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# Energy Development and Investment in Latin America and the Caribbean

## New Energy Options for Green Growth, Seoul, Korea September 2 , 2009

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Organización Latinoamericana de Energía
Latin American Energy Organization
Organização Latino-Americana de Energia
Organisation Latino-américaine D'Energie

olade Organización Latinoamericana de Energía is an intergovernmental agency created through formalization of the LIMA CONVENTION on November 2, 1973, and ratified by 26 countries of Latin America and the Caribbean:

**12 countries of South America:** Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela.

**7 countries of the Caribbean:** Barbados, Cuba, Dominican Republic, Grenada, Haiti, Jamaica, Trinidad & Tobago

**6 countries of Central America:** Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama

**1 country of North America:** Mexico, and

**1 participant country:** Algeria



# ACTUAL ENERGY INTEGRATION PROCESS IN LATIN AMERICA AND THE CARIBBEAN

**INTEGRATION THRU NATURAL DEVELOPMENT OF ENERGY INTEGRATION INITIATIVES BILATERAL AND MULTILATERAL ALLIANCES : OLADE, SICA, CARICOM, CAN, UNASUR, MERCOSUR ARPEL, CEPAL, ALADI, CIER, OAE.**


## Vision olade

OLADE is the political and technical-support organization by means of which its Member States undertake common efforts to achieve integration and development in the regional energy market.

## Mission olade

To contribute to the region's integration, sustainable development and energy security, advising and promoting cooperation and coordination among its member countries.



## Quality Policy

At the Latin American Energy Organization (OLADE), we are committed to work with quality to address the regional and sub-regional energy integration needs of its Member Countries, and to fulfill the objectives of the Lima Agreement and the decisions deriving from the Meeting of Ministers with motivated staff, team work, and continual improvement of defined processes.

# CONTENT

1. Basic Information about LAC to 2008
2. Regional Energy Matrix
3. Investment - Offer/ Demand Regional and subregional Scenarios
4. Regional Energy Policies/Programs to Insure Energy Security and Sustainable Energy Development.
5. Final Remarks

# 1 Demographic Indicators for LA and C

| Indicator | 1997 | 2007 |
|---|---|---|
| Number of children per woman | 3.0 | 2.5 |
| Population (millions) | 488 | 567 |
| 0-14 | 1 | 174 |
| **15-39** | **253** | **299** |
| 40-64 | 36 | 55 |
| >65 | 28 | 39 |
| Life expectancy (years) | 70.1 | 72.5 |
| Children death rate (for each thousand inhabitants) | 6.8 | 6.5 |
| **Population Distribution** | **61% urban** | **68% urban** |
| | 39% rural | 32% rural |

# 1 Indicators for Latin America & C

| | Population MM | GDP MMUSD | GDP per capita USD | Growth Rate GDP (%) |
|---|---|---|---|---|
| Mexico | 106 | 1,346,009 | 12,698 | 6.0 |
| Central America | 41 | 230,945 | 5,633 | 9.3 |
| Caribbean | 36 | 129,704 | 3,603 | 8.8 |
| Andean Region | 125 | 1,011,338 | 8,091 | 10.1 |
| Southern Cone | 65 | 819,070 | **12,601** | **10.3** |
| Brazil | 193 | 1,835,642 | 9,511 | 8.2 |
| **TOTAL AL y C** | **567** | **5,372,704** | **9,476** | **8.4** |

(a): Source; CEPAL, 2008

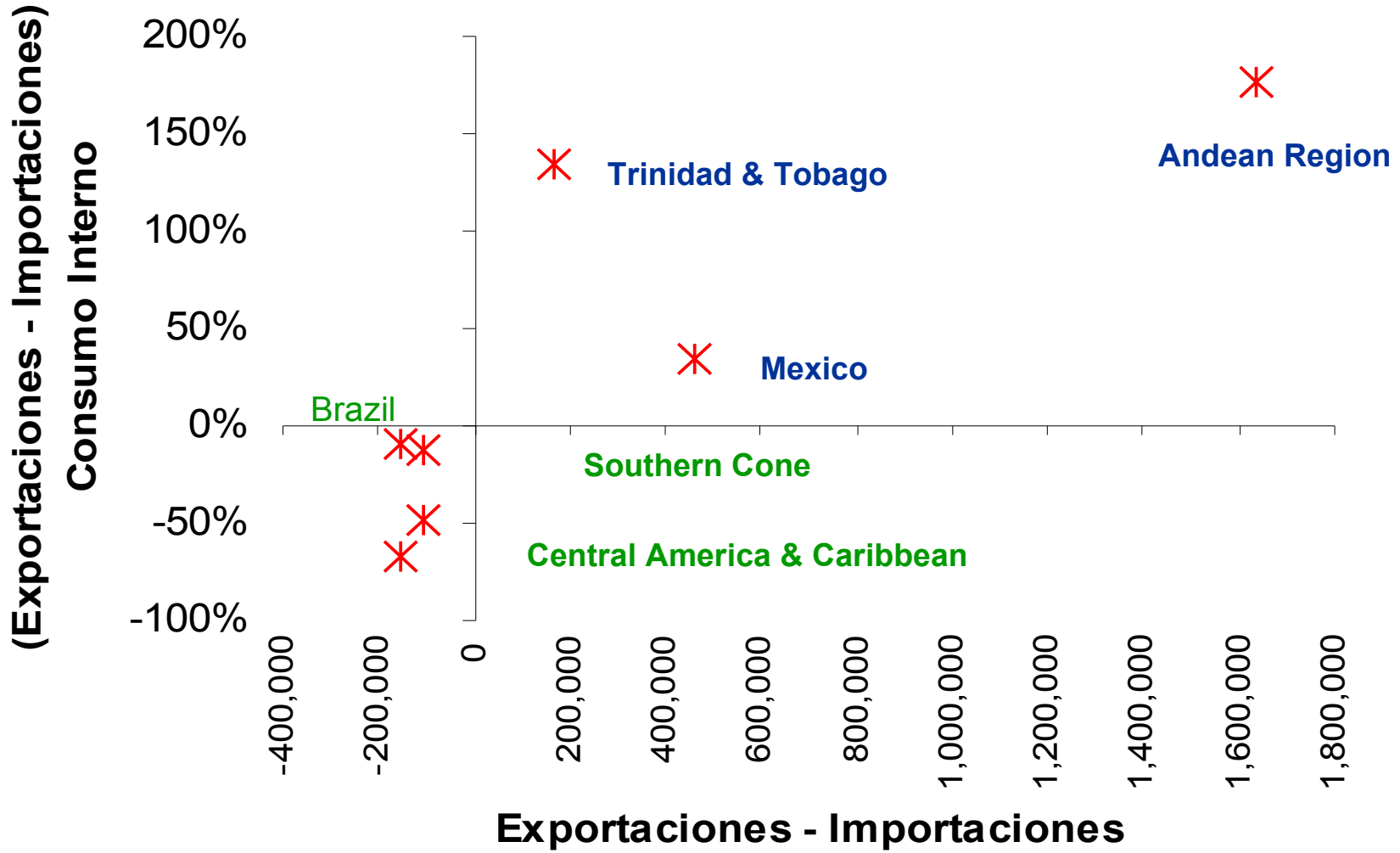
(b): World Bank, april 2008, World Development Indicators database. PIB con base a la Paridad del Poder Adquisitivo (PPA).

# 1 Indicators for Latin America & C

| | | | Energy Sector | |
|---|---|---|---|---|
| | Total Exports (a) MM USD | (Exp.+ Imp.)/GDP (a) | Exports – Imports Tebp (b) | (Exp.- Imp.)/Intern Consump. (b) |
| Mexico | **266,218** | **68.24** | 458,740 | 0,35 |
| Central America | 44,128 | 5.74 | -108,373 | -0,49 |
| Caribbean | 23,242 | 2.00 | -152,819 | -0,67 |
| Trinidad Tobago | 12,100 | 1.39 | **165,539** | **1,34** |
| Andean Region | 139,980 | 17.00 | **1,638,009** | **1,77** |
| Southern Cone | 130,932 | 10.52 | - 108,440 | -0,13 |
| Brazil | 157,270 | 49.45 | -151,535 | -0,09 |
| **TOTAL LA & C** | **773,870** | **12,97** | **1,741,121** | **0,33** |

(a): Comisión Económica para América Latina y el Caribe – CEPAL, 2007
(b): Sistema de Información Económica Energética -SIEE

# 1 Indicators for Latin America & C



# 1 Indicators for Latin America

| | Consumption per capita of Energy (ebo/ per) | Growth Rate of consumption per capita (%) | Installed Capacity (GW) | Electric Consumption per capita (kWh) |
|---|---|---|---|---|
| Mexico | 7.7 | 7.9 | 50 | 1,703 |
| Central America | 4.3 | 5.8 | 10 | 783 |
| Caribbean | 8.0 | 2.3 | 14 | 1,226 |
| Andina Region | 5.1 | -2.7 | 49 | 1,338 |
| Southern Cone | **9.0** | **1.7** | 54 | **2,583** |
| Brazil | 7.2 | 4.2 | **101** | 2,053 |
| **TOTAL LA & C** | **6.9** | **3.0** | **278** | **1,744** |

# 2 Regional Energy Matrix

o Gas Natural Carbón mineral

**Used Potential:**

**Hidroelectricity:** 22 %

**Others**: 4.2%

3

94%

**Relación reservas/producción:**
**RRReRelation Reserves/ Production**

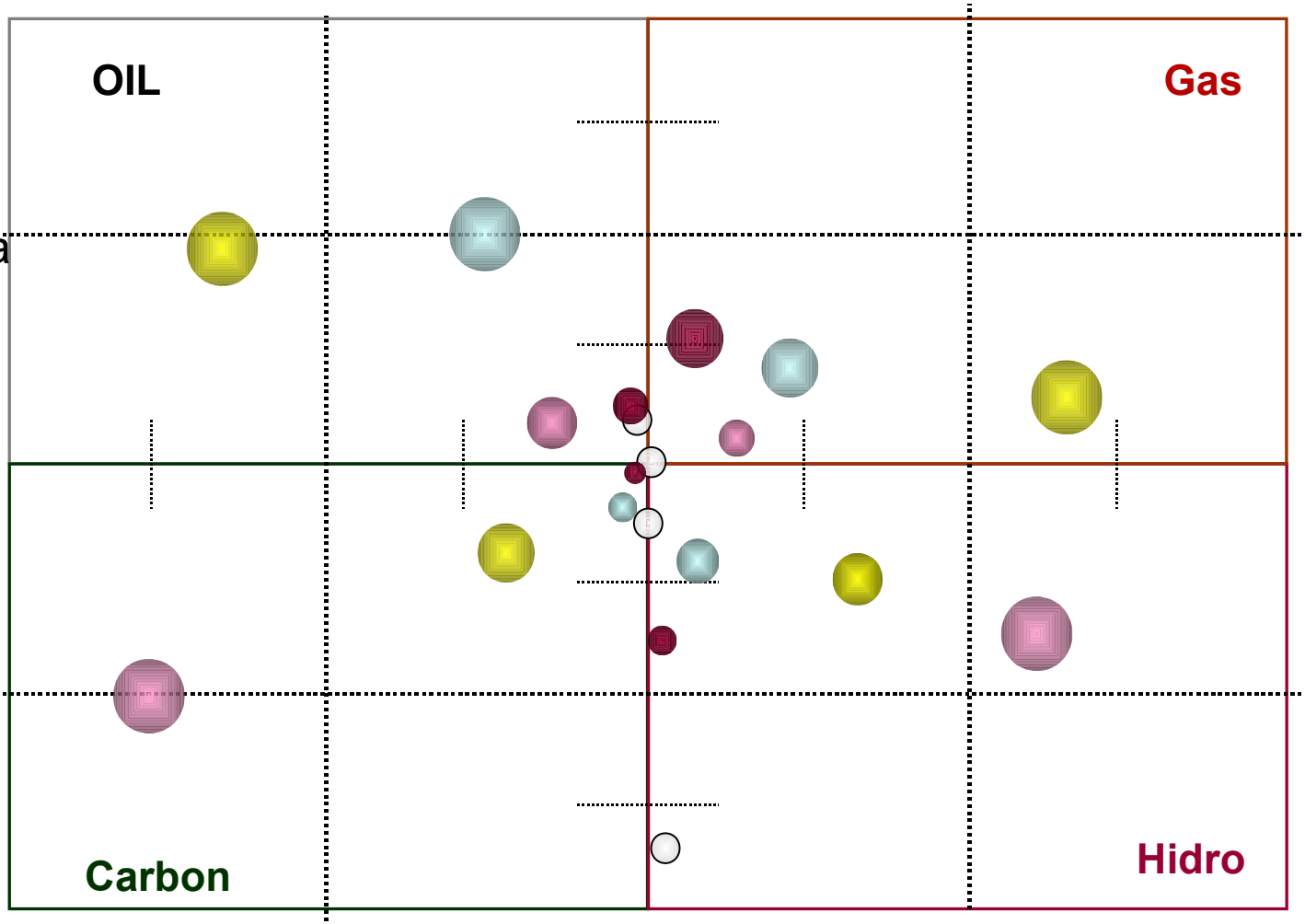
**OIL: 44 Years**

**GAS: 34 Years**

**CARBON: 500 Years**

# 2 Regional Energy Matrix, and Resource Distribution in LA & C

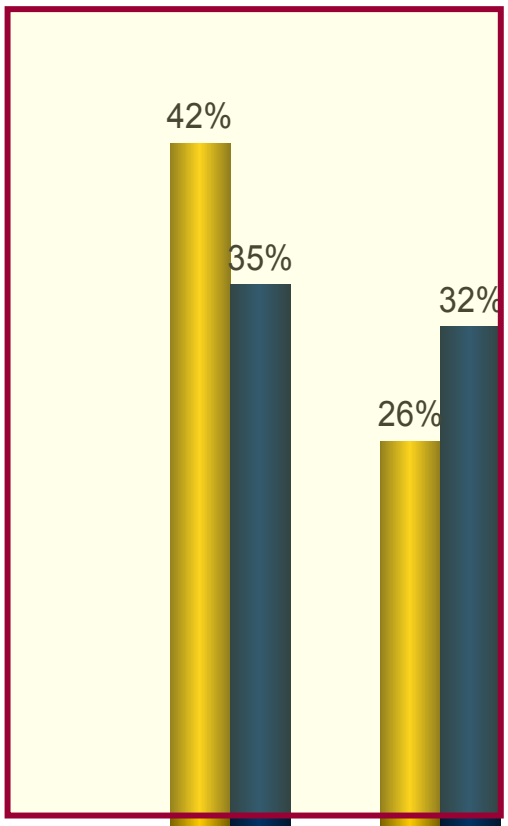
- Mexico
- Central America
- Caribbean
- Andean Region
- S. Cone




Data

# 2 Regional Energy Matrix

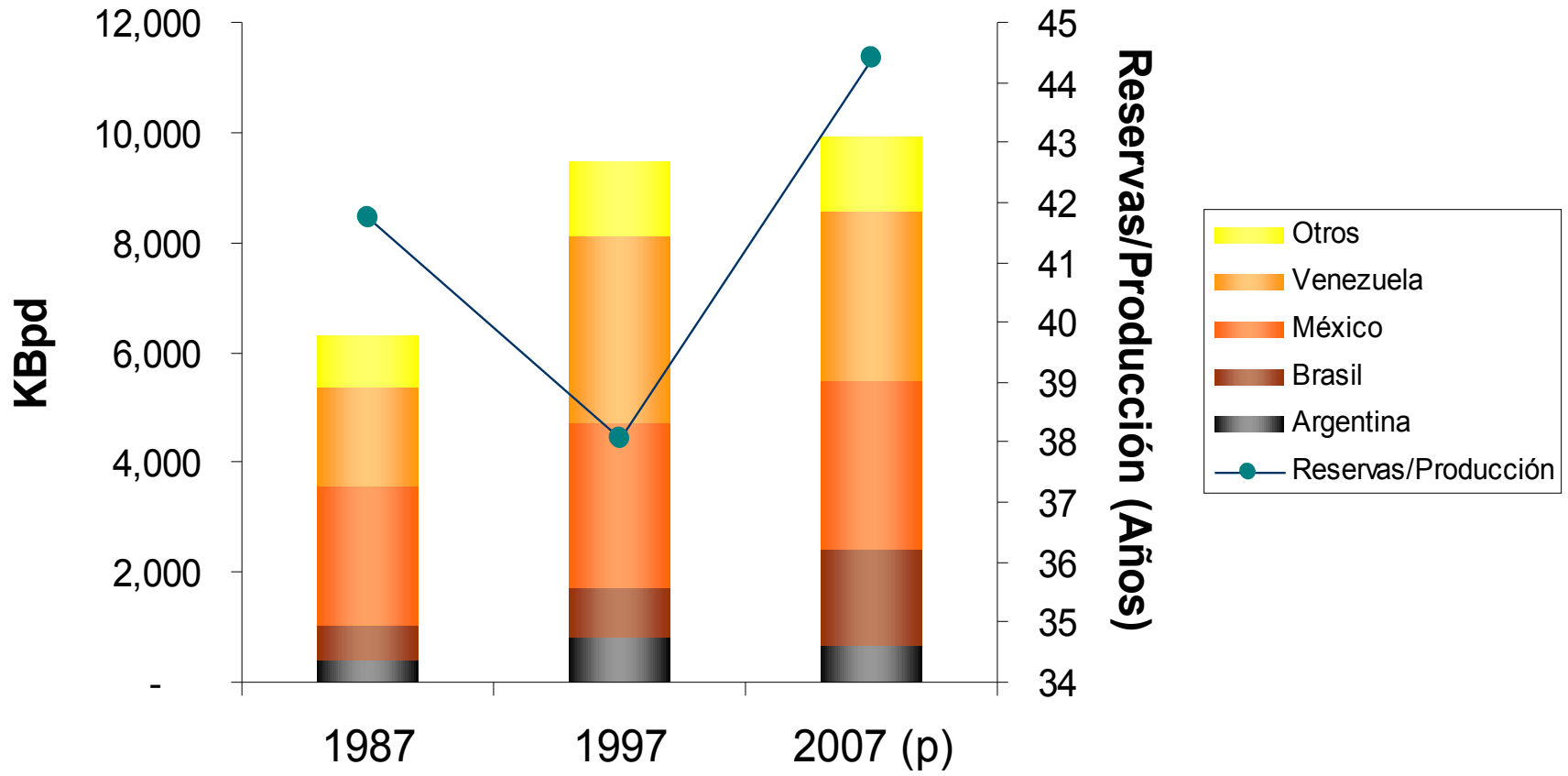
## Perspective Demand structure for LAC & C




**Oil, by- products and natural gas** remain in the order of 70%, which confirms this resources as the main source of energy in the region

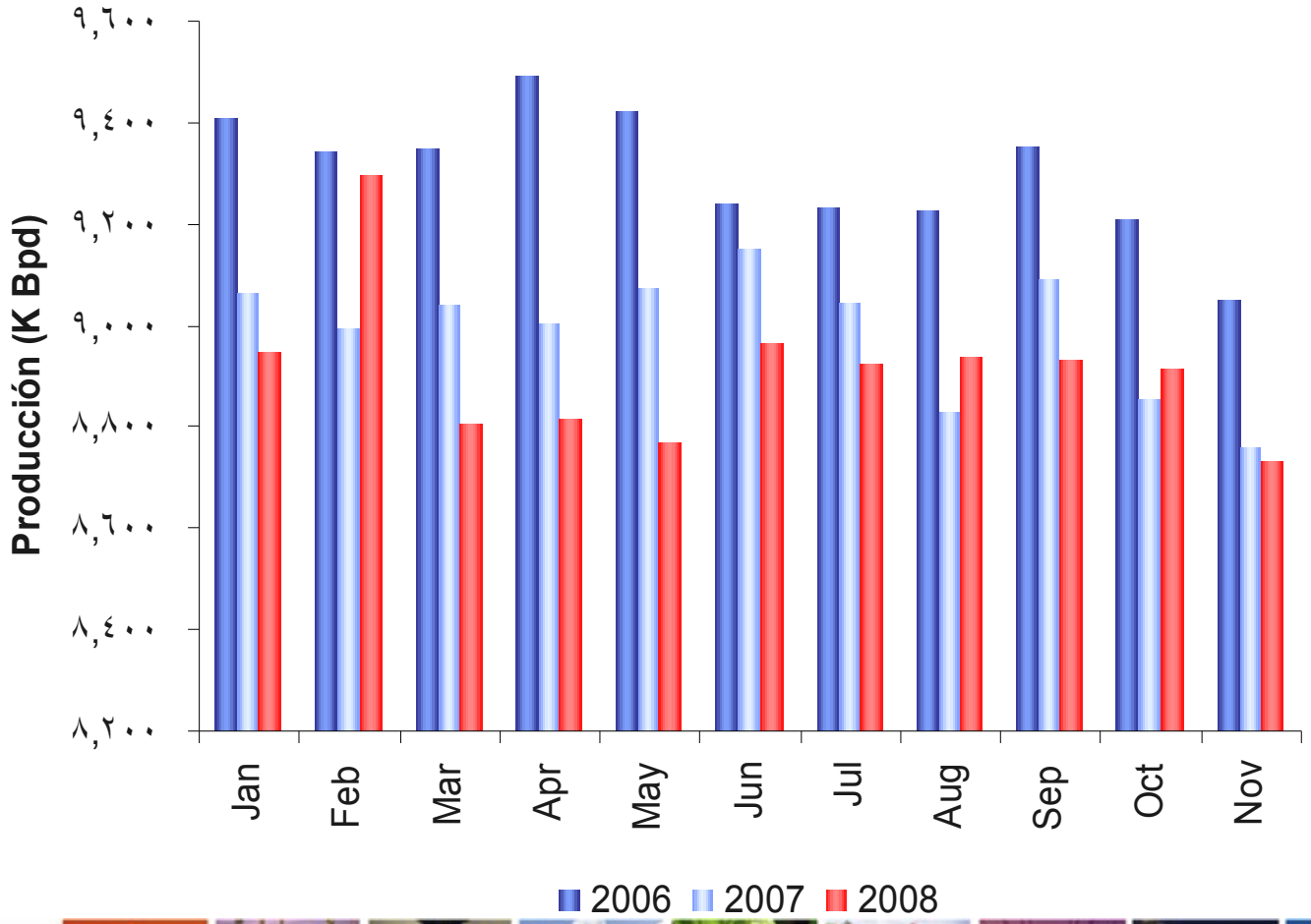
# 2 Regional Energy Matrix

## Production and Oil Reserves



# 2 Regional Energy Matrix

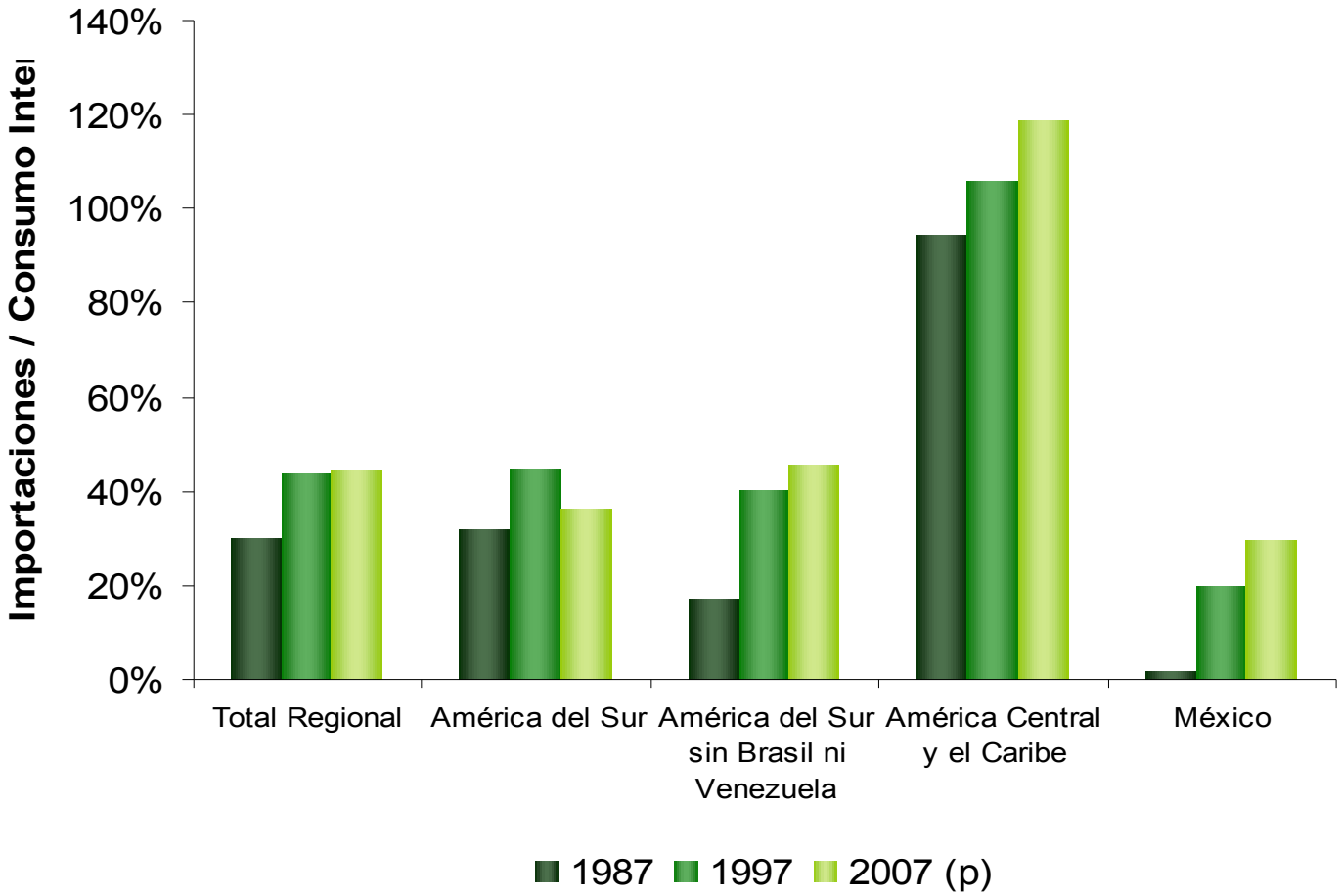
## Oil Production (Recent Years)




**Per Year Average Growth**
**2007 = - 3.2%**
**2008 = - 0.3%**

# 2 Regional Energy Matrix

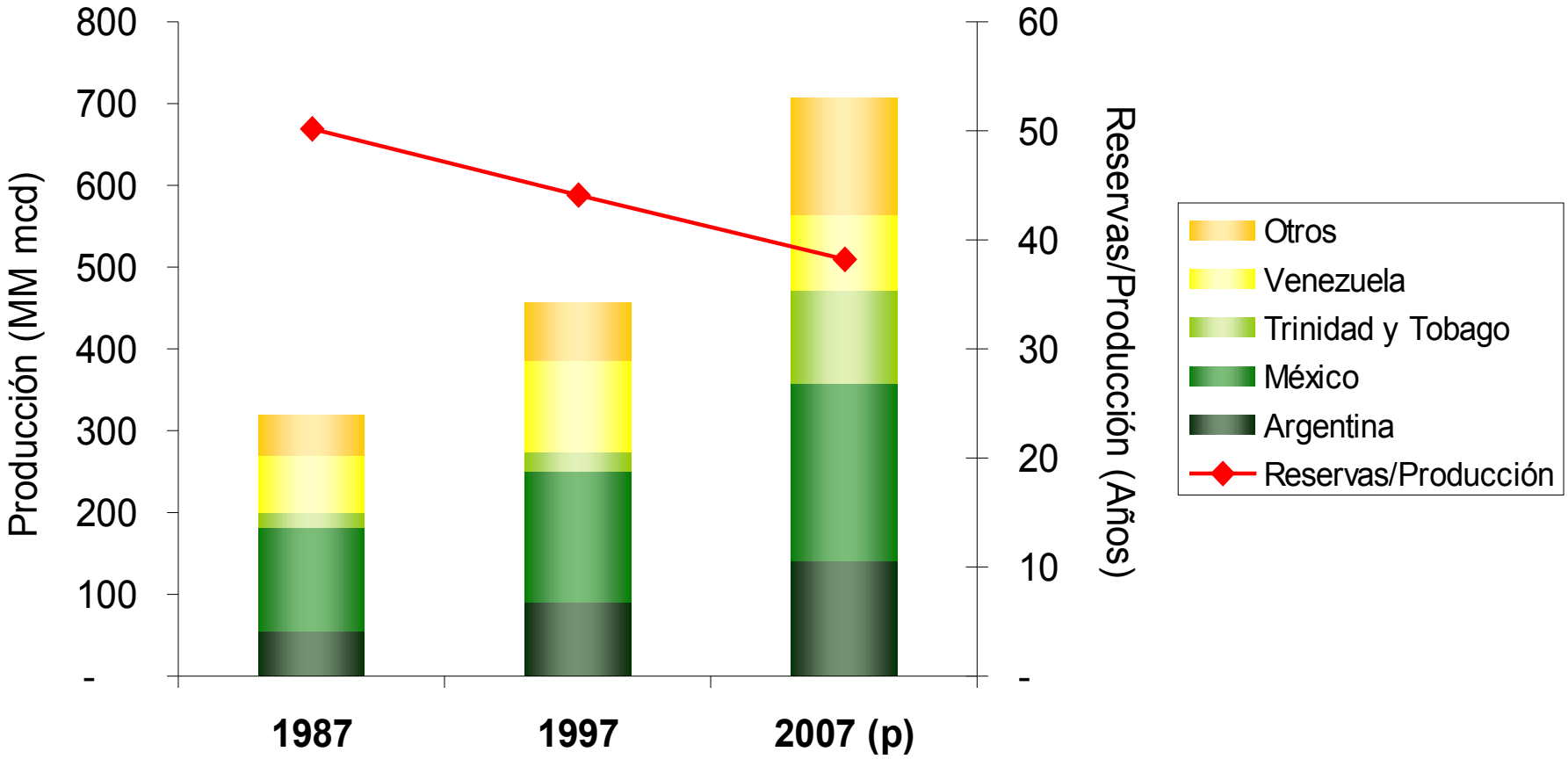
## Oil Imports in the Region




External Oil Dependency of the Region and Sub regions

# 2 Regional Energy Matrix

## Reserves and Production Natural Gas

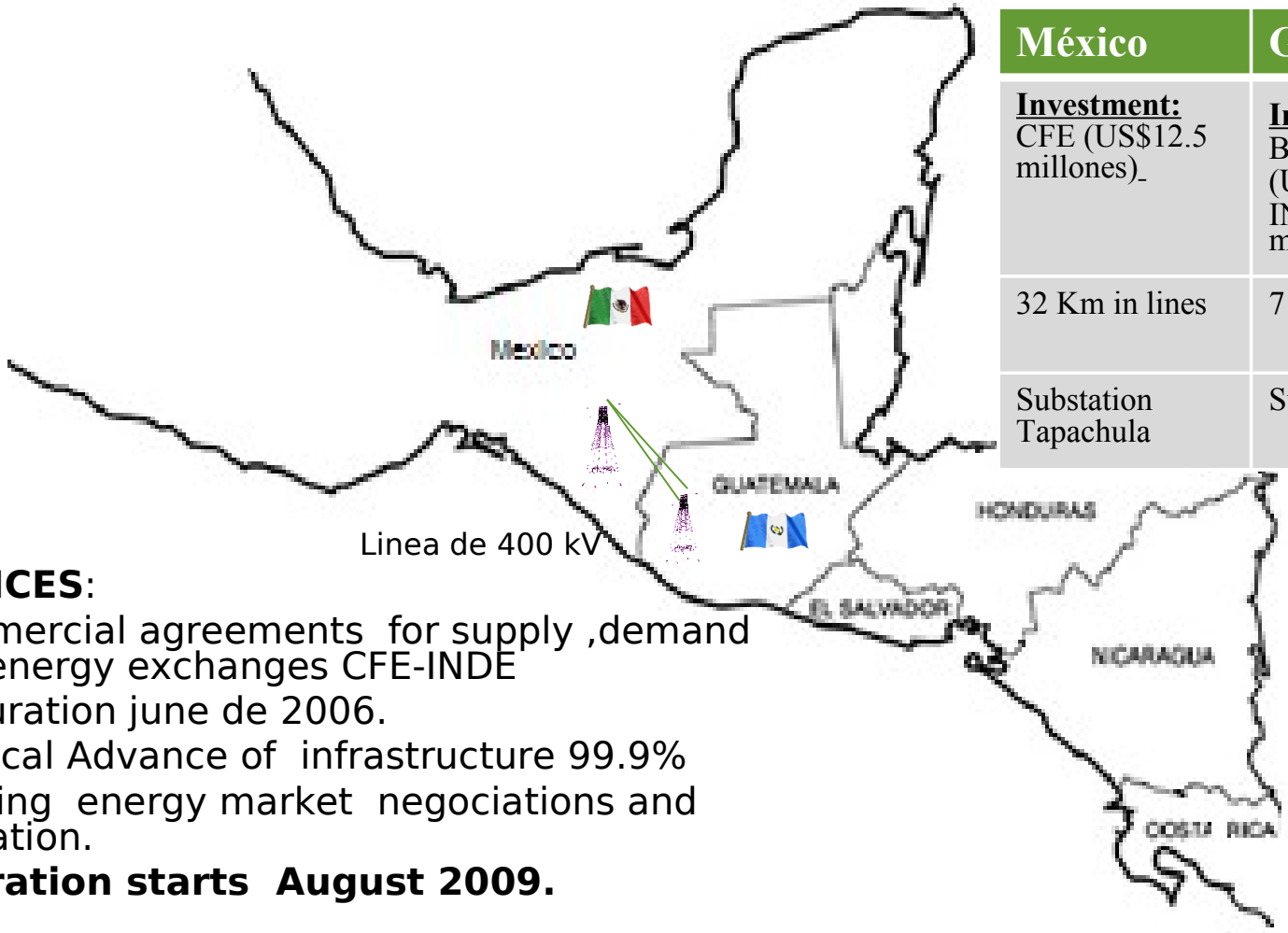


# 3 Investment Supply /Demand Regional and Subregional Scenarios

## MEXICO

- National Oil production sustains internal demand, which tends to stabilize and reduce its impact over the economy during increment of oil prices.
- Greater weight of the industrial sector in its energy demand matrix
- Growing use of natural gas which leads to net imports of the product – Electric Energy Plant Conversion-
- Important efforts and advances in Energy Efficiency field.
- Recent establishment of legal and regulatory frameworks and institutionalization of renewable energies towards energy matrix diversification..

# ELECTRIC INTER CONNECTION MEXICO - GUATEMALA




| México | Guatemala |
|---|---|
| **Investment:** CFE (US$12.5 millones) | **Investment:** Préstamo BID 1470/OC-GU (US$ 37.5 millones) INDE (US$ 5.8 millones) |
| 32 Km in lines | 71 Km en lines |
| Substation Tapachula | Substation los Brillantes |

**ADVANCES**:

- Commercial agreements for supply ,demand and energy exchanges CFE-INDE
- Inaguration june de 2006.
- Physical Advance of infrastructure 99.9%
- Pending energy market negociations and operation.
- **Operation starts August 2009.**

# 3 Investment Supply/Demand Regional and Subregional Scenarios

## CENTRAL AMERICA

- Existing high oil dependency which leads to high Energy bill with high economic impact in the payment balances since they are oil import countries .
- Guatemala produce small amounts oil and Belize is a new oil and gas producer both lack investment capacity for exploration, exploitation and commercialization.
- Transportation is the main energy consumer in general, and particularly of oil by products.
- With some exceptions in the electric markets is observed an intense development of thermoelectric generation in a region that was once predominantly hydroelectric and geothermal with high potential for foreign investment.
- Although in the future the Central American Electric Inter connection System SIEPAC will be fully operational there will be opportunity of investments with the Mexico-Guatemala inter connection and the Colombia -Panama inter connection for medium term investments there are possibilities of a regional oil refinery , LNG Plants, and a Central American Gas pipe line project that could change the subregional energy matrix .
- There is an important chance to make more efficient the energy consumption improving performance of oil and gas use and substitution of oil by products for renewable energies and biofuels.
- Large potential for development of renewable energy resources: Hydro, geothermal, solar, wind, biofuels. Energy Efficiency is a most for the sub region.

# Electric Energy Inter connection System In Central America

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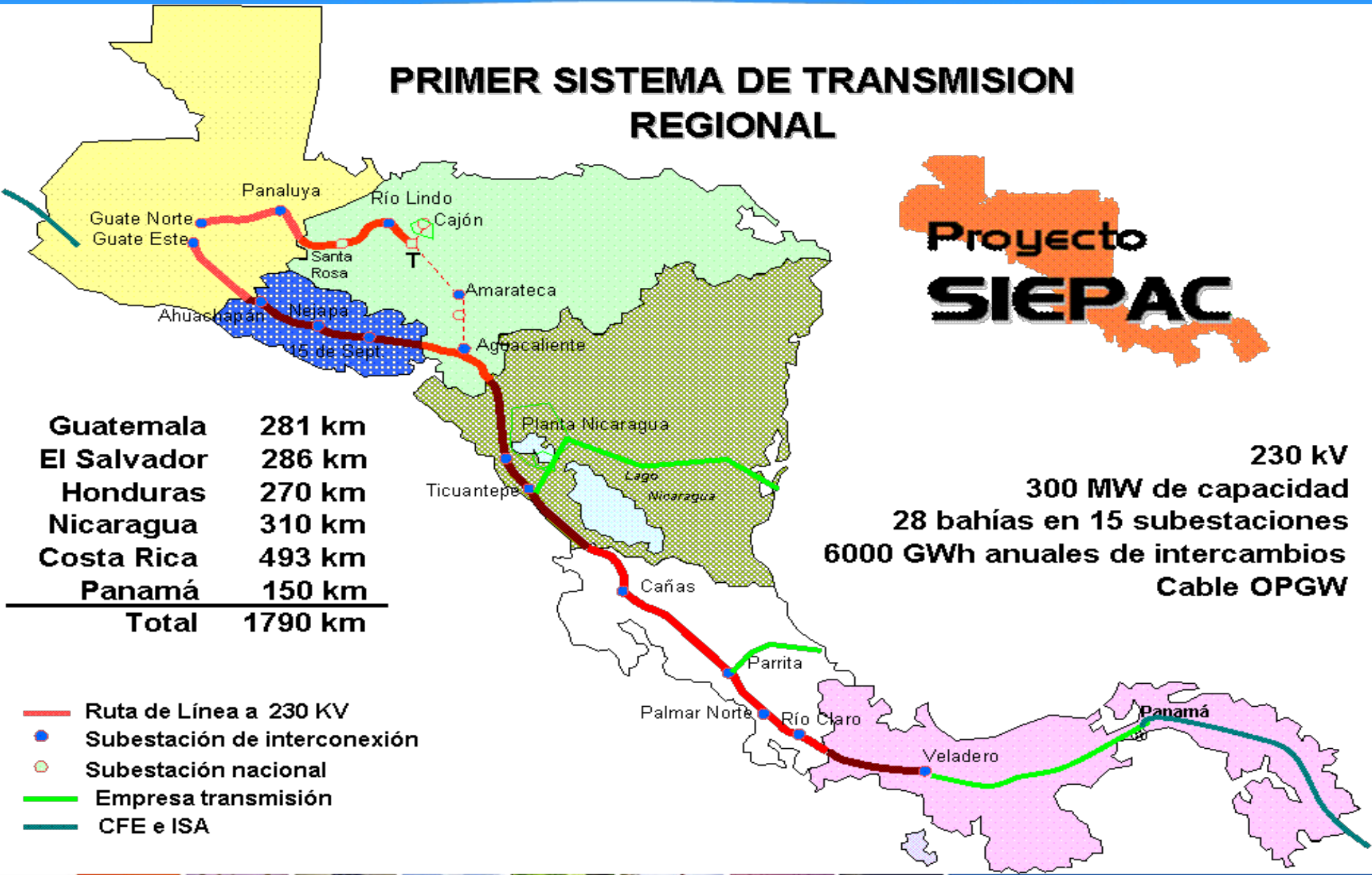


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# Strategic Alternatives for Gas Introduction in Central America


## Gas Investment Options

| No. 1 | No. 2 | No. 3 | No. 4 |
|---|---|---|---|
| US$ 4,754.6 | US$ 2,957.8 | US$ 1,417.8 | US$ 841.8 |
| 3805 Km. | 3165 Km. | 2795 Km. | 1753 Km. |

1. Gas pipe to Mexico from Venezuela
2. Gas pipe to Guatemala from Venezuela
3. Gas pipe to Costa Rica, with LNG Plant in El Salvador to distribute in Guatemala, Honduras & Nicaragua
4. LNG Plant in El Salvador & Costa Rica, more pipe lines to other countries.



# Electric Inter Connection Panama-Colombia

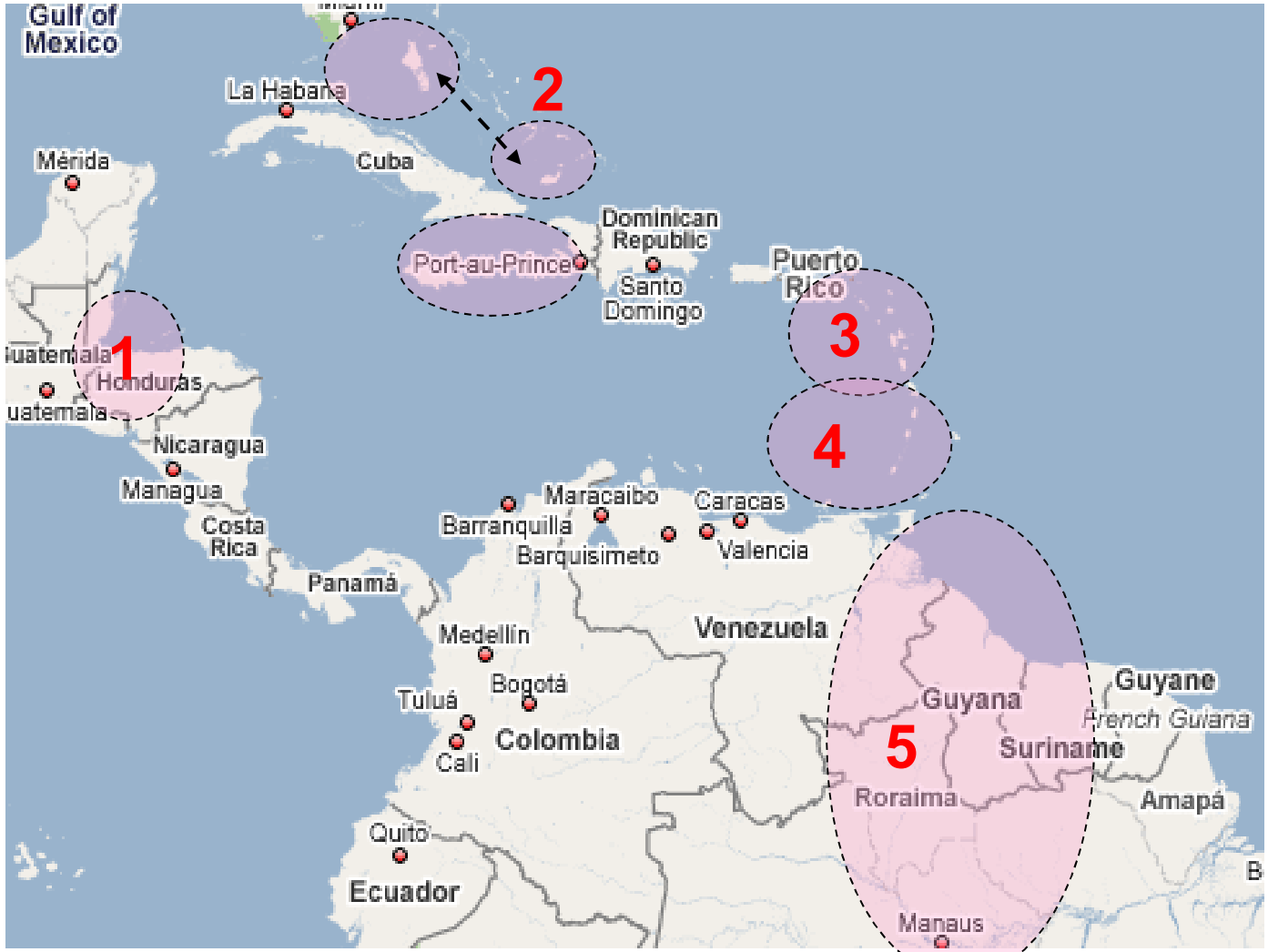

## Technical Aspects

| |
|---|
| 614 kilometers Between substations Cerromatoso, in Colombia, and Panamá II en Panamá. |
| Investment superior to 300 million US dollars, |
| Transport Capacity de 300 MW |
| Project will be ready in 2,012 |

# 3 Investment Offer-Demand Regional and Subregional Scenarios

- **CARIBBEAN SUBREGION**
  - **Sensible oil dependency of most Island States as a primary energy source with exception of Trinidad &Tobago with oil and gas.**
  - **Tourism development is essential to the commercial sector and services in some cases like Jamaica the mining industry is essential. Transport and Tourism are the largest energy consumers.**
  - **Although the Caribbean sub region has less possibilities of physical energy integration, there are several investment opportunities like the marine gas pipeline that is being planned for the future by Trinidad & Tobago to serve several Island States.**
  - **There are possibilities for greater commercial exchanges since all of them have marine energy infrastructure and in several island state cases, oil and gas reserves are waiting for offshore investment and development.**
  - **There is an important emphasis in clean and renewable energy investments as alternatives to clean energy production, that is compatible with the tourism sector and the island state characteristic of the sub region.**
  - **Climate Change and prevention of natural disasters are important issues in their agenda**

# Subregional Caribbean Energy Integration Groups

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# Caribbean Energy Ring Project (Oil and Gas)

## PETROCARIBE INICIATIVE OIL - GAS

### MENPET, VENEZUELA: ANILLO ENERGETICO DEL CARIBE


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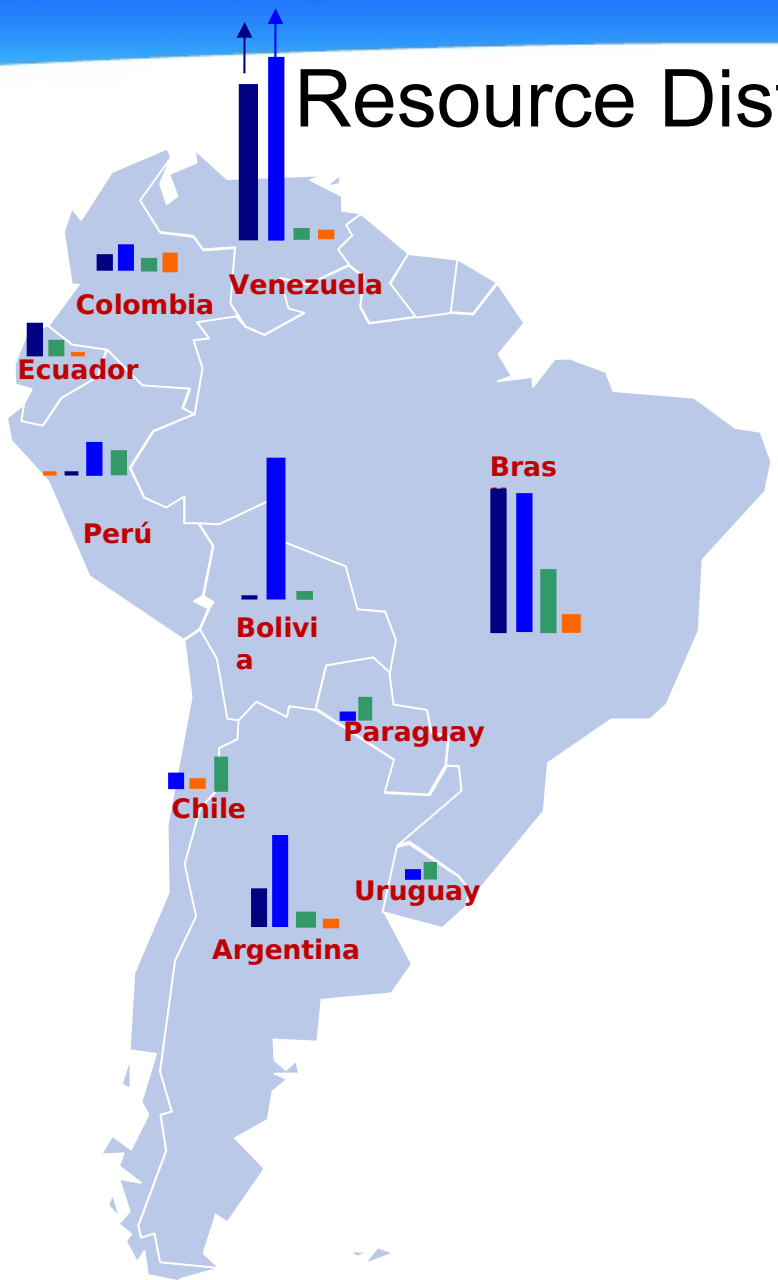
# 3 Investment Offer- Demand Regional and Subregional Scenarios

## SOUTH AMERICA

- High oil-gas impact in the sub regional energy matrix; although tendencies to reduce its impact is observed towards reduction due to energy efficient use and economic variables and energy consumption per capita in countries such as Chile and Brazil.
- Industry is a sector that is gaining relevance in relative terms in this sub region showing increasing tendencies in its energy intensity.
- Transport has an important participation in energy consumption in the sub region, but also shows increasing signals of efficiency in the sub sector
- Renewable Energies such as Hydro, Solar, Eolic, Geothermal, and Biofuels and Energy Efficiency are becoming important oil substitutes during oil crisis gaining ground in the South American energy matrix Transport has an important participation in energy consumption in the sub region,
- Natural gas is highly important for its penetration in the energy matrix of each country and clean development potential.
- The South American gas ring is in process for subregional consensus.

# Resource Distribution in Southamerica




- OIL Reserves
- Gas Reserves
- Coal Reserves
- Hydro Potential

**Latin America 2008**

| Energy Source | Proved Reserves | Production MMtep | Consump. MMtep |
|---|---|---|---|
| OIL | 112.791 MMb | 332,7 | 252 |
| Natural Gas | 7.525 $Tm^3$ | 135,7 | 121,1 |
| Coal | 43.016 MMtep | 55,3 | 22,4 |

| | |
|---|---|
| Hydro Potential | 580,606 MW 3,146,072 GWh /year |

Source: SIEE- OLADE, 2007

# Consumption of Gas and LNG en Southamerica


**Gas Inter connections, 9 announced in 2005**


**Interconexiones de gás, 1 anunciado 2008**

Source: OLADE-CAF 2008

# There are important advances in energy inter connection and Electric Energy complementarity in South and Central America



**Total estimated Investment in inter connections US$ 1.000 MM**

Existing — Announced

**Electricity Inter connections, 4 announced in 2005**

**Electricity inter connections, 7 anunciadas 2008**

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# 4 Energy Policies and Energy Security Programs.

## Regional Energy Integration

•The Fundamental reason for regional and subregional energy Integration is to satisfy social economic needs of the citizens of the region thru Sustainable Energy Development as a driving engine.

## ¿Why Energy Integration in LA & C?

- •Bad Energy Resource Distribution
- •Satisfy National Energy needs of Member Countries
- •Energy Security and Supply
- •Reduce Dependency of the Extra-regional Energy Market
- •Complementarity ?
- •Solidarity ? Energy Sustainability ?

# Energy Integration in LA & C Thru Inter Connections



Source OLADE Prospective 2018

# 4 Programs and Policies for Energy Security and Sustainable Energy Development

## Strategic Energy Plannig

- Previously the regional energy market established energy development plans of the sector.
- Actual Structural an legal reforms in Latin America and the Caribbean demonstrated the importance of long term energy planning.
- Energy Security is the soul responsibility of the Member States, having ready a tool to face such responsibility thru Strategic Alliances and Energy Integration Initiatives.
- The energy organization plannig is fundamental for further sustainable energy development.

4

# Programs and Policies for Energy Security and Sustainable Energy Development

## Strategic Alliance for Sustainable Energy Development in Latin America and The Caribbean

- **Regional and Subregional Energy Integration Iniciatives based on solidarity and complementarity of energy resource use.**
- **Energy planning, information, resource development and International cooperation.**
- **Energy Security: Demand and Supply**
- **Environment, Energy and poverty reduction**
- **Energy knowledge and technology innovation**
- **Renewable Energy Development**
- **Climate Change**
- **Energy Efficiency**

# 4 Regional Policies for Energy Security and Investment for Sustainable Energy Development

- Maintain all energy and resource development alternatives open
- Promote Energy Efficiency in both demand and supply.
- Promote Energy market integration sub regional, regional and global levels.
- Establish extraregional and regional Strategic Alliances for Energy Technology development and transfer in LAC.
- Promote Energy Security dialog about Energy Security of supply and demand regionally and extraregionally.
- To promote and establish a long term regional legal, industrial, commercial, and tax incentives regulatory framework to ensure investment stability.
- Strenghten Strategic bilateral and multilateral energy alliances for energy Supply and Demand that will duplicate in the next 40 years.
- Universal Access of energy in the region.
- Sustainable Energy Development of conventional energy and renewable energies, and Climate Change.

# Investments Announced for Resource Development in LA & C

**Existe un nuevo impulso al desarrollo de proyectos hidroeléctricos (2008-2012)**

**South America US$ 25.000 MM**
**Central America US$ 1.500 MM**
**Mexico US$  US $ 3.000 MM**

**Main Investment for OIL and GAS in the Region (2008)*:**
**Brazil US$ 20.000 MM**
**Venezuela US$ 15.000 MM**
**Mexico US$ 21.000 MM**
**Colombia US$ 9.000 MM**

**There are also important Renewable Energy, geothermal and biofuels investments projected in:**
**(Central America, Brazil, Argentina y Colombia).**
**Solar & Eolic (México, Brasil, Chile y Argentina)**

** Fuentes Oficiales de los Países Miembros de OLADE

5

# *Potential Areas for Energy Development Between Korea and Latin America & Caribbean*

- Oil, Gas and Coal energy resource development in Member Countries with high potential, but with limited in country capacity, non producers and producers, energy trade opportunities.
- Investment opportunities in Energy Infrastructure:  Oil and Gas Infrastructure development, power plant s
- Strategic Alliances Between Korea and LA & C (OLADE) Member Countries for bilateral and multilateral investment for Sustainable resource and energy development.
- Energy knowledge, Technological Innovation R&D for energy cooperation.
- Areas of Interest for  joint development: Energy Security and Supply, Energy Efficiency, Climate Change, Renewable Energy Development, biofuels , technology exchanges, Hydro Tech.

5

# *Potential Areas of Resource Development for Oil & Gas in Latin America & Caribbean*

- **There are two tendencies well defined between the countries in the region,one considers that the state has to be in charge, mainly for upstrean OIL operations, dthe second one opens the possibility to the private sector so associated or not eith the government do exploration and exploitation and resource development of Oil and Gas**
- **In the first Group we have: Venezuela, Bolivia, Ecuador, Mexico. In the second Group we have: Brazil, Argentina, Peru and Colombia. In a third group we have a mixt model wich includes the country producers.**
- **Generally countries in Group II have leasing processes of International in character to atract investment for Oil and gas exploration and exploitation.**

# *Potential Areas of Resource Development for Oil & Gas in Latin America & Caribbean*

- **Generally contracts used are: 1) Services and/or operation in the first group and; 2) Shared production in the second group 3) All the rest of the countries which use both tipes of contracts.**
- **Taxation rates vary from one country to another, those more flexible have royalties and taxes based on production variables + Taxes over gains; on the other side there are countries in the region with fixed tax rates over production.**
- **Natural gas commerce has grown in the last years, in a first phase, during the 90´s decade, gas trade was in the rigion included only (Brasil-Bolivia, Chile-Argentina); although, supply problems in the region, forced many producers and non producers to buit re gasification plaqnts in the main centers of consumption: Brasil, Argentina, Chile. And expanded markets for Trinidad & Tobago, and Venezuela, and changed perspectives for Bolivia.**

5

# Approach Strategies for Energy Cooperation Between Korea and LA & C

- OLADE´s Regional Center of knowledge for Energy Development
- Joint studies KEEI-OLADE for the analysis of Latin American & Caribbean Energy Market based on Energy Prospective work 2032
- Regional Strategies study for International Energy Trade development and promotion of LA & C energy sector, identifying opportunities for energy resource development.
- Joint identification for bilateral and multilateral energy development opportunities.
- Long Term Energy Demand/Supply in LA & C based on prospective 2032, and simulation analysis modeling for resource development.
- Joint effort to identify Energy Credit Lines and resource allocation thru FOLADE, (Latin American & Caribbean Sustainable Energy Development Fund) , to attract investment and energy resource development opportunities.

**The cheapest energy is that which is not consumed, and the most expensive is that which is not available.**

*Rational use ensures sufficient supply.*

*Efficiency brings sustainable development benefits for the people, to meet the basic needs of transport, housing, food, health, and education, mitigate poverty and preserve the environment.*

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# THANK YOU!!


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