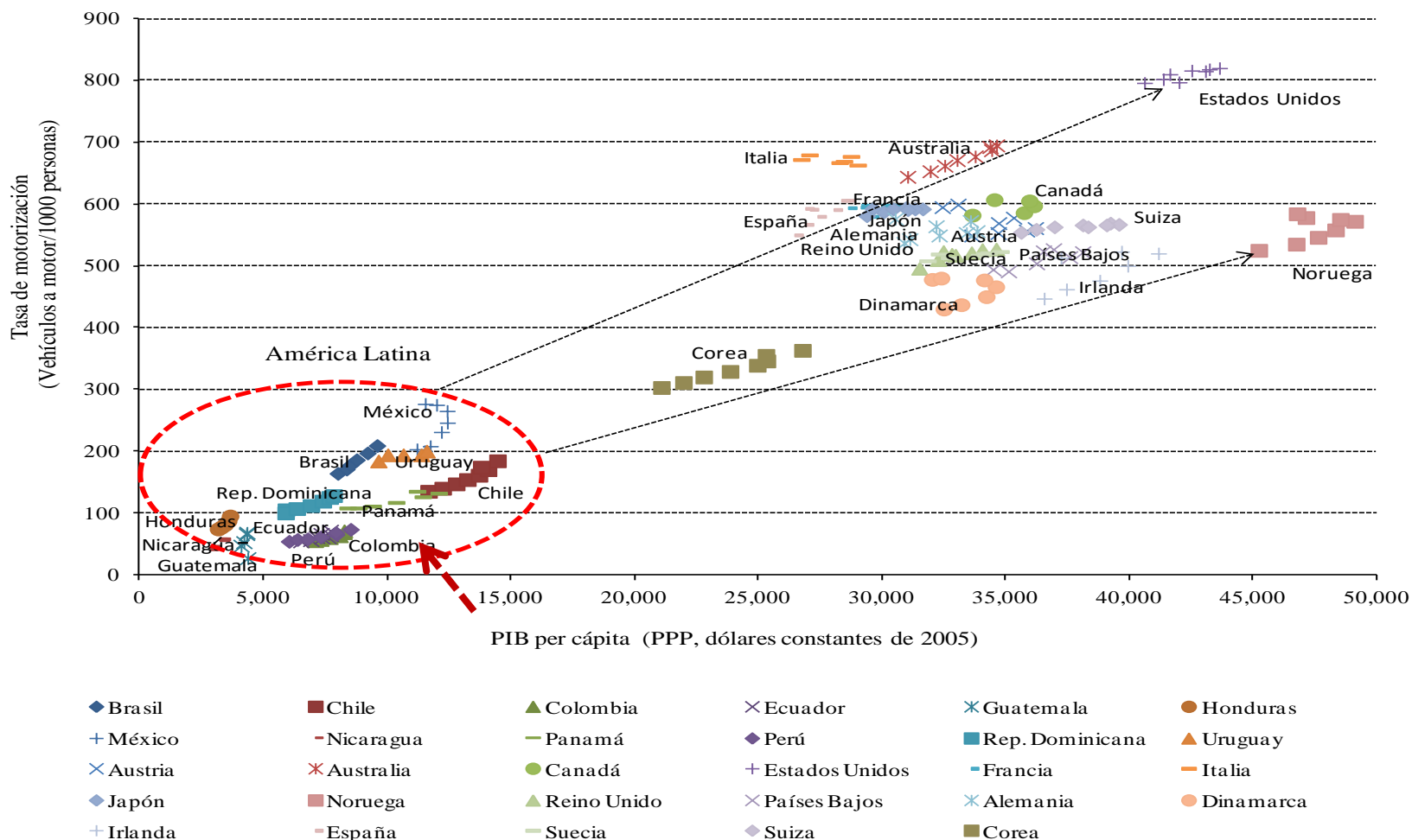


Nicaragua, 2006



Source: Economic Commission for Latin America and the Caribbean (ECLAC), based on official information

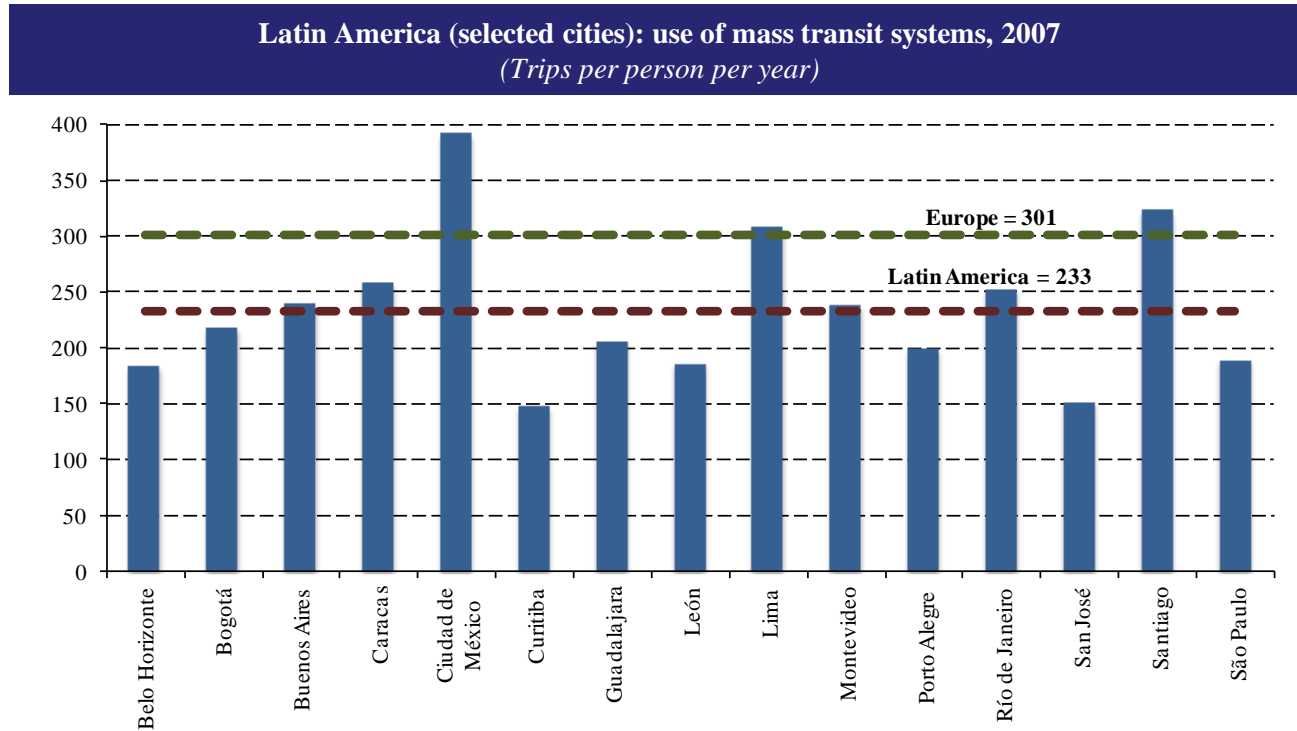
The future. Car ownership and GDP per cap. LAC and developed countries. 2003-2010



Nota: El límite superior corresponde a países como Estados Unidos, Australia, España e Italia. El límite inferior corresponde a Noruega, Países Bajos, Dinamarca. Las líneas punteadas no indican proyección, sino potenciales sendas de acuerdo a los estilos de crecimiento que adopte la región.

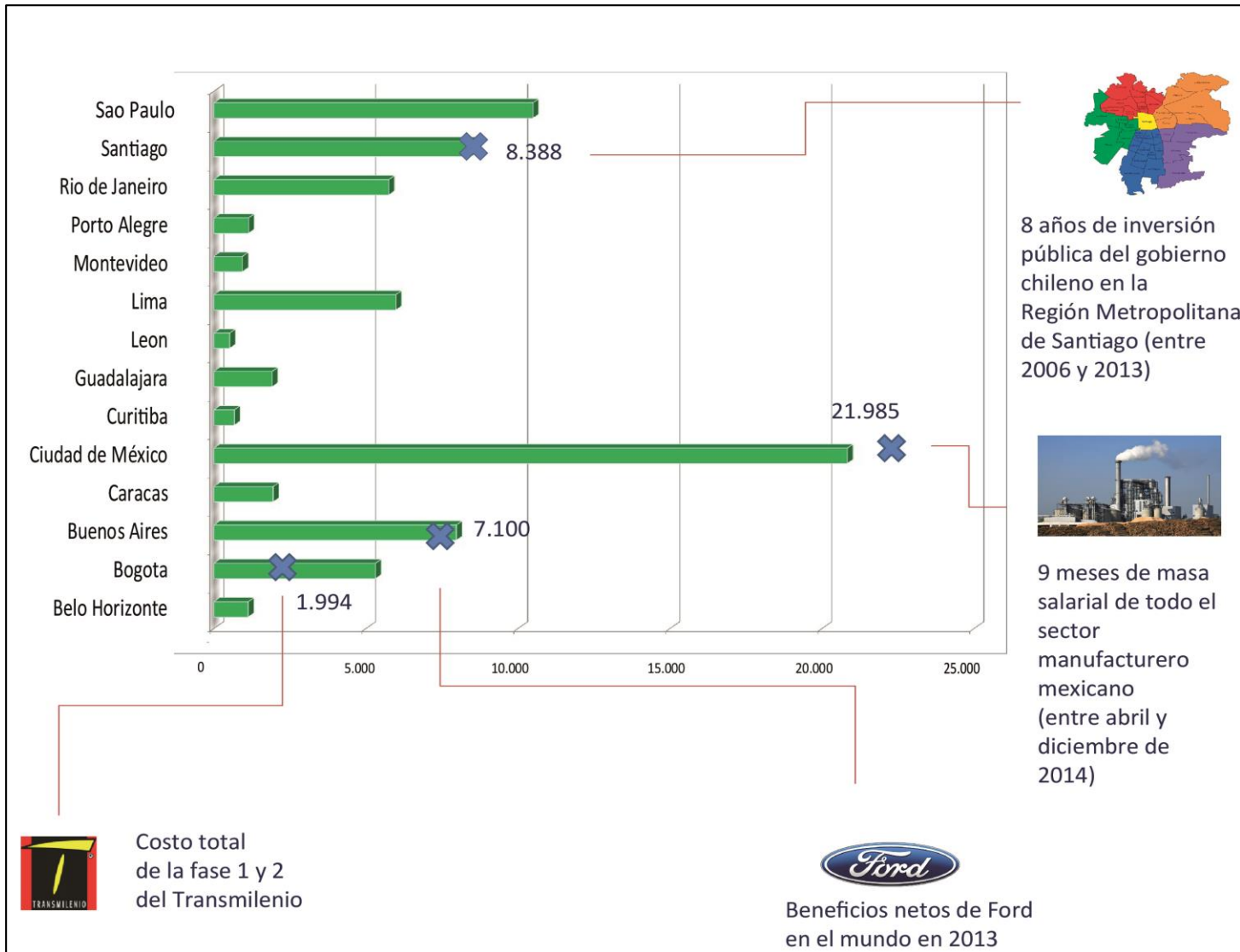
Fuente: Elaborado por la Unidad de Cambio Climático de la DDSAH, con base en datos del World Development Indicators.

In Latin America there need for changes in the modes of transport through public investment policy



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of figures from CAF-Development Bank of Latin America, Urban Mobility Observatory (OMU), 2009.

Latin America (selected cities): Annual loss of wealth for the time spent on public transport, 2007 (in millions of dollars)



Price mechanisms alone will not be enough to reduce gasoline consumption in Latin America and the Caribbean

Latin America and OECD countries: income and price elasticity of energy demand (Elasticities)

	OCDE countries	Latin America
	Income elasticity	
Long-term elasticity	0,62	0,69
Short-term elasticity	0,41	0,49
	Price elasticity	
Long-term elasticity	-0,34	-0,25
Short-term elasticity	-0,20	-0,11

Latin America and OECD countries: income and price elasticity of gasoline demand (Elasticities)

	OCDE countries	Latin America
	Income elasticity	
Long-term elasticity	0,55	0,69
Short-term elasticity	0,24	0,26
	Price elasticity	
Long-term elasticity	-0,41	-0,31
Short-term elasticity	-0,22	-0,17

Price mechanisms alone will not be enough to reduce gasoline consumption in Latin America and the Caribbean during times of rapid economic growth, and that market mechanisms will therefore have to be coupled with regulatory instruments to bolster these economic incentives



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Public policy strategy for cc+sustainable development

Improved matrix of public services and logistics (global and local pollutants).

- Limited effectiveness of only price changes to fossil fuels.
- **Modal shift.** Investments in efficient, high-quality, safe and sustainable infrastructure, such as bus rapid transit (BRT) systems and networks for non-motorized modes of transportation, and more efficient logistical systems for cargo. (higher emissions reduction potential than technological change in vehicles and dealing with congestion);
- **Incentives** (based on regulatory and economic instruments) for reducing the use of individual forms of transportation;
- Fuels improvement/substitution in vehicle fleet.
- Solid and liquid waste infrastructure.



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Public policy strategy for cc+sustainable development

Global coordination and Regional coordination

- Global agreement (big change under way= INDCs and new markets) vs. “grandfathering” the atmospheric sink in the long term.
- Move from pilots to mainstream. Social price of carbon in financial systems (to evaluate project carbon footprint), global investors (risk of stranding assets) and national public investment practices (opening the concept of a price for carbon).
- Fossil fuels subsidies phase –out (changing targets) and fiscal coordination to introduce national carbon taxes (on fuels, vehicles, exports, etc.).
- Productive/industrial policies to better use the environmental national space.
- Low carbon physical infrastructure for regional integration.

LULUCF

- ESPs+enforcement.
- Universal social protection vs. employment based social protection.

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