Eco-Business promotion policies in LAC:
Energy Saving and Renewables
Analysis of current trends and challenges

UNITED NATIONS

ECLAC

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U.N ECLAC, Santiago, Chile

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FEALAC forum MOFA, Tokyo, Japan

Contents

1. Energy saving and Clean Energy in LAC: where do we stand?

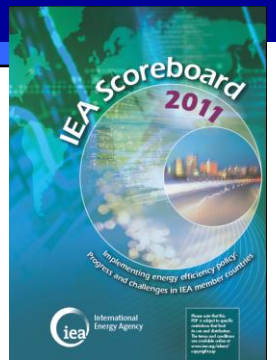
Energy Efficiency

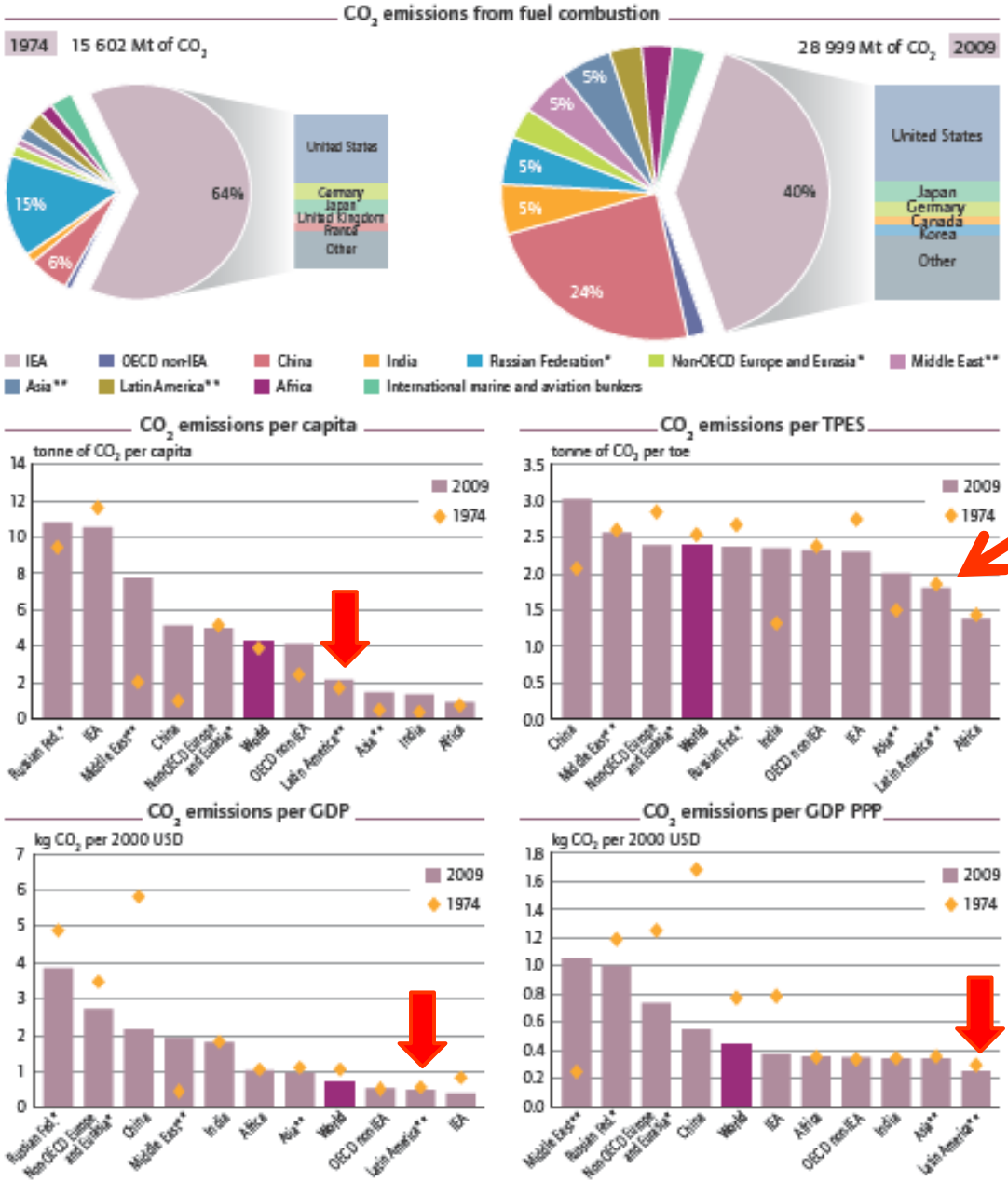
- Current status by sector
- Current barriers impeding the development of a dynamic market for Energy Efficiency (EE) and NCRE projects in LAC
- Current status of national EE policies in LAC.
- Lessons from Asia's experience (ESCO market development in Japan, China, Thailand)
- Actores y acciones clave para construir el mercado EE en ALC.

Renewable Energy Sources

- Observed trends:
- How effective are current NCRE promotion incentives?
- Large Hidro decreasing share, a worrisome trend in LAC.

Regional baseline situation 2009





* For 1974, the Russian Federation includes the rest of Former Soviet Union (FSU). For 2009, Non-OECD Europe and Eurasia excludes Estonia, Slovenia and the Russian Federation.
** Middle East excludes Israel. Asia excludes China, India and OECD Asia Oceania. Latin America excludes Chile and Mexico.

LAC CO2 intensity among lowest worldwide

(large Hydroelectricity % in TPES).

LAC CO2 per GDP and CO2 per capita follow similar trend.

(low-middle levels of per capita incomes).

BUT

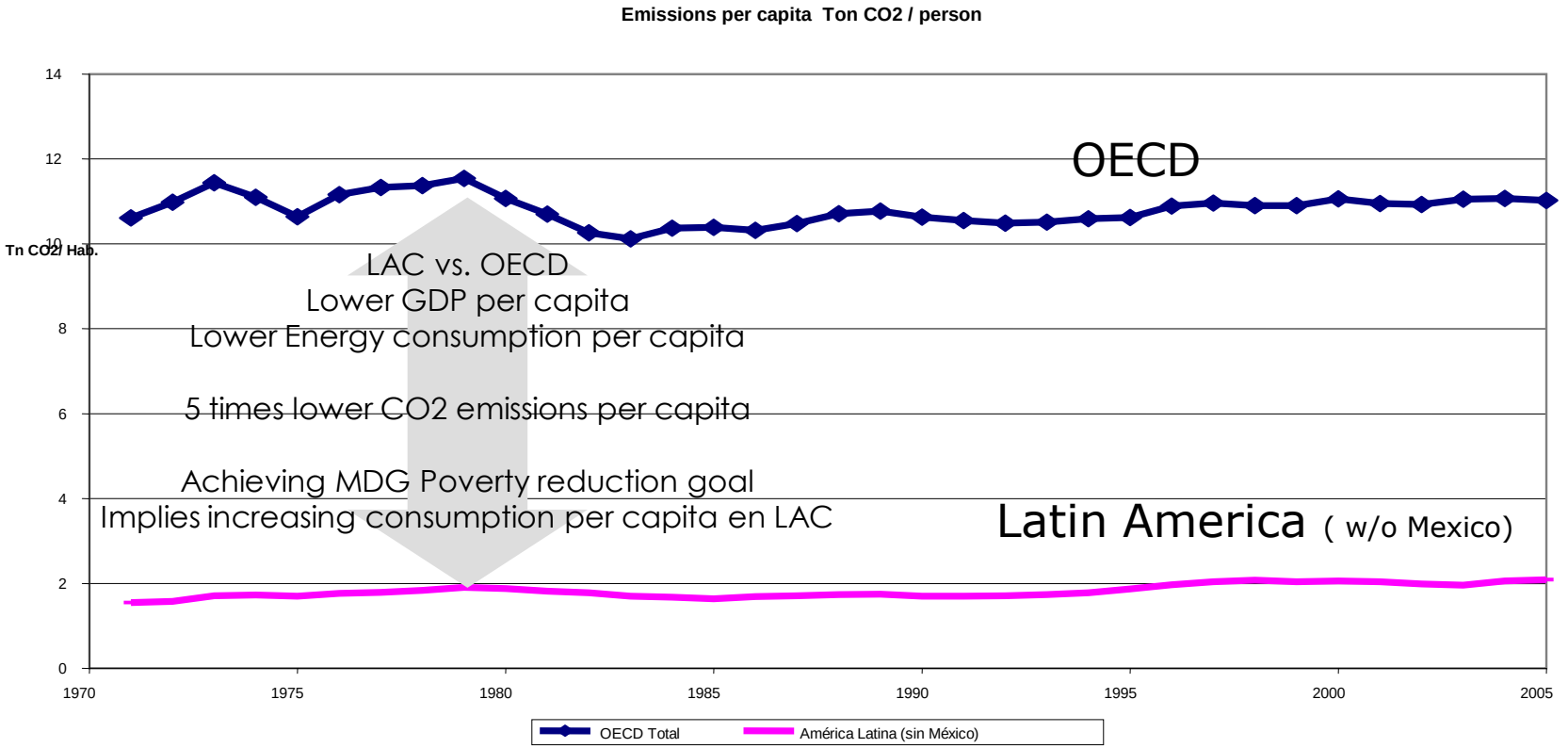
Very high growth rates of Energy Demand

(rapid GDP growth > 4%, rapid growth of E. Demand > 5%).

1971 – 2005 CO2 per capita trajectory

(Ton CO2 per person)

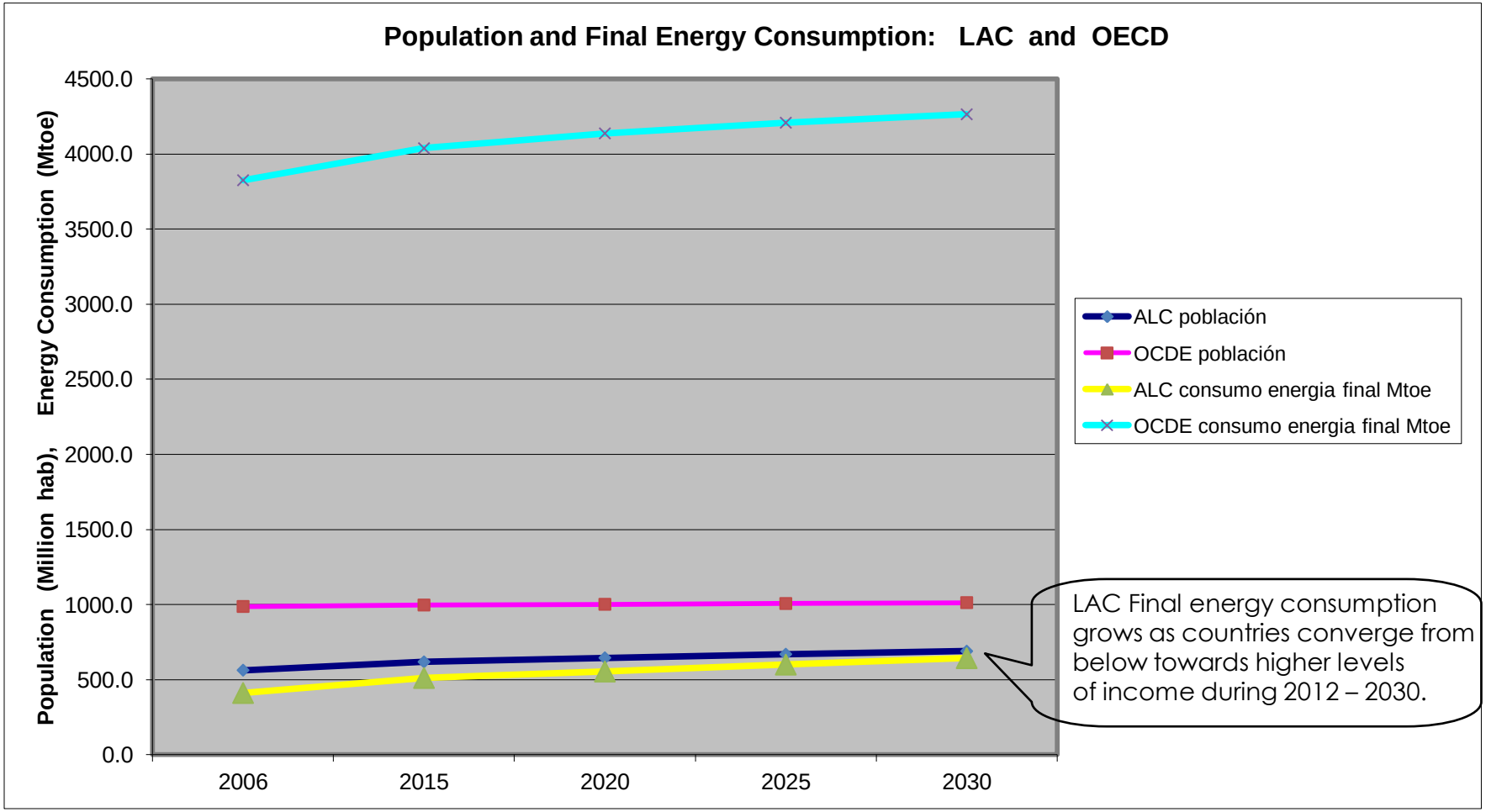
CO_2 Emissions per capita 1971-2005



Source: EIA-OECDE. CO_2 Emissions from Fuel Combustión. CO_2 Indicator Vol 2007 release 01.

IEA OECD Reference Scenario 2010-2030

LAC and OECD: Final Energy Consumption and population projections.
LAC energy consumption set to grow. Challenge is to grow with efficiency.



Statistical Source: EIA CO2 from fuel combustion, Reference Scenario 2030, World Energy Outlook 2008.
Population statistics: CELADE –CEPAL, División de Población Naciones Unidas: Panorama de la Población Mundial: Revisión 2008.

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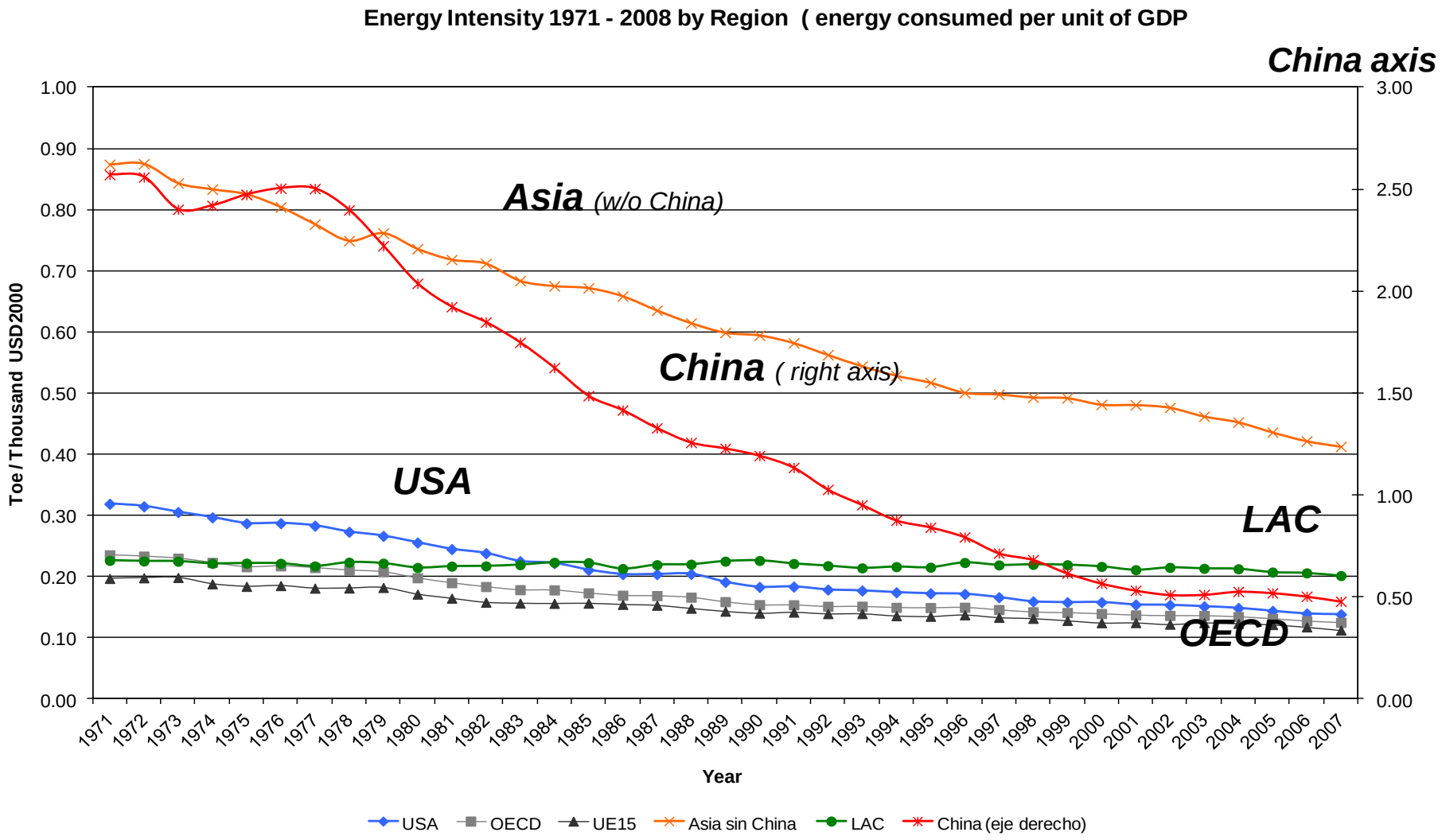
Energy saving and Clean Energy in LAC: where do we stand?

1. **Energy Efficiency**
   - Current status by sector

Energy Intensity trends 1971-2008 *(Tons oil equiv. / thousand USD2000)*

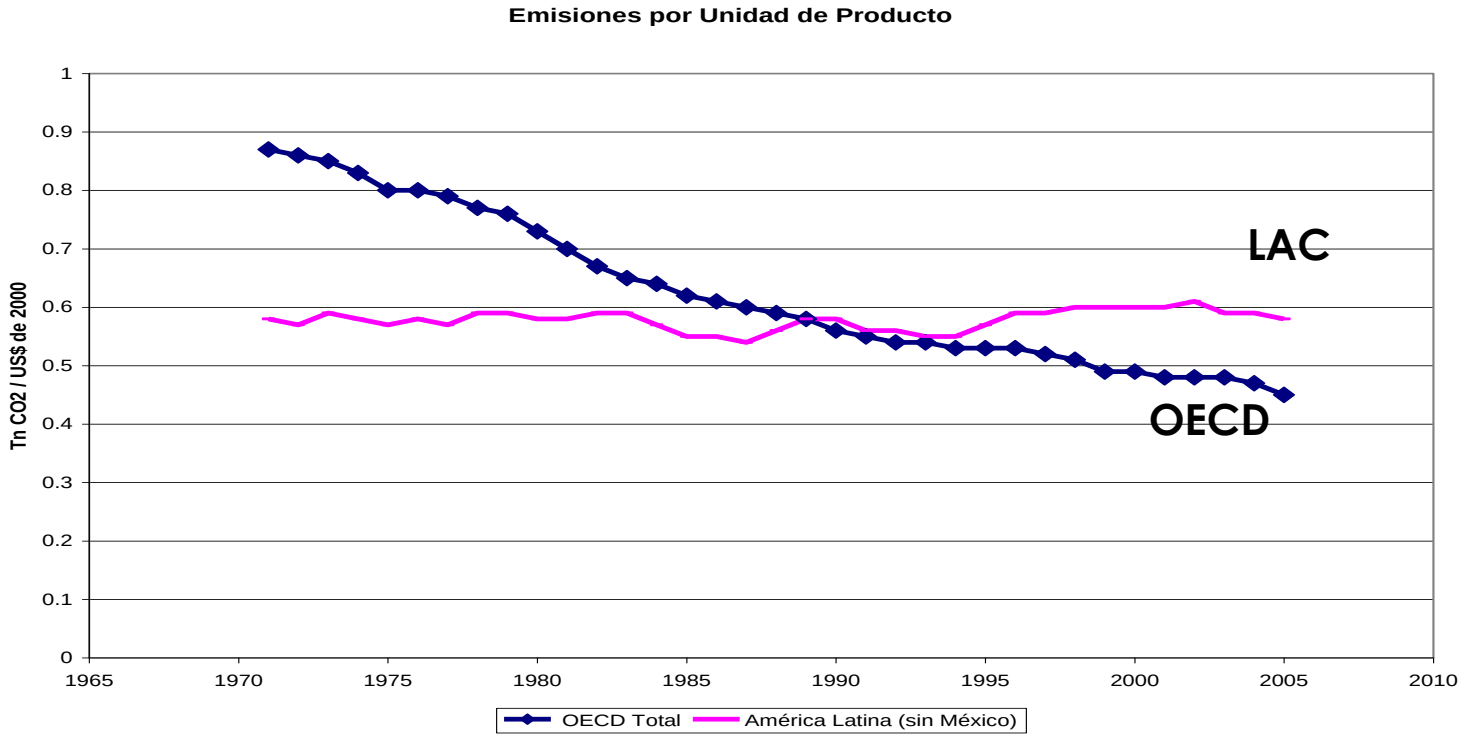
In spite of low absolute levels, LAC decreasing trend in Energy Intensity in LAC has stagnated after 1985, relative to continued progress in other regions.



Statistical source : IEA Energy Balances OECD, Energy Balances no-member countries 2010

Energy Intensity decreasing trend in LAC stagnates after 1990 relative to OECD

Carbon Intensity: CO2 per unit of production (USD) 1970-2005

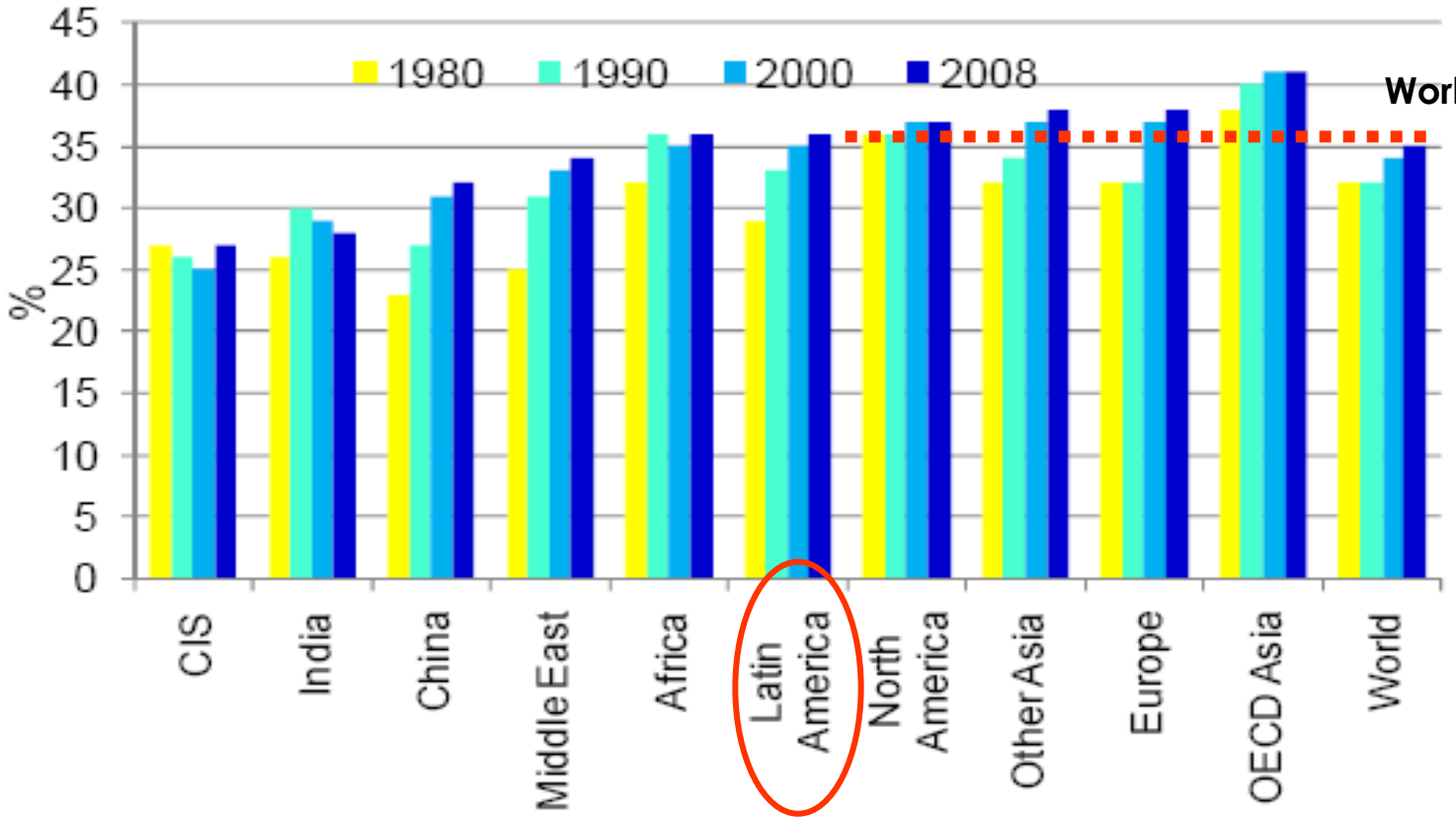


Source :IEA-OECD. CO2 Emissions from Fuel Combustión. CO2 Indicator Vol 2007 release 01.

Efficiency of Electric Power Generation: LAC is very close to the technological frontier in thermal generation.

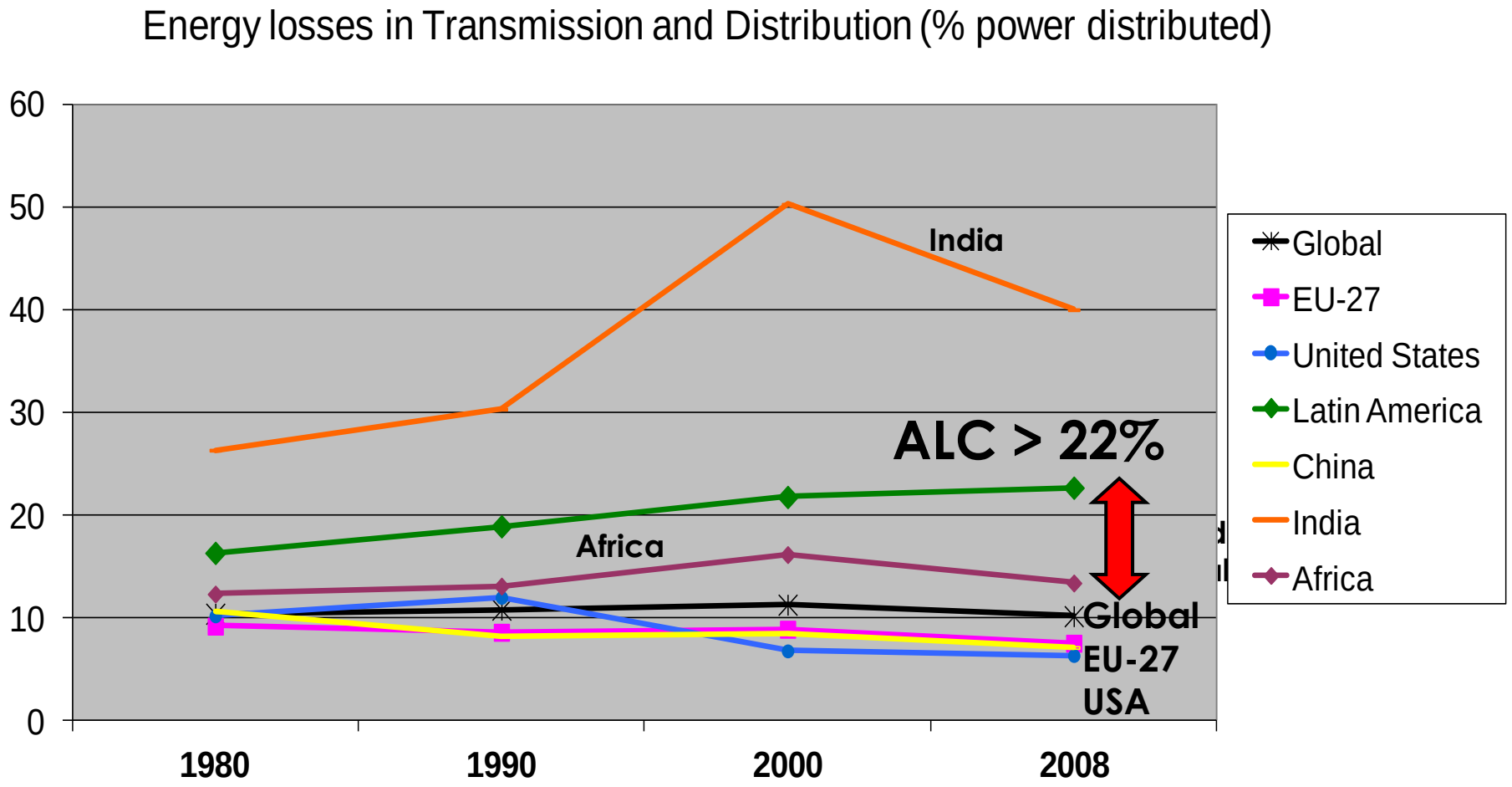
Figure 2.11: Trends in the average efficiency of thermal power production

Variation du rendement moyen des centrales thermiques



Source: Energy Efficiency trends at World level. World Energy Council (2010)
Estadísticas: ENERDATA

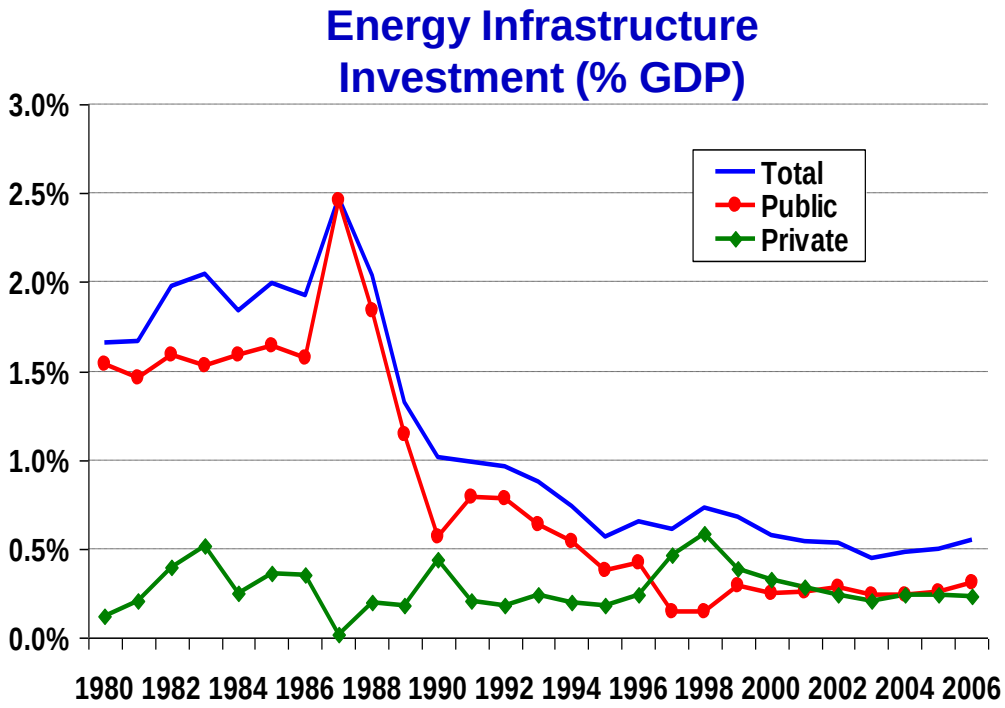
Efficiency of Electric Power Transmission and Distribution: LAC falls behind in Transmission and Distribution losses (>22%)

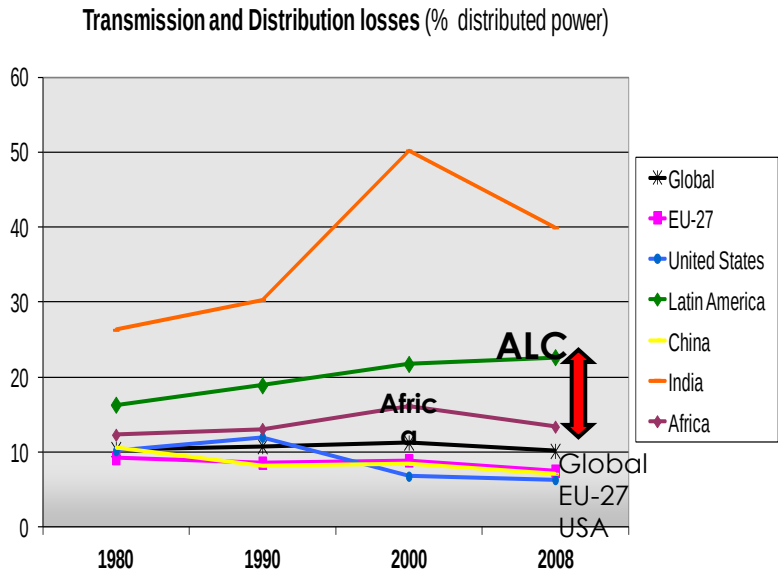


Fuente: Elaboración propia con base en estadísticas ENERDATA WEC(2010)

Electric Power sector: Barriers to Efficiency

- Insufficient investment in power infrastructure after 1990s.
- Informal energy access: power tapping in periurban areas.
- Weak demand management measures. Demand subsidies?

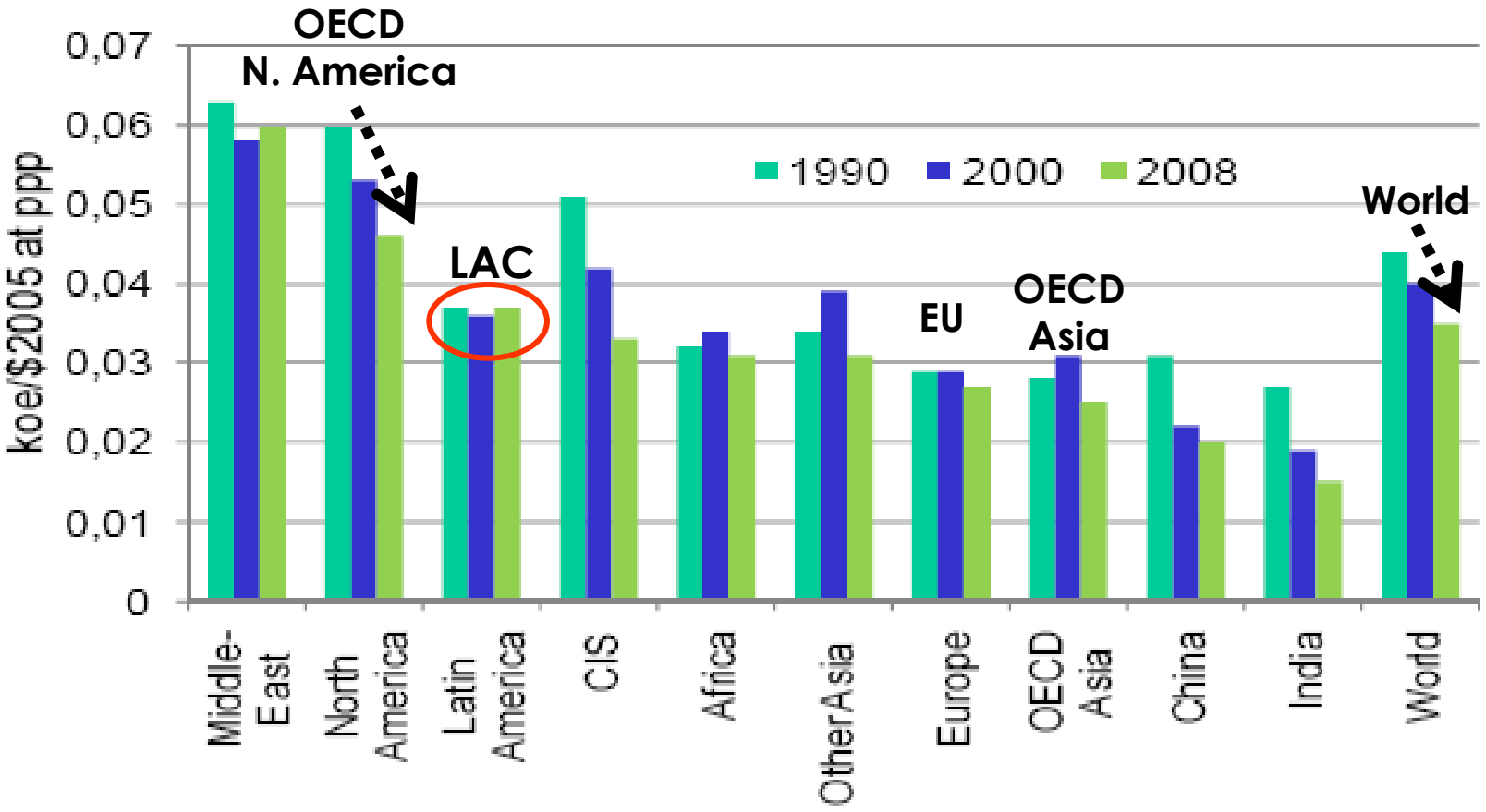




Fuente: Calderón and Servén (2008) Seminario Infraestructura 2020
CEPAL, MOP-Chile. Santiago 10 de Noviembre 2008

Energy Intensity of Transport Sector : LAC shows relative stagnation 1990 - 2008

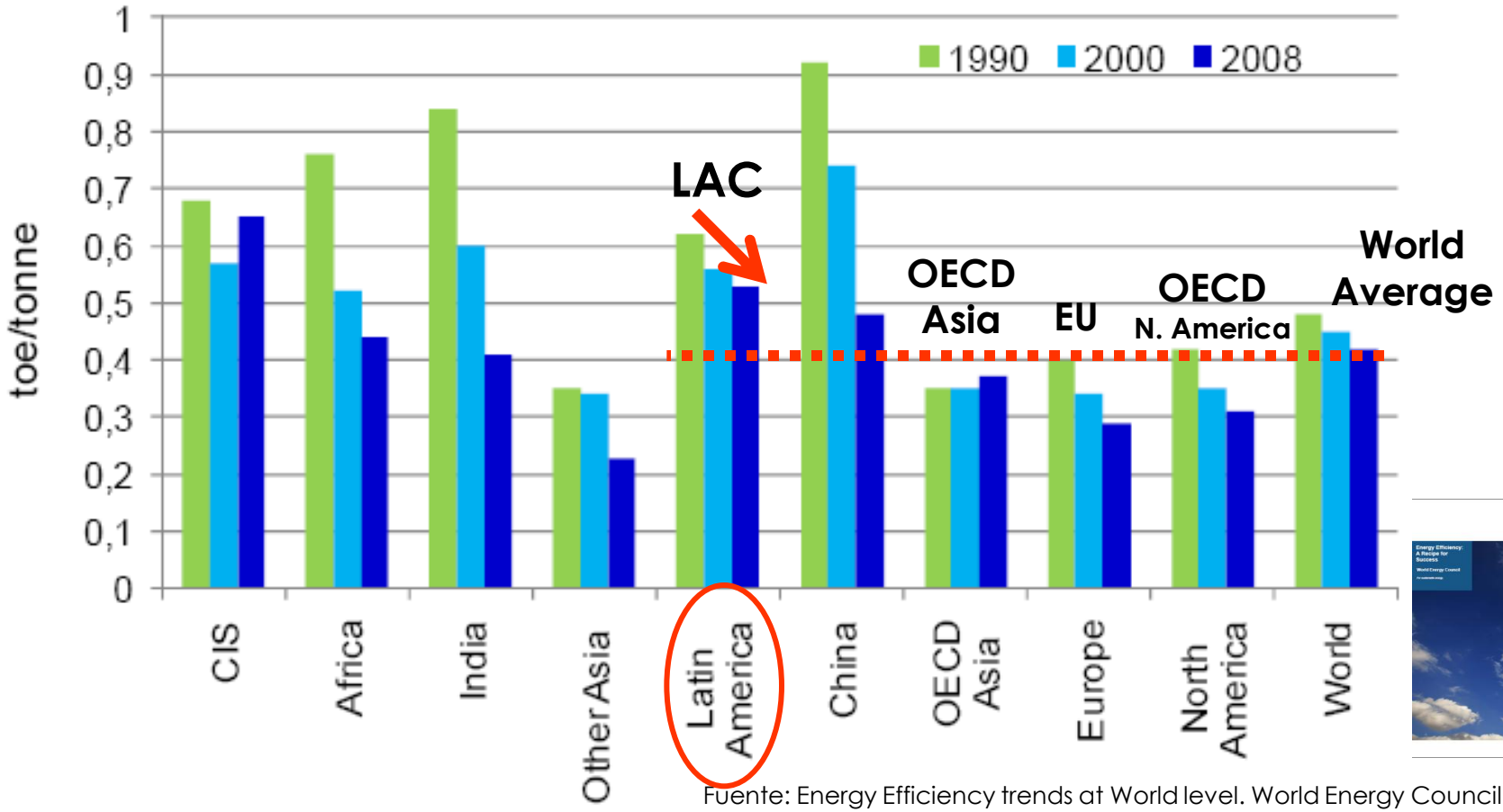
Figure 2.23: Energy intensity of transport
Intensité énergétique du transport



Fuente: Energy Efficiency trends at World level. World Energy Council (2010)
Base estadística: ENERDATA

Industry Sector : Decreasing energy intensity 1990-2010 in large industries (Steel), but still lagging world average. Small/Medium industries further behind technological frontier

Figure 2.19: Variation of the energy consumption per tonne of steel
Variation de la consommation unitaire moyenne de l'acier



Fuente: Energy Efficiency trends at World level. World Energy Council (2010)

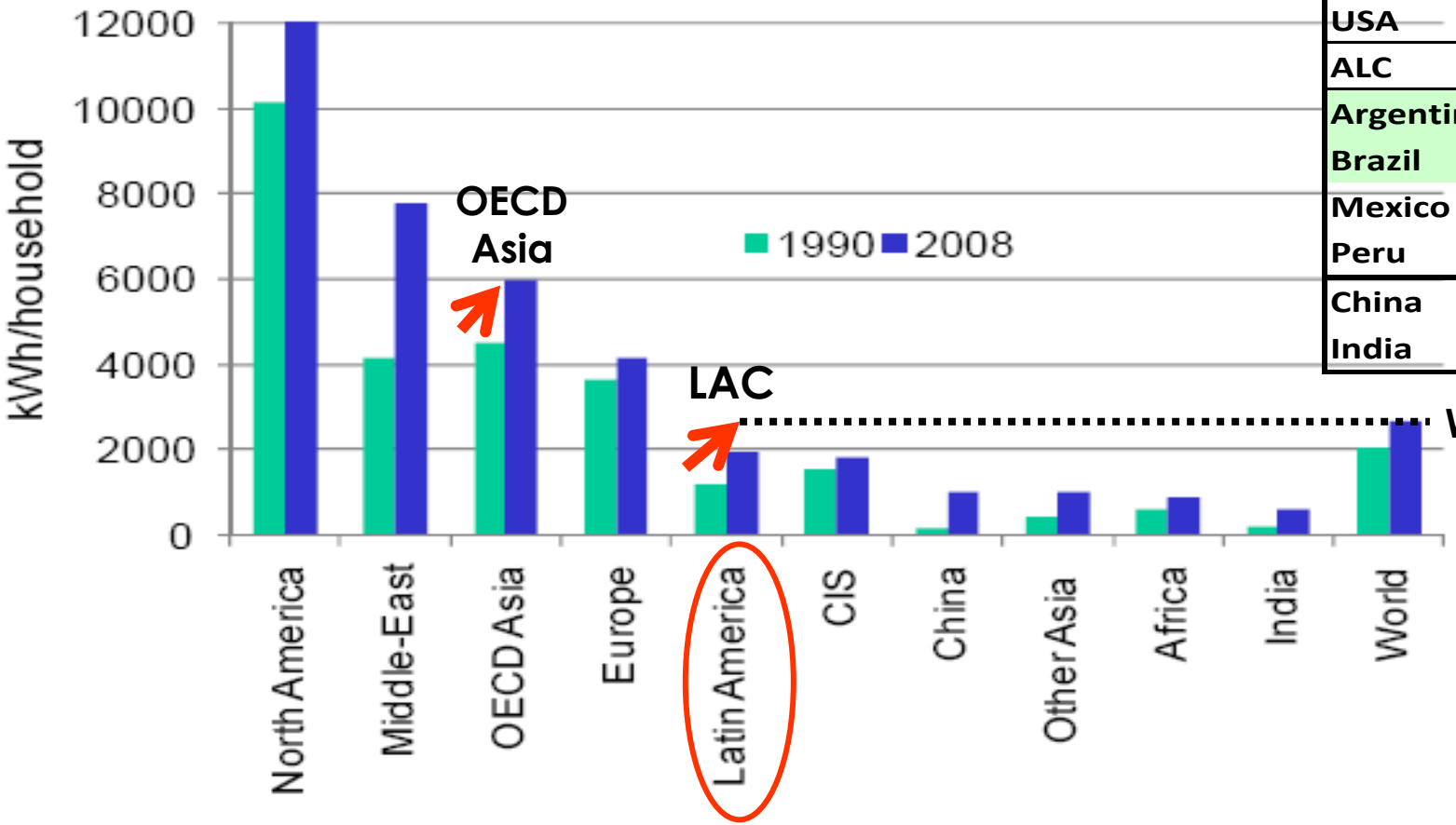
Industry Sector: Barriers to Energy Efficiency in LAC

- Large informal sector of micro and small enterprises with limited engineering capacity to manage energy use.
- Under developed ESCO market for energy efficiency projects.
- Under developed financial intermediation for EE projects.
- Limitations to Govt. sponsored technical extension programs to small and medium enterprises (SMEs)
- Challenges: Development of ESCO market for EE projects, project aggregation mechanisms, EE financial intermediation.

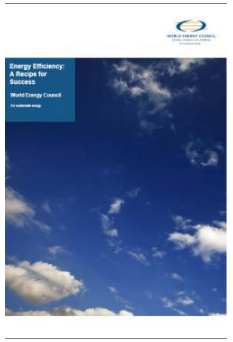
Fuente: Energy Efficiency trends at World level. World Energy Council (2010)

Household Sector : Electricity consumption Kwh/home 1990-2008 in LAC converges to world average from below

Figure 2.25: Electricity consumption per household
Consommation d'électricité par ménage



% crec. anual 1990 - 2008	
Global	0.5
EU-27	0.7
USA	1.4
ALC	**0.3**
Argentina	**4.1**
Brazil	**-1**
Mexico	2
Peru	0.3
China	9.4
India	1.7



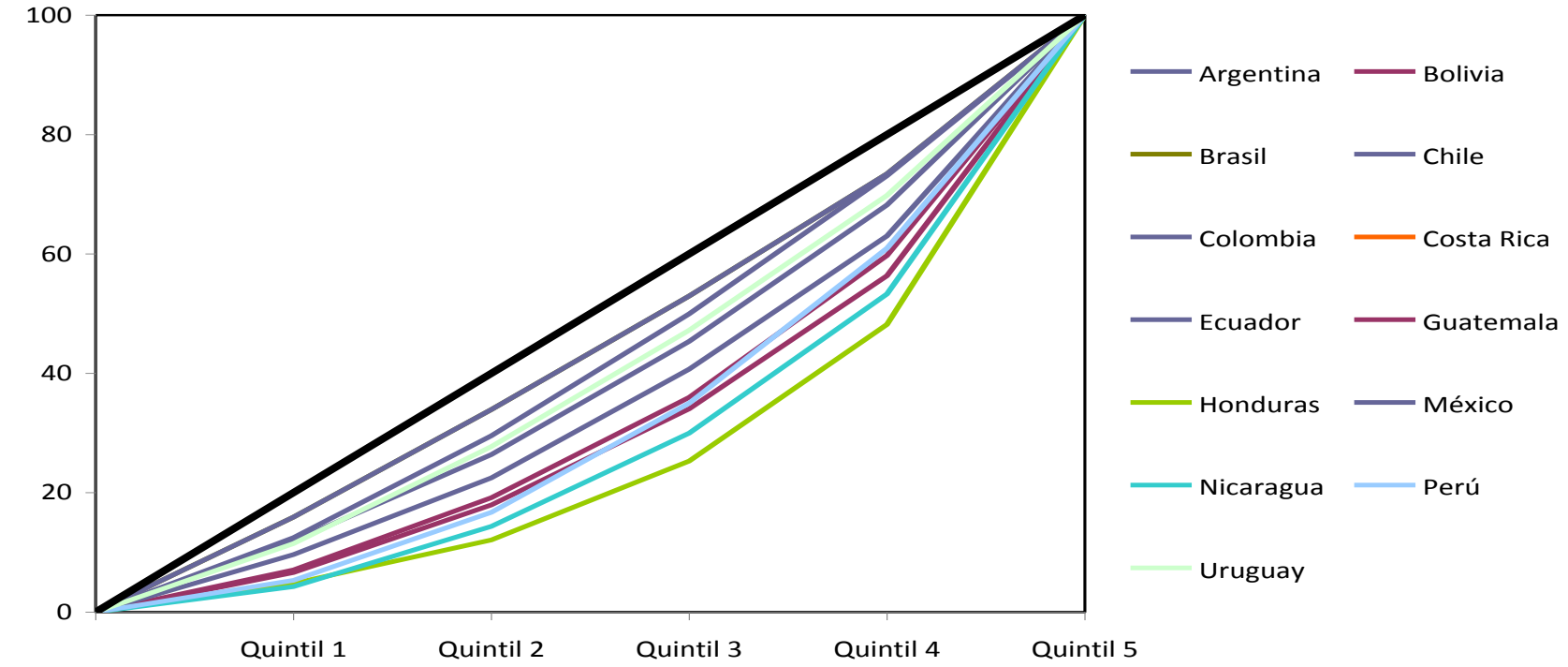
Fuente: Energy Efficiency trends at World level. World Energy Council (2010)

Household sector: Barriers to EE in LAC

- Large asymmetries in energy consumption by income group.
- Challenges: block tariffs, targeted subsidies to low income groups, cross subsidization of access to basic energy services.

  Poor information on end-use equipment.

LAC: distribution of household electricity expenditures by income group.

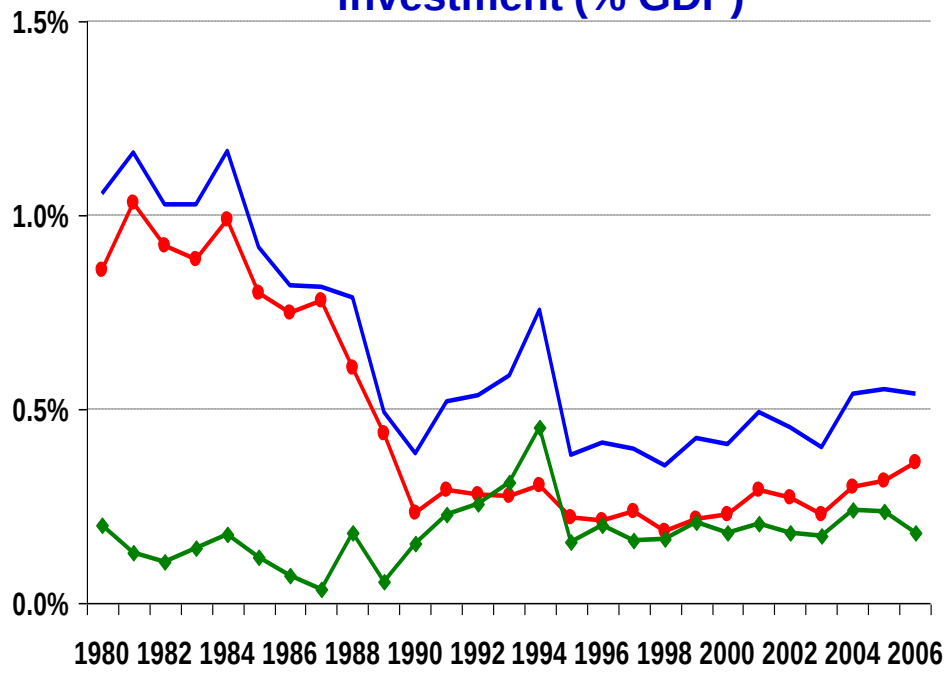


Fuente: Varinia Tromben CEPAL –DRNI. Base estadística CEPAL-STAT (2010)

Transport Sector : Barriers to Efficiency

- Lag in transportation infrastructure investments and mass transit systems.
- Weak urban planning and zoning policies.
- Importation of used cars (C. America).

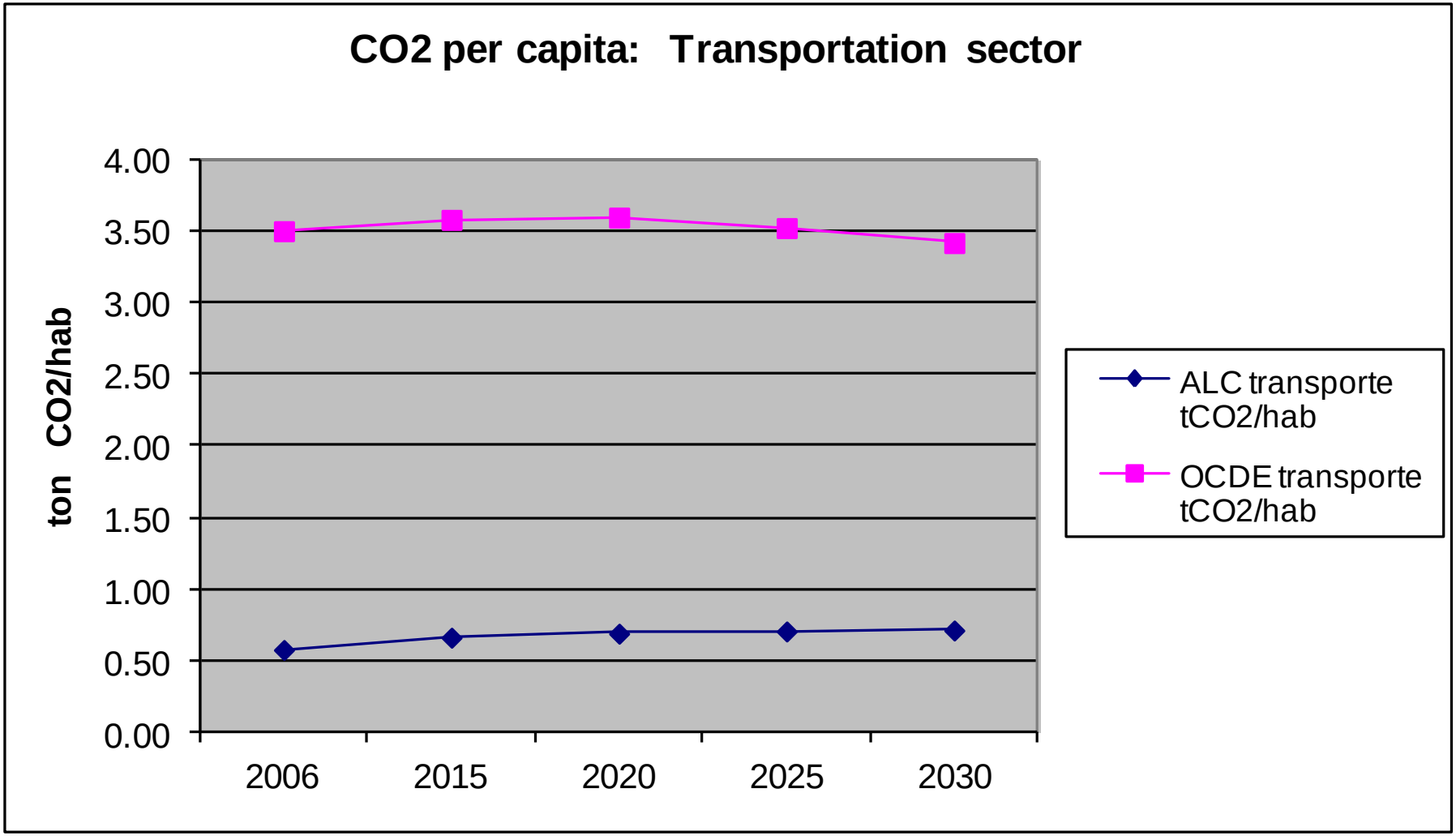
Land Transport infrastructure investment (% GDP)



Fuente: Calderón and Servén (2008) Seminario Infraestructura 2020 CEPAL, MOP-Chile. Santiago 10 de Noviembre 2008

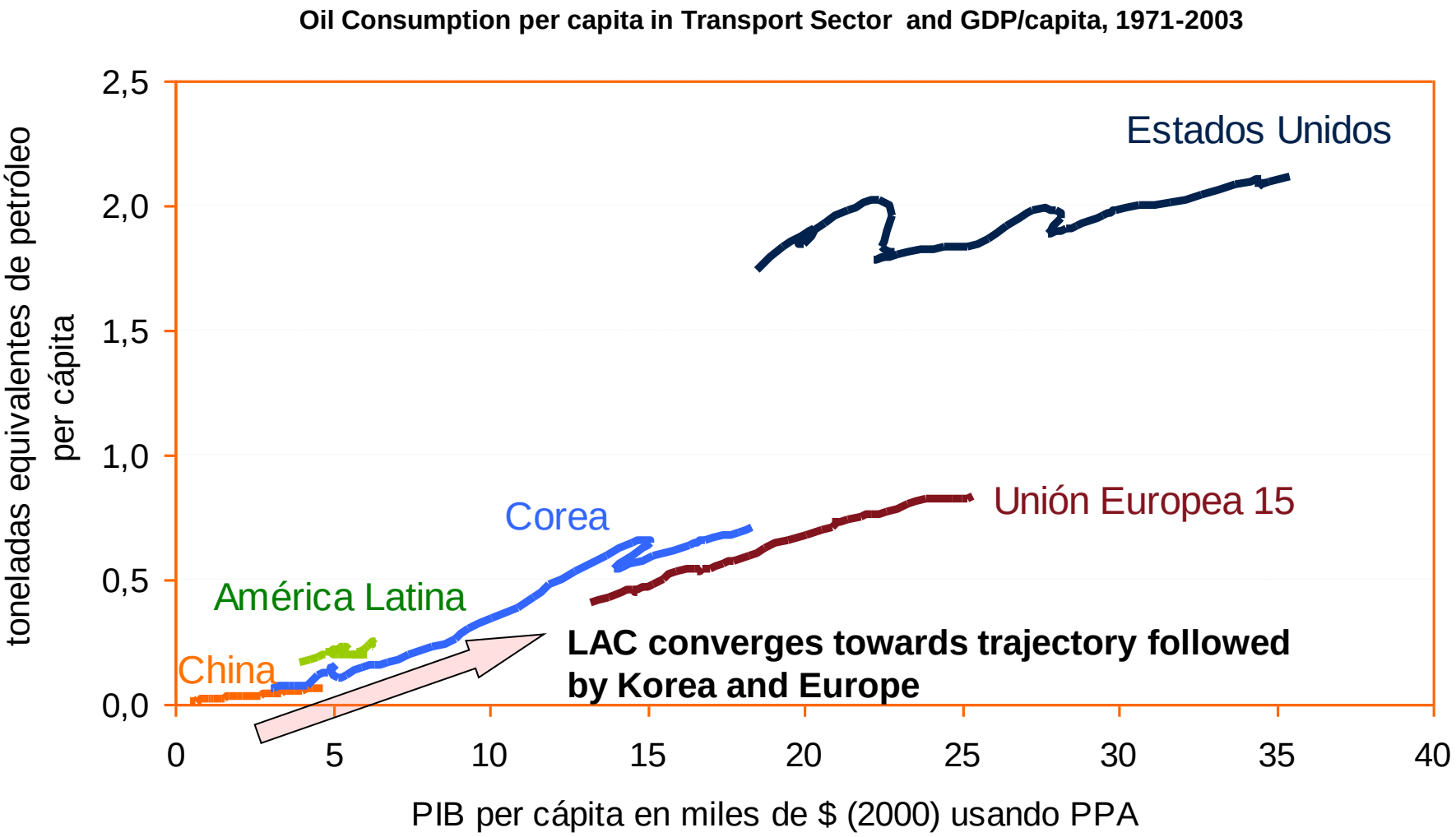
Urban planning and mass transit systems

- **IEA_OECD Reference Scenario 2010-2030 projection.**
  LAC set for growth in Tranportation CO2 per capita emissions.
  Still LAC 4 times below OECD median in 2030



Statistical Source: EIA CO2 from fuel combustion, Reference Scenario 2030, World Energy Outlook 2008.
Population statistics: CELADE –CEPAL, División de Población Naciones Unidas: Panorama de la Población Mundial: Revisión 2008.

Transportation Sector: Oil Consumption and convergence to higher income per capita trends GDP/capita 1971- 2003

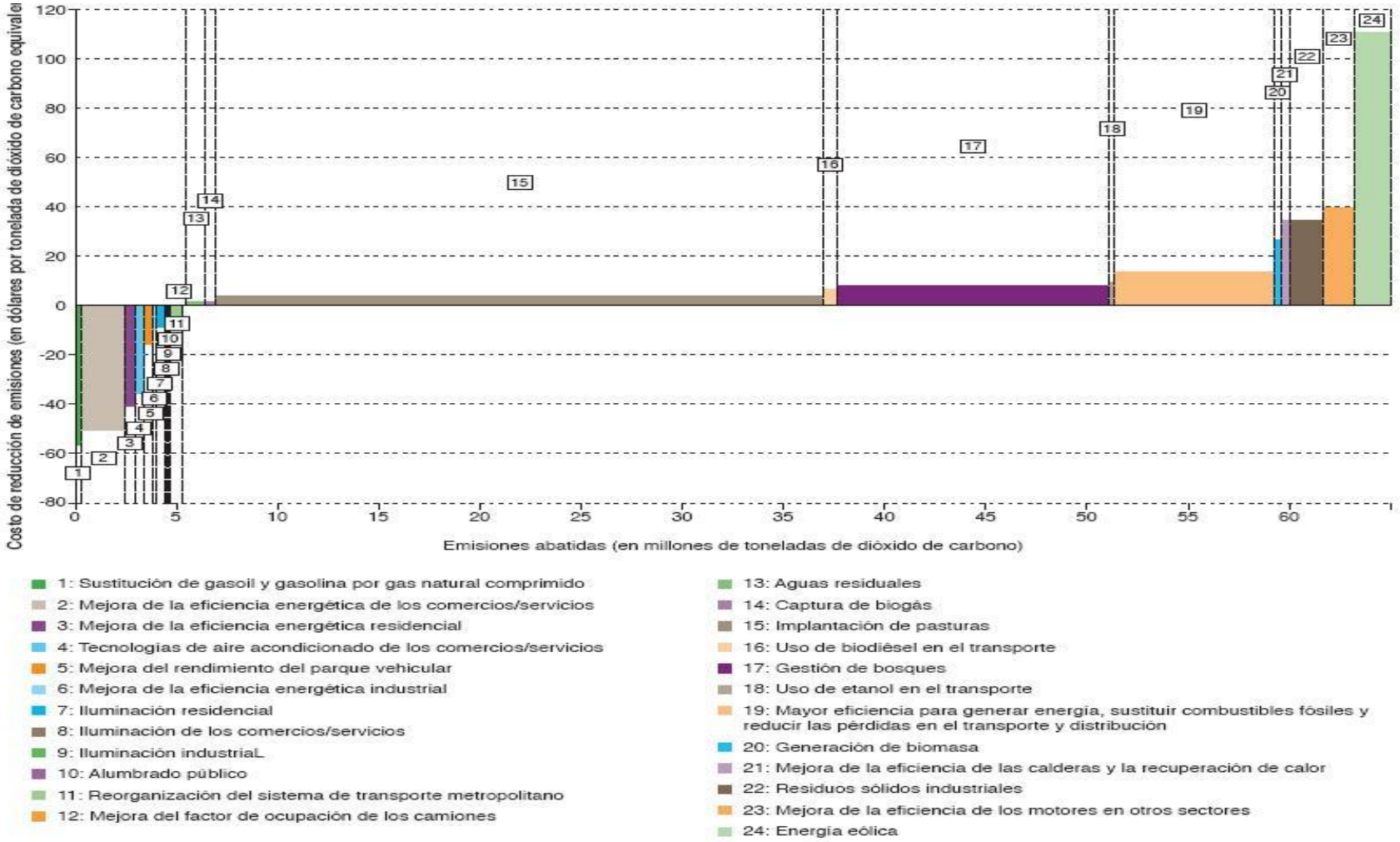


Fuente: AIE y FMI. Elaboración: Dirección de Estudios y Análisis del Entorno de Repsol YPF

Example: Uruguay EE abatement opportunities

Why we do not see more EE projects implemented in LAC?

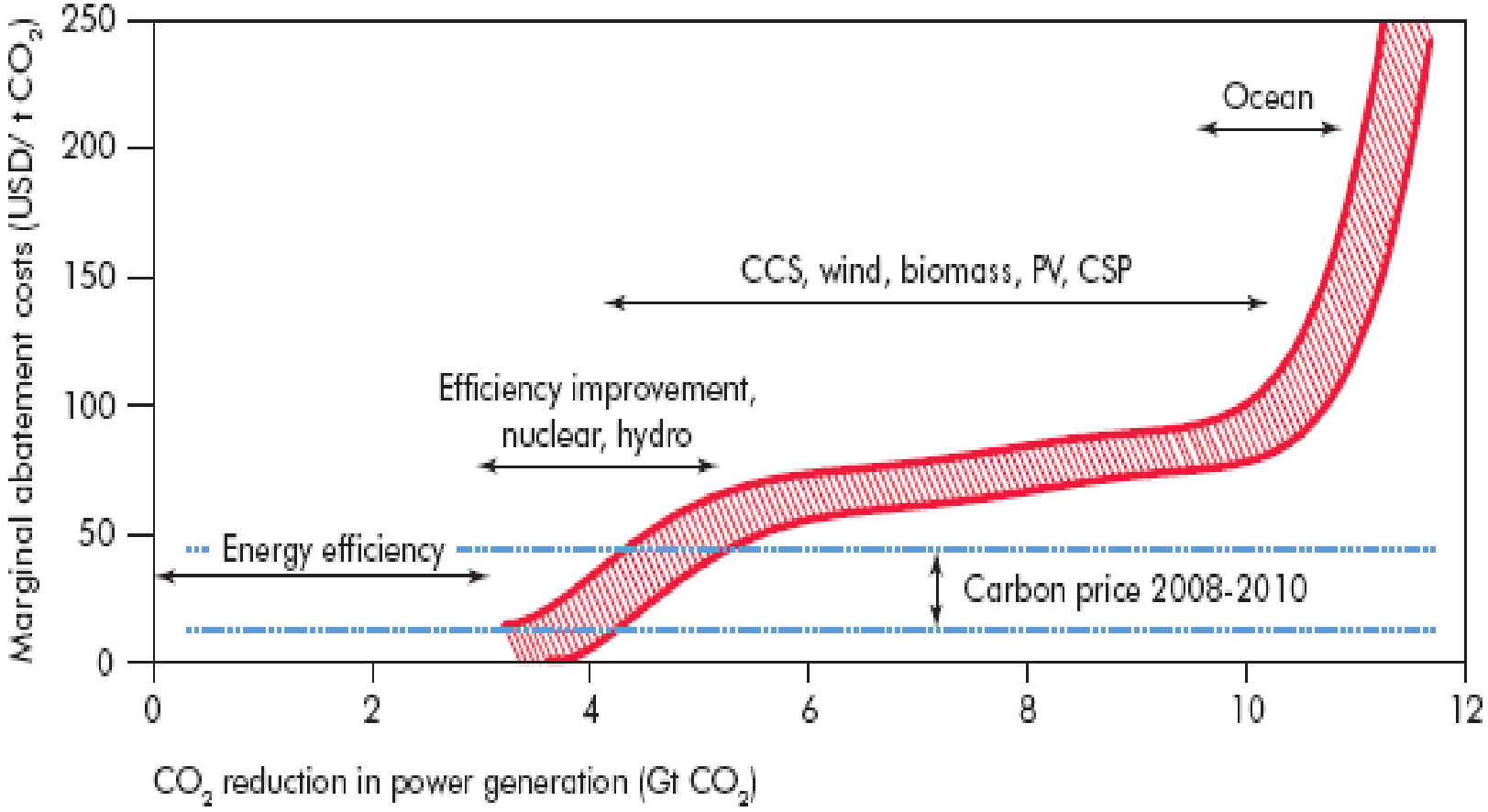
- **Under developed ESCO market**
- **Under developed financial intermediaries for EE project activities**



Fuente: Elaboración propia sobre la base de datos del Grupo Intergubernamental de Expertos sobre el Cambio Climático y la Unidad de Cambio Climático.

Energy Efficiency actions are the most cost-effective climate change mitigation option available 2010 – 2030 period

Figure 12.2 ▶ CO_2 mitigation costs in the electricity sector (2010-20) and current CO_2 prices



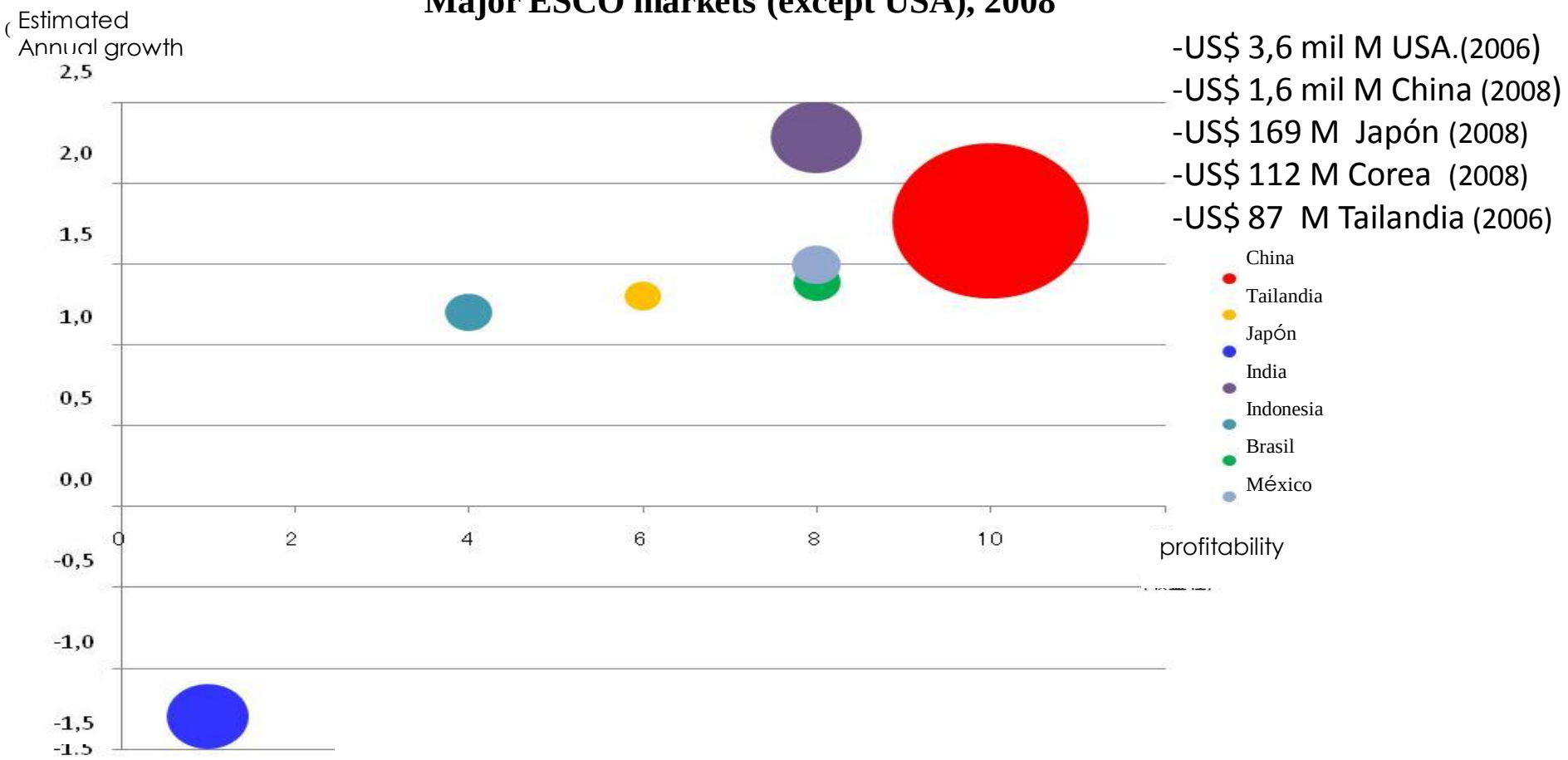
Source: CO_2 price data from the European Climate Exchange; accessed at www.ecx.eu.

Source: IEA World Energy Outlook 2010 - OECD

creating a national Energy Efficiency market requires policy action

- Development of ESCOs and EE project markets in Asia was based on specific policy actions.
- Financial innovation and specialized intermediation required (EE – ESCO contracts)

Major ESCO markets (except USA), 2008



-US$ 3,6 mil M USA.(2006)
-US$ 1,6 mil M China (2008)
-US$ 169 M Japón (2008)
-US$ 112 M Corea (2008)
-US$ 87 M Tailandia (2006)

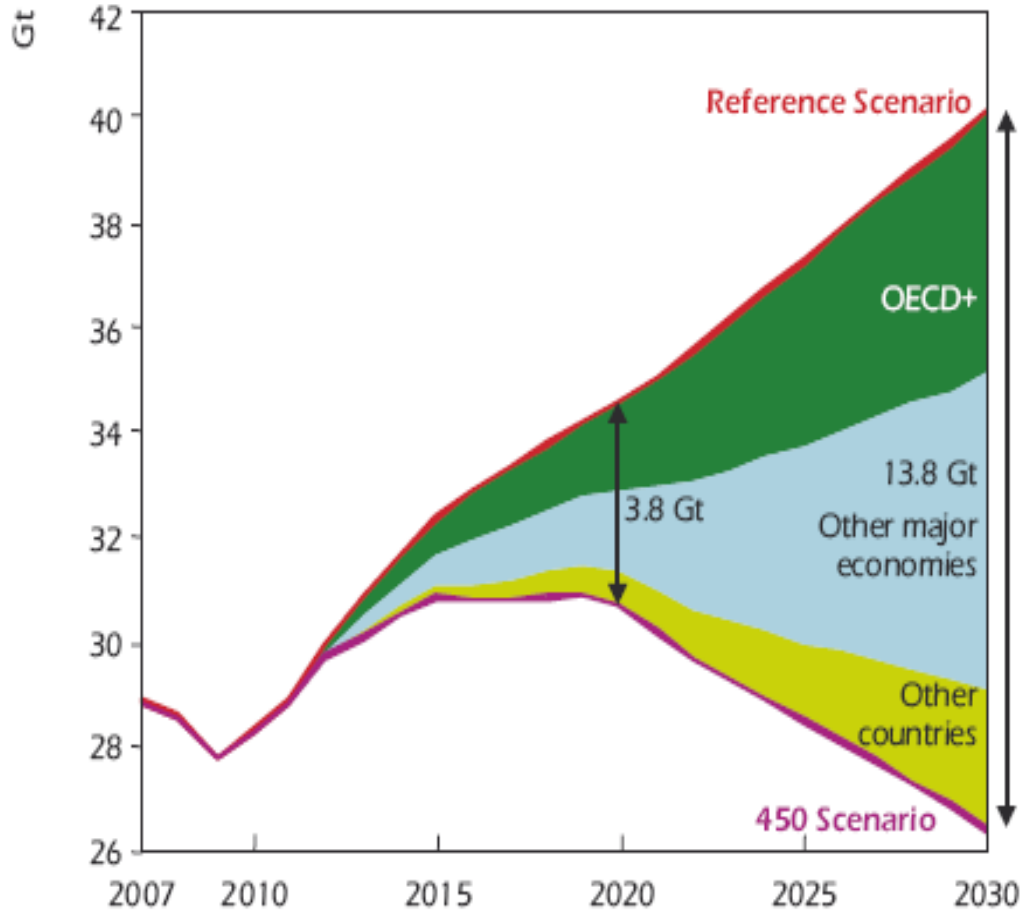
* Resumen de los datos de varias fuentes como la *Agencia Internacional* de *Energía* (AIE), la firma McKinsey y otras.
* Tamaño de los círculos: Volumen de las emisiones de CO_2 en 2008, Potencial de crecimiento: Pronóstico del 2030/Resultados reales del 2008, Rentabilidad: Se calculó de varios datos estableciendo a China como 10.

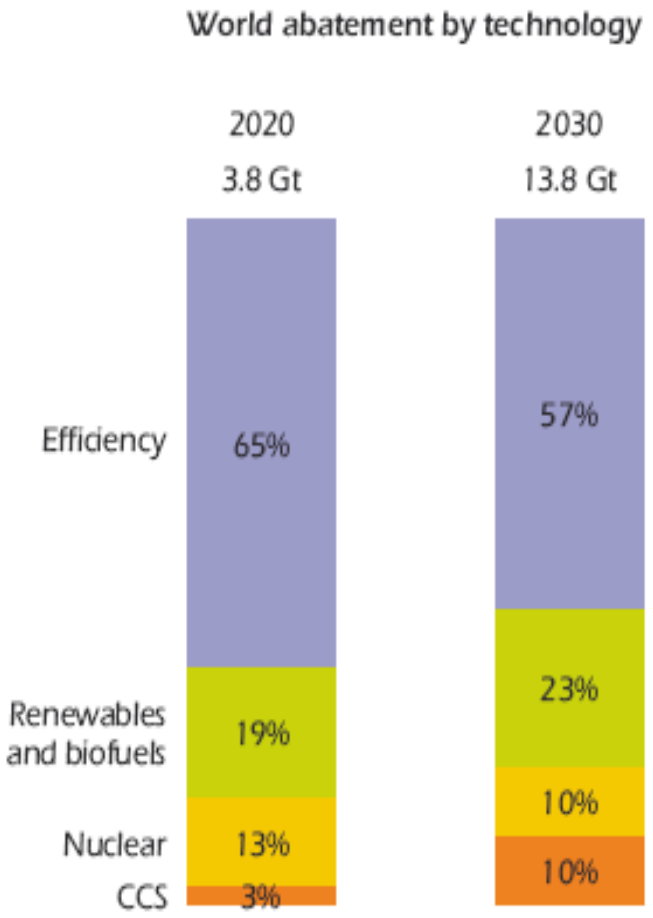
Policy Challenges: Energy Saving EE

1. Remove specific barriers identified in each sector.
2. Development of national ESCO market, specialized financial intermediation and aggregation mechanisms for EE projects.
3. Targeted technical extention services and capacity building for EE opportunities in small/medium enterprise and informal sectors.
4. Strengthening of National EE policies, plans and targets.
5. Develop statistical capacity and official indicators for baseline measurement and tracking progress in energy use efficiency. Including specific energy consumption and energy intensity trends by sector.
6. Develop capacity for Demand Management, including removal of existing price distortions and non-targeted energy subsidies.
7. Strong political will is required to enforce National EE plans and achieve 20% energy efficiency gains relative to Business-as-Usual Scenario in the 2010-2030 time horizon.

It will not be easy!!!

World abatement of energy-related CO_2 emissions in the 450 Scenario





An additional USD 10.5 trillion of investment is needed in total to stabilise concentrations of CO_2 at 450 parts per million (450 Scenario) and keep global temperature increase to 2 C° – measures to boost energy efficiency account for most of the abatement to 2030

Source: IEA World Energy Outlook 2009 - OECD

LAC participation in IEA Climate Change Mitigation Scenario

PARTICIPACIÓN REGIONAL EN LAS EMISIONES CO_2 GLOBALES EN 2005-2030, Y EN LA INVERSIÓN ADICIONAL REQUERIDA EN EL ESCENARIO DE MITIGACIÓN

REGIONES	Emisiones CO_2 2005 ACTUAL 27 Gt CO_2 Participación regional %	Emisiones CO_2 2030 Esc. REFERENCIA 42 Gt CO_2 Participación regional %	Inversión adicional en 2030 Esc. MITIGACION - 15 Gt CO_2 Reducción necesaria vs. Esc. Referencia Millones USD (dólar 2006)
América Latina	3,5 %	3,9 %	$ -5 670
Brasil			$ -1 220
Otros ALC			$ -4 350
México			$ 6 470
Asia	28,0 %	41,6 %	$ 41 300
China	19,0	27,3	$ 33 500
India	4,3	7,9	$ 7 600
Países en Desarrollo	39,0 %	55 %	$ 38 700
OECD	48,0 %	36,0 %	$ 66 900
EEUU	18,2	16,4	$ 51 800
Unión Europea	14,5	10	$ 6 800
Mundial	100	100	$ 109 000

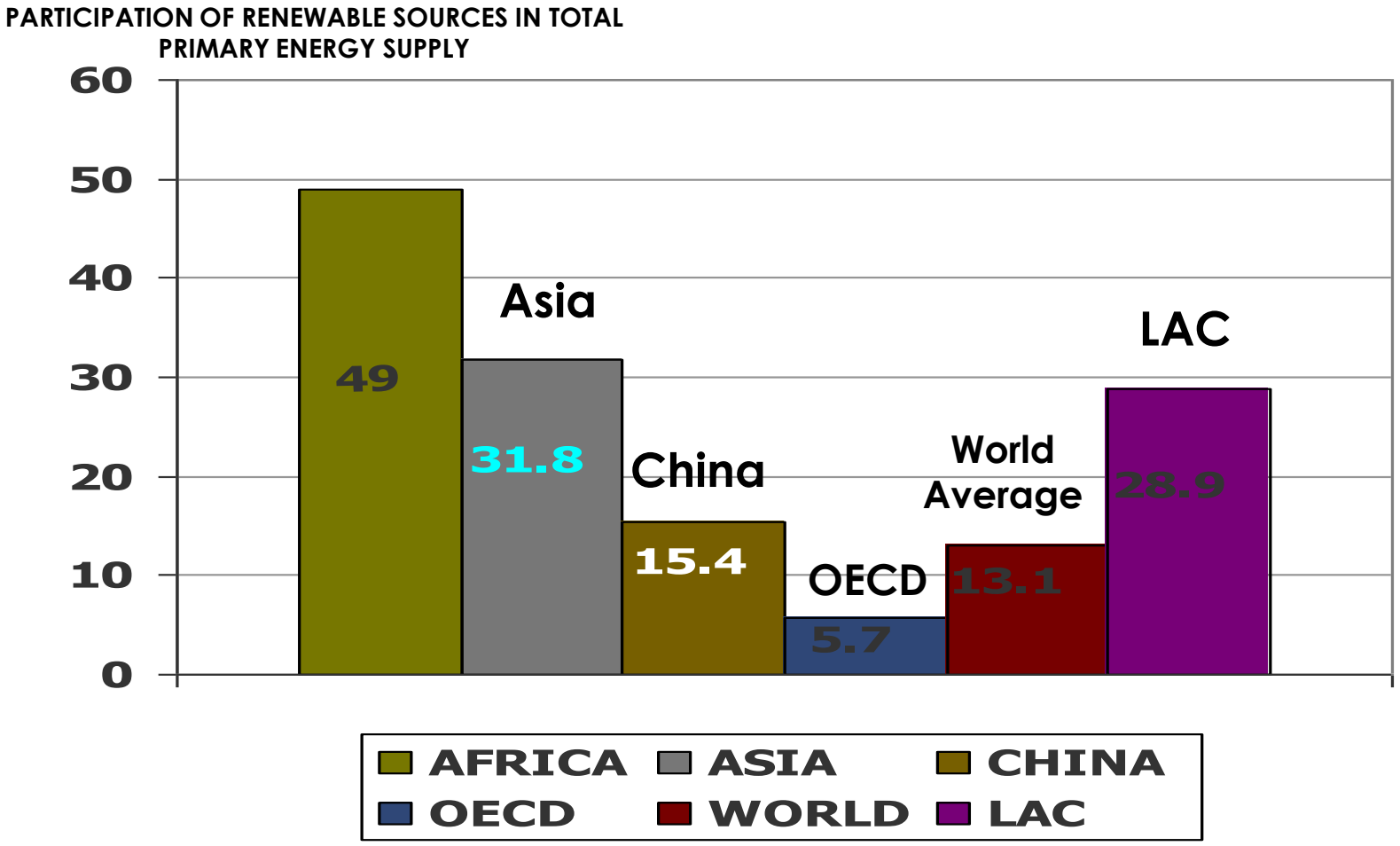
Fuente: Elaboración propia con base en estadísticas: IEA WEO 2007, UNFCCC 2007

Contents

Energy saving and Clean Energy in LAC: where do we stand?

2. Renewable Energy

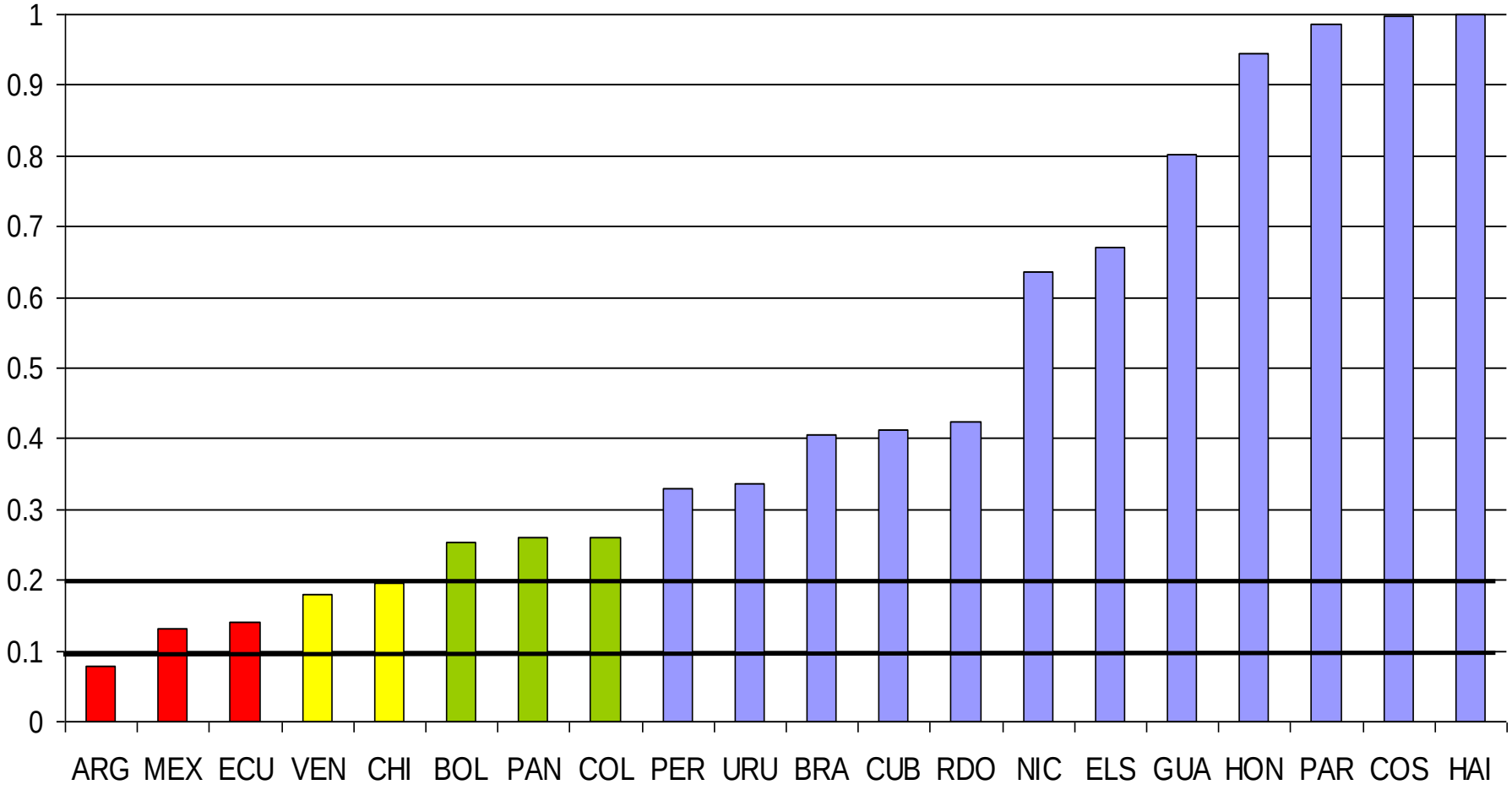
LAC: Renewable energy share in Total Primary Energy Supply remains above the World's Average due to large share of Hidroelectricity.



Statistical Source: IEA, Renewables in Global Energy Supply. January 2007, OLADE Sistema de Información Económico Energético. Mayo 2007

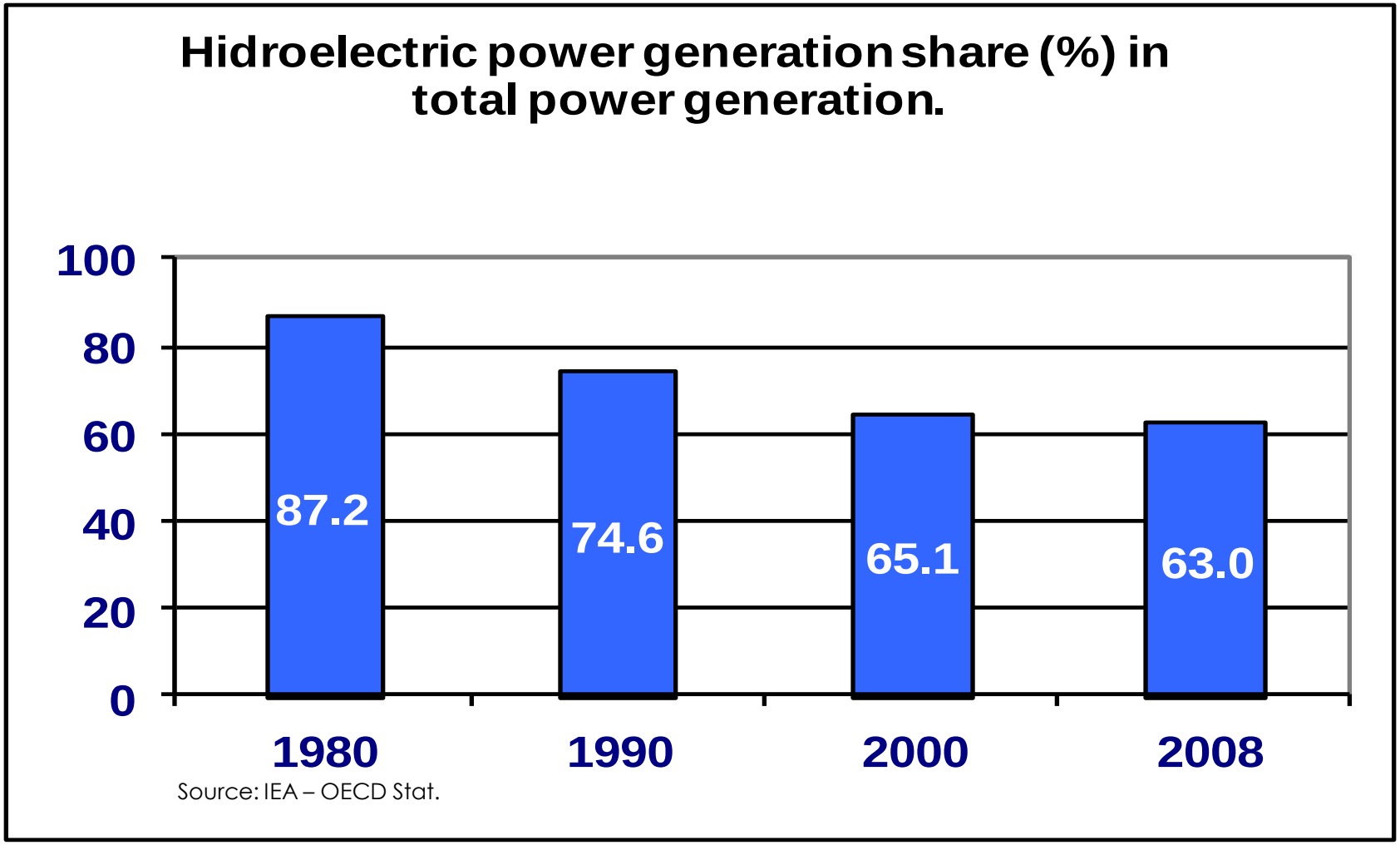
However there is large heterogeneity across countries in the region

Renewability Index: Renewable Energy Supply / Total Primary Energy Supply



Source: Fuentes renovables de energía en América Latina y el Caribe: dos años después de la Conferencia de Bonn. CEPAL, 2006.

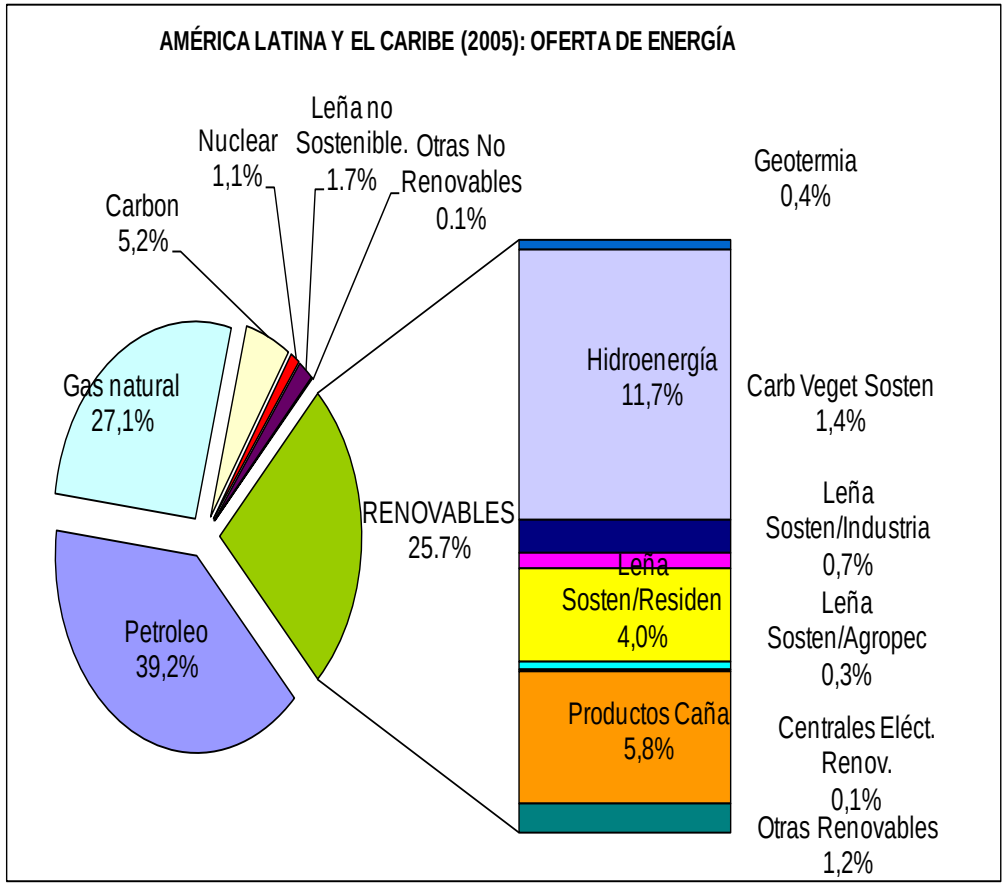
Large Hidroelectricity share in power generation has been decreasing since the 1990s



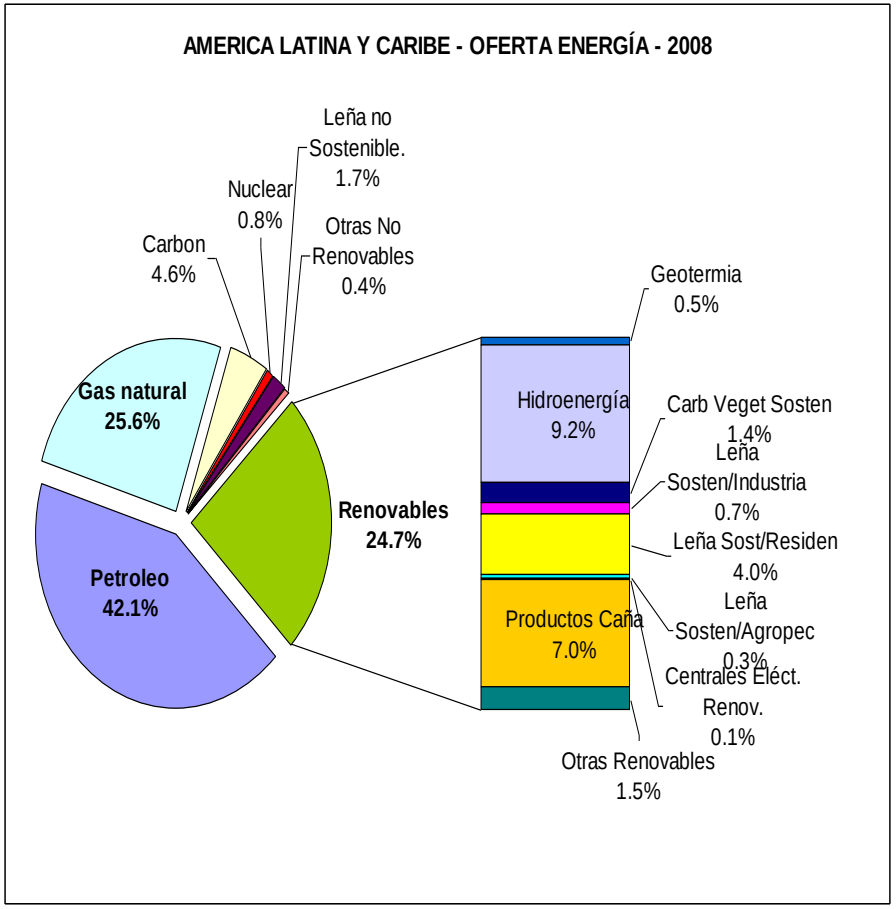
Source: Own elaboration based on statistical data from SIEE (OLADE) and IEA database.

Hidroelectricity share has decreased from 12% to 9%, Non-conventional Renewables share is growing (0.1% a 0.4%)

2005 - 5034 MMBEP

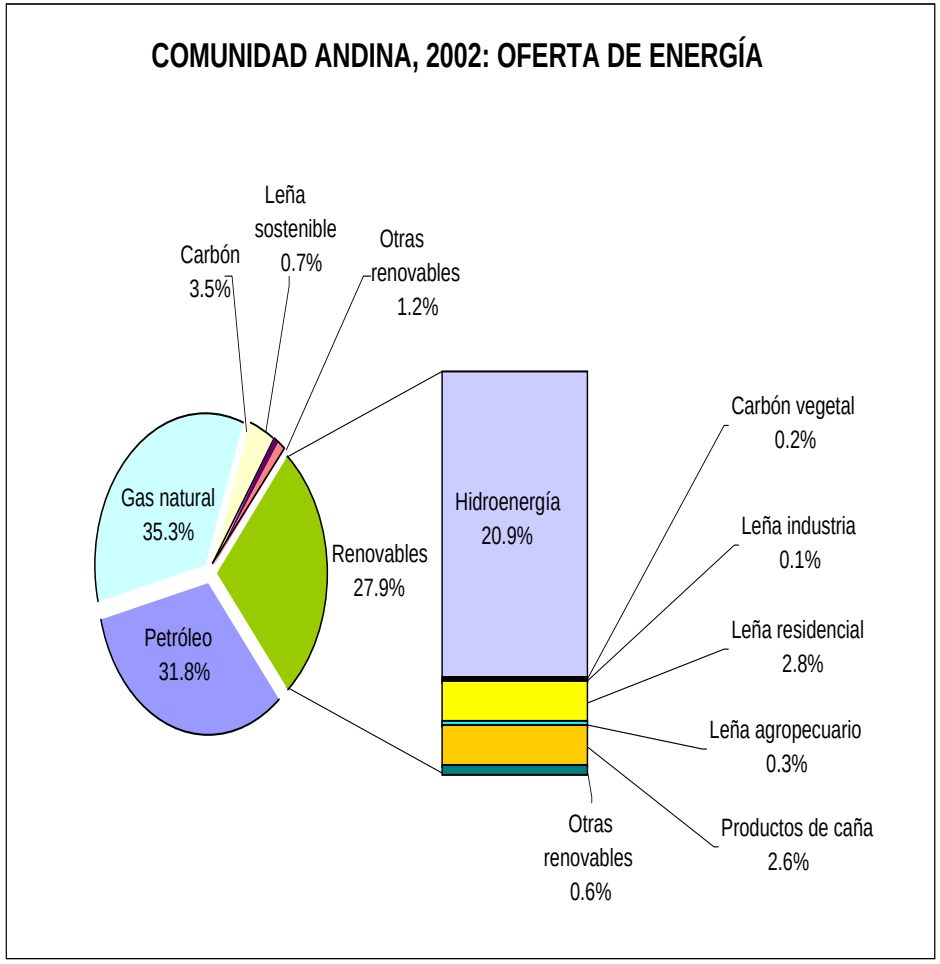


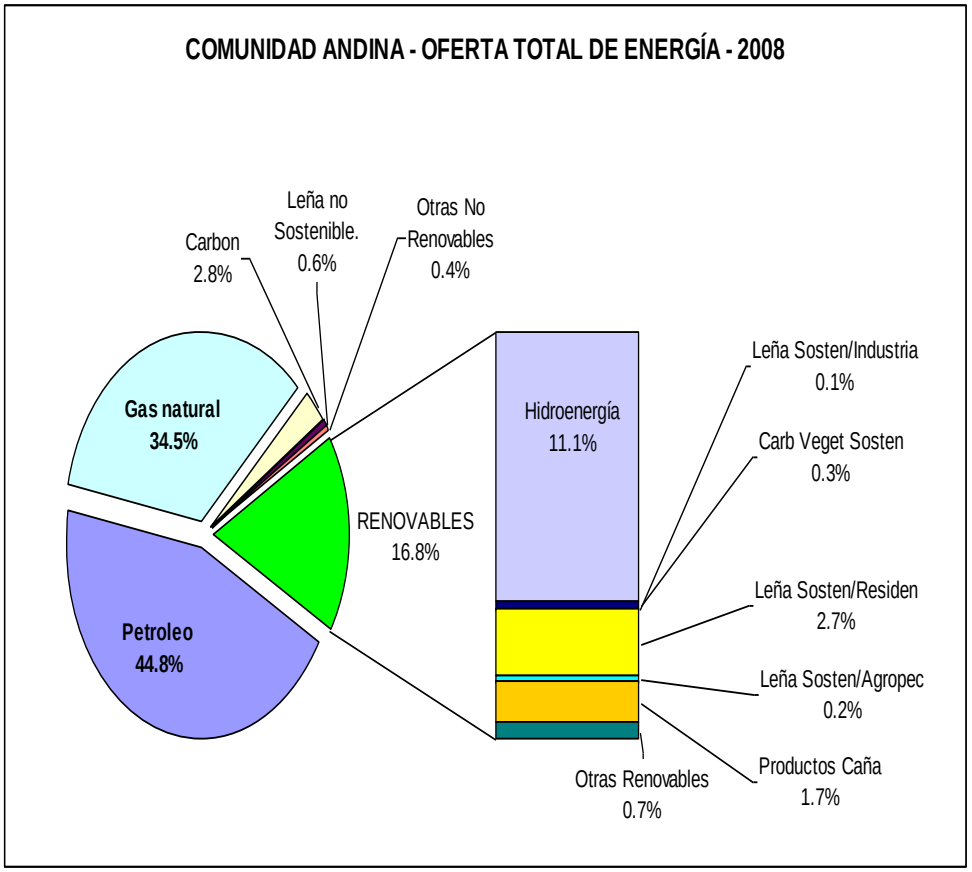
2008 - 5540 MM BEP



Source : Elaboración propia con datros de IEA, Renewables in Global Energy Supply. January 2007 y OLADE Sistema de Información Económico Energético. Mayo 2007

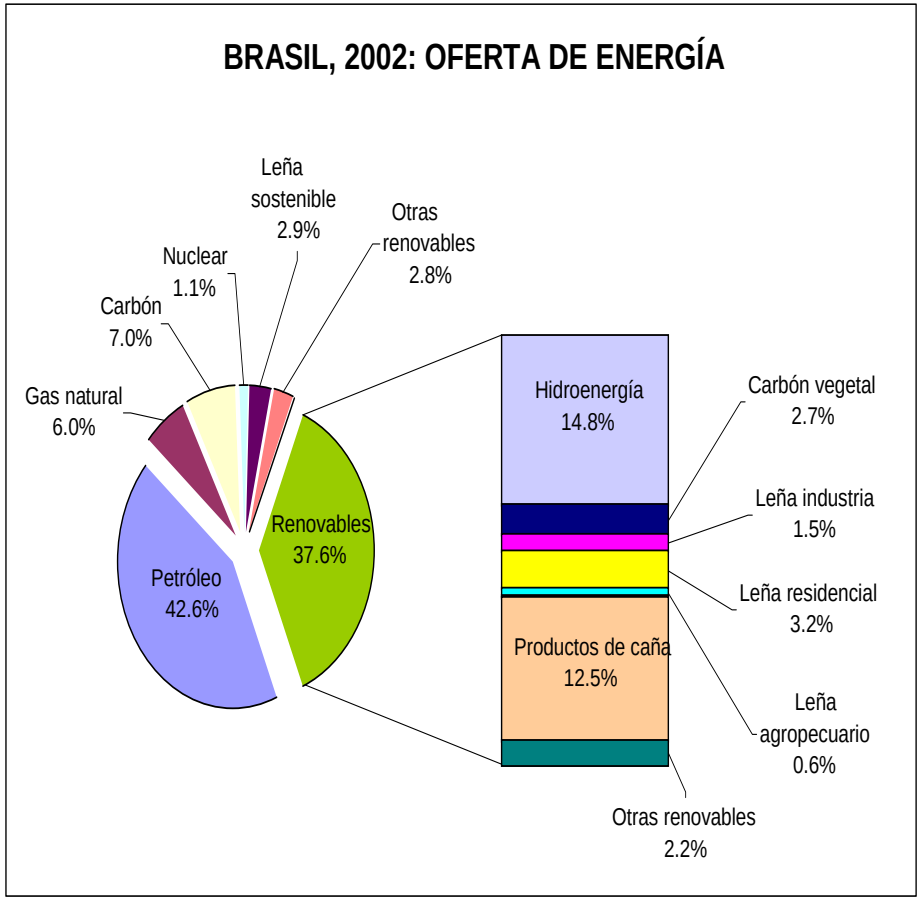
Andean Community 2002 – 2008
Hidroelectricity share decreases from 21% to 11%

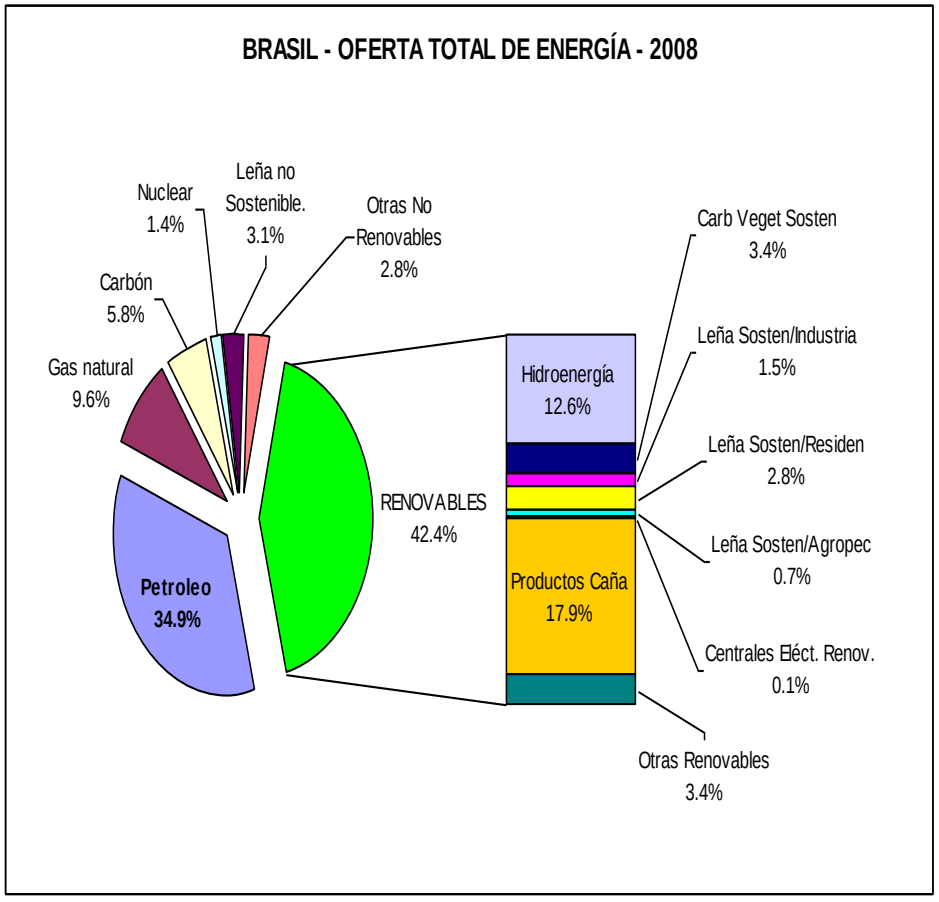




Source: Elaboración propia con datros de IEA, Renewables in Global Energy Supply. January 2007 y OLADE Sistema de Información Económico Energético. Mayo 2007

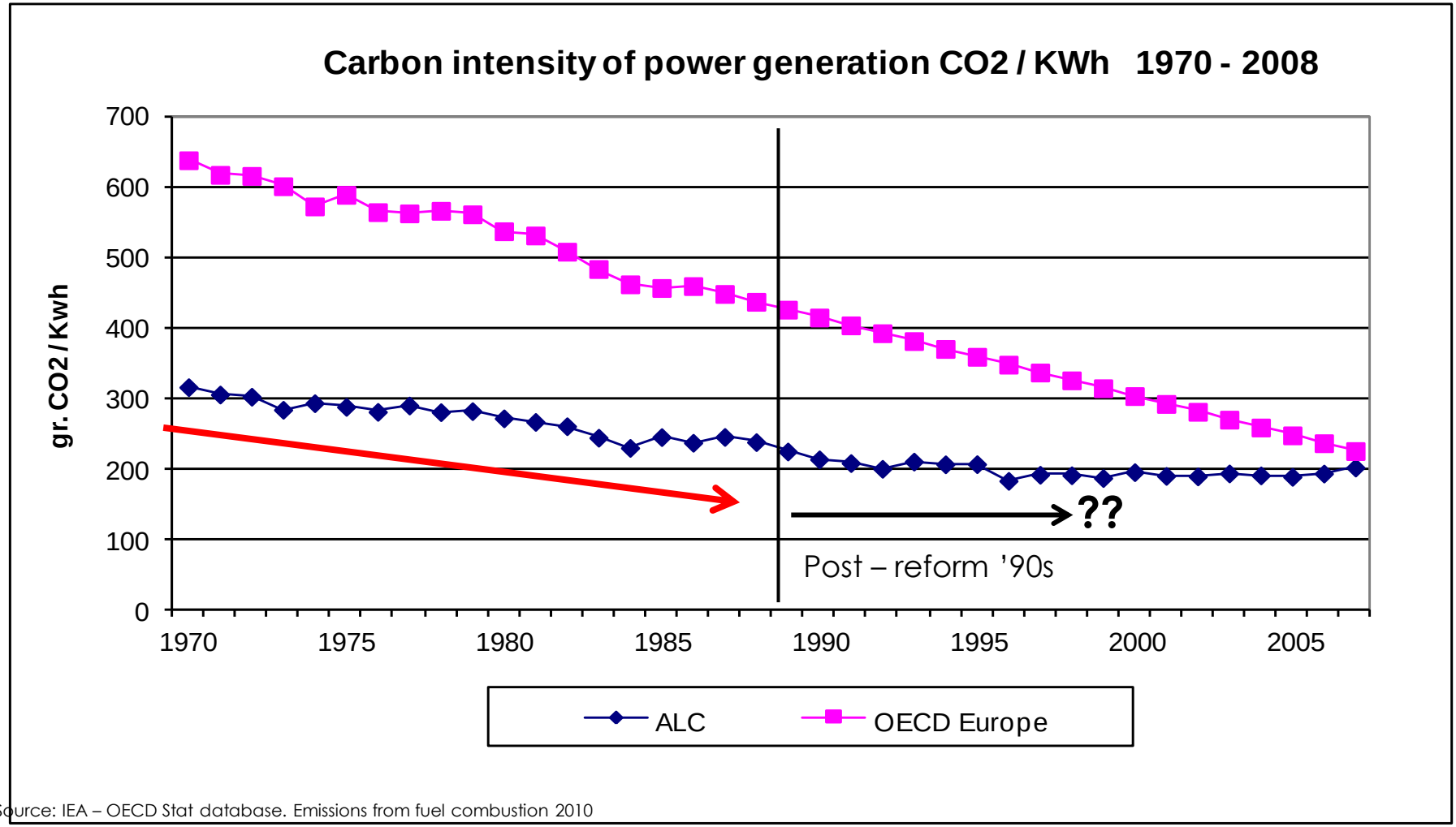
Brasil 2002 – 2008
Hidroelectricity share decreases from 15% to 13%, sugar cane bagasse rises from 13% to 18%





Source: Elaboración propia con datros de IEA, Renewables in Global Energy Supply. January 2007 y OLADE Sistema de Información Económico Energético. Mayo 2007

Electric Power sector policy reforms during 1990s have favored the economics of Thermal Generation projects over Large Hidro projects (riskier) CO2 per KWh generated rises after 1994



Source: IEA – OECD Stat database. Emissions from fuel combustion 2010

Source : J. Acquatella, H. Altomonte . CEPAL with IEA Statistics.

LAC countries already have in place policy incentives to promote penetration of non-conventional Renewable Energy sources.

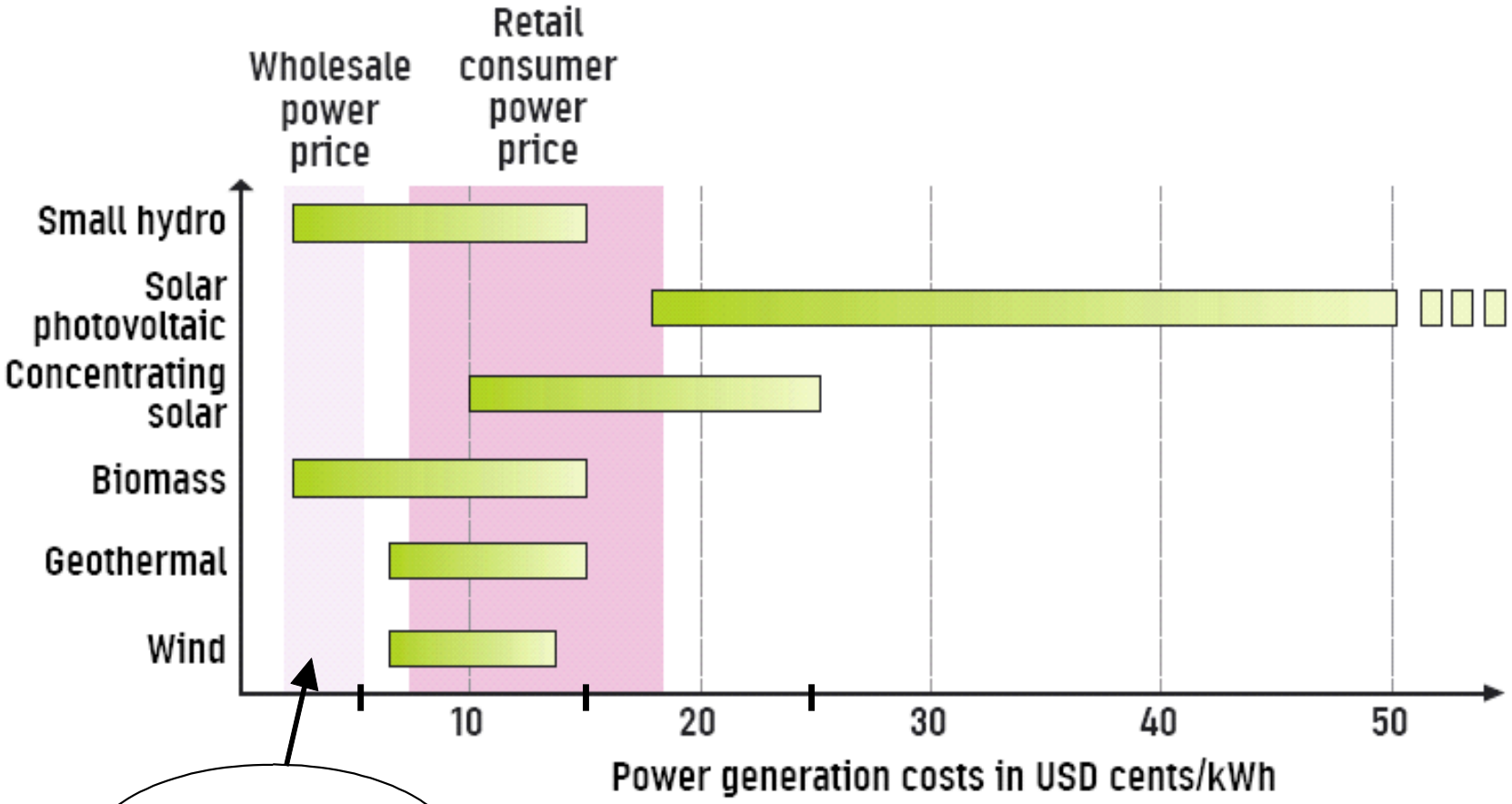
However these incentives have limited impact over market realities and project economics of non-conventional renewable energy sources.

Table 2. Renewable Energy Promotion Policies

Country	Feed-in tariff	Renewable portfolio standard	Capital subsidies, grants, or rebates	Investment or other tax credits	Sales tax, energy tax, excise tax, or VAT reduction	Tradable renewable energy certificates	Energy production payments or tax credits	Net metering	Public investment, loans, or financing	Public competitive bidding
Developing countries										
Argentina	✓		✓	(*)	✓		✓			
Brazil	✓								✓	✓
Chile			✓							
China	✓		✓	✓	✓				✓	✓
Costa Rica	✓									
Ecuador	✓			✓						
Guatemala				✓	✓					
Honduras				✓	✓					
Mexico				✓				✓		
Nicaragua	✓			✓	✓					
Panama							✓			

Source: REN21 "Renewables, Global Status Report, march 2008.

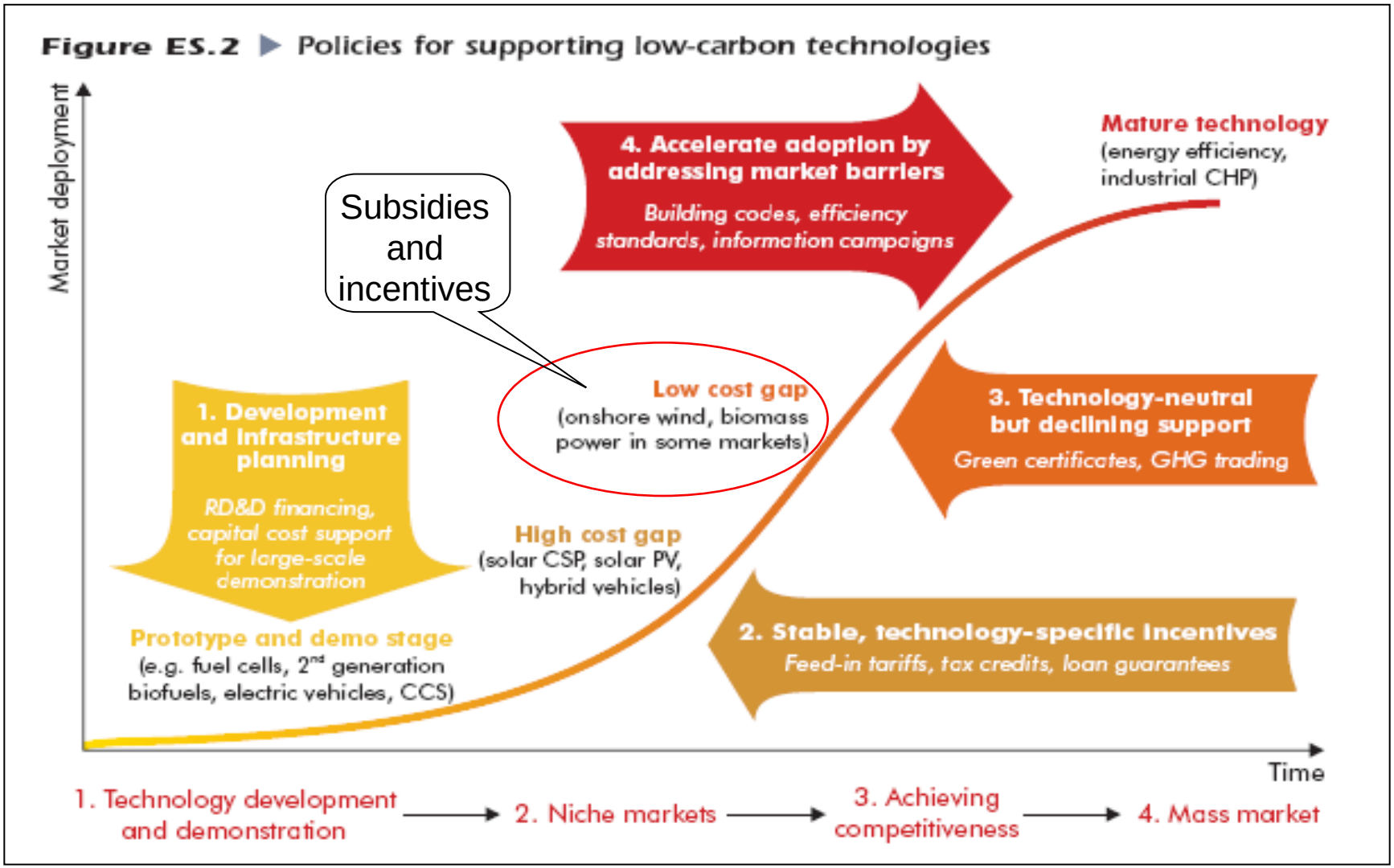
Cost-competitiveness of Selected Renewable Power Technologies



- Medium-Big Hydro
- Natural Gas
- Oil & Coal

Source, IEA, January 2008

LAC countries (middle income) generally absorb energy technologies after initial development and maturity phases.



Source: IEA Energy Technology Perspectives 2010. IEA-OECD

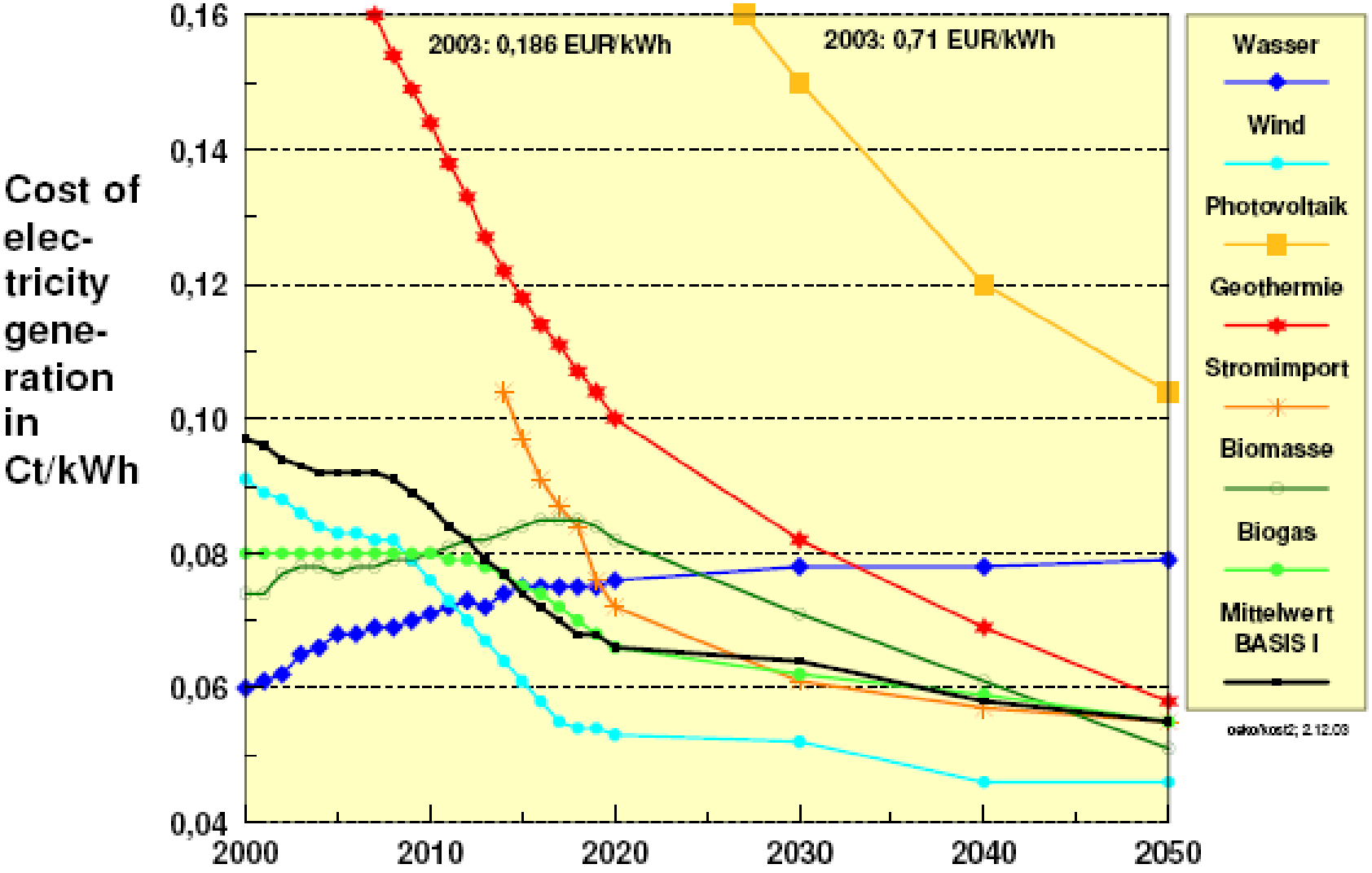
In spite of Policy Incentives deployed, incipient development of NCRE projects evidence the persisting gaps in unitary costs relative to conventional sources that cannot be breached via subsidies nor fiscal incentives.

Table 2. Renewable Energy Promotion Policies

Country	Feed-in tariff	Renewable portfolio standard	Capital subsidies, grants, or rebates	Investment or other tax credits	Sales tax, energy tax, excise tax, or VAT reduction	Tradable renewable energy certificates	Energy production payments or tax credits	Net metering	Public investment, loans, or financing	Public competitive bidding
Developing countries										
Argentina	✓		✓	(*)	✓		✓			
Brazil	✓								✓	✓
Chile			✓							
China	✓		✓	✓	✓				✓	✓
Costa Rica	✓									
Ecuador	✓			✓						
Guatemala				✓	✓					
Honduras				✓	✓					
Mexico				✓				✓		
Nicaragua	✓			✓	✓					
Panama							✓			

Source: REN21 "Renewables 2007, Global Status Report, march 2008.

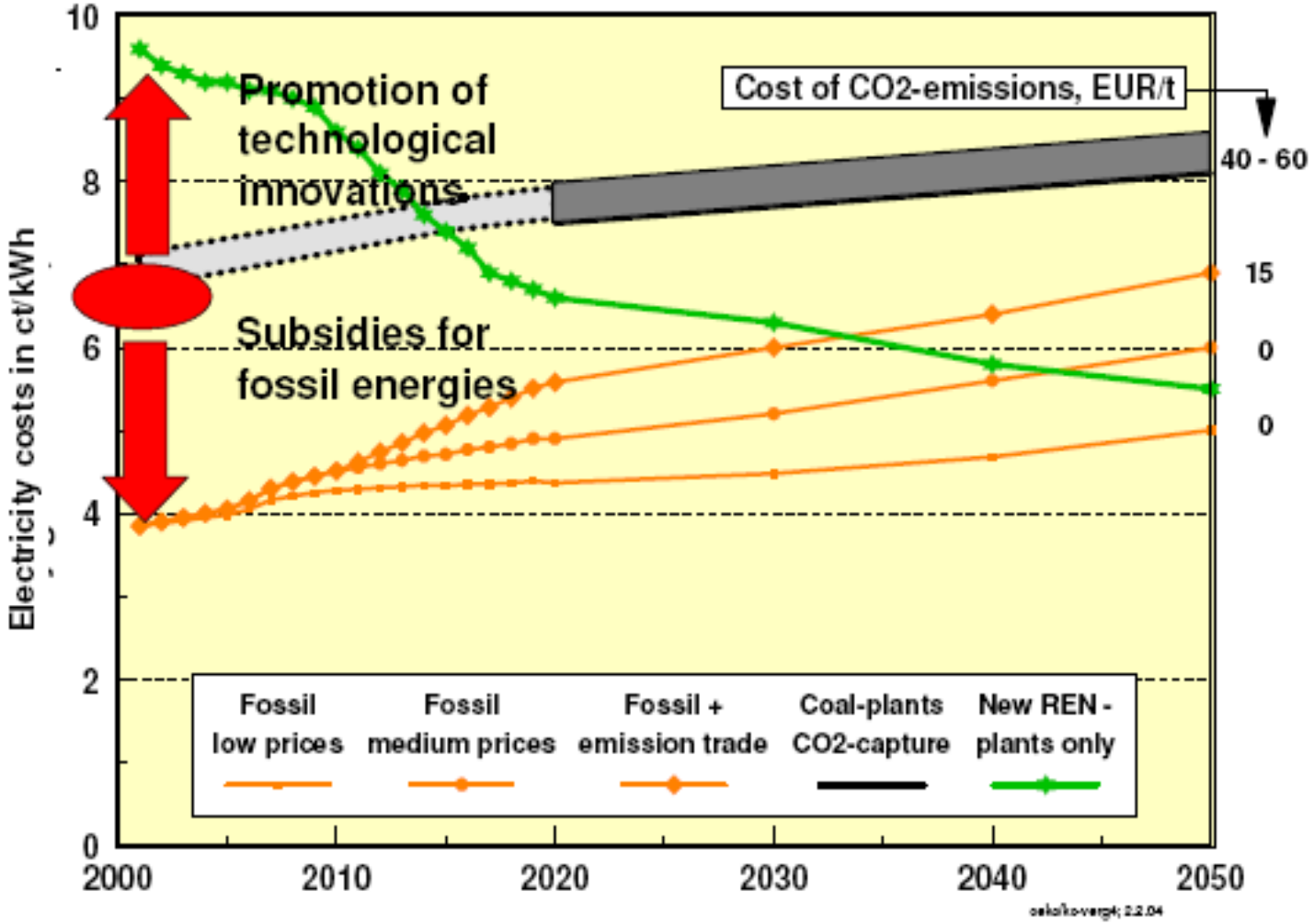
Expected reduction of unitary costs (Ct/kWh) by technology 2010 - 2030



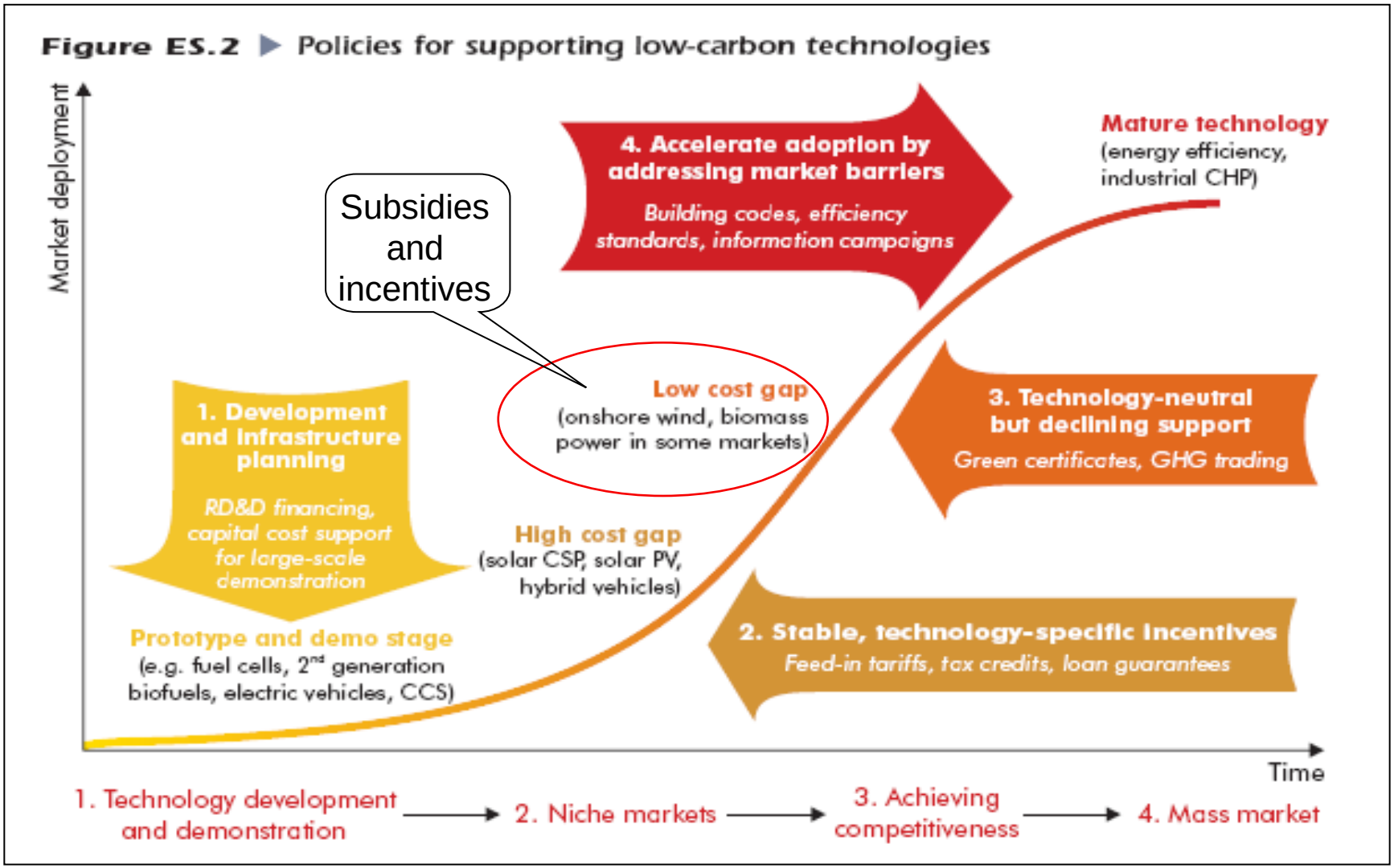
Source: Umwelt Bundes Amt study, Germany

Umwelt Bundes Amt
Für Mensch und Umwelt

Comparison of technological options in the time scale



LAC countries (middle income) generally absorb energy technologies after initial development and maturity phases.



Source: IEA Energy Technology Perspectives 2010. IEA-OECD

Contents

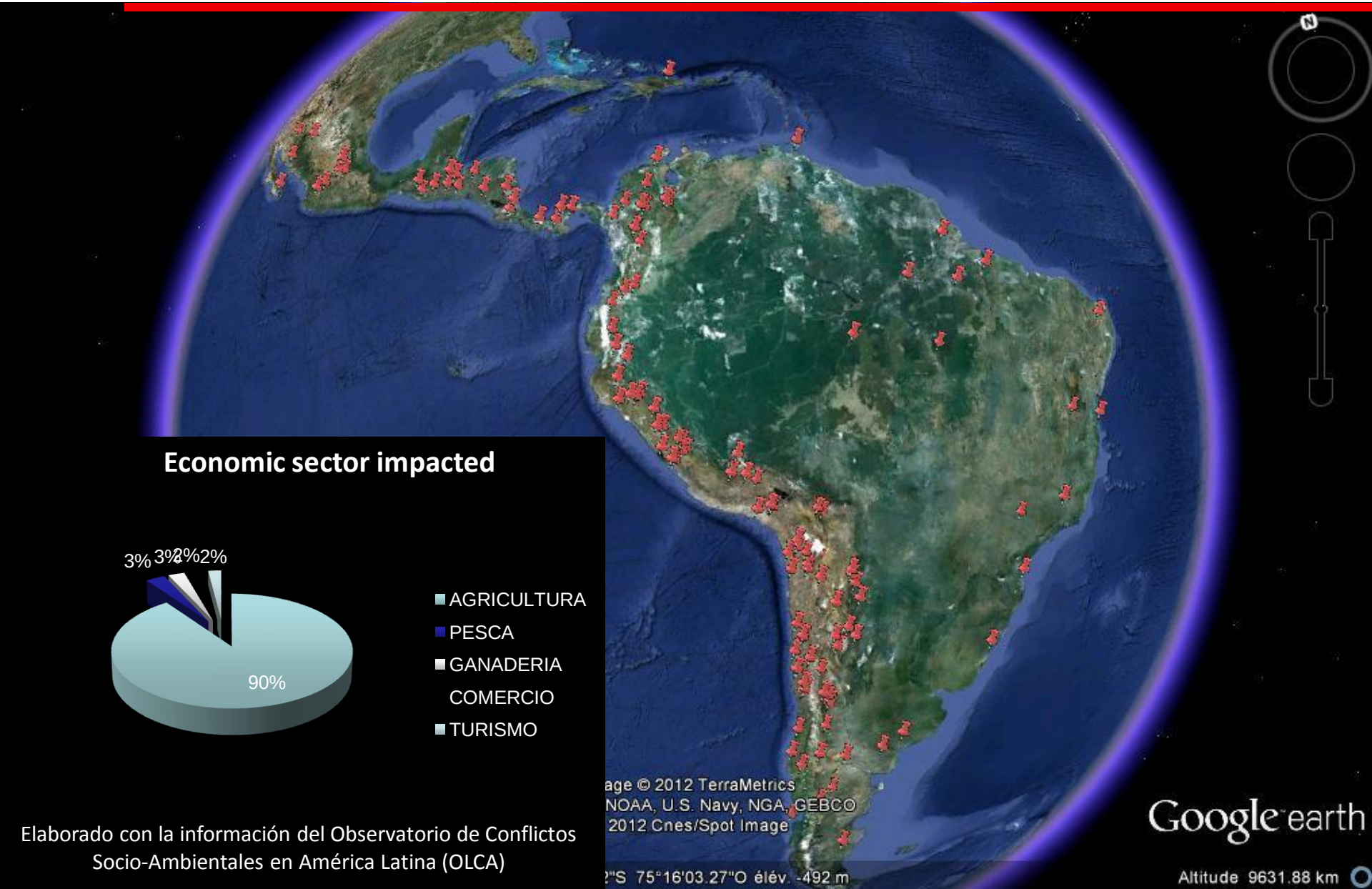
3. Current trends and drivers of Eco-Business promotion in LAC

- Eco-Business drivers: market access concerns vs. national policy?

- Observed trends and results:

  - Increased number of socio-environmental conflicts in project development.
  - Corporate (CSR) and Government policy responses.
  - Managing tension between: economic growth and poverty reduction goals vs. “green” business and clean energy promotion policies.

Increasing socio-environmental conflicts to project development



Elaborado con la información del Observatorio de Conflictos Socio-Ambientales en América Latina (OLCA)

Corporate Social Responsibility drivers:

Market Access concerns, Consumer preferences, or Policy Incentives?

working with the Carbon Trust	The carbon footprint of this product is 850g per wash and we have committed to reduce this
850g CO2 per wash	By comparison the carbon footprint of non-biological washing liquid is 600g per wash
	Help to reduce this footprint. Washing at 30°C rather than 40°C saves 160g CO2 per wash

working with the Carbon Trust	
200g CO2 per account	The carbon footprint of this account is 200g per year and we have committed to reduce it
	This is the total carbon dioxide (CO2) and other greenhouse gases emitted in providing the account, including setup, ongoing use and closure

Overview - Conclusions

1. Energy saving and Clean Energy in LAC: where do we stand?

- Observed trends: Large Hidro decreasing share. How effective is NCRE promotion?
- Current barriers impeding the development of a dynamic market for Energy Efficiency (EE) and NCRE projects in LAC
- Current status of national EE policies in LAC.
- Lessons from Asia's experience (ESCO market development in Japan, China, Thailand)
- Policies to promote accelerated penetration of Non-conventional Renewable Energy
- Trends in large Hydroelectricity projects.

2. Current trends and drivers of Eco-Business promotion in LAC

- Eco-Business drivers: market access concerns vs. national policy?
- Observed trends and results:
  - Increased number of socio-environmental conflicts in project development.
  - Corporate (CSR) and Government policy responses.
  - Managing tension between: economic growth and poverty reduction goals vs. "green" business and clean energy promotion policies.

3. Policy challenges in the 2010 – 2030 time horizon.

- Consolidate national Energy Policies (rebuild long term planning capacity).
- Energy demand management: baseline statistics, national EE policy, measure progress.
- Consolidate ESCO and EE project markets, finance channels, remove distortions and market barriers to EE and clean energy projects.

Thank you very much

Annexes.

UNITED NATIONS

ECLAC

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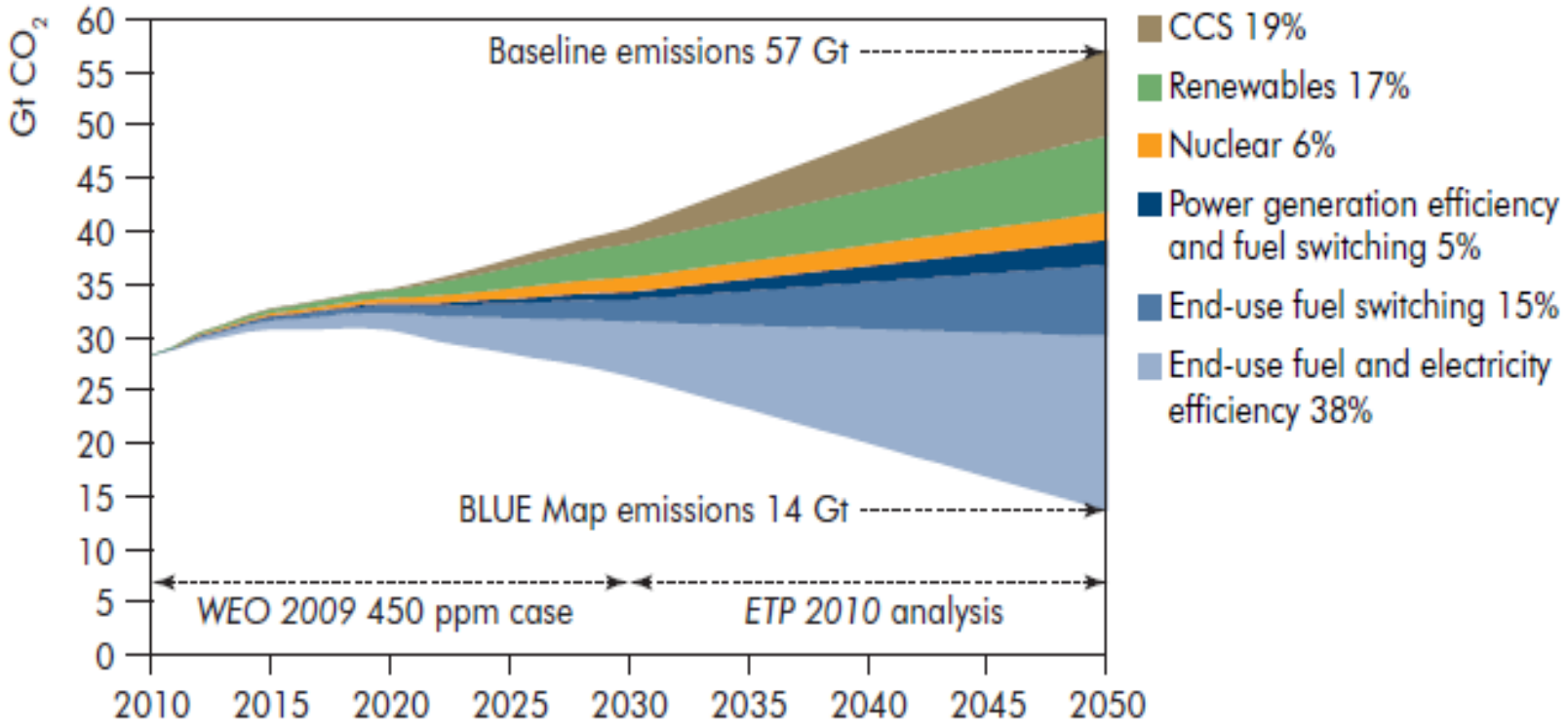
Energy Efficiency is key in Global Climate Change Mitigation Scenarios. LAC contribution to Climate Change Mitigation is basically EE action a win-win solution for the region.

Figure ES.1 ▶ Key technologies for reducing CO_2 emissions under the BLUE Map scenario



Statistical Source: EIA CO2 from fuel combustion, Reference Scenario 2030, World Energy Outlook 2008.
Population statistics: CELADE –CEPAL, División de Población Naciones Unidas: Panorama de la Población Mundial: Revisión 2008.

LAC participation in IEA Climate Change Mitigation Scenario

PARTICIPACIÓN REGIONAL EN LAS EMISIONES CO_2 GLOBALES EN 2005-2030, Y EN LA INVERSIÓN ADICIONAL REQUERIDA EN EL ESCENARIO DE MITIGACIÓN

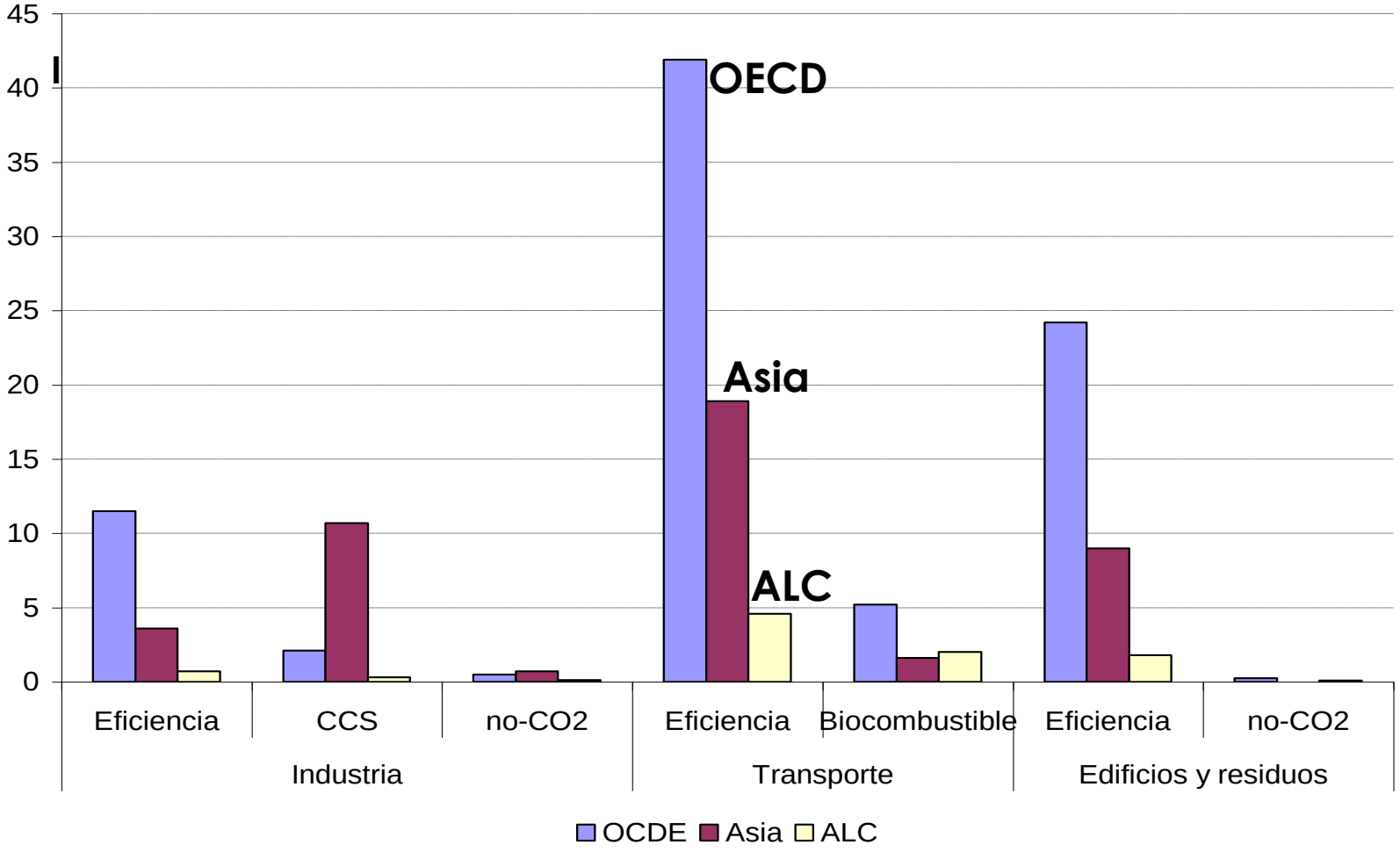
REGIONES	Emisiones CO_2 2005 ACTUAL 27 Gt CO_2 Participación regional %	Emisiones CO_2 2030 Esc. REFERENCIA 42 Gt CO_2 Participación regional %	Inversión adicional en 2030 Esc. MITIGACION - 15 Gt CO_2 Reducción necesaria vs. Esc. Referencia Millones USD (dólar 2006)
América Latina	3,5 %	3,9 %	$ -5 670
Brasil			$ -1 220
Otros ALC			$ -4 350
México			$ 6 470
Asia	28,0 %	41,6 %	$ 41 300
China	19,0	27,3	$ 33 500
India	4,3	7,9	$ 7 600
Países en Desarrollo	39,0 %	55 %	$ 38 700
OECD	48,0 %	36,0 %	$ 66 900
EEUU	18,2	16,4	$ 51 800
Unión Europea	14,5	10	$ 6 800
Mundial	100	100	$ 109 000

Fuente: Elaboración propia con base en estadísticas: IEA WEO 2007, UNFCCC 2007

LAC role in CC Mitigation scenario 2030

relative to Asia and OCDE

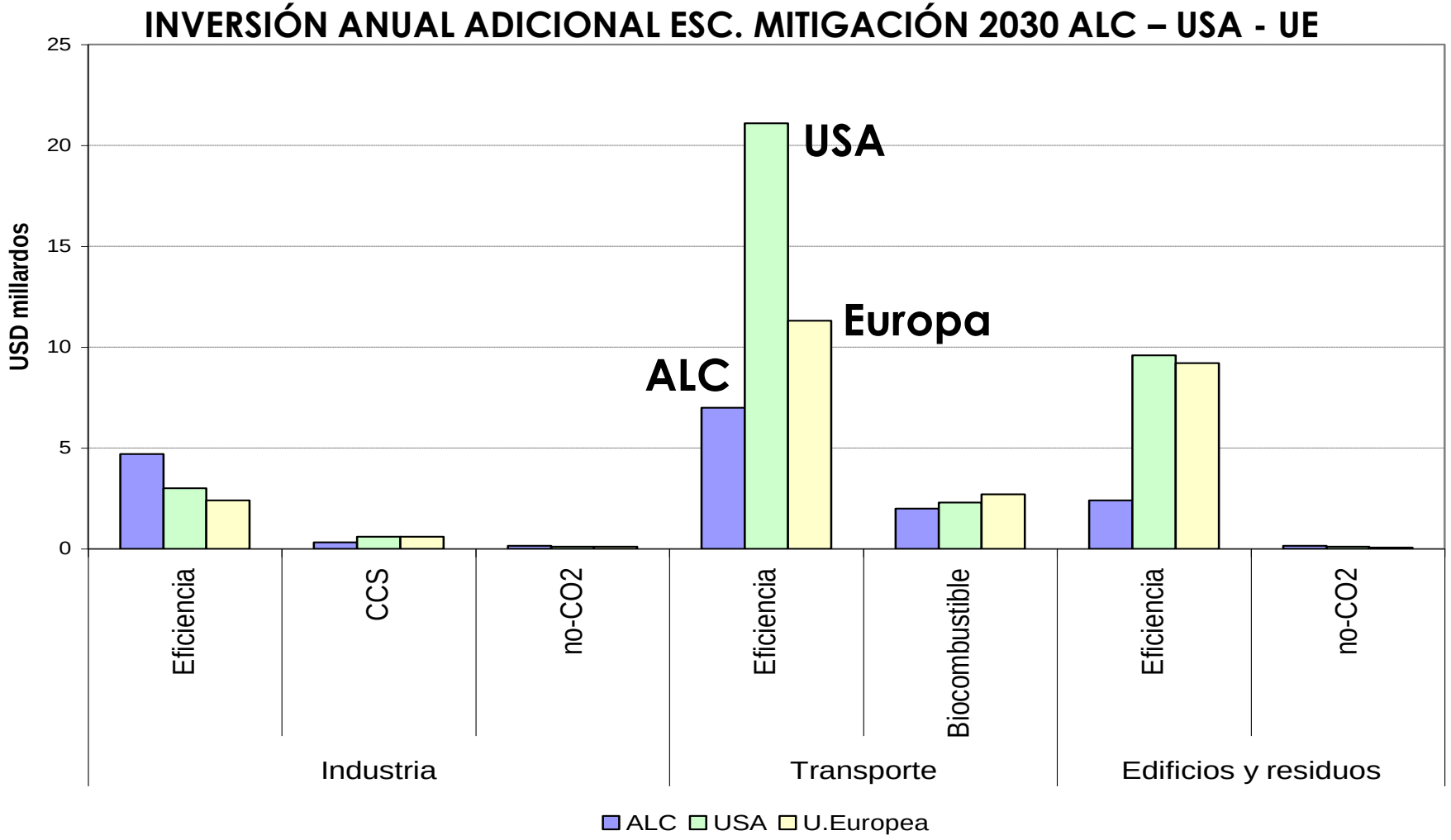
Industry, Transportation, Buildings.



Fuente: elaboración propia. Fuente estadística UNFCCC (2007).

LAC role in CC Mitigation scenario 2030

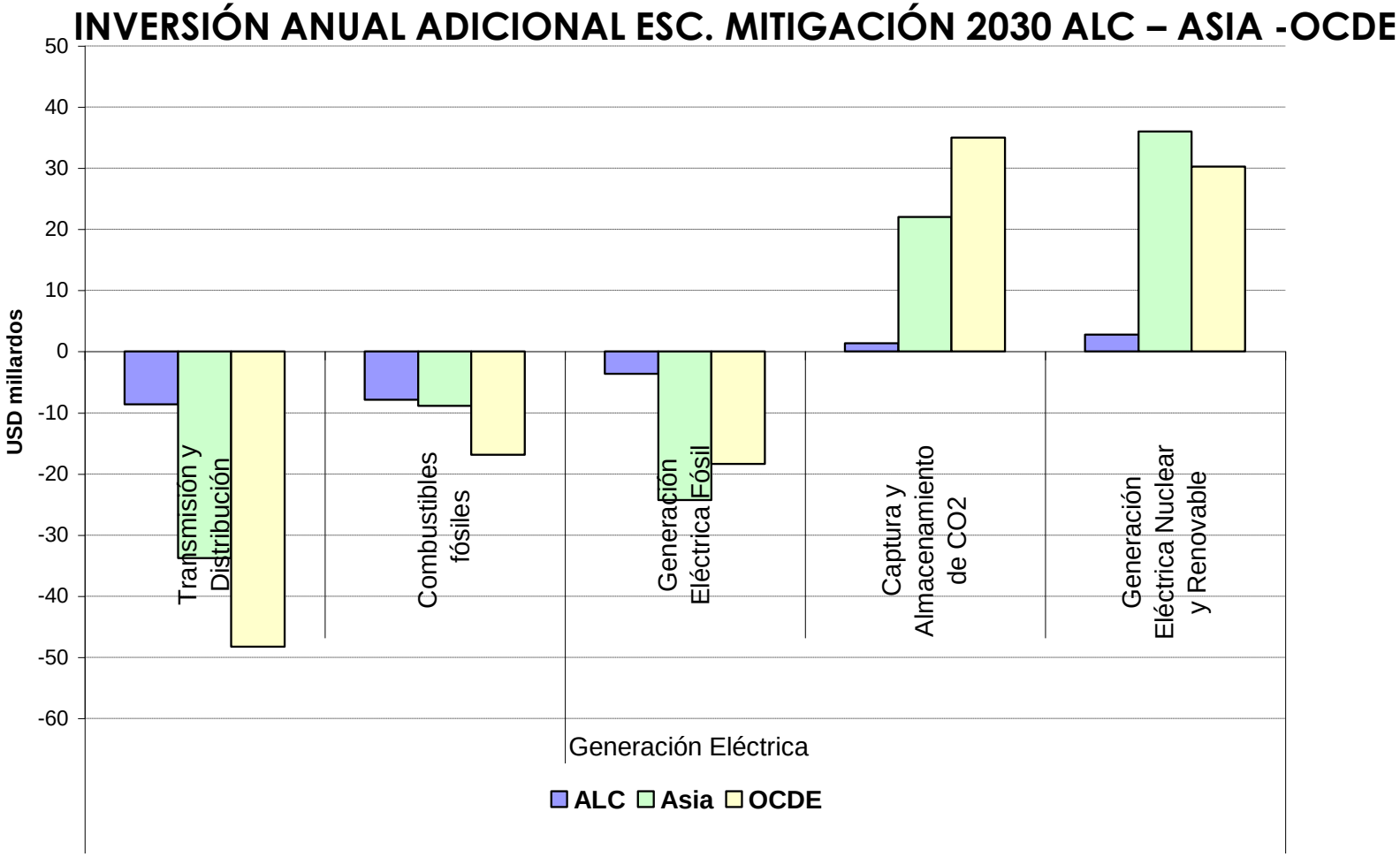
relative to USA and EU required additional investment in LAC focus on EE investments in Industry, Transportation and Buildings.



Source: J. Acquatella CEPAL LC/W 218 (2009). Statistics source UNFCCC (2007).

LAC role in CC Mitigation scenario 2030 relative to Asia and OECD

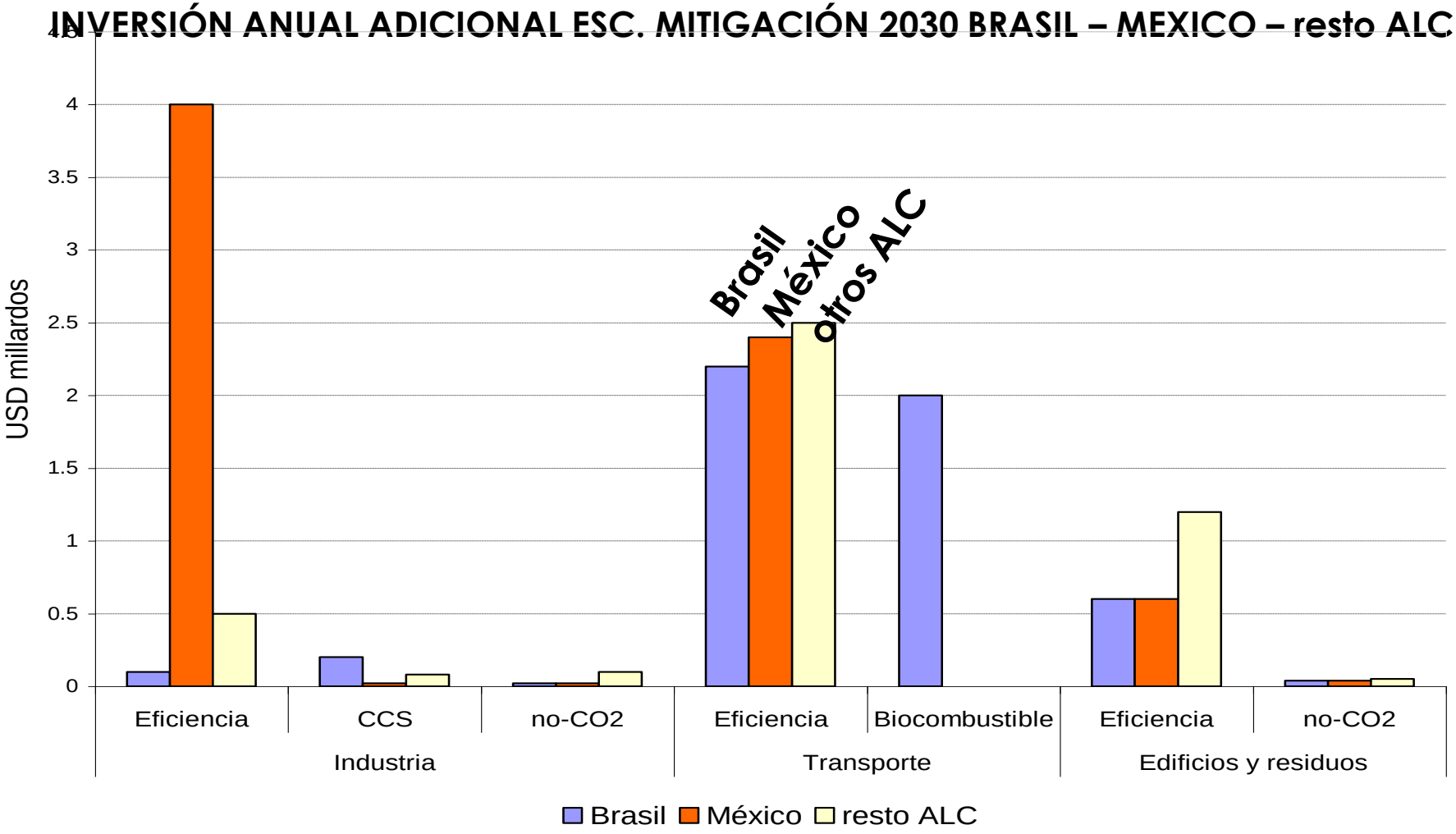
LAC saves money from Fuel Savings and Delayed Generation Expansion.



Source: J. Acquatella CEPAL LC/W 218 (2009). Statistics source UNFCCC (2007).

LAC role in CC Mitigation scenario 2030

Within the region EE investment opportunities focus on EE investments in Industry, Transportation and Building sectors.



Source: J. Acquatella CEPAL LC/W 218 (2009). Statistics source UNFCCC (2007).

Main Findings: large benefit from EE investments.

- EE investments produce Net estimated savings of 5,700 million USD per year by 2030, relative to BAU scenario without policy intervention (UNFCCC – IEA analysis)/

- Resources saved in avoided generation capacity expansion are larger than EE investments required.

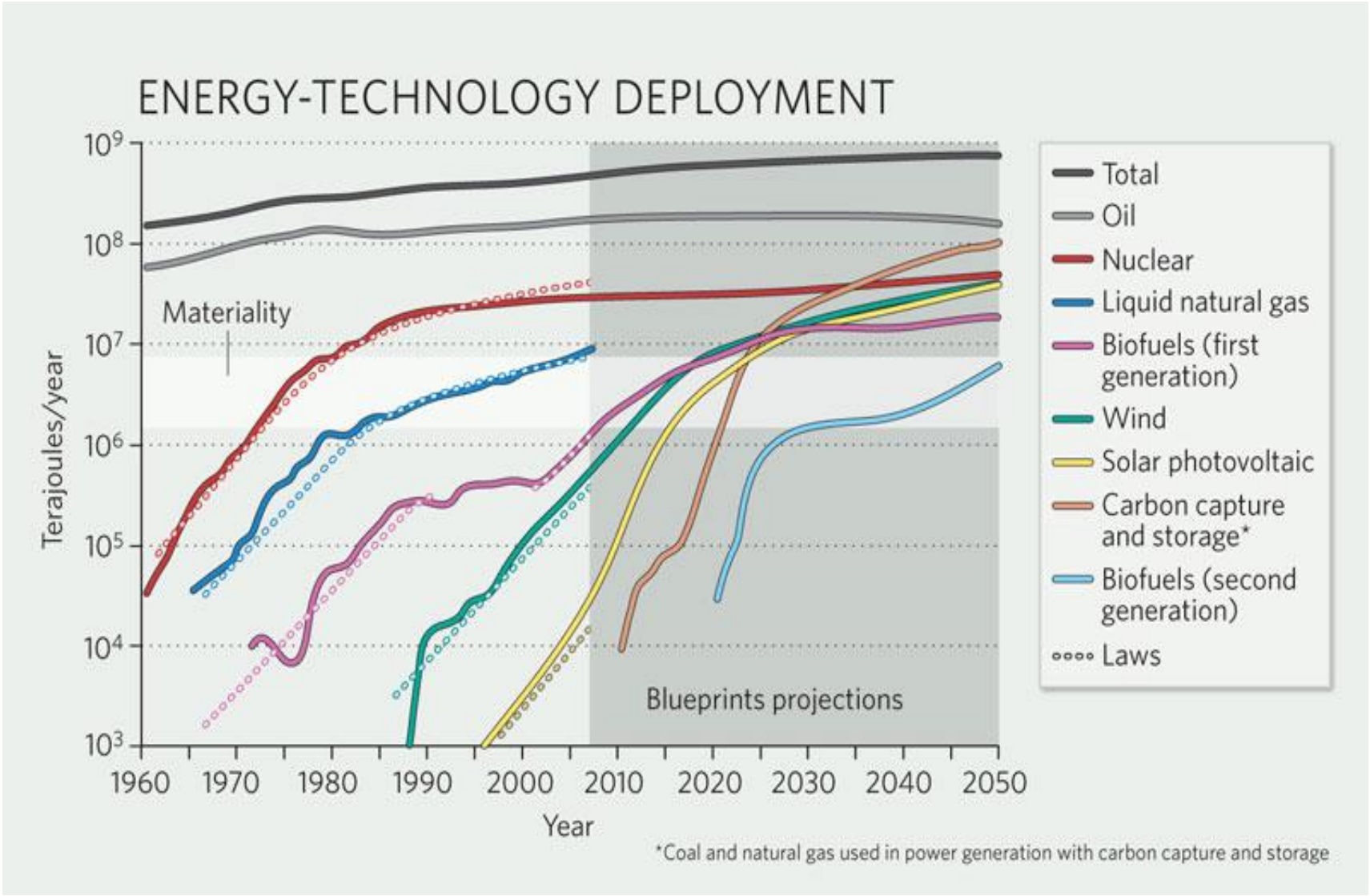
- Industry, Buildings and Transportation sectors require additional annual EE investments by 2030 relative to BAU in the range of

  5,200 Million USD for Brasil
  8,500 Million USD for México y
  8,300 Million USD in other LAC countries.

- The above investments are estimated to produce the following savings in terms of avoidad generation capacity expansion, associated transmission and distribution infrastructure, and avoided fossil fuel imports, in the range of

  -6,600 Million USD for Brasil,
  -2,200 Million USD for México y
  -12,600 Million USD in other LAC countries.

Fuente: UNFCCC (2007) *Investment and Financial Flows to address climate change*, estimación basada en Modelo OECD-Env Linkages IEA.



Source: Gert Jan Kramer, Martin Haigh. Nature, December 2009