Energy Indicators: Assesing the Energy Transition in the LAC

Regional Observatory on Sustainable Energies

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Has there been an energy transition in the Latin American region?

¿How does ECLAC define Energy Transition in Latin America and the Caribbean??

Energy transition will be understood as the **process of change** in policies, institutions, regulations and investments that promote the generation and more sustainable uses of energy aiming at the decarbonization of the economy, prioritizing:

- More generation of electricity from renewable sources, with an emphasis on variable renewables.
- More energy efficiency of energy systems, including transport.
- More sustainable management of fossil fuels and biofuels
- More energy complementarity leading to less regional energy vulnerability

Objective:	Decarbonization
Strategy:	Energy Transition
Instrument:	Environmental Big Push

- Are the existing indicators comprehensive, robust and comparable?
- How the existing indicators can be improved?
- Role of regional cooperation and knowledge sharing

Devil is in Detail: Need for Disaggregation

- Energy access: share of population with access

➔ ***Improvement:*** *Access Quality?, Impact on poorest sector?,* Share of rural and urban population

- Renewable energy share in final energy

➔ ***Improvement:*** RE in heat, electricity, mobility, End-of-Life

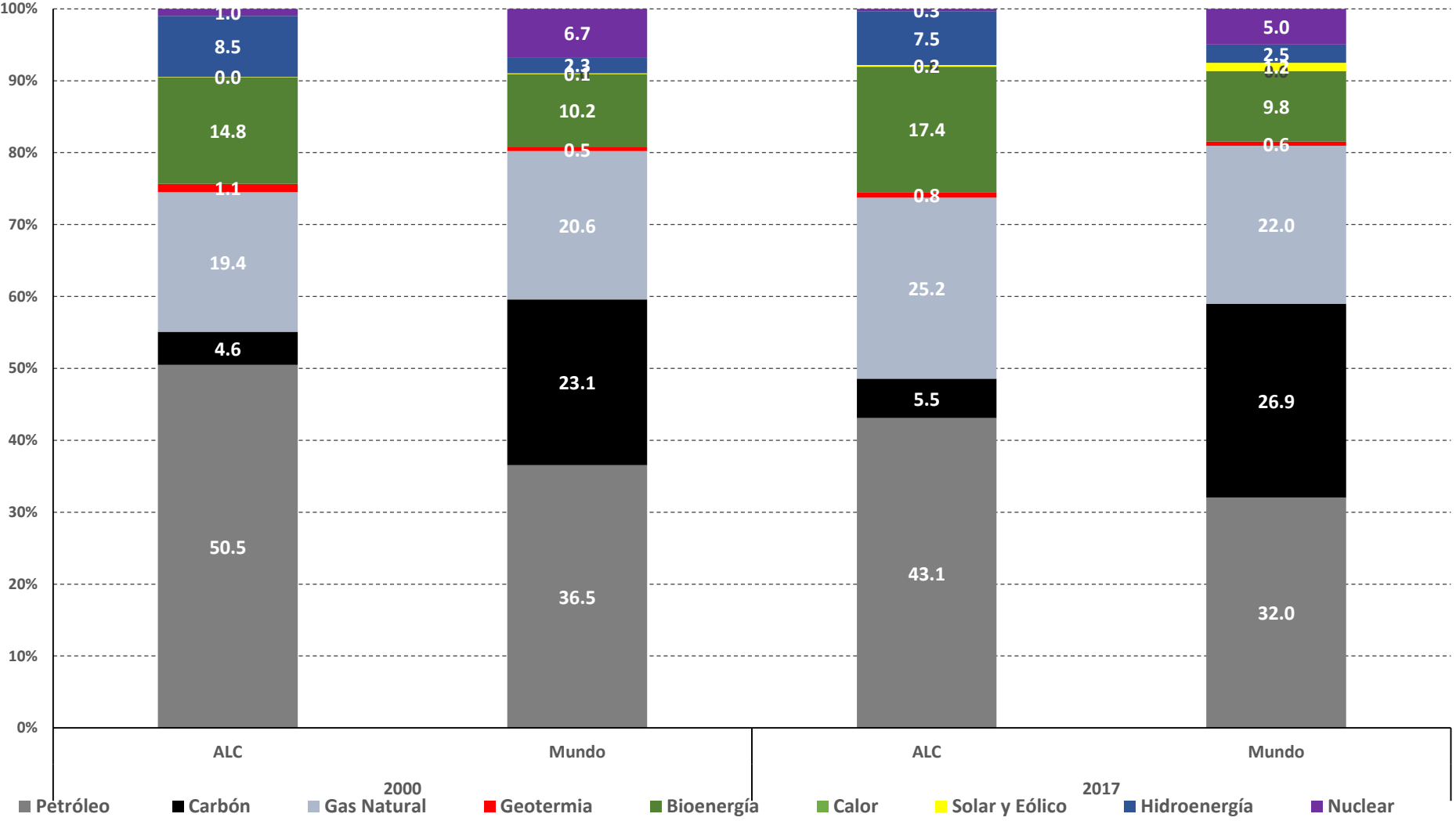
- Energy intensity: primary energy per GDP

➔***Improvement:*** Sectoral tracking (households, industry, transport)

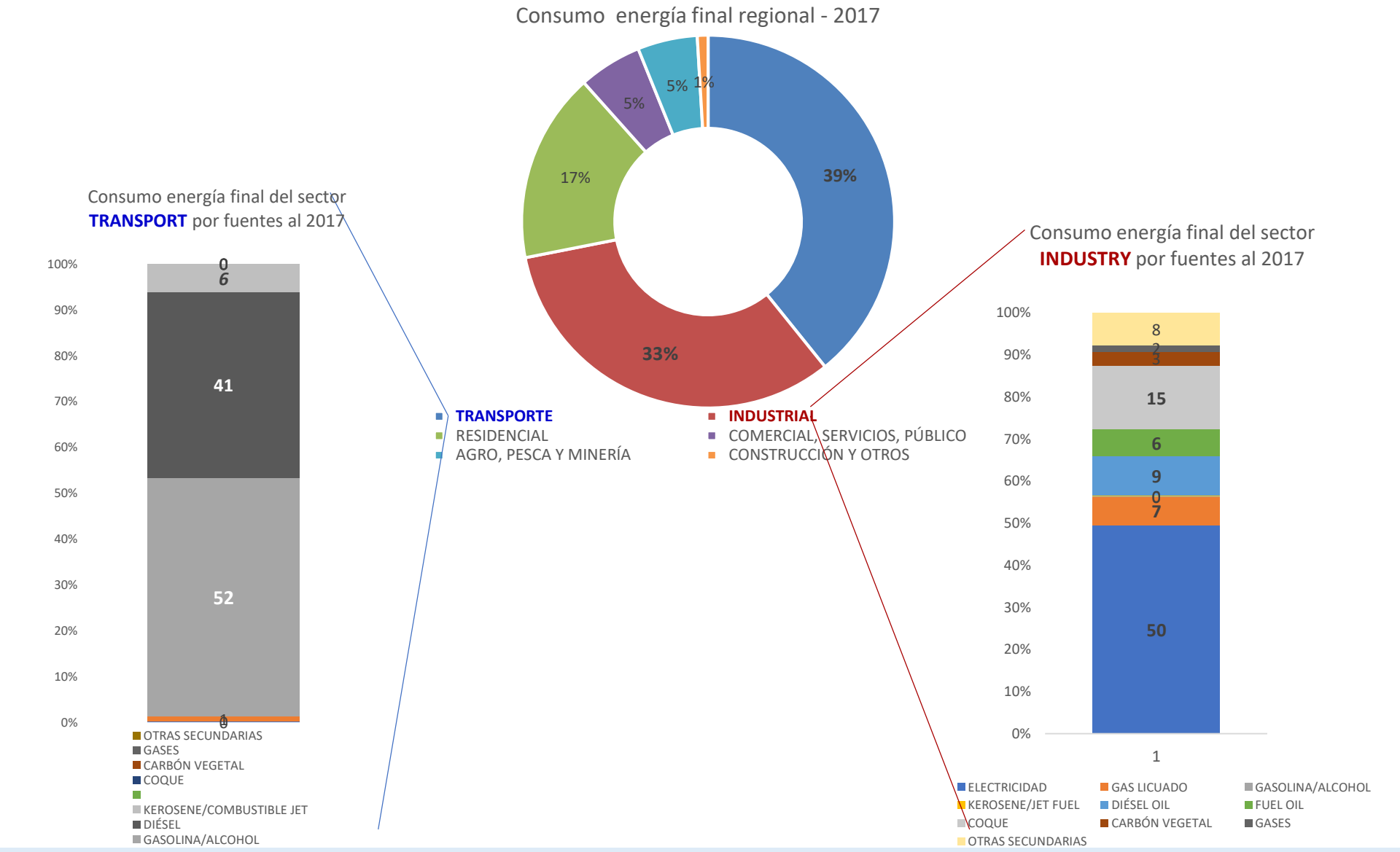
➔***Challenge:*** Considering the heterogeneity between countries (climate, economic structure, etc.)

Energy Matrix

LAC vs the World - Total Primary Energy Supply 2000 - 2017 (Percentages)

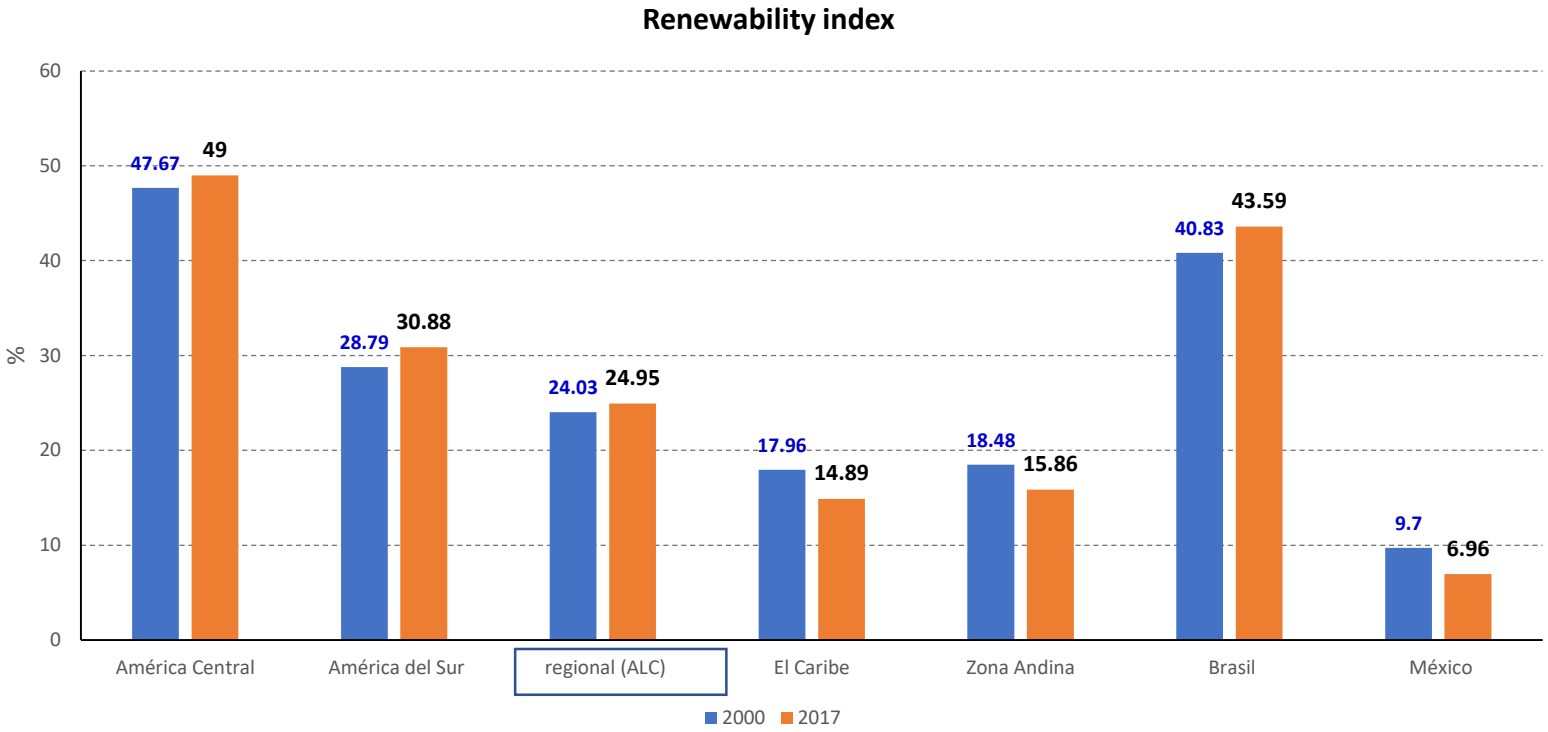


Energy Consumption by Sector 2017. The transport sector is one of the largest consumer of energy resources, with 99% coming from fossil fuels.



Fuente: CEPAL elaborado sobre la base de SieLAC-OLADE.

The percentage of renewable supply in the primary matrix grew by less than 1% between 2000 and 2017. It can be seen that the Andean region, Mexico and the Caribbean have decreased their renewability index.



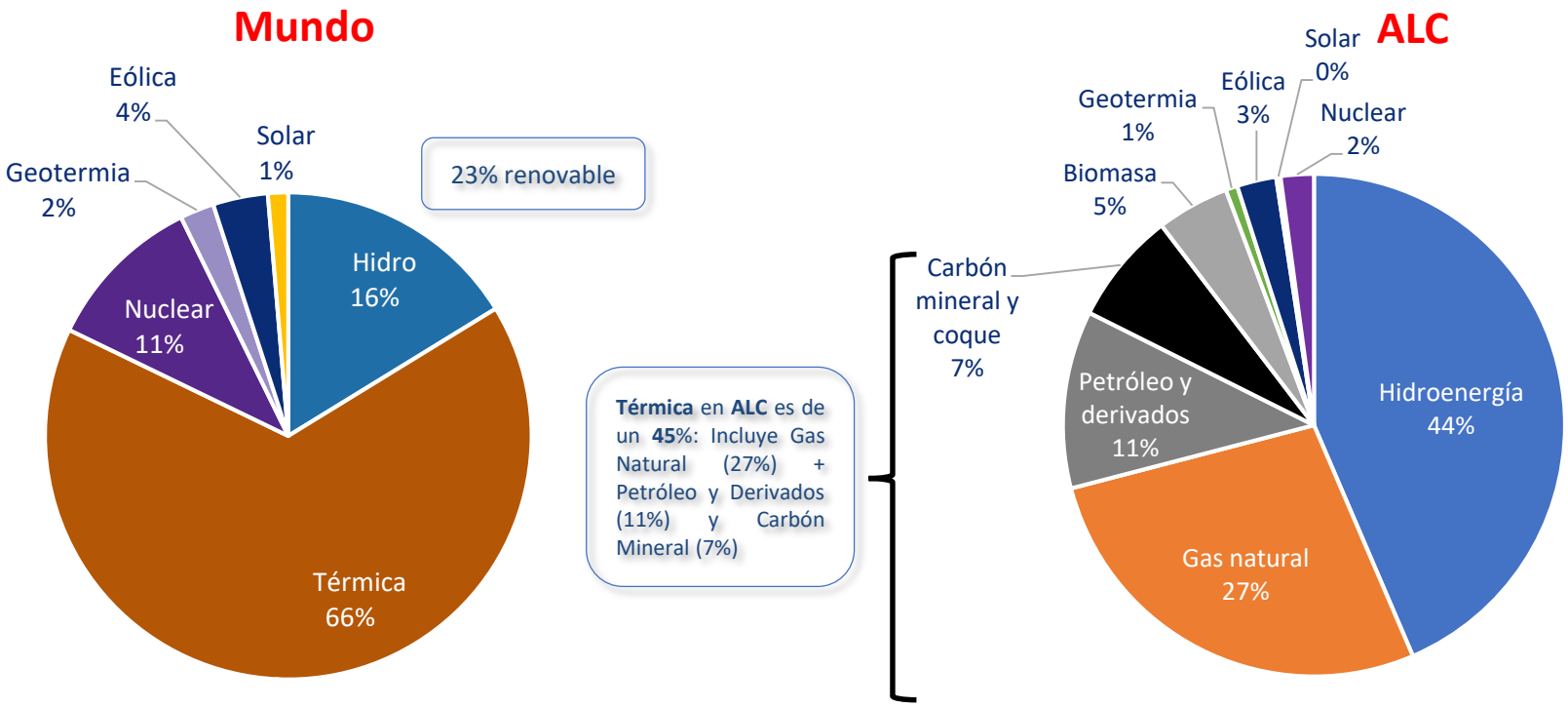
The **renewability index** is defined as the percentage that the supply of primary renewable energy represents in relation to the total energy supply.

Fuente: CEPAL elaborado sobre la base de SieLAC-OLADE.

Electricity generation matrix: in Latin America and the Caribbean, 53% is renewable, of which 83% is hydroenergy.

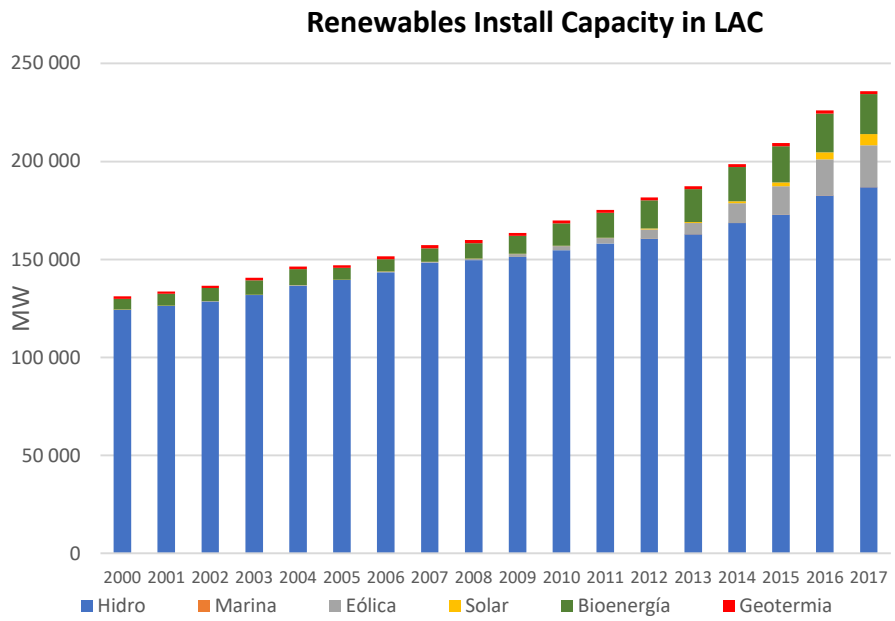
Matriz de generación eléctrica en América Latina y el Caribe y el Mundo 2017

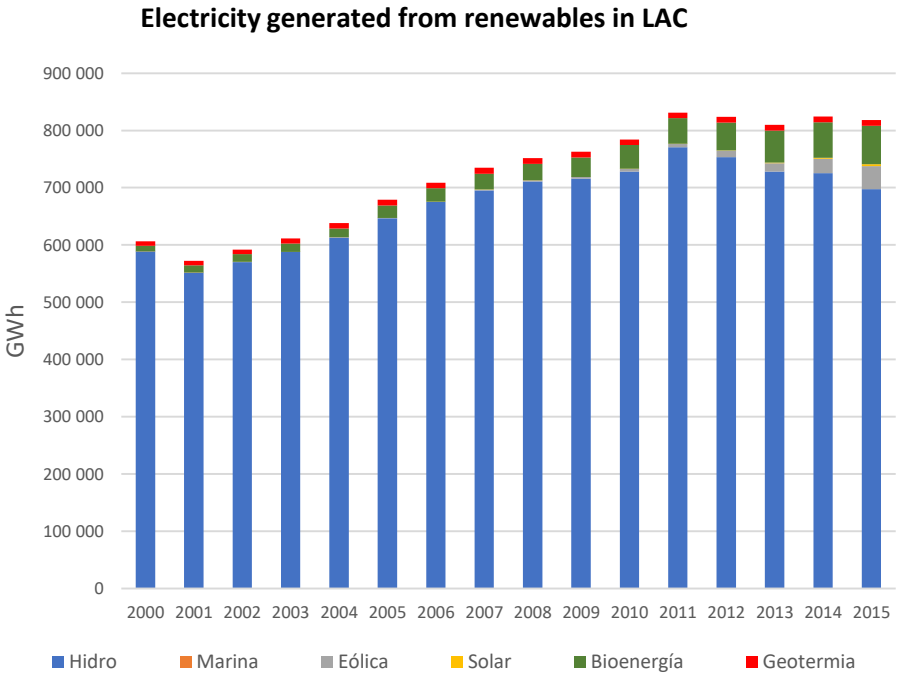
(En porcentaje respecto al total)

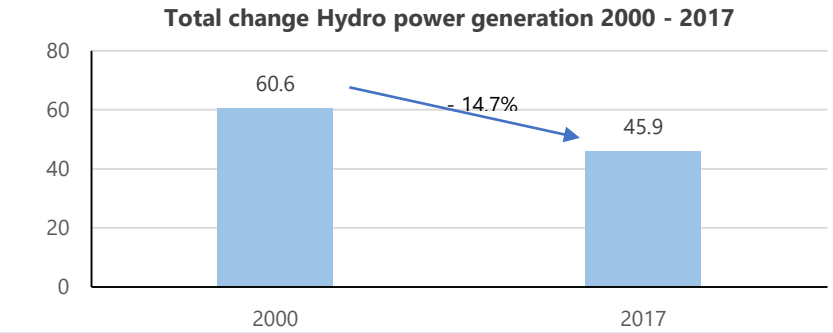


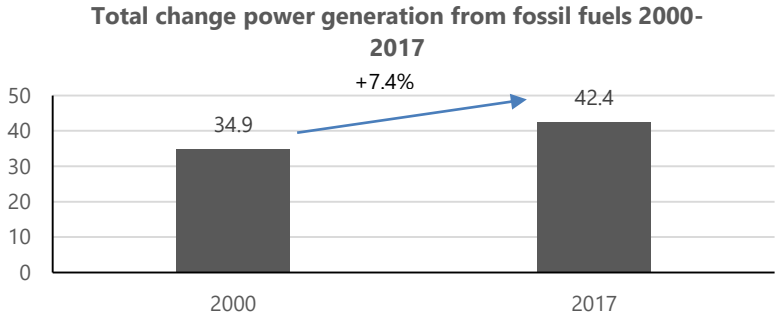
Fuente: CEPAL elaborado sobre la base de SieLAC-OLADE y base de datos de la IEA.

Total hydropower generation is downward (15% from 2000 to 2017). However, fossil fuel generation continues to rise.





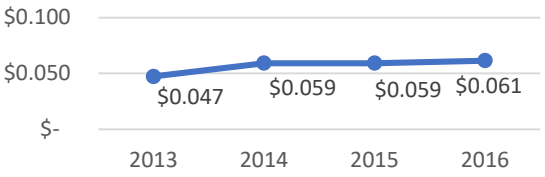




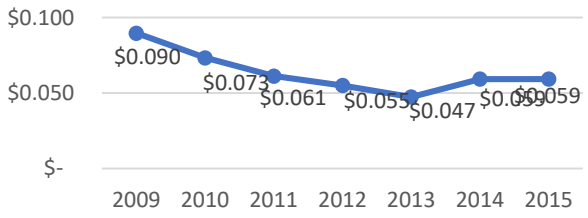
Fuente: CEPAL elaborado sobre la base SieLAC y base de datos de IRENA - **Estos resultados se están actualizando al 2017**

Auction results in some LAC countries (by technology)

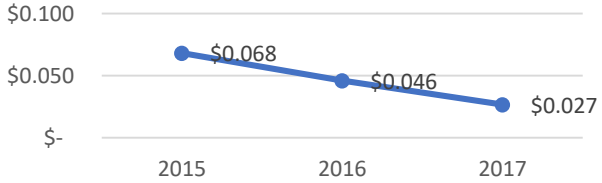
Biomass energy Auction trends in **Brazil**
USD Kwh (Weighted Average)



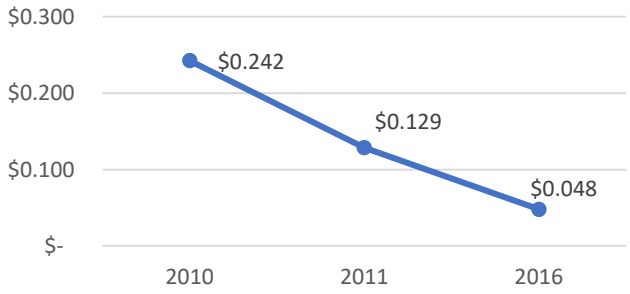
Wind energy Auction trends in **Brazil**
USD Kwh (Weighted Average)



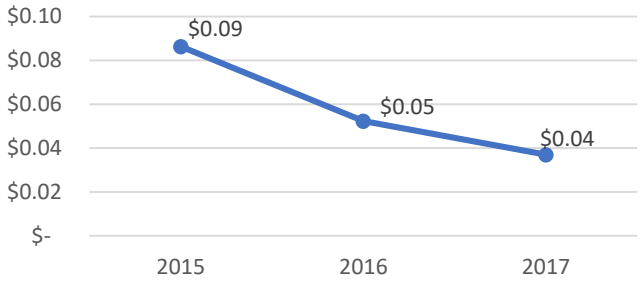
Solar energy Auction trends in **Chile**
USD Kwh (Weighted Average)



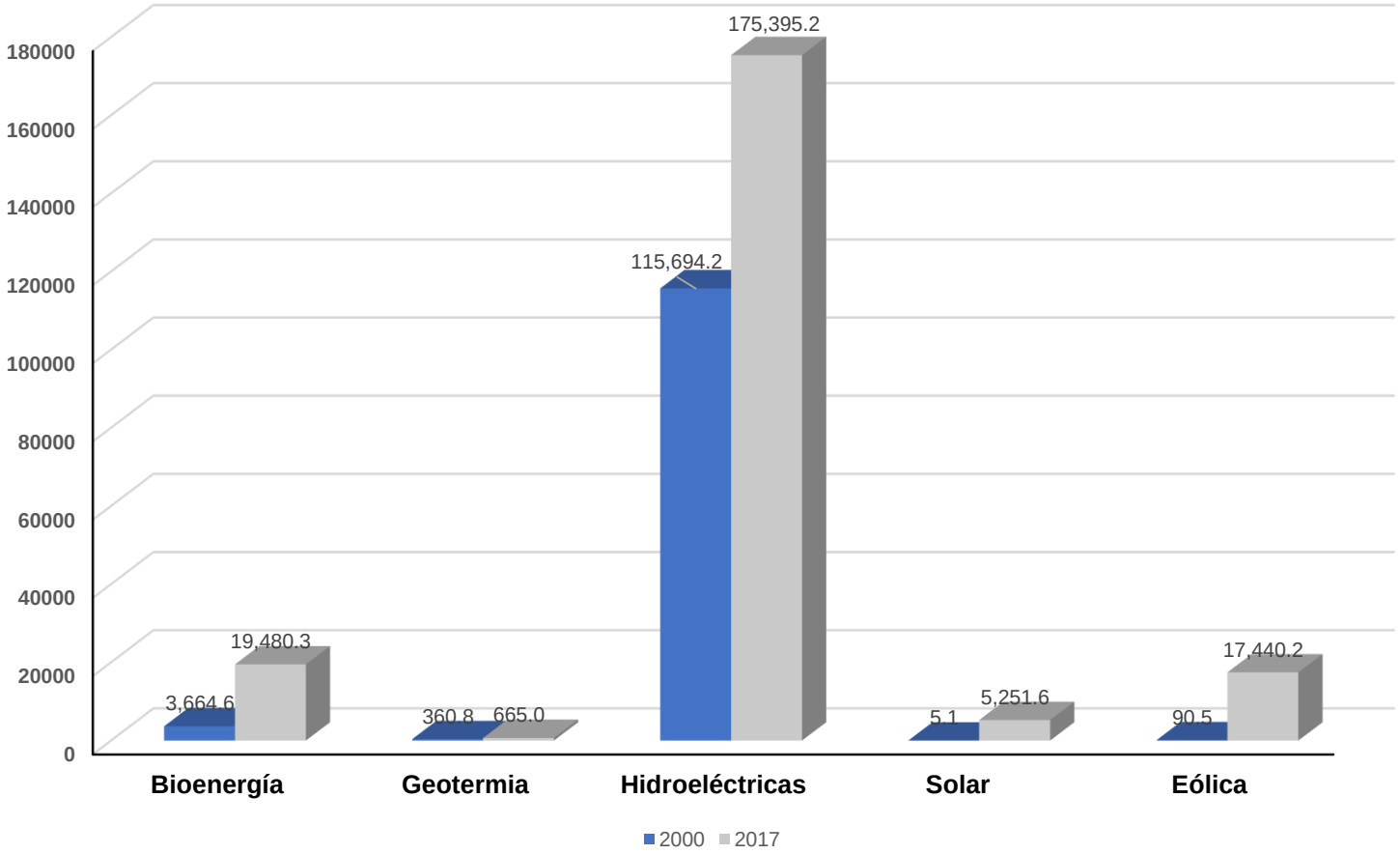
Solar energy Auction trends in **Peru**
USD Kwh (Weighted Average)



Wind energy Auction trends in **Chile**
USD Kwh (Weighted Average)

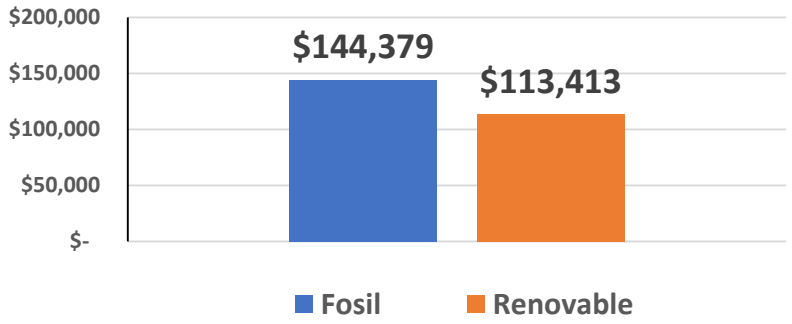


Installed renewable energy capacity in the electricity sector has advanced significantly

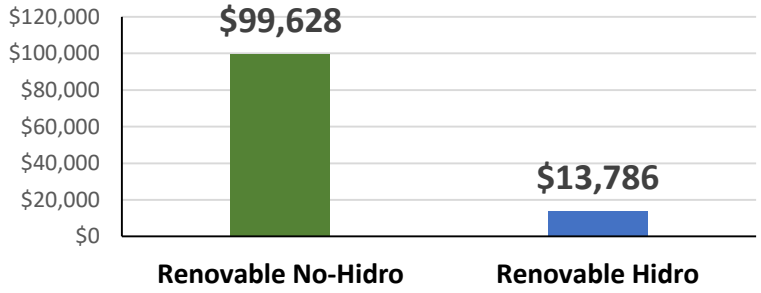


Announcement of Foreign Direct Investment in the energy sector: shows an increase in non-hydro renewables, confirming the beginning of a transition.

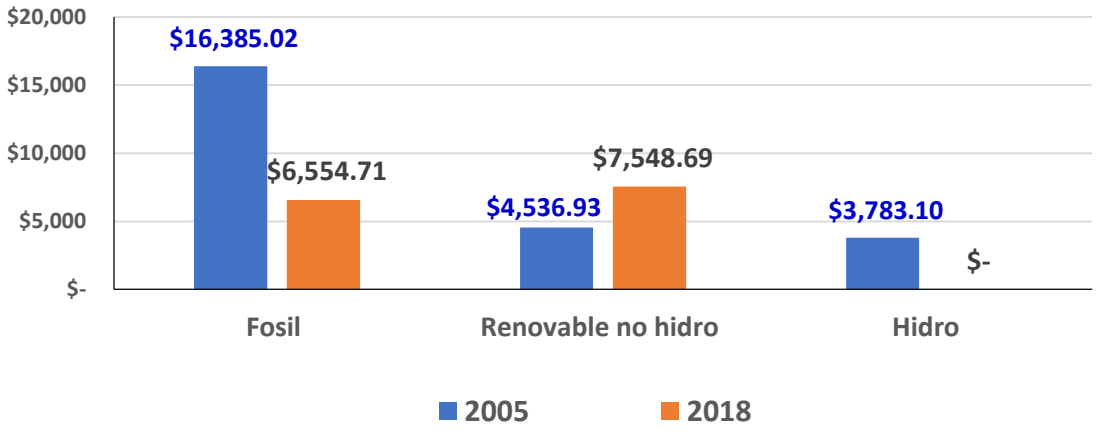
Accumulated investment 2005 and 2018 (MUSD)



Accumulated investment for non-hydro renewables and hydro 2005 and 2018 (MUSD)



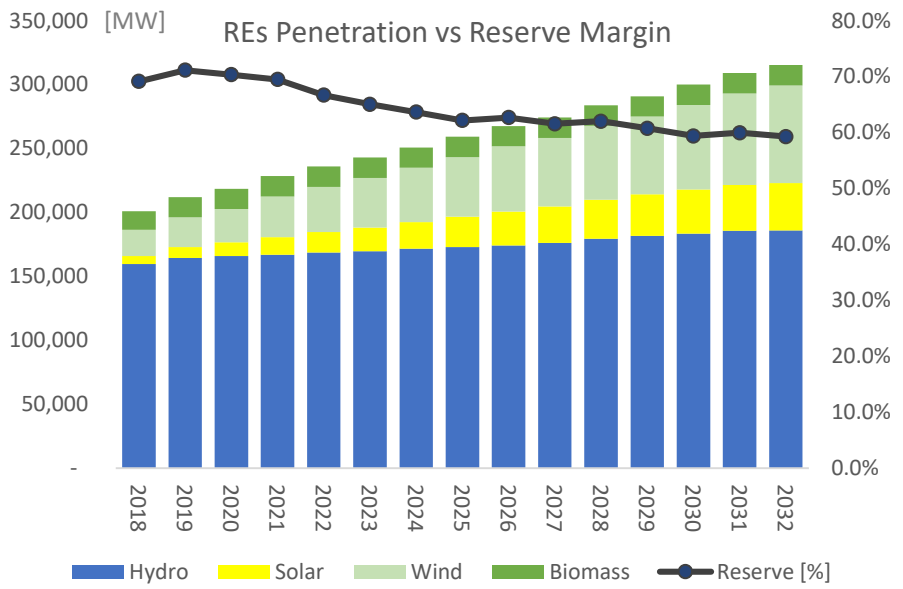
Comparison of Investment between 2005 and 2018 (MUSD) by technology



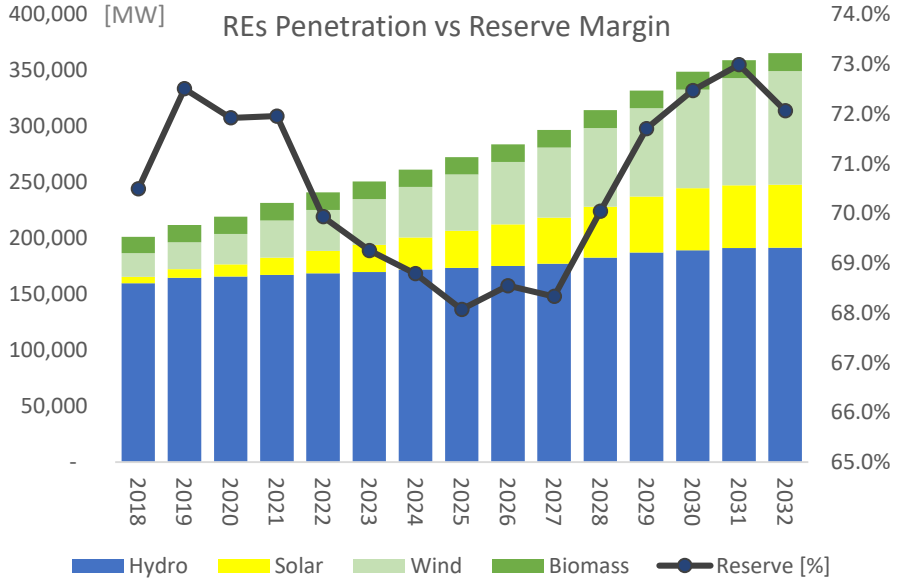
The foreign direct investment announced in the energy sector represents in renewables an annual investment of approximately 0.16% of the region's GDP (from 2005 to 2018) considering the annual regional GDP at constant dollar prices, while fossil fuels represent 0.21%.

Fuente: Elaboración CEPAL sobre base de datos de Financial Times fDi Markets.

Flexibility, Rotating mass to support system stability: Attention should be paid to the issue of margin reserve and ancillary/secondary services - storage will be key in the near future



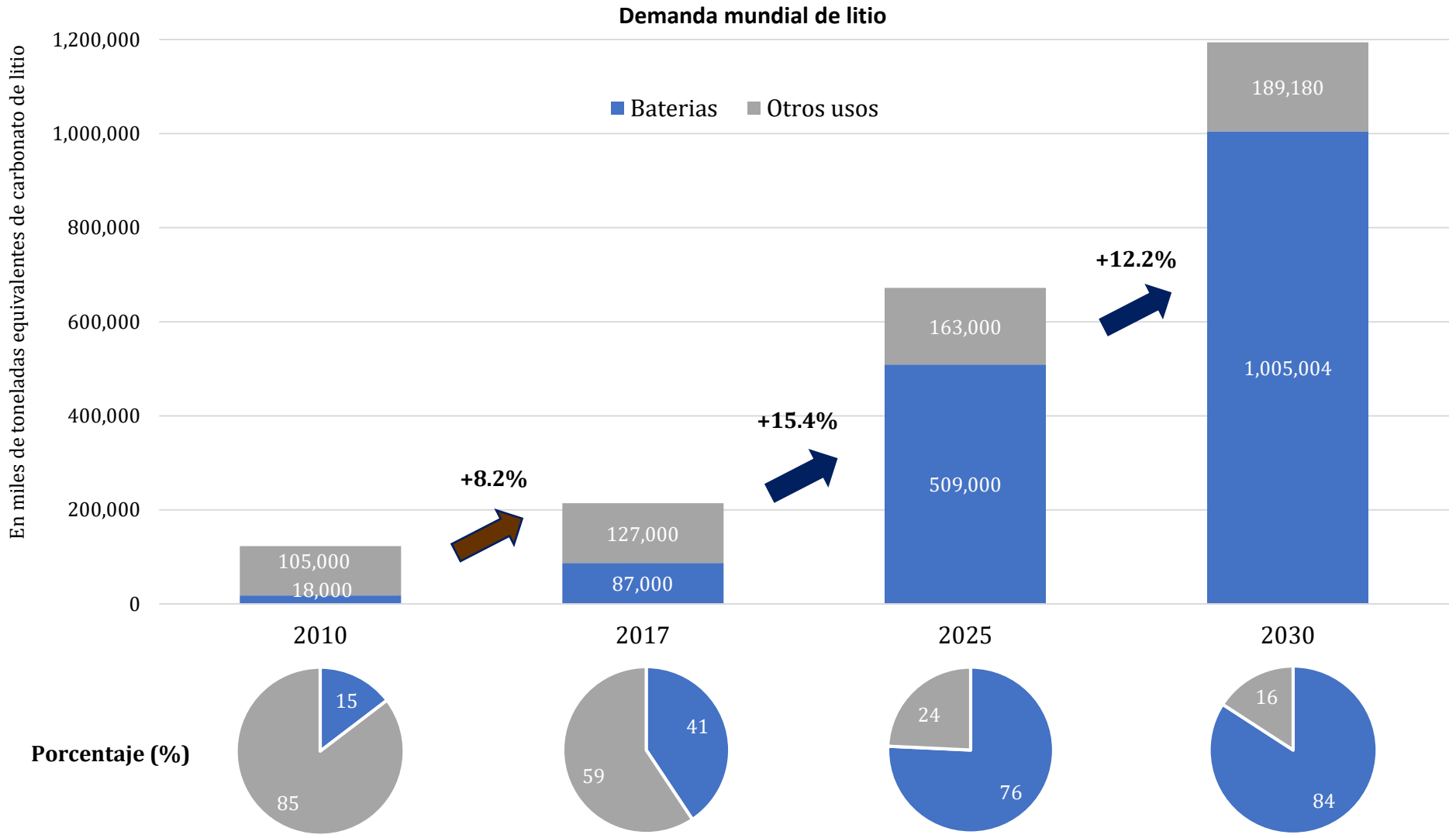
Escenario base ECOSUD - Sudamérica



Escenario Renovables + Integración ECOSUD - Sudamérica

El escenario ER+INT (~800 mil millones US$) representa a la región una inversión anual aproximada del *1% del PIB* de la región (del año 2019 al 2032) considerando el PIB total anual a precios en dólares constantes.

Una transición energética sostenible conlleva requisitos para nuevos patrones de uso de minerales

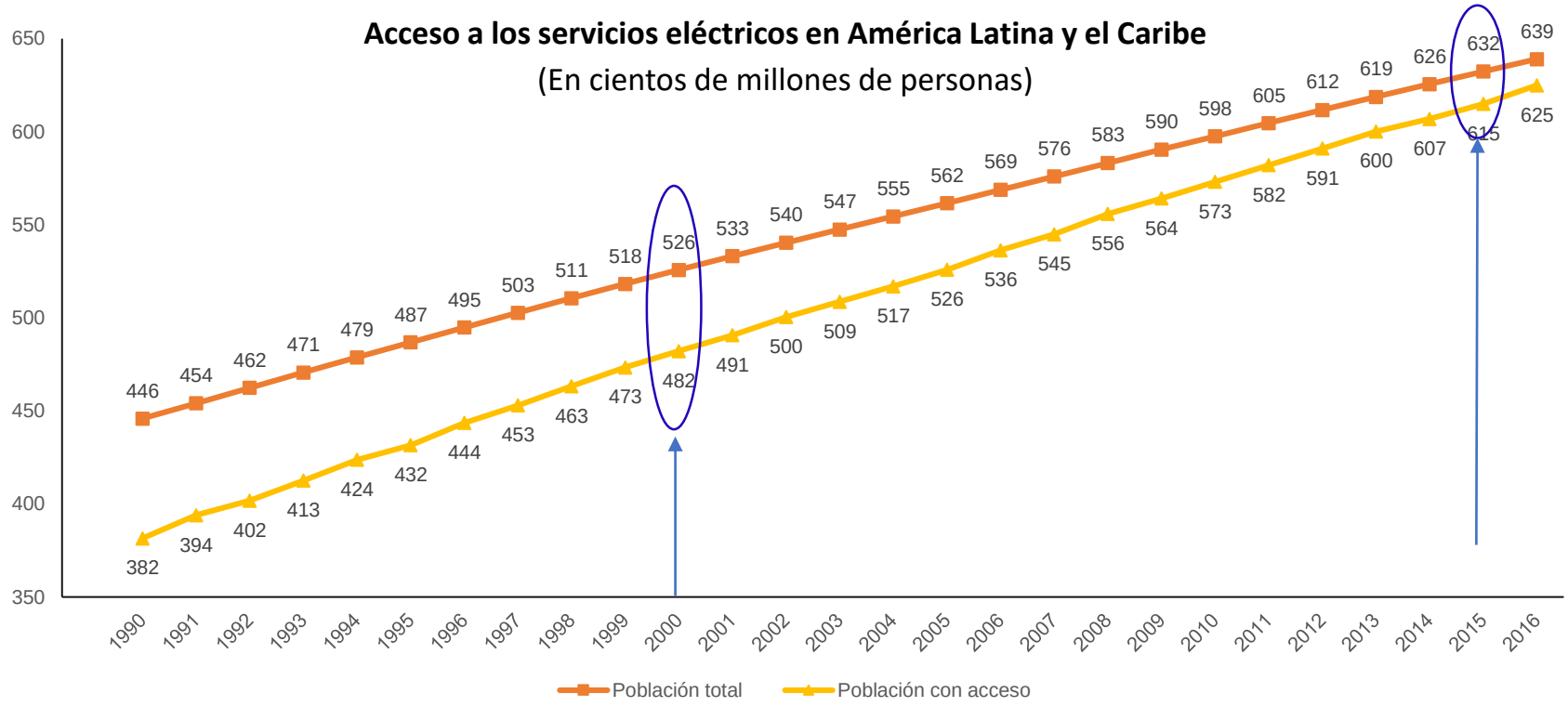


Notas: Las baterías incluye para vehículos (híbridos, híbridos enchufables y eléctricos con batería), camiones y autobuses (livianos, medianos y pesados), vehículos de dos y tres ruedas, redes de almacenamiento y productos electrónicos de consumo. Los valores en % refieren a la tasa crecimiento anual promedio para esos años

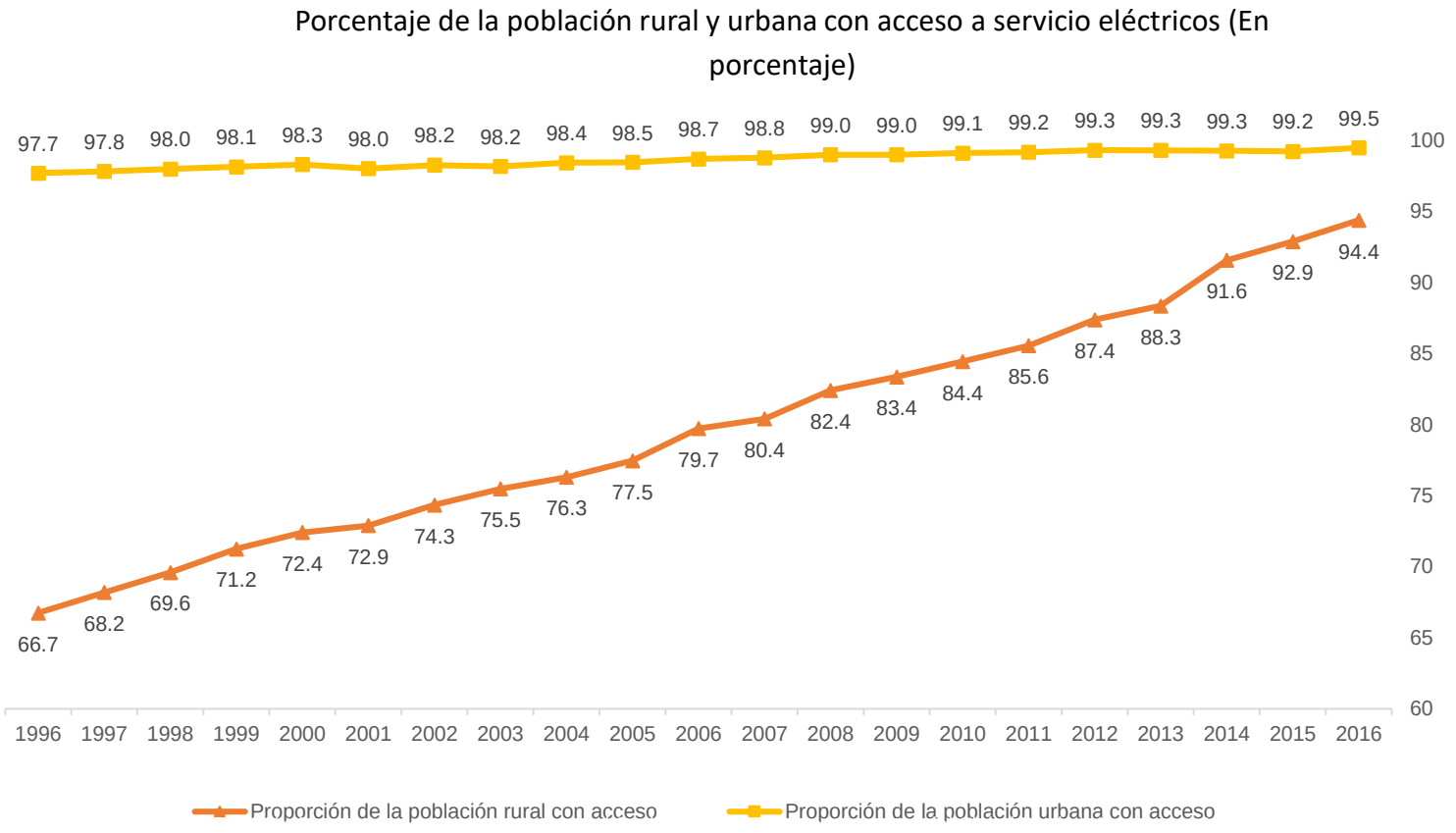
Fuente: Comisión Económica para América Latina y el Caribe (CEPAL), sobre la base estadística de McKinsey & Company (2018), "*Energy Technology Perspectives 2015: Mobilising Innovation to Accelerate Climate*". Metals and mining, McKinsey & Company.

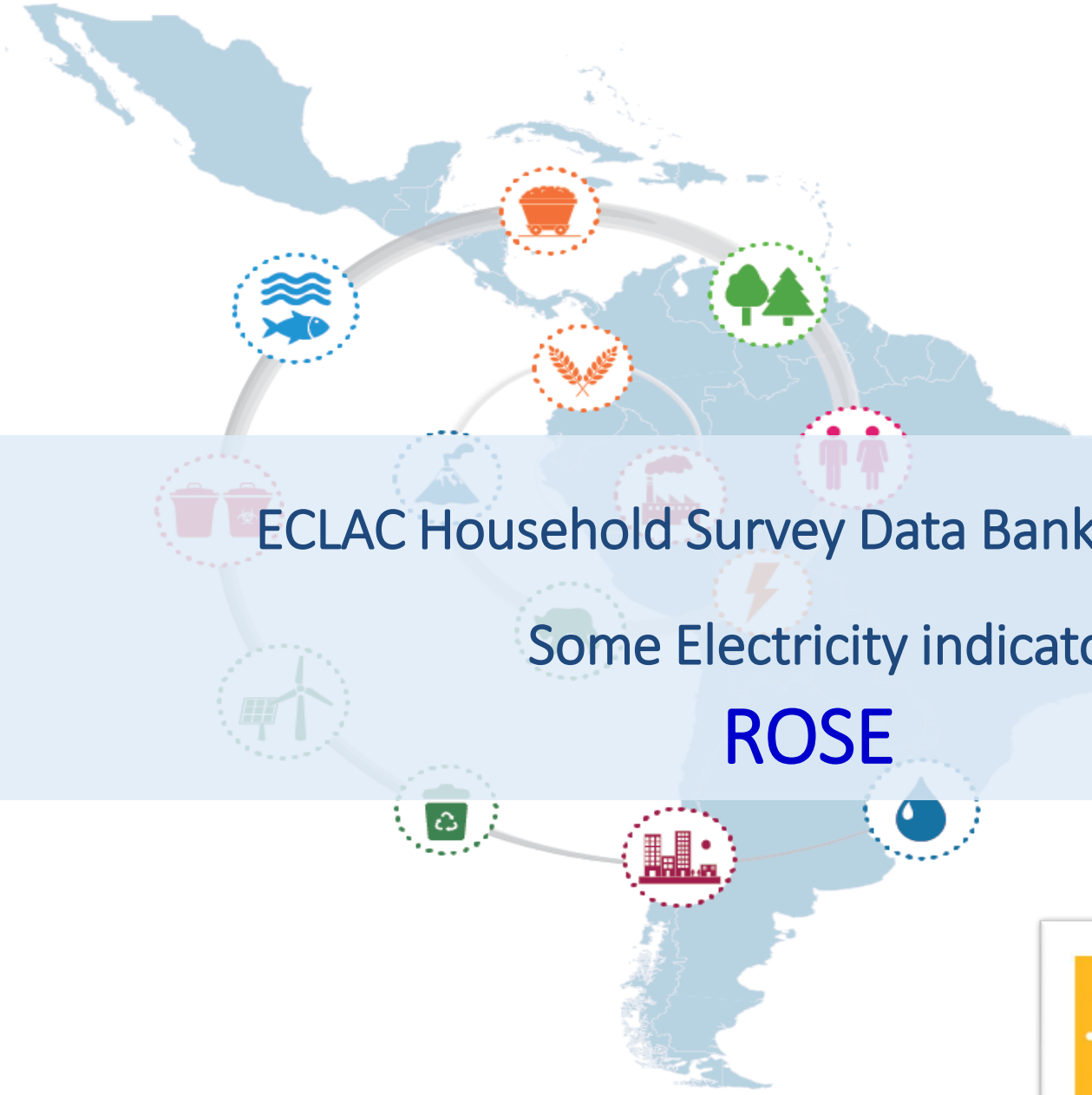
Beyond Access

The number of people without access to electricity services fell from 43.6 million in 2000 to 14 million in 2016.



The rural-urban access gap has narrowed from 31% in 1990 to 5.1% in 2016.





Actualizado a
octubre de 2019

ECLAC Household Survey Data Bank processing

Some Electricity indicators

ROSE

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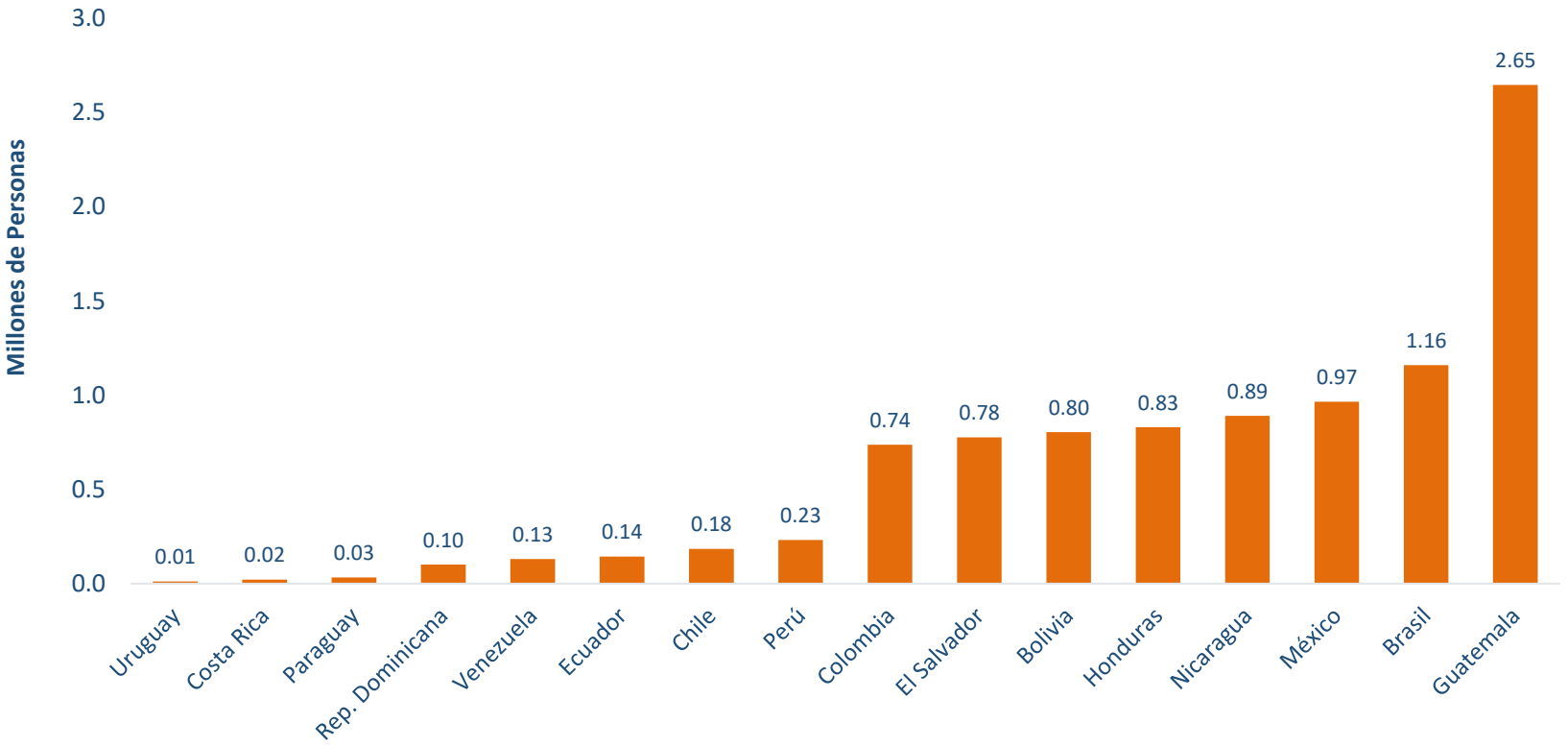
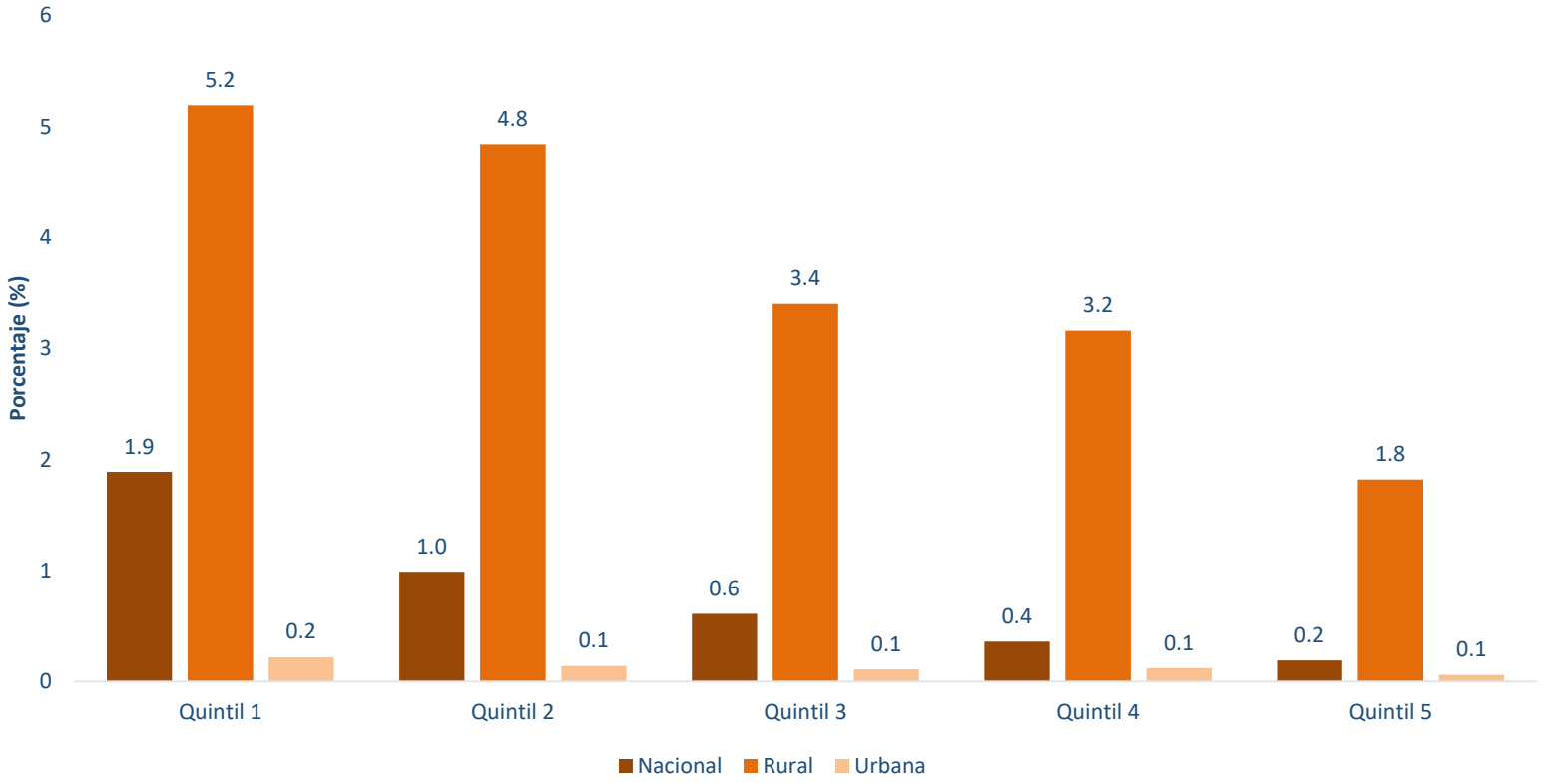
Latin America: Number of people without access to electricity by country, latest available year (16 countries)



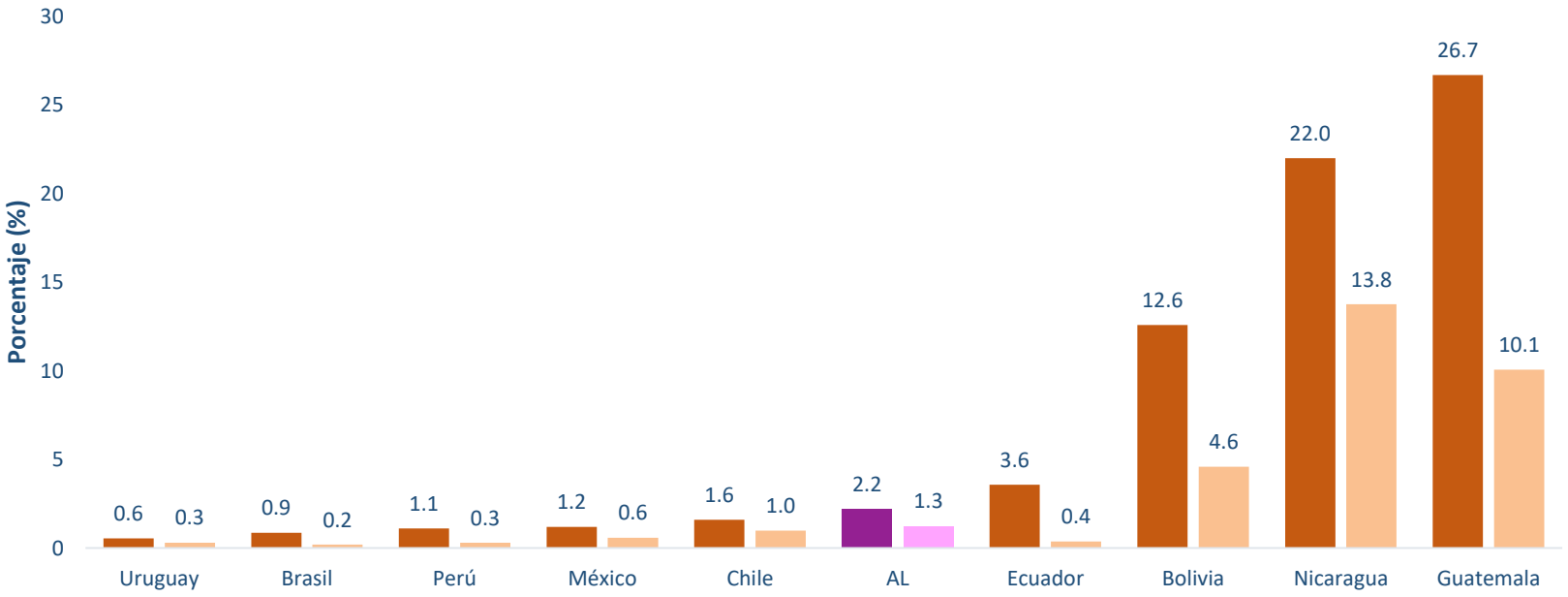
Fuente: CEPAL, Banco de Datos de Encuestas de Hogares (BADEOHG). Se incluyeron 16 países.
ECLAC Household Survey Data Bank

Latin America: Proportion of population without access to electricity by income quintiles (rural, urban and total), latest available year



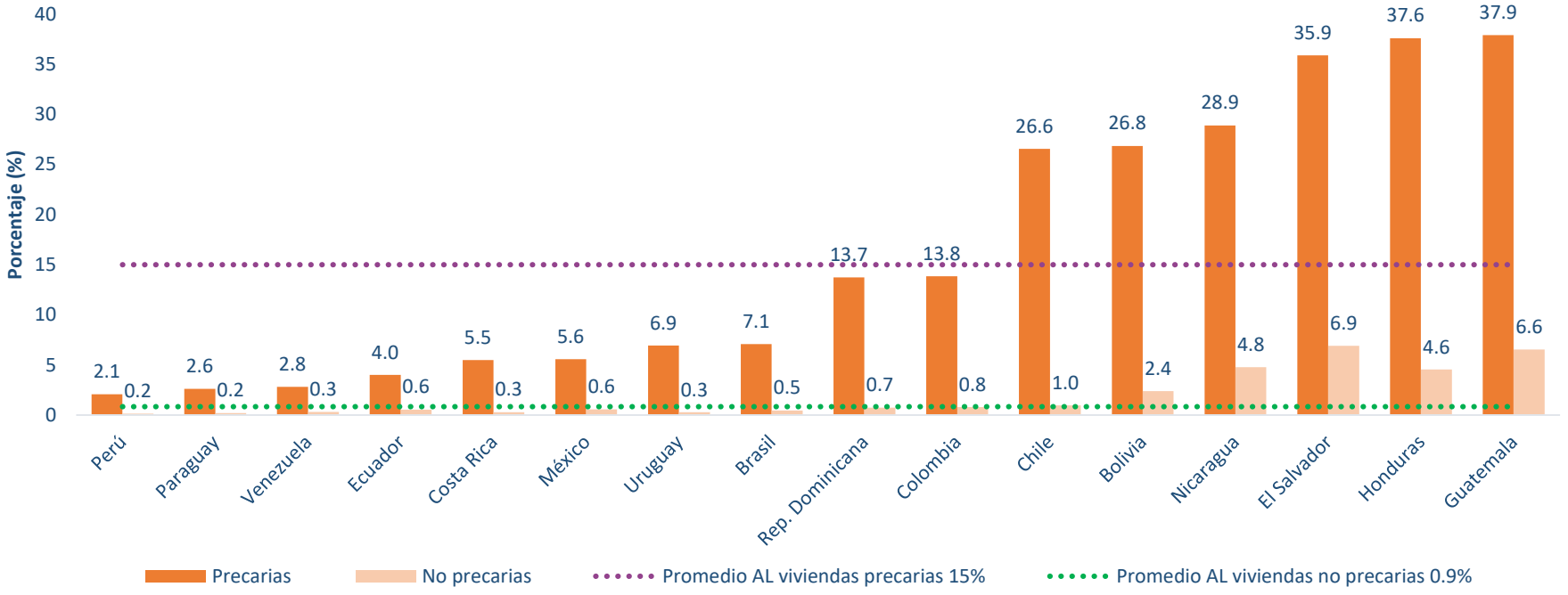
Fuente: CEPAL, Banco de Datos de Encuestas de Hogares (BADEOHG). Agregación regional por quintiles. Se incluyeron 16 países.

Latin America: Proportion of indigenous and Afro-descendant population and rest of population without access to electricity, latest available year



Fuente: CEPAL, Banco de Datos de Encuestas de Hogares (BADEOHG).Promedio regional ponderado por población. Se incluyeron 9 países.
ECLAC Household Survey Data Bank

Latin America: Proportion of population without access to electricity according to housing precariousness, latest available year



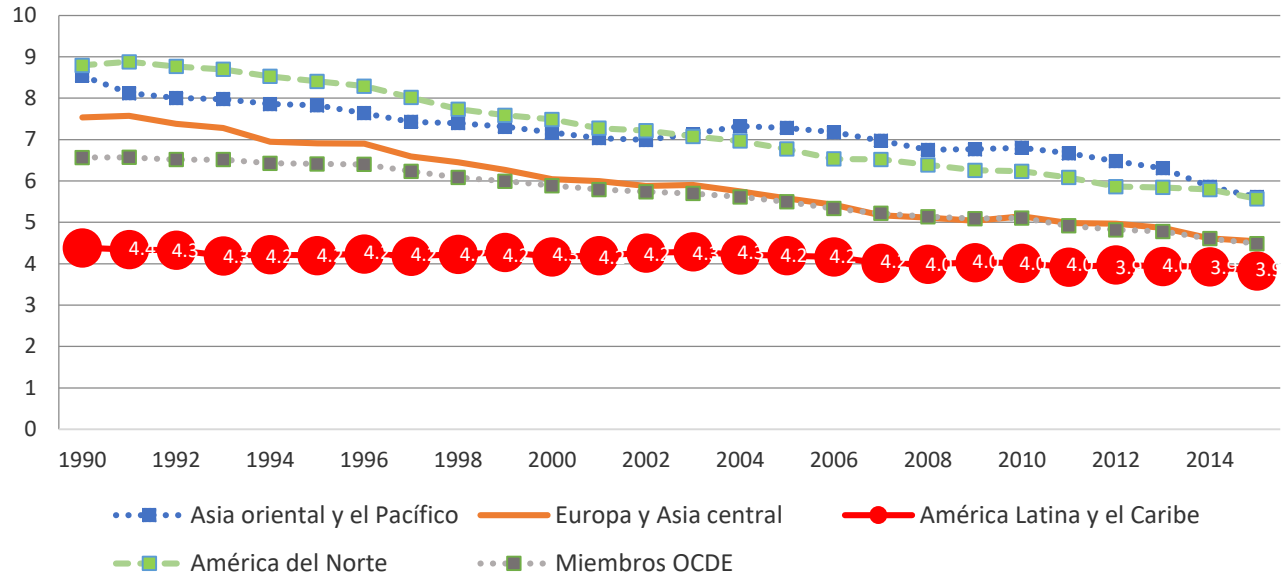
Fuente: CEPAL, Banco de Datos de Encuestas de Hogares (BADEOHG).Promedio ponderado por población. Se incluyeron 16 países.

Note: Precarious housing refers to deprivation in housing materials, which have been considered to be households in dwellings with irrecoverable materials in at least one aspect: ceiling, walls or floor. Example: Floor of earth or walls and/or ceiling of natural fibres and/or waste.

Energy Efficiency

Históricamente, la región ha tenido la menor intensidad energética a nivel mundial, pero también ha sido la que menos ha mejorado.

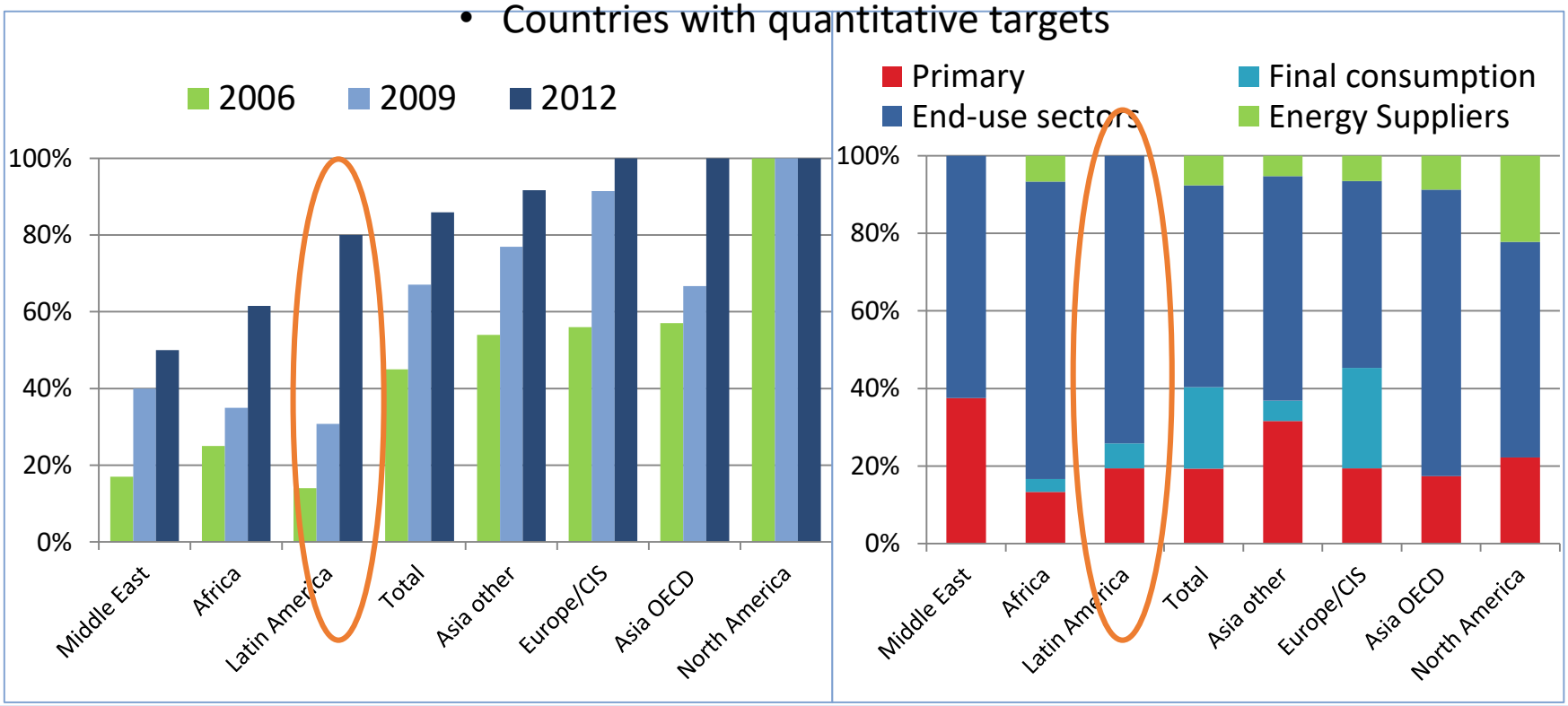
Intensidad energética en base a la energía primaria en América Latina y el Caribe versus otras regiones (En MegaJoule/PIB)



Increasing number of countries with quantitative targets

Targets are expressed in different ways and relate to different part of the consumption: on total (primary)consumption (around 20%) , on final energy consumption (around 20%) , or end-use sectors (case of 60% of countries)

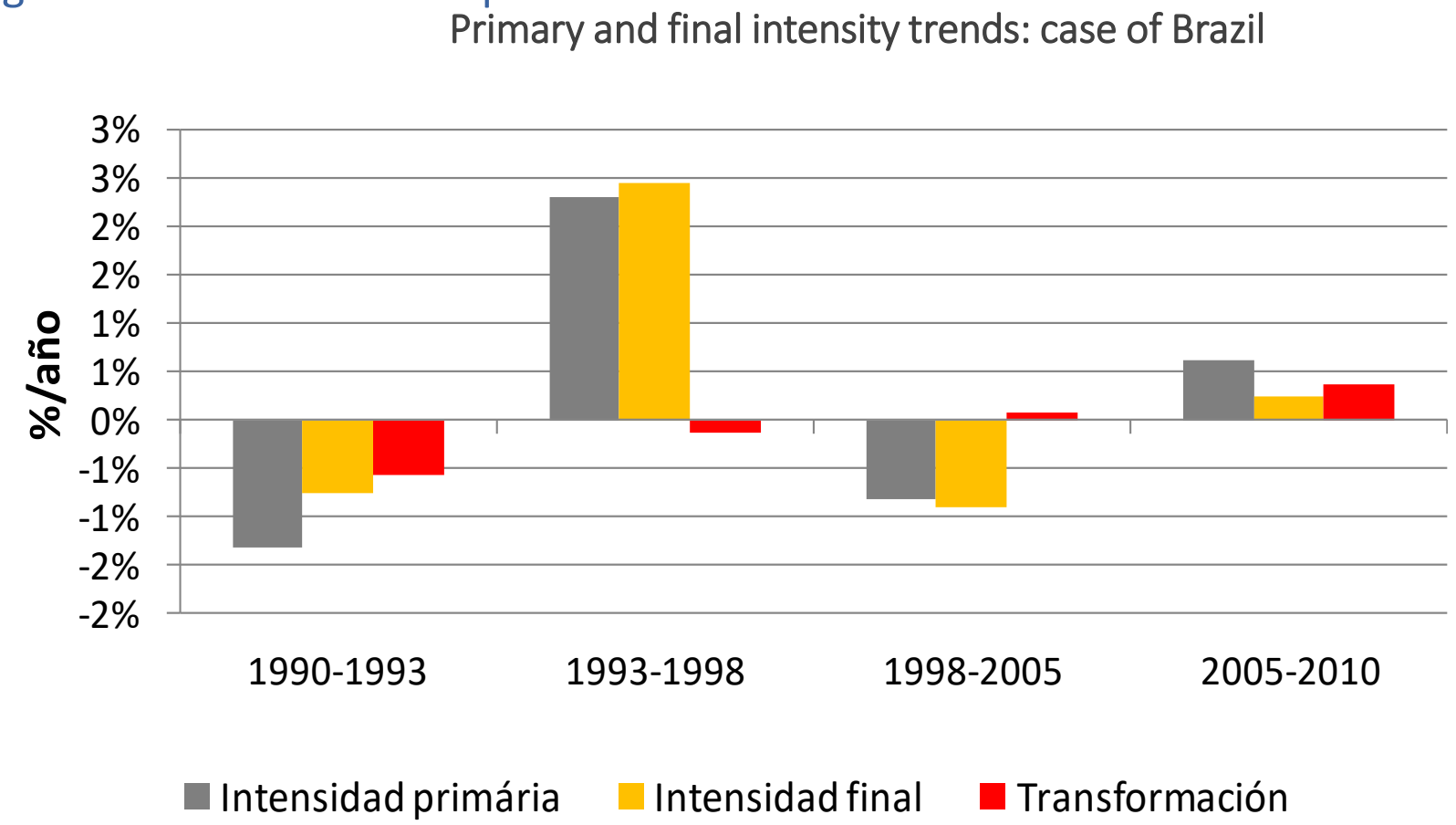
- Countries with quantitative targets



Source WEC surveys (85 countries, of which 10 in Latin America)

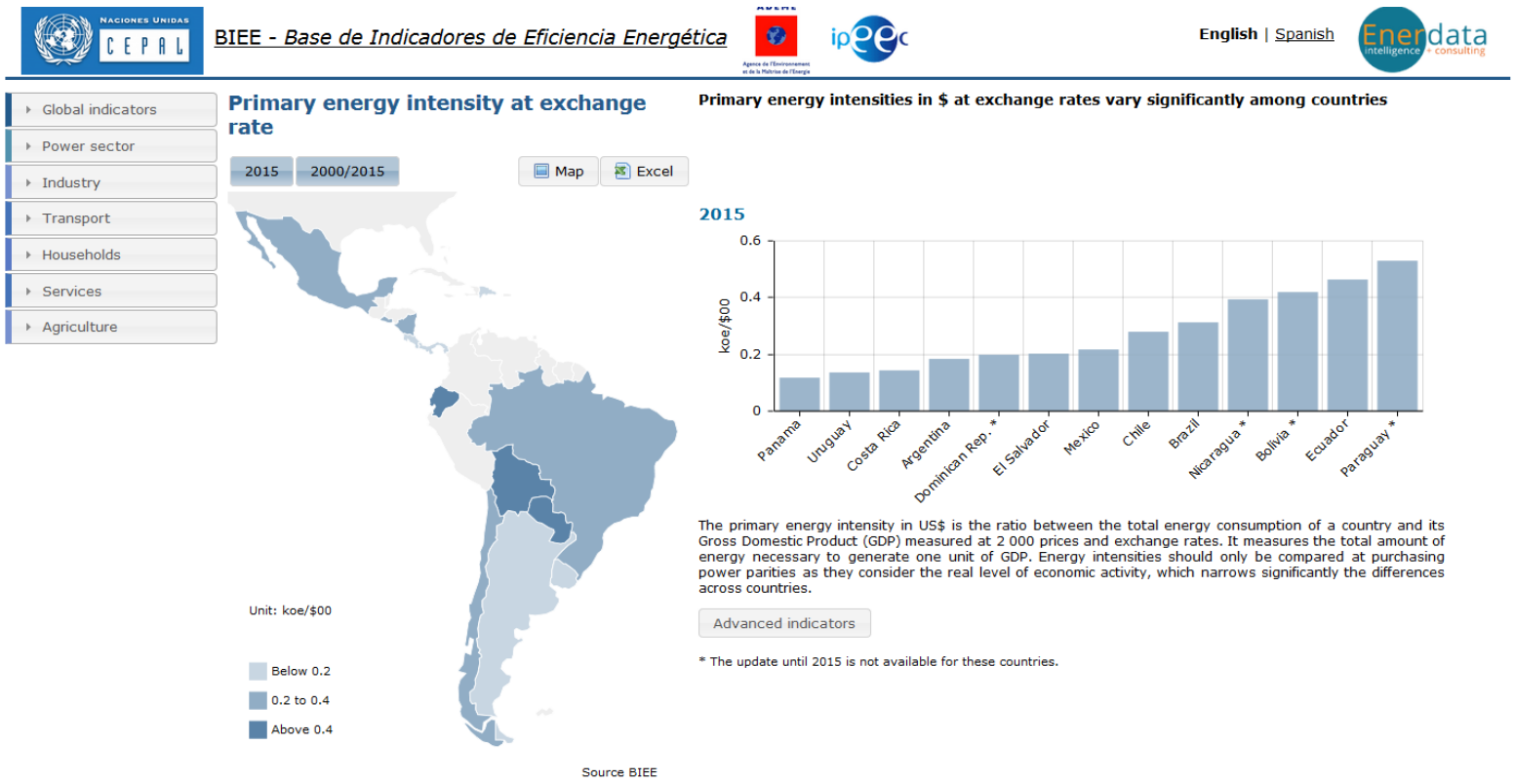
Different trends as to the variation of primary and final intensity in Brazil depending on energy transformations and mainly the power sector

Since 1998, and especially since 2005, energy transformations contribute to increase the primary intensity due to the development of thermal power generation and biofuels production



Source BIEE/EPE

El ROSE utilizará el conocimiento y la metodología empleada en el desarrollo del programa BIEE



Data-Mapper: sitio Web de la Base de datos para elaboración de Indicadores en EE

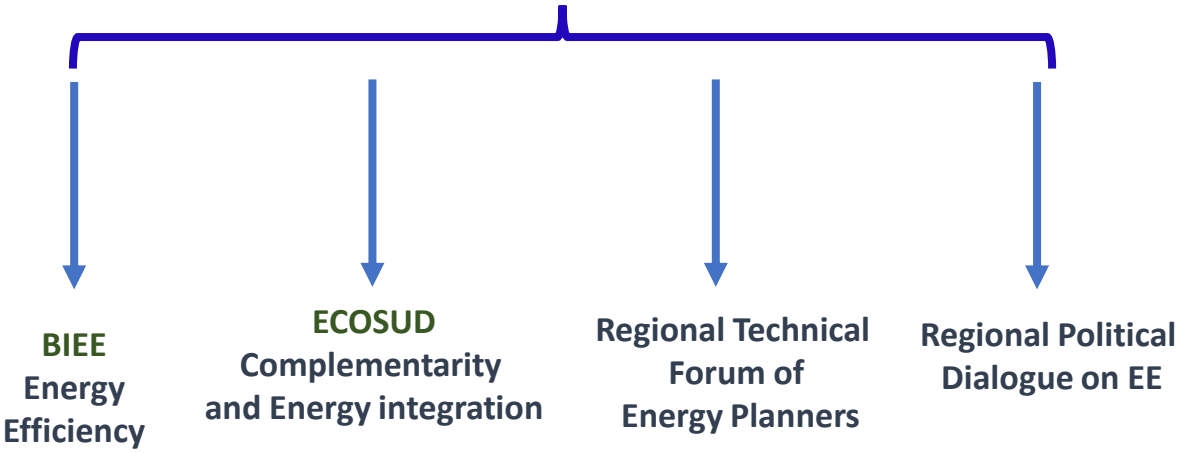
Sitio Web: https://www.cepal.org/es/proyectos/programa-biee-base-de-indicadores-de-eficiencia-energetica

Base de datos 'Data-Mapper': http://www.biee-cepal.enerdata.eu/

ECLAC Project: The Regional Observatory on Sustainable Energies (ROSE)

Regional Observatory on Sustainable Energies (ROSE)

Energy Data in the form of Energy Indicators



3.6 Objectives of the "Regional Observatory on Sustainable Energy".

General objective:
To strengthen the national capacities of all Member States in Latin America and the Caribbean to design, implement and monitor sustainable energy strategies, plans and policies based on objective evidence.

Specific objectives:

1 Strengthen the technical capacities of beneficiary countries to produce relevant and consistent data (e.g. social changes in access) to develop energy indicators.

2 Improve the capacity of beneficiary countries to design and implement evidence-based policies and action plans on sustainable energy.

One of ROSE's actions is to create spaces for political-technical dialogue in the region to promote efforts to achieve Agenda 2030 and SDG7.

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POR UN DESARROLLO SOSTENIBLE CON IGUALDAD

REGIONAL TECHNICAL FORUM OF ENERGY PLANNERS

Reunión preparatoria del Foro - Río de Janeiro, EPE – marzo 6, 2018

1er Foro Técnico de Planificadores Energéticos – Bogotá, Ministerio de Energía y Minas de Colombia, 5-junio-2018

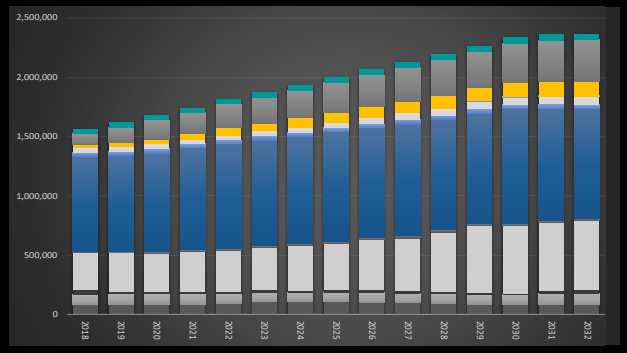
2do Foro Técnico de Planificadores Energéticos – Santiago en CEPAL, 30 octubre 2018

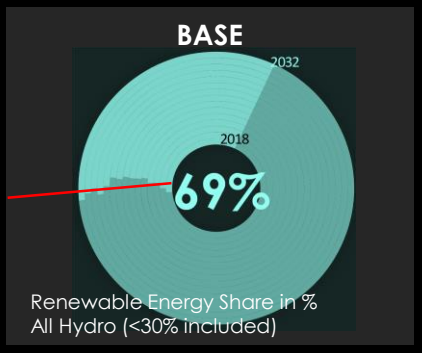
CONTINENTAL LATIN AMERICA

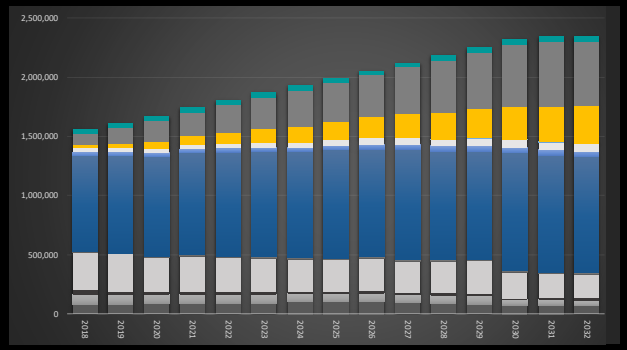
ENERGY PRODUCTION - GENERATION [GWh]

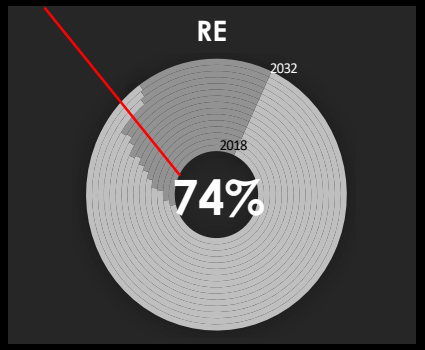
- Biomass
- Wind
- Solar
- Ocean
- Nuclear
- Mini-Hydro
- Hydro
- Geothermal
- Gas
- FuelOil
- Diesel
- Coal

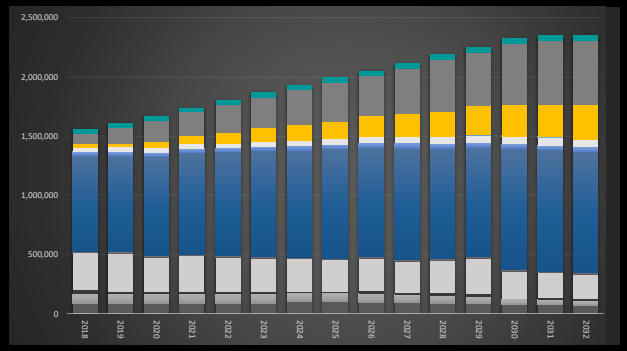
Description:	Latin America Electricity Production Mix Forecast
Horizon:	15 years [2018-2032]
Units:	Annual GWh (lossless)
Scenarios:	-BASE -RE: Renewable Energy -RE+INT: Interconnected and RE
Notes:	ECOSUD update. Central America + Mexico from GoF

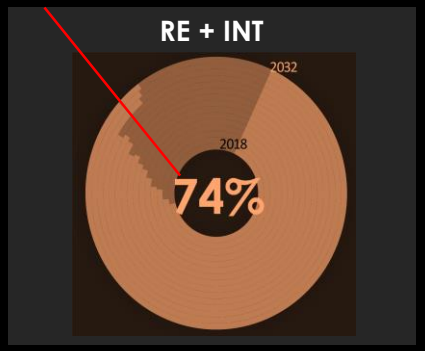






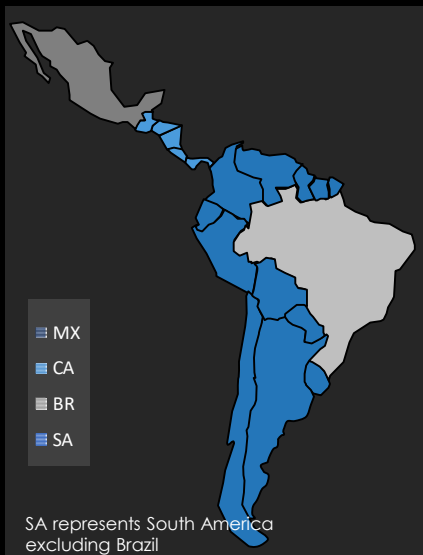






CONTINENTAL LATIN AMERICA

TOTAL COSTS: Production + Investment



SA represents South America excluding Brazil

BASE

B$852

Total Costs

RE

B$817

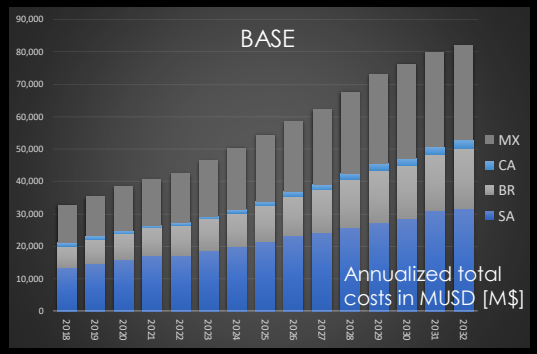
Total Costs

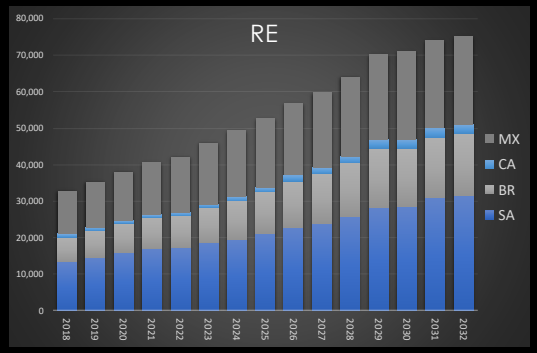
Re + INT

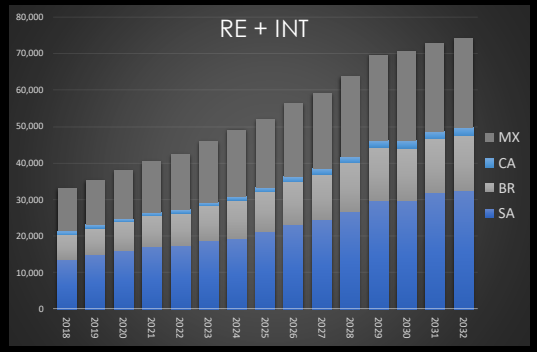
B$812

Total Costs

Description:	LATIN AMERICA production and investment costs
Horizon:	15 years [2018-2032]
Units:	Annualized Capital and Operational Costs in Million USD
Notes:	Real annualized costs. Regional discount rate of 8% used for NPV calculations. WACC, economic life project specific. 2016 USD used for all input costs projections







B$466.1
Generation Costs

B$203.4
Annualized Build Cost

B$181.6
FO&M Cost

B$0.91
Transmission Build Cost

B$316.7
Generation Costs

B$303.4
Annualized Build Cost

B$194.6
FO&M Cost

B$ 2.3
Transmission Build Cost

B$310.7
Generation Costs

B$301.5
Annualized Build Cost

B$195.4
FO&M Cost

B$4.61
Transmission Build Cost

THANKS

ECLAC Partners for Sustainable Energy

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IRENA
International Renewable Energy Agency

BID
Banco Interamericano de Desarrollo

ADEME
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