

A changing world: Mexico facing the 21st century energy revolution



Instituto Mexicano para la Competitividad A.C.



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#ReformaEnergética

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1. Global Outlook of the Oil & Gas sector
2. International Lessons
3. Oil & Gas sector in Mexico today
4. Assessing Mexico's potential
5. The sector we envision

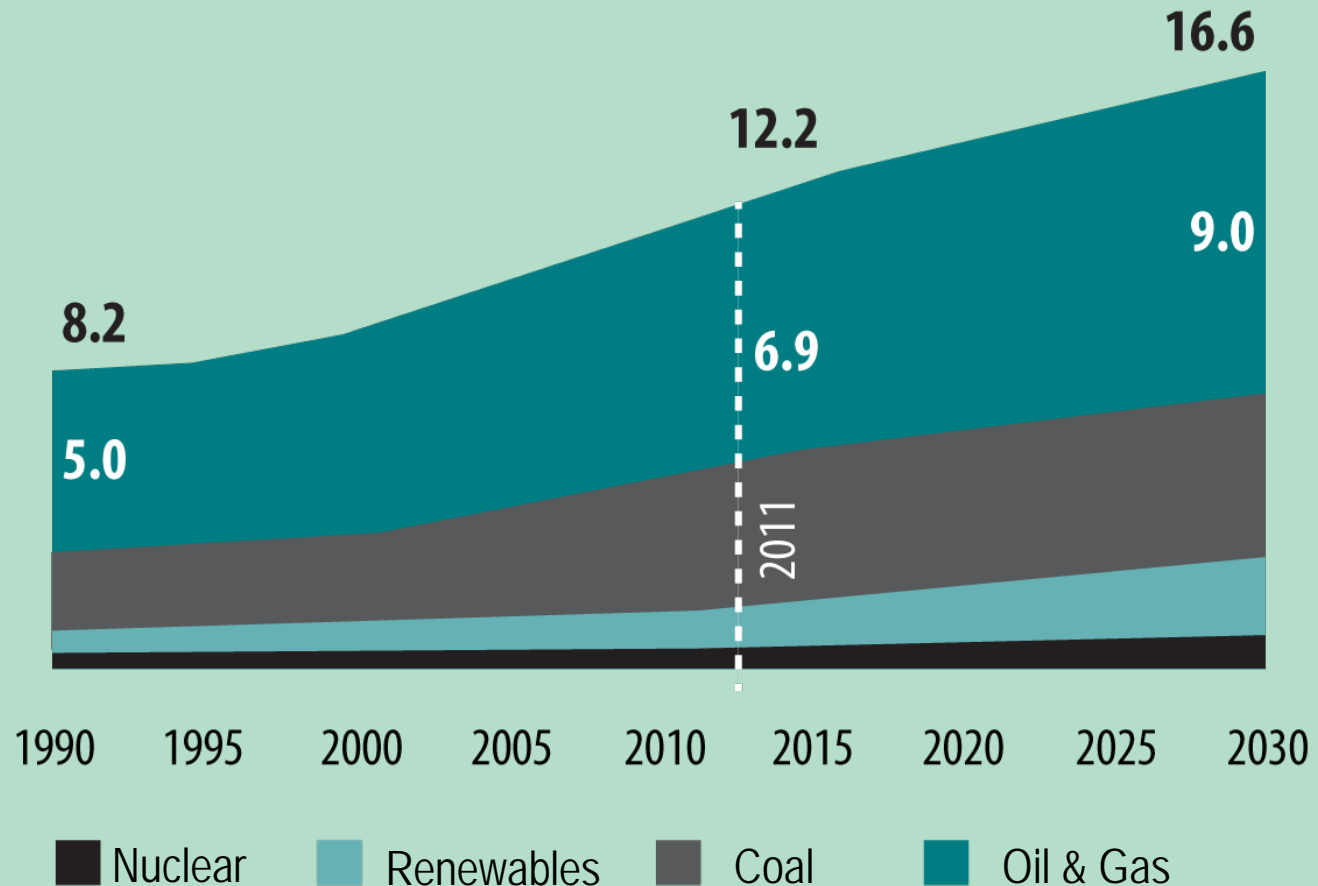
GLOBAL OUTLOOK ON THE OIL & GAS SECTOR

OIL AND GAS WILL REMAIN THE BACKBONE OF GLOBAL ENERGY SUPPLY

Total energy output by source, 1990-2030

Billion tonne of oil equivalent (Gtoe)

- By 2030 oil & gas will still account for 54% of global energy supply
- Since 1980 proven oil reserves have grown by 142%



THE WORLD OF LARGE, **EASY OIL** FIELDS IS COMING TO AN **END**

- Future output will come primarily from projects with high marginal and sunk costs due to the geological and technical complexity of untapped reservoirs.
- The scale of new reservoirs will be much smaller than that of 20th century reservoirs

EASY OIL



EXPLORATION/PRODUCTION



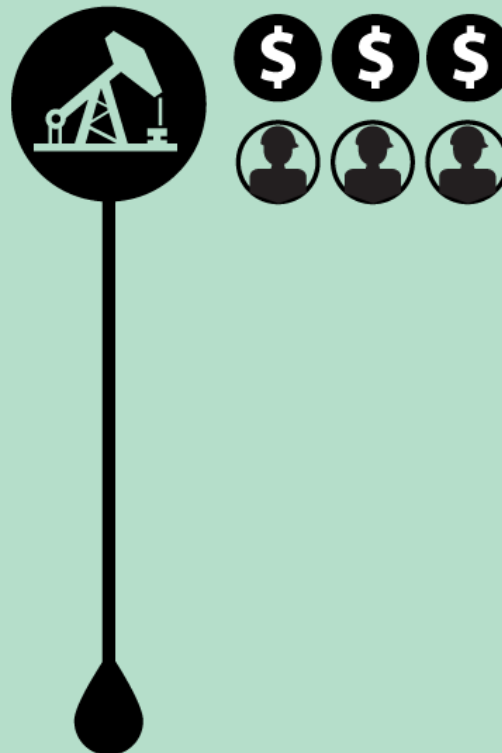
REQUIRED INVESTMENT



HUMAN CAPITAL

NEW RESOURCES

DEEP WATERS

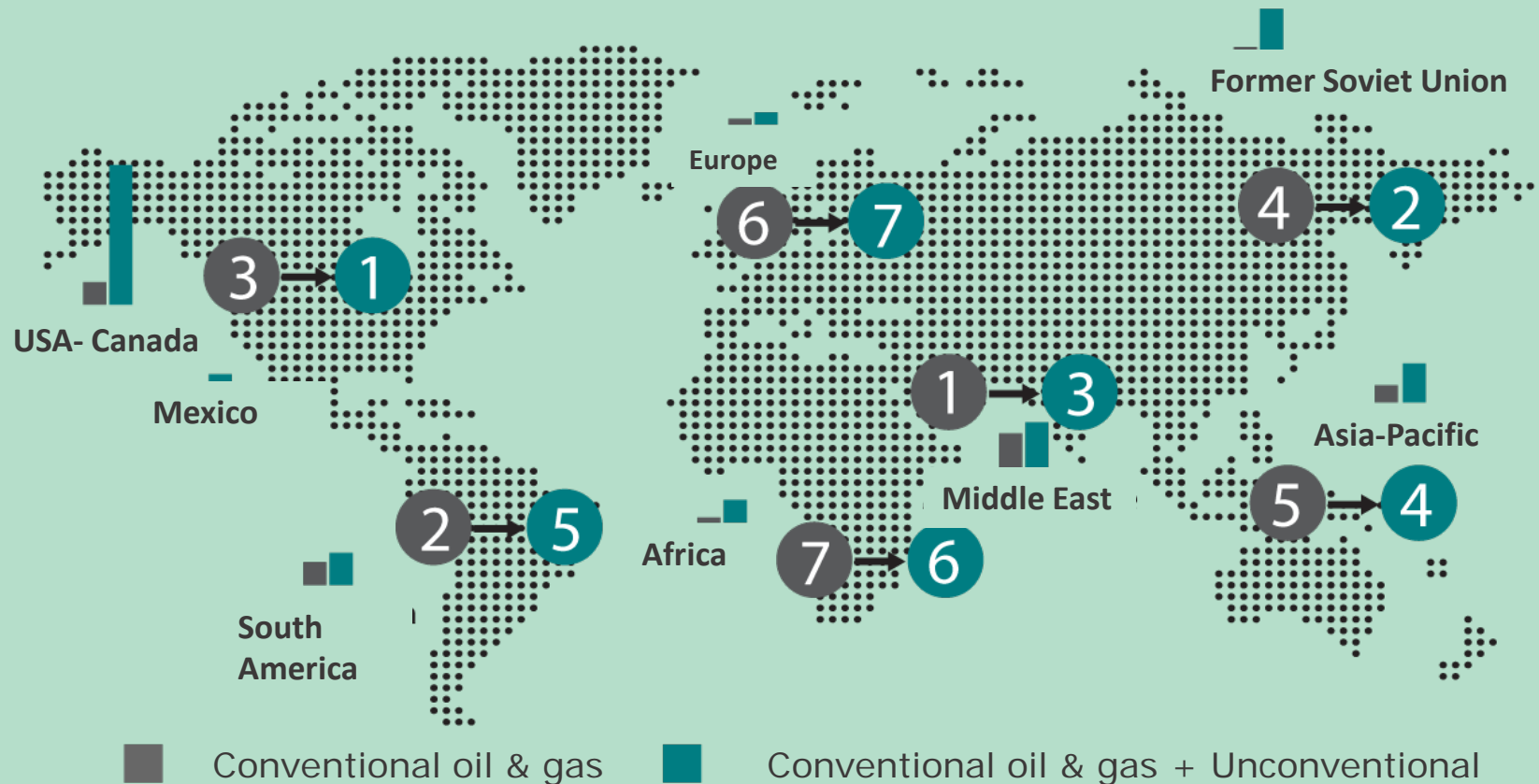


UNCONVENTIONAL



WORLD HYDROCARBON POTENTIAL: USA AND CANADA AS NEW LEADERS

RANKING OF REGIONS BY RESERVES OF CONVENTIONAL AND UNCONVENTIONAL RESOURCES (2011)



HUMAN CAPITAL AND TECHNOLOGY AS THE KEY TO SUCCESS

PATENTS 2011

INNOVATION

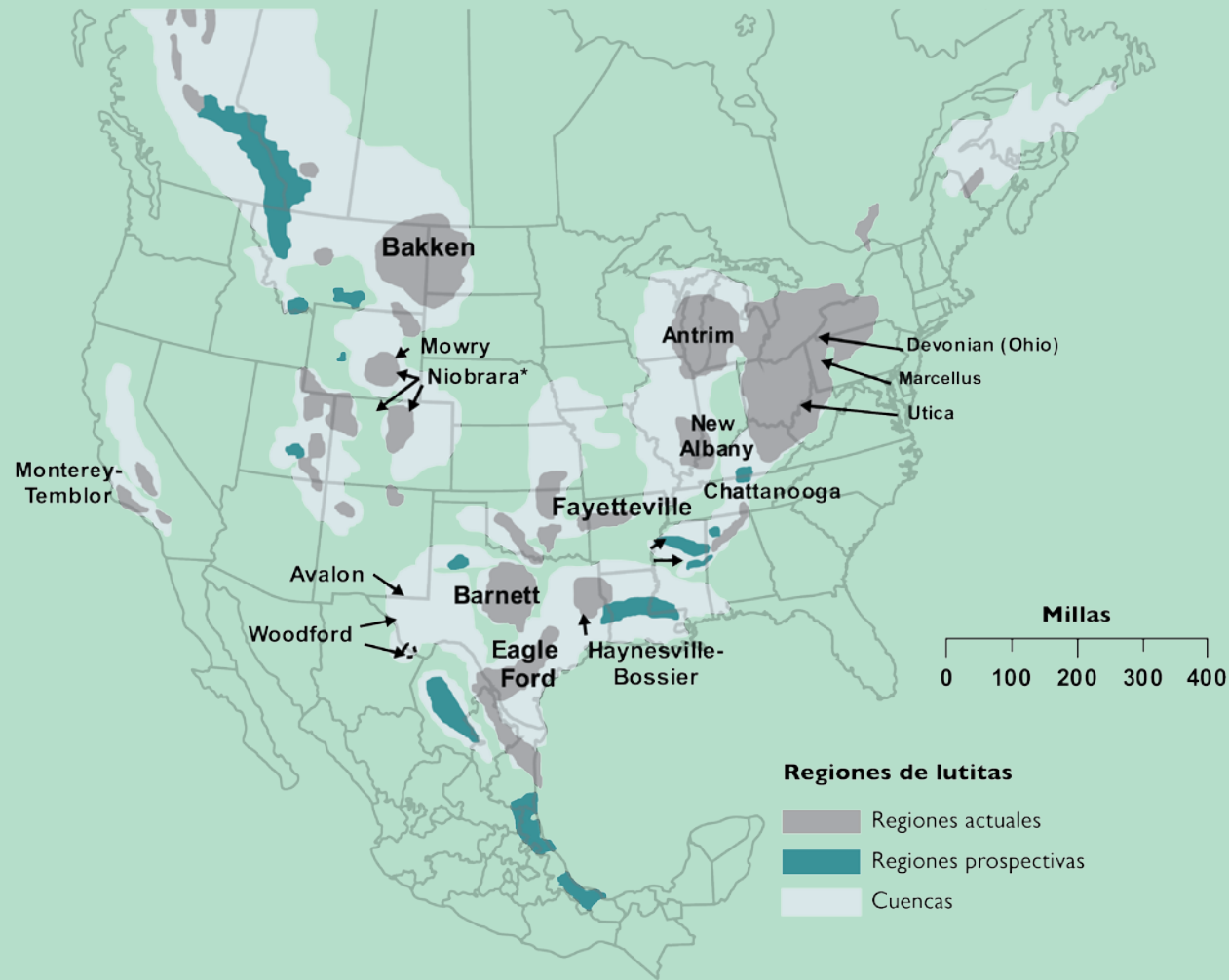
Schlumberger 540



22

USA IS THE NEW ARABIA

- Unconventional oil & gas have changed the landscape of the industry
- North America (excl. Mexico) now has the largest potential of any region
- Technology has shattered the traditional paradigm of the oil & gas sector. It holds the key to future growth.

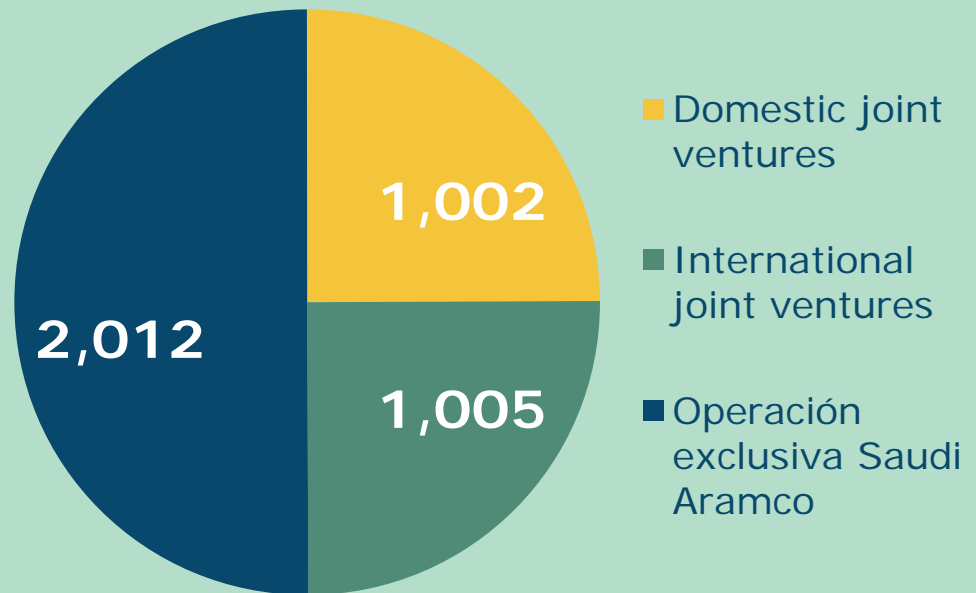


INTERNATIONAL LESSONS

SAUDI ARABIA: PRIVATE INVESTMENT IN REFINING, PETROCHEMICAL INDUSTRY AND GAS SHALE

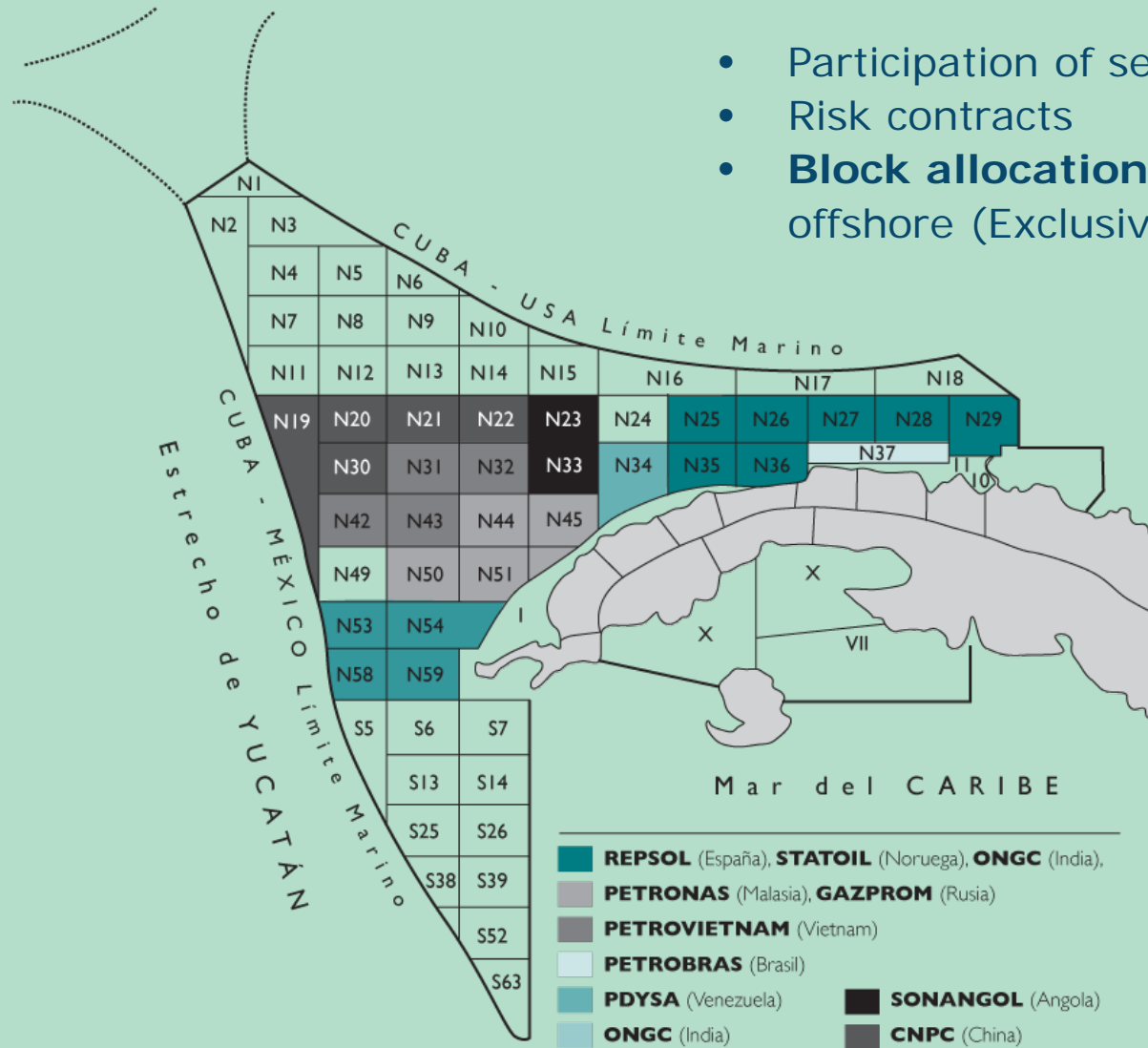
- **Private investment** in downstream (oil refining, petrochemical industry)
- Since 2003 allowed foreign investment in gas exploration
- Shell, Eni, Repsol, Sinopec, Lukoil signed deals to explore for gas with Saudi Aramco

SAUDI ARAMCO REFINING
CAPACITY
(1000 OF DAILY BARRELS)



CUBA: PRAGMATIC ENERGY OUTLOOK VS POLITICAL IDEOLOGY

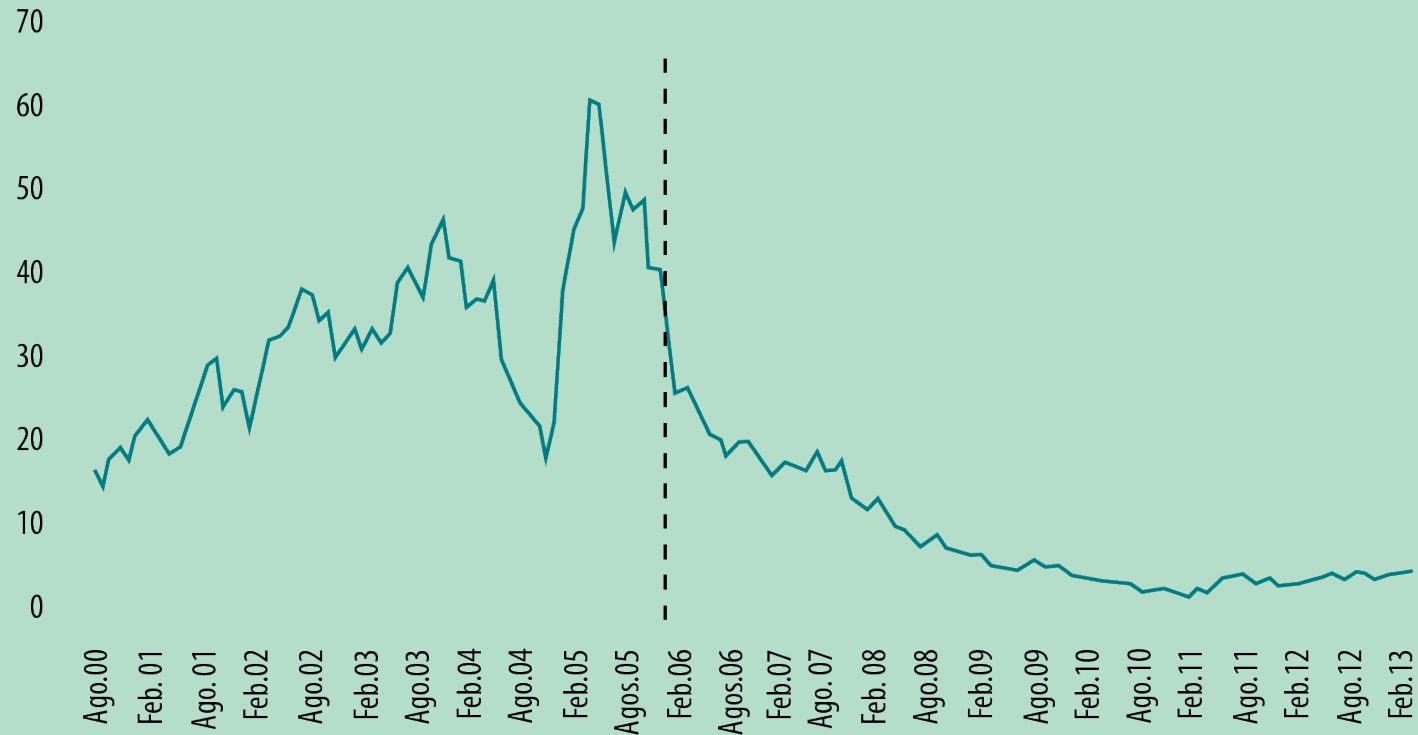
- Participation of several foreign oil firms
- Risk contracts
- **Block allocation:** 43 inland and 59 offshore (Exclusive Economic Zone)



BRAZIL: CHANGE IN ENERGY POLICY (LULA)

- Petrobras 2Q 2012: first reported loss in 13 años (USD \$665 million)
- The firm has pulled out of several international projects
- Share prices have plummeted

Petrobras share price (PBR) on Nasdaq (USD per share)



Source: IMCO with data from BOVESPA (Sao Paulo Stock Exchange)

Note: Dotted line indicates date of discovery of Présal (Feb 2006)

NORWAY: OIL RENT MANAGEMENT WITH AN INTERGENERATIONAL OUTLOOK

- **NORWAY OIL RENT** IS REVERSED IN A SOVEREIGN INVESTMENT FUND WHICH IS EQUIVALENT TO **1.47 TIMES THE NORWEGIAN GDP**
- GOV'T MAY USE ONLY THE FUND INTEREST

**GOVERNMENT PENSION FUND
(2012)**

737

BILLION DOLLARS

**NORWEGIAN GDP
(2012)**

500

BILLION DOLLARS

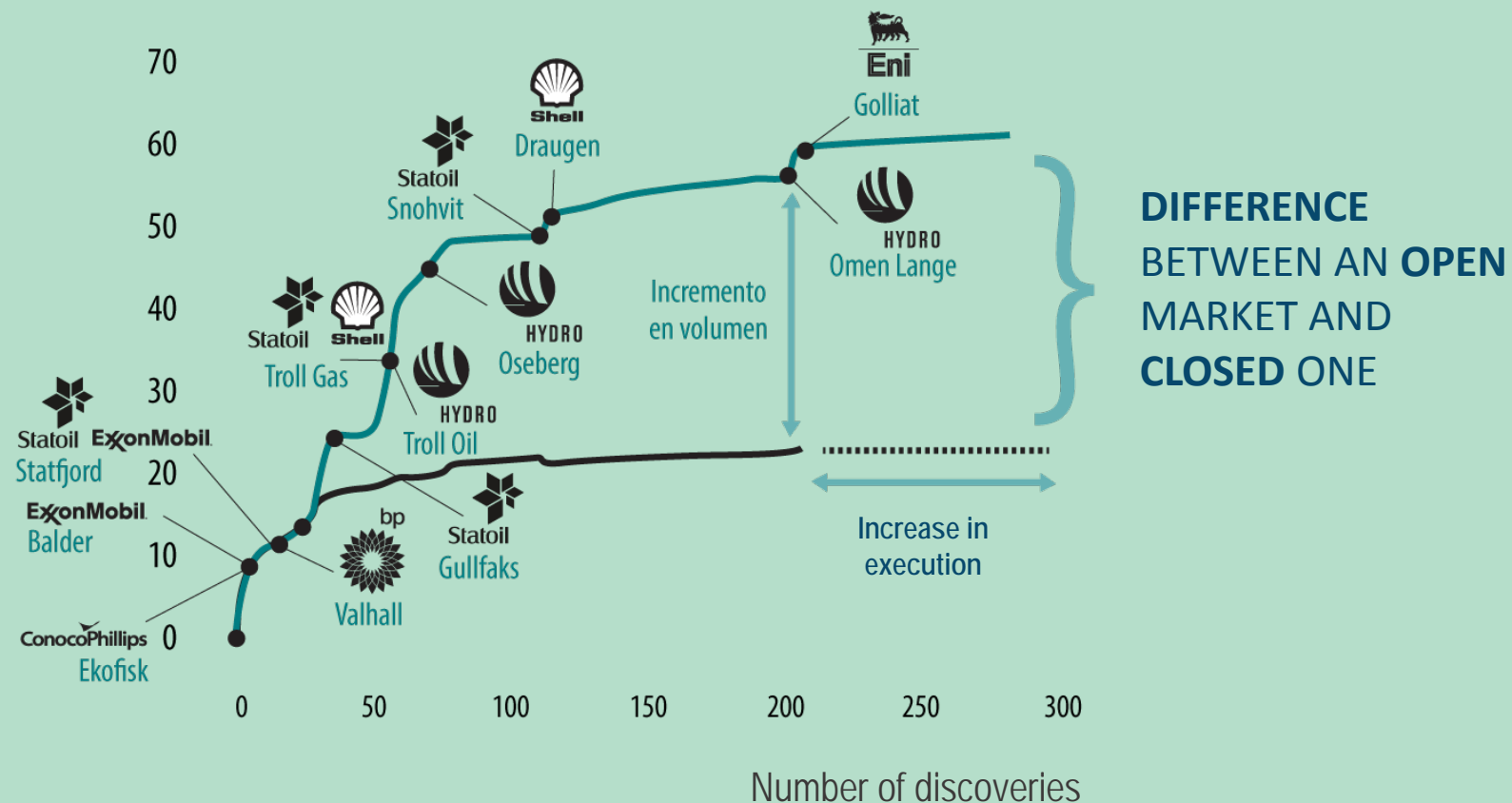
**GOVERNMENT PENSION FUND
(1.15% DEL PIB GLOBAL)**

NORWAY: INCREASED EXPLORATION UNDER OPEN MARKET

CUMULATIVE GROWTH IN RESERVES AND MAIN DISCOVERIES*

PROVEN RESERVES AND RESOURCES

Billion barrels of oil equivalent

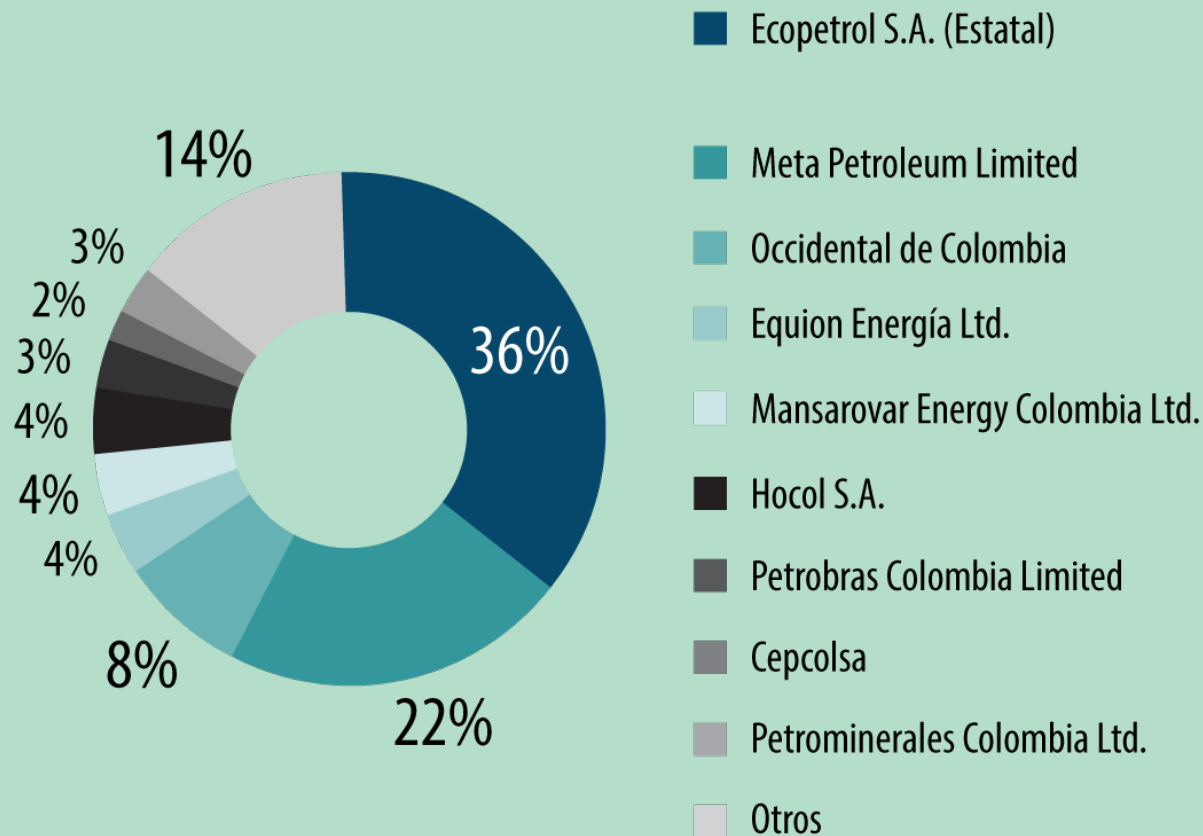


*From opening-up of sector
Source: Wood Mackenzie

COLOMBIA: MODEL OF EFFECTIVE REGULATION AND SEVERAL OPERATING COMPANIES

SHARE OF TOTAL OIL OUTPUT IN
2011, BY FIRM (%)

- **2005-2011: oil output rose 73%**



COLOMBIA

Stock-market performance of Ecopetrol vs Petrobras



**MEXICO IS THE ONLY
COUNTRY WHERE A
NATIONAL OIL COMPANY
HOLDS A MONOPOLY
OVER THE ENTIRE
VALUE CHAIN OF THE
OIL & GAS SECTOR**

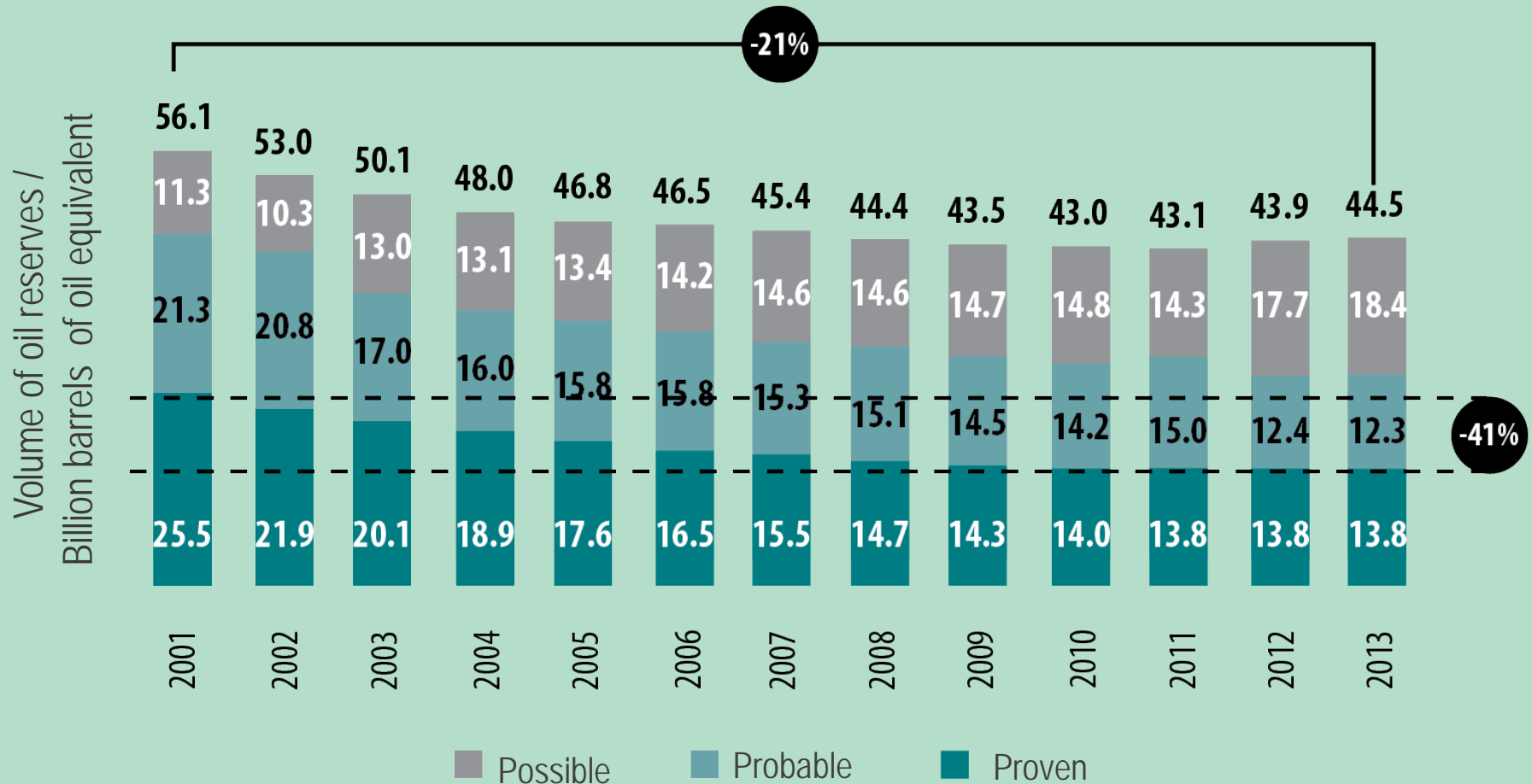
| | | Norway | Brazil | Colombia | Saudi Arabia | Cuba | México* |
|--|--|--------|--------|----------|--------------|------|--|
| Exploration and Production | Concessions + Joint Ventures | Yes | Yes | Yes | Yes | Yes | No |
| | National oil Company with international activities (<i>upstream</i>) | Yes | Yes | Yes | Yes | No | No |
| Refining, petrochemical and distribution | Join ventures (<i>downstream</i>) | Yes | Yes | Yes | Yes | Yes | No |
| | Private or foreign investment in refining activities? | Yes | Yes | Yes | Yes | Yes | No |
| | Multiple firms and liberalized fuel prices | Yes | Yes | Yes | No | No | No |
| | National oil Company with international activities (<i>downstream</i>) | Yes | Yes | No | Yes | No | Yes (<i>Deer Park Houston Joint venture with Shell</i>) |
| | | | | | | | |

Source: IMCO with data from EIA (2013) *Analysis briefs*. Available at www.eia.gov.

Pemex holds 9.49% of the shares of Repsol

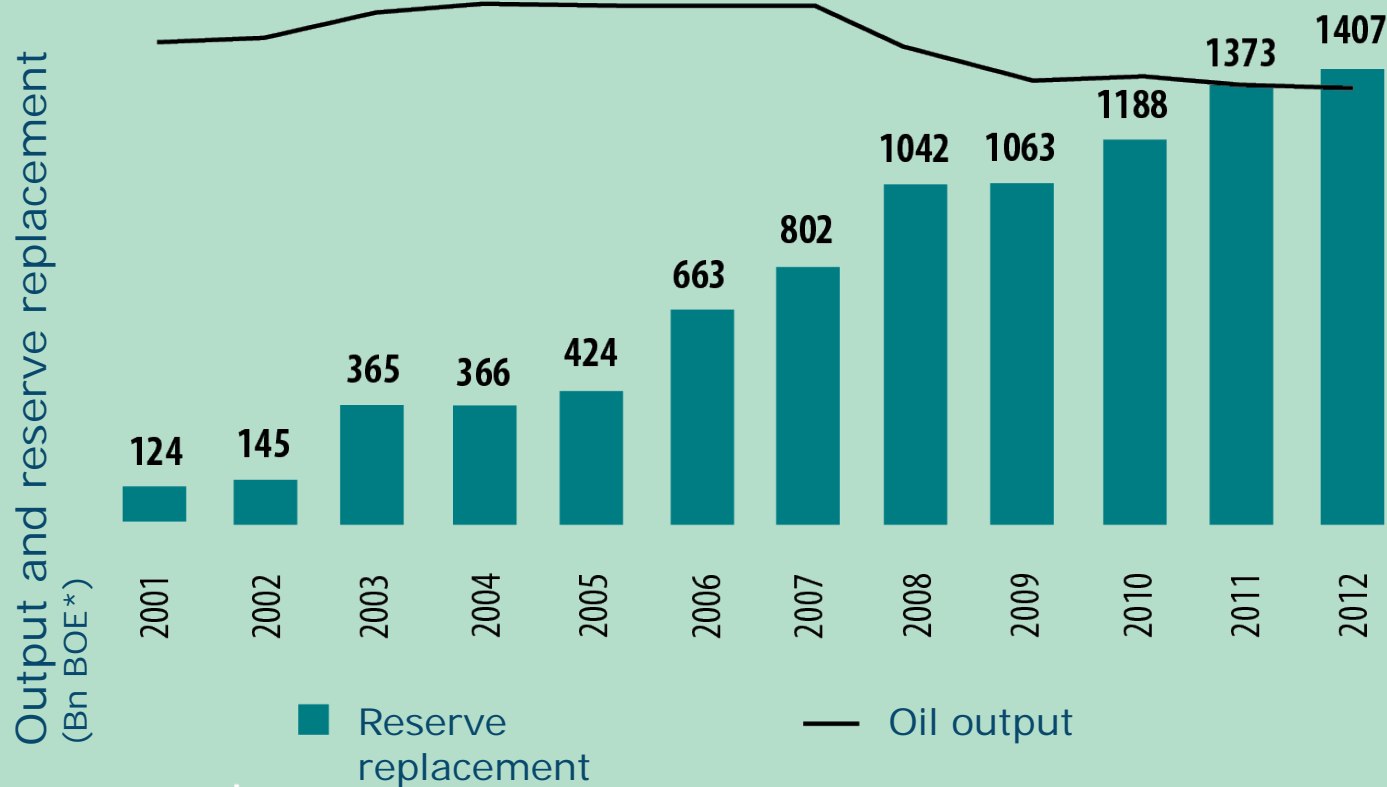
OIL & GAS SECTOR IN MEXICO

PROVEN RESERVES HAVE DECREASED 41% SINCE 2001



Note: Reserves are classified as: Proven=1P; Proven+Probable =2P; Proven+ Probable+Possible=3P= Total reserves.

RESERVE-REPLACEMENT RATIO HAS IMPROVED STEADILY IN RECENT YEARS AND REACHED **100% IN 2011** FOR THE FIRST TIME SINCE THE DISCOVERY OF CANTARELL



Reserve-replacement ratio (%)

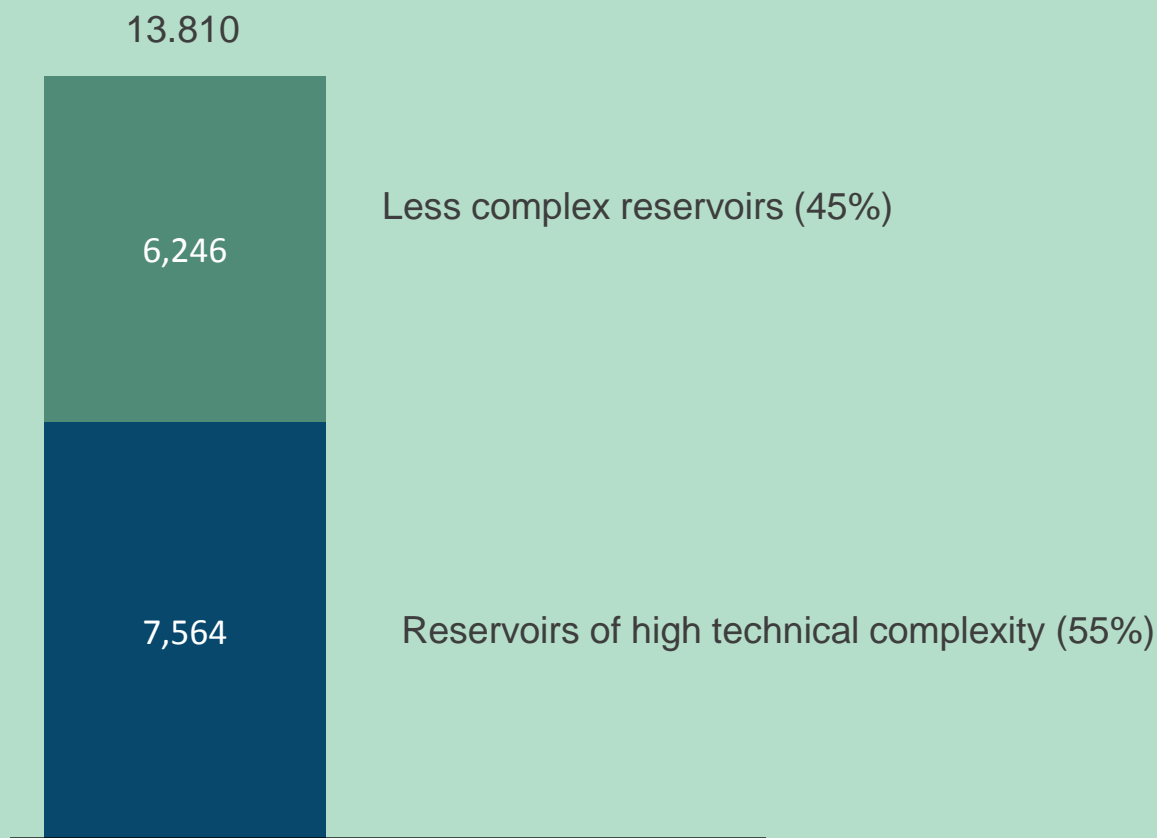
| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|-------|-------|
| 8.3 | 9.6 | 23 | 22.7 | 26.4 | 41.0 | 50.0 | 71.8 | 77.1 | 85.8 | 101.1 | 104.0 |

Source: PEMEX,
Anuario estadístico
2012

* BOE : Barrel of Oil
Equivalent

MEXICO'S **PROVEN RESERVES** ARE MOSTLY IN FIELDS OF HIGH **TECHNICAL COMPLEXITY**

Proven reserves (1P) 2011*
(Billionn Barrels of Oil Equivalent)



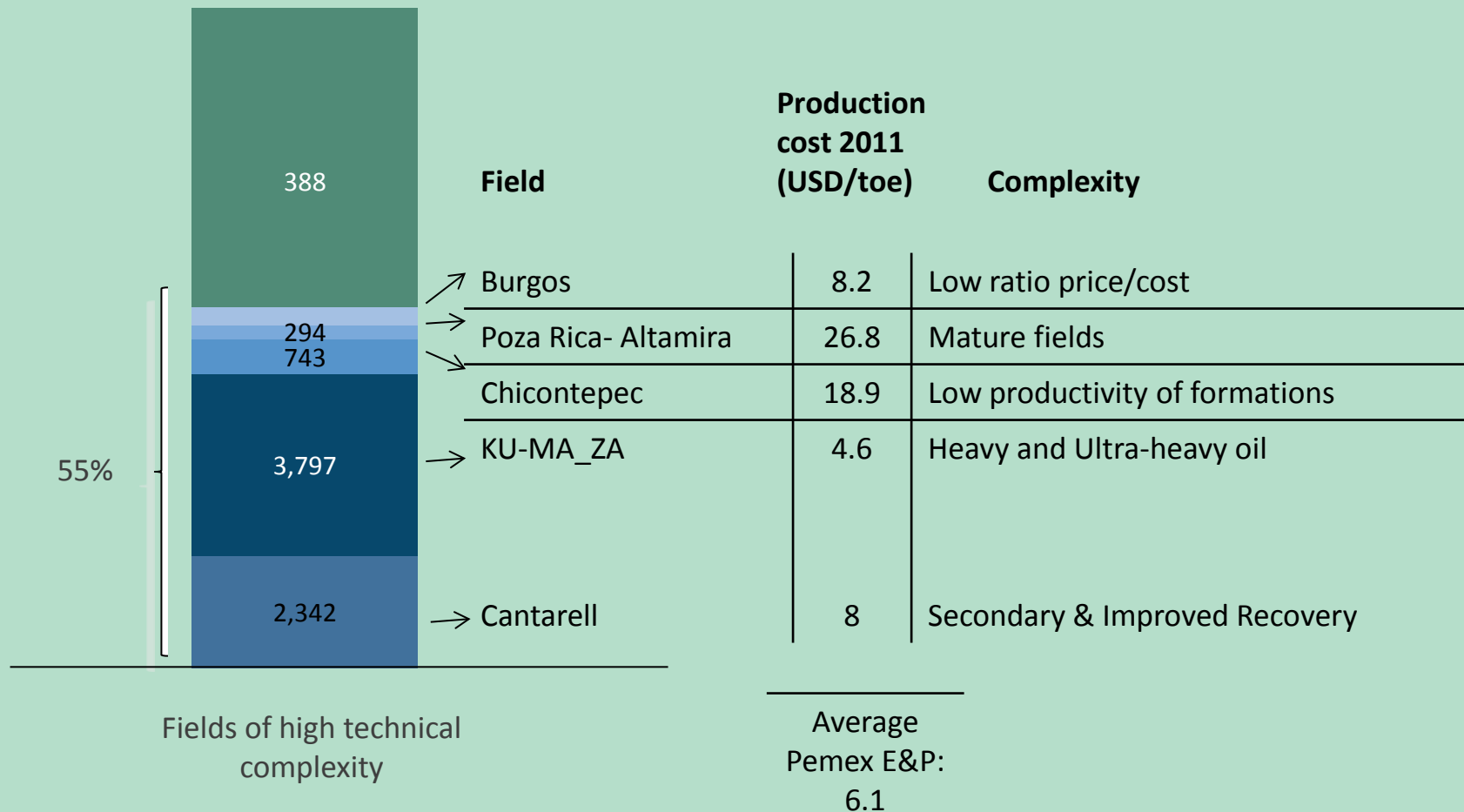
Source: PEMEX, *Reservas de México 2012*

*Reserves as of Dec 31, 2011

MEXICO'S PROVEN RESERVES ARE MOSTLY IN FIELDS OF HIGH TECHNICAL COMPLEXITY

Proven reserves (1P) 2011*

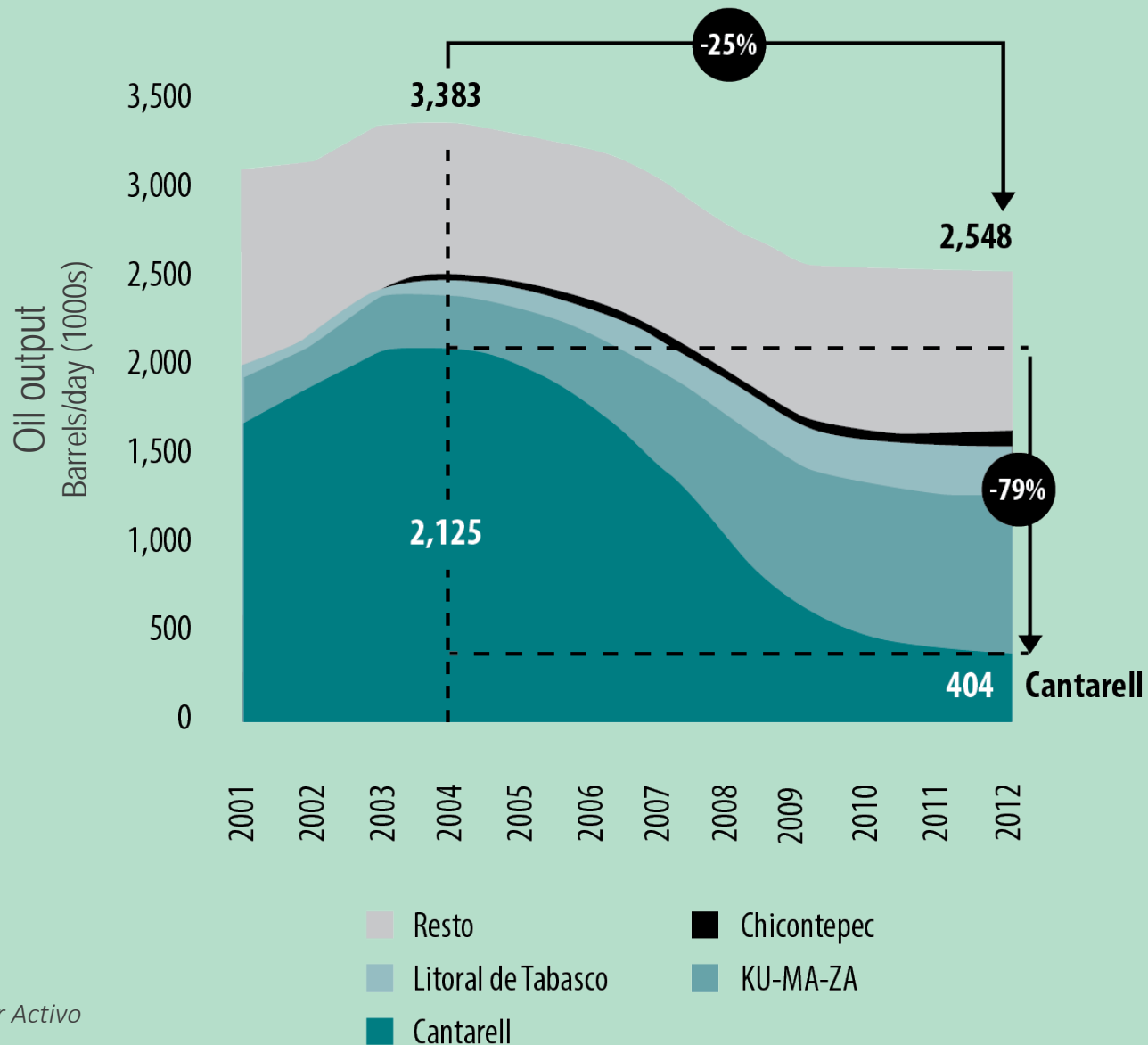
(Billionn Barrels of Oil Equivalent)



Source: PEMEX, *Reservas de México 2012*

*Reserves as of Dec 31, 2011

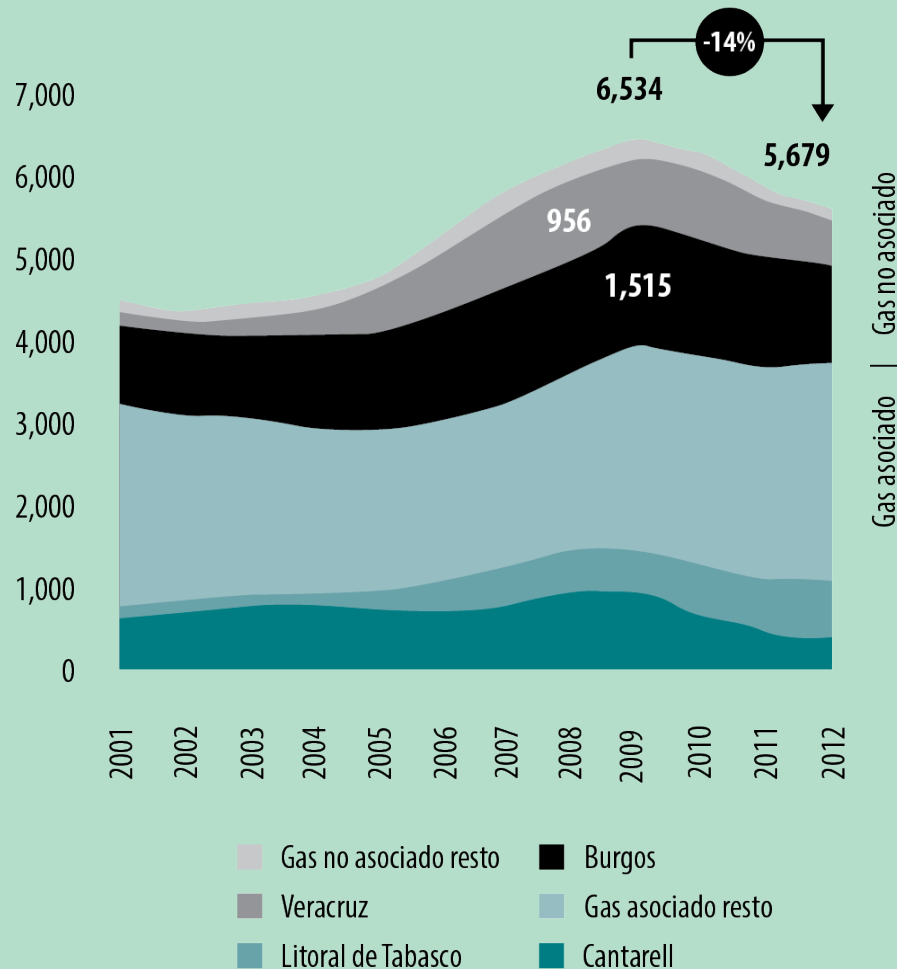
DEPLETION OF CANTARELL COULD NOT BE OFFSET BY THE INCREASE IN OUTPUT OF KU-MA-ZA AND TABASCO SHORE



GAS OUTPUT IN DECLINE SINCE 2009 DUE TO **DEPLETION** OF CANTARELL, **LACK OF INVESTMENT** IN BURGOS AND LOW RESERVE REPLACEMENT RATIO IN VERACRUZ

Output of gas fields

Million Standard Cubic Feet per Day

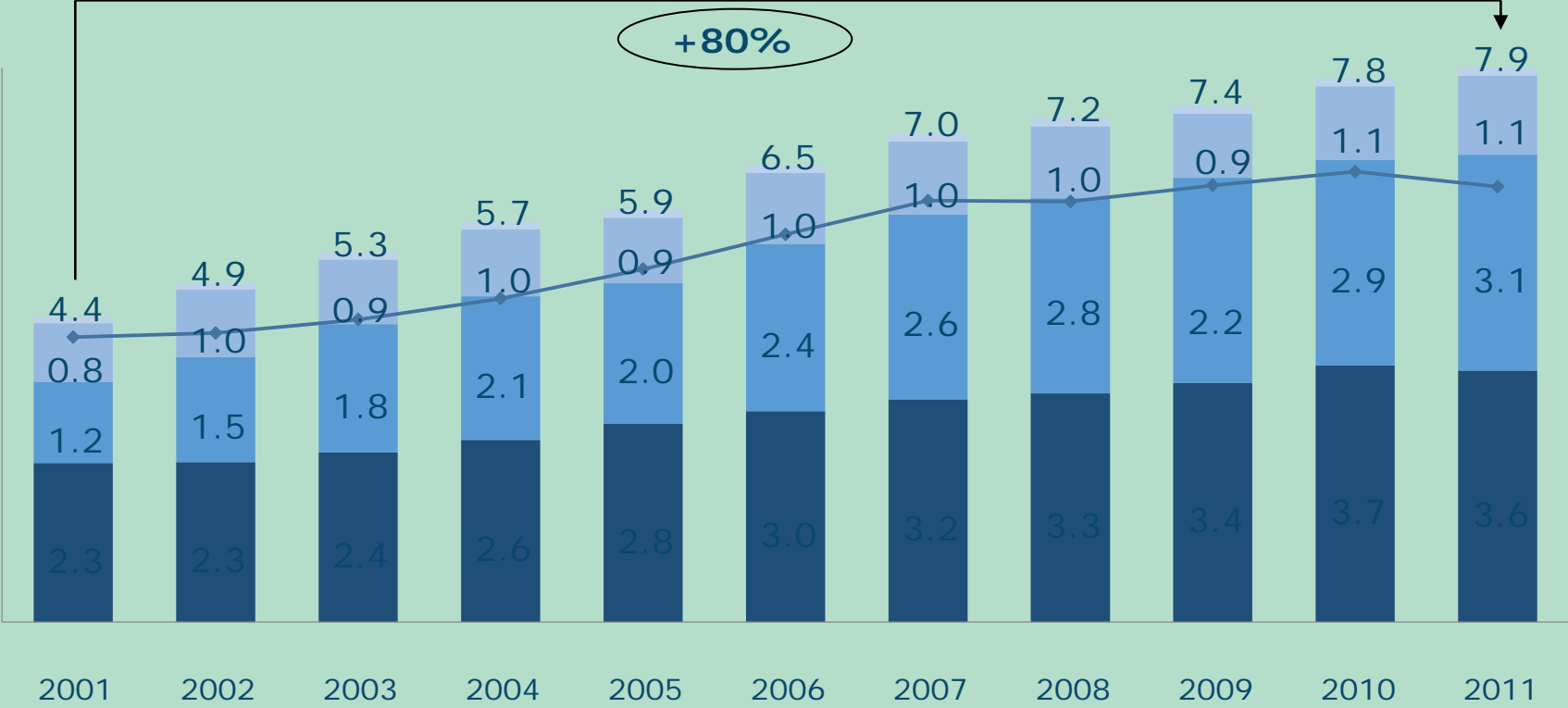


Source: National Hydrocarbon Commission (CNH)
Does not include Nitrogen. Output per project

DOMESTIC CONSUMPTION OF **DRY NATURAL GAS** IS GROWING AT **6%** A YEAR DUE TO DEMAND FROM **ELECTRICITY GENERATION**, PEMEX AND THE INDUSTRIAL SECTOR

Dry natural gas: domestic supply vs demand

Billion Standard Cubic Feet



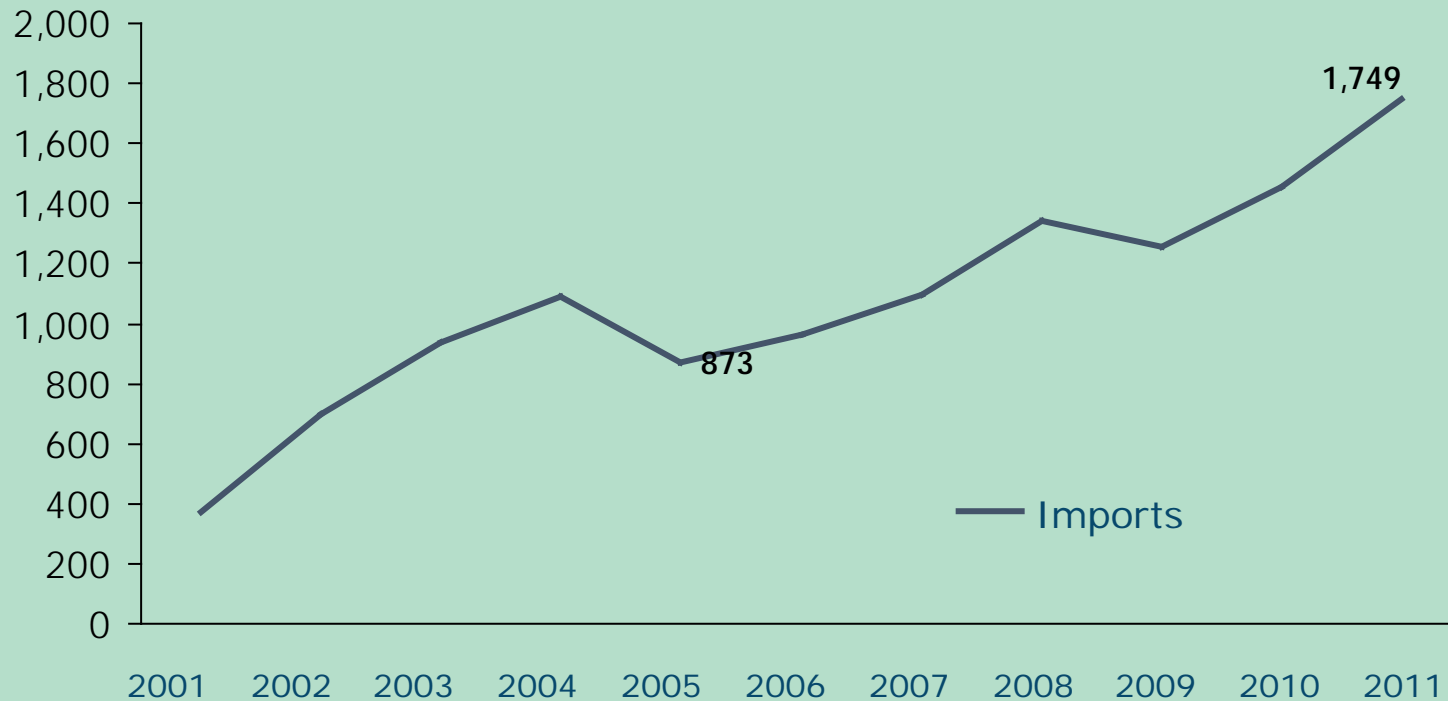
- Supply of dry natural gas
- Oil sector
- Residential demand and services*
- Industrial demand
- Electricity generation

Source: Ministry of Energy (SENER), *Prospectiva de Gas Natural 2012*.
*Including Transport

SINCE 2005 NATURAL GAS IMPORTS HAVE GROWN BY **100%** DUE TO DOMESTIC MARKET IMBALANCES. BUT IMPORT **INFRASTRUCTURE IS LIMITED** AND UNDER STRAIN.

Dry natural gas imports

Million Standard Cubic Feet



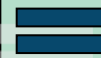
Stagnated
natural gas
supply



Quickly
growing
demand



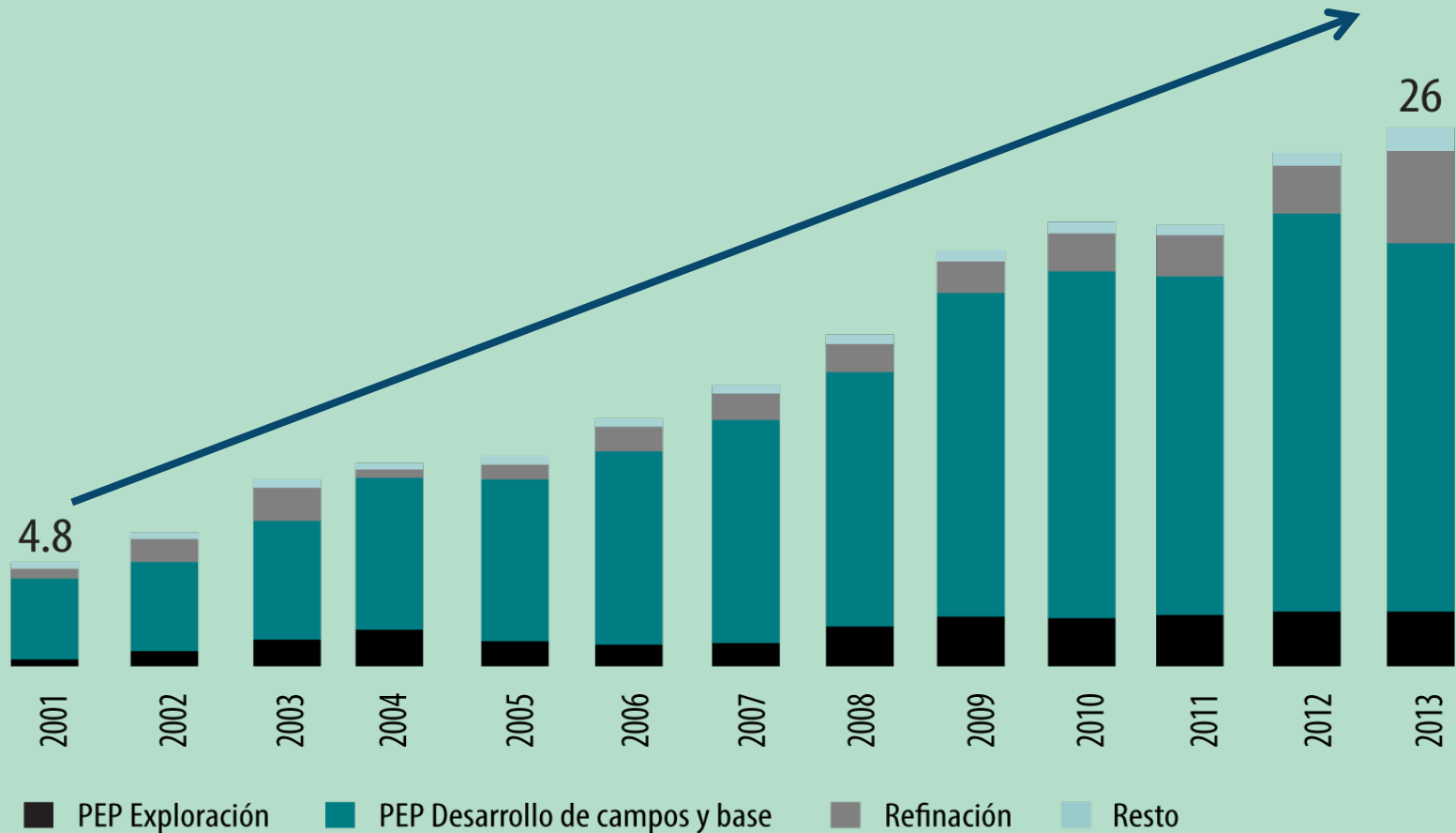
Inadequate
import
infrastructure



Risk and
vulnerability of
supply

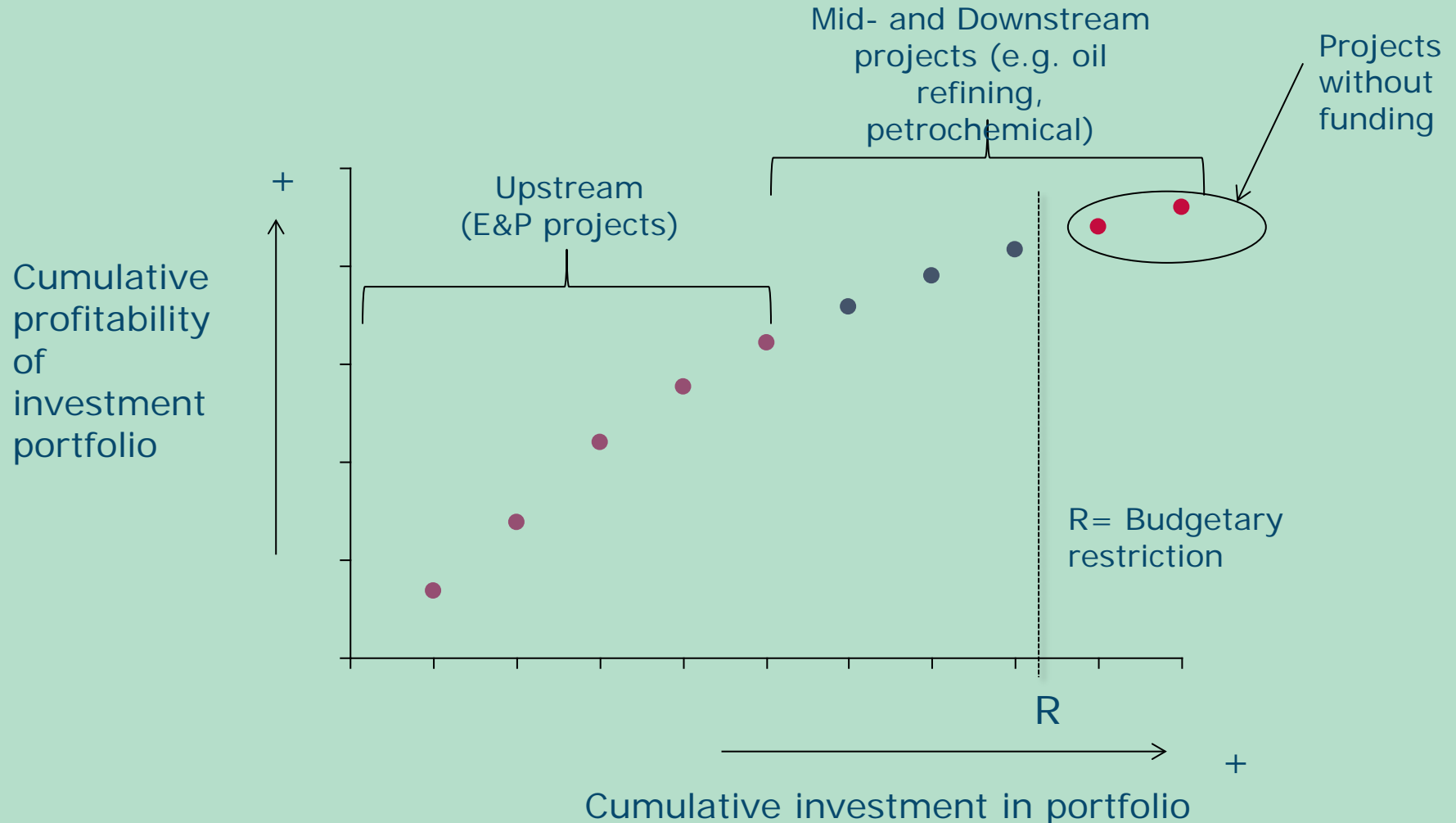
INVESTMENT HAS GROWN, ESPECIALLY IN **E&P**. BUT IT IS STILL **NOT ENOUGH** TO BRING OUTPUT BACK TO **3 MILLION BARRELS A DAY (B/D)**.

Investment
Billion dollars



IN A SCENARIO OF **LIMITED INVESTMENT FUNDS**, UPSTREAM PROJECTS (I.E. **E&P**) CAPTURE THE MAJORITY OF FUNDS SINCE THEY ARE **THE MOST PROFITABLE**

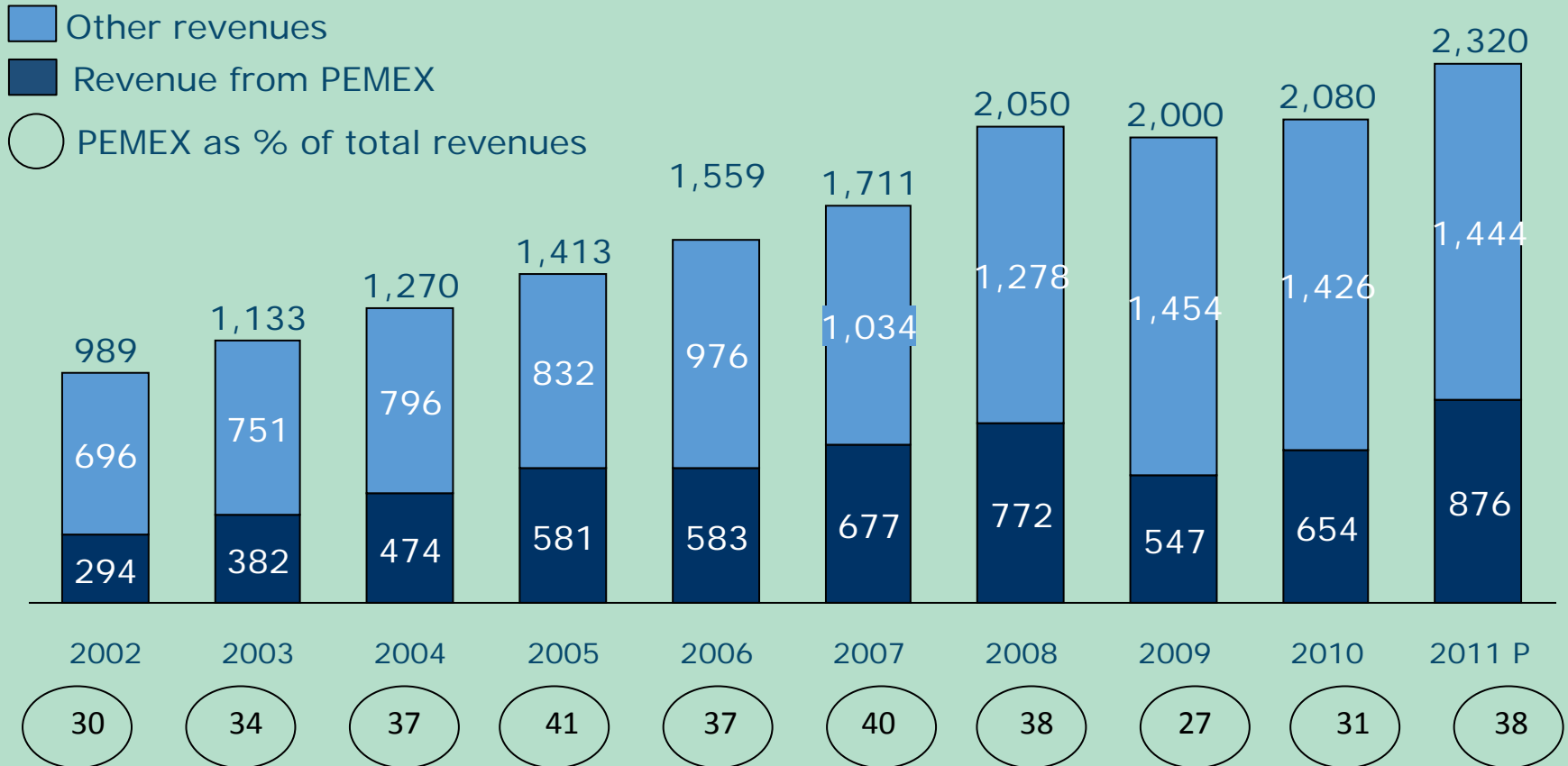
Conceptual



PEMEX PROVIDES ABOUT 35% OF TOTAL FEDERAL REVENUES EACH YEAR

Federal Government revenues

Billion Mexican Pesos (MXN)



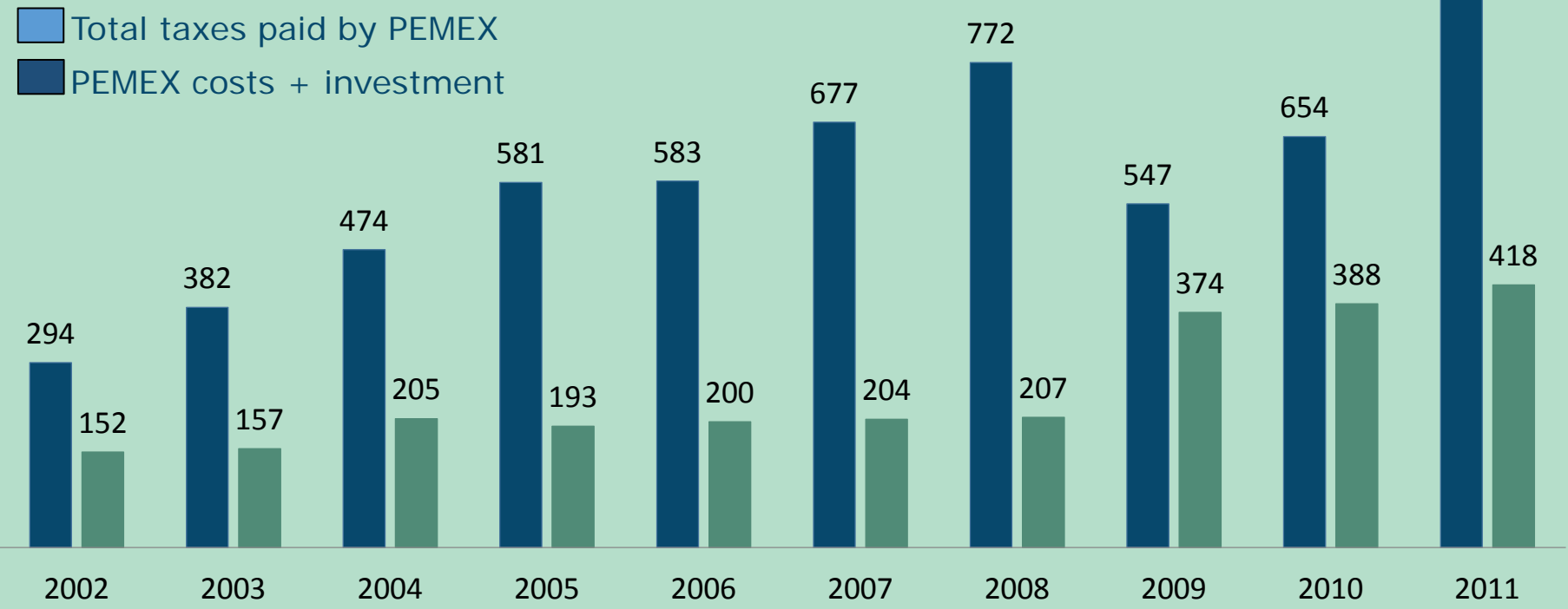
Sources: INEGI; PEMEX, Anuario Estadístico 2012.

2002-2011: EACH PESO SPENT ON PEMEX (INVESTMENT AND RUNNING COSTS) PROVIDES A **RETURN OF 2.5 PESOS** THROUGH TAXES AND OTHER **FISCAL REVENUES**

Investment and operating costs versus fiscal revenues

The ratio has been 1.7 since 2009

Billion Constant Pesos (2011)

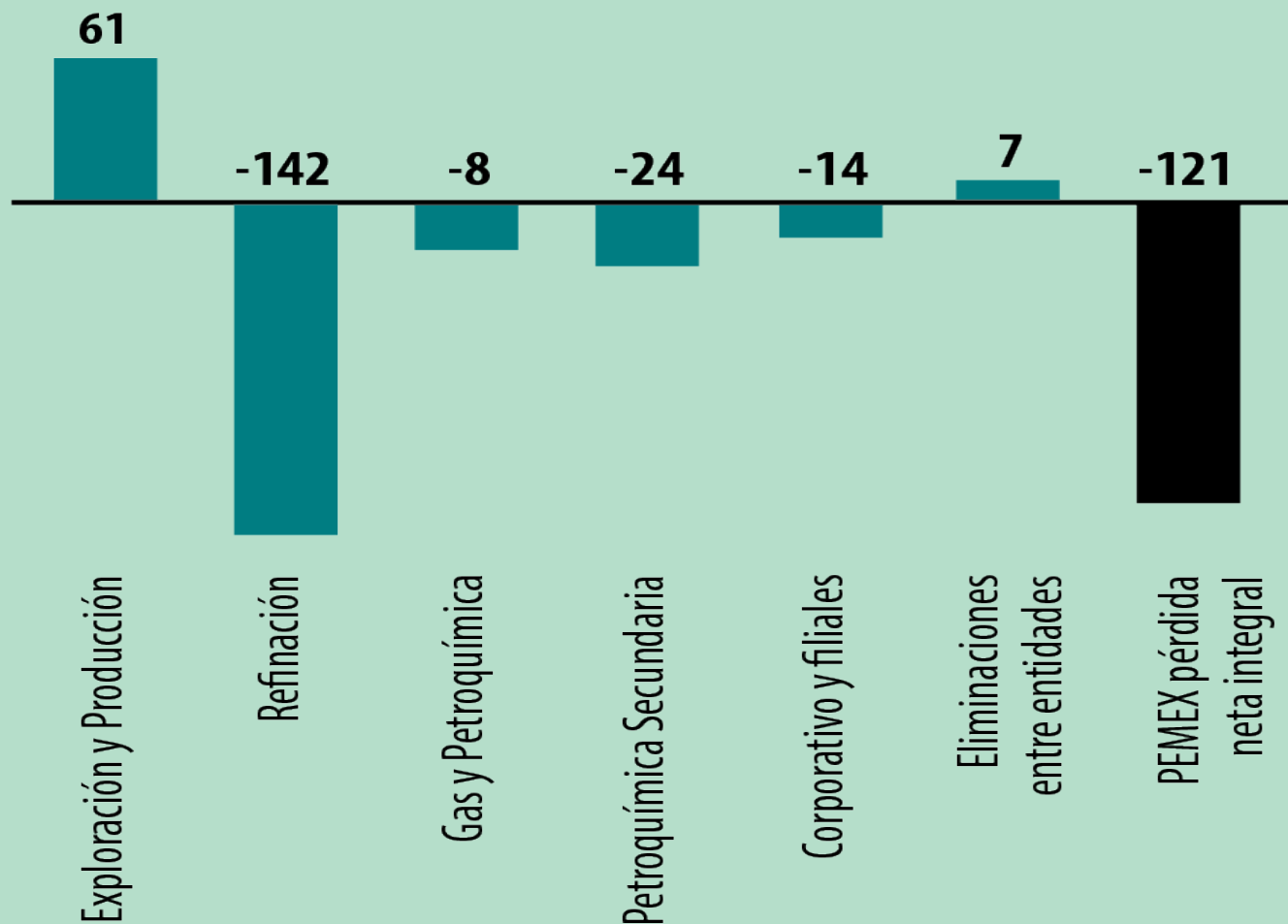


Source: PEMEX, *Memoria de Labores*

IN 2012 PEMEX POSTED MXN 121 BILLION LOSS, AFTER PAYING MXN 907 BILLION IN TAXES

Net balance by subsidiary, 2012*

Figures in MXN billions



Source: PEMEX 20-F SEC

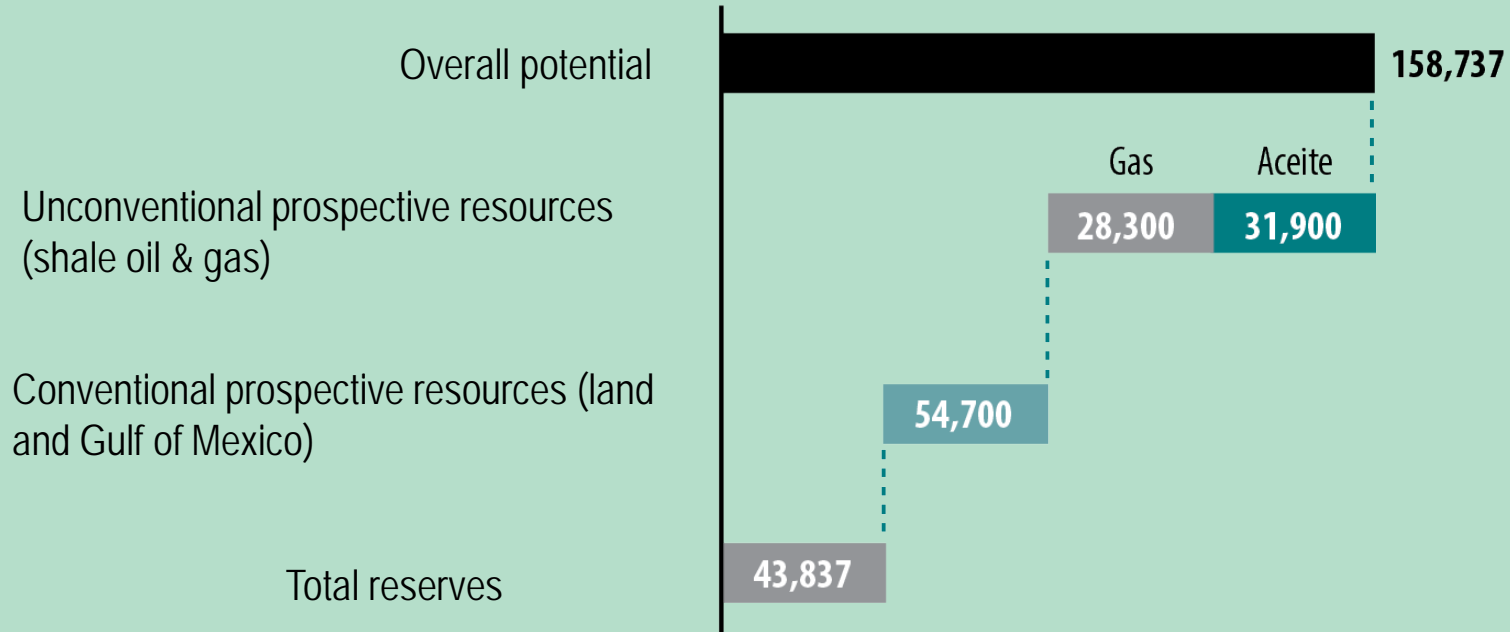
* After taxes

ASSESSING MEXICO'S POTENTIAL

MEXICO'S POTENTIAL IS VAST (MATURE FIELDS, DEEPWATER, SHALE). **NO SINGLE FIRM** CAN EXPLOIT IT ON ITS OWN.

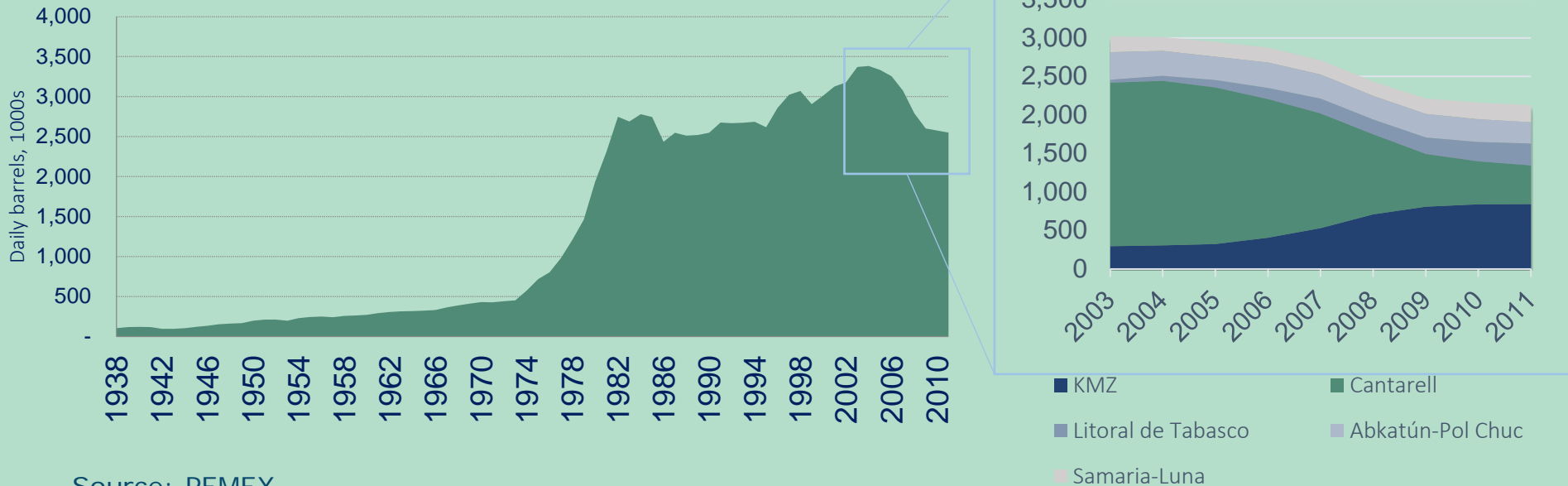
Potential (reserves & prospective resources)

Million barrels of oil equivalent (boe)



MEXICO NEEDS A NEW MODEL

Oil output in Mexico, 1938-2011



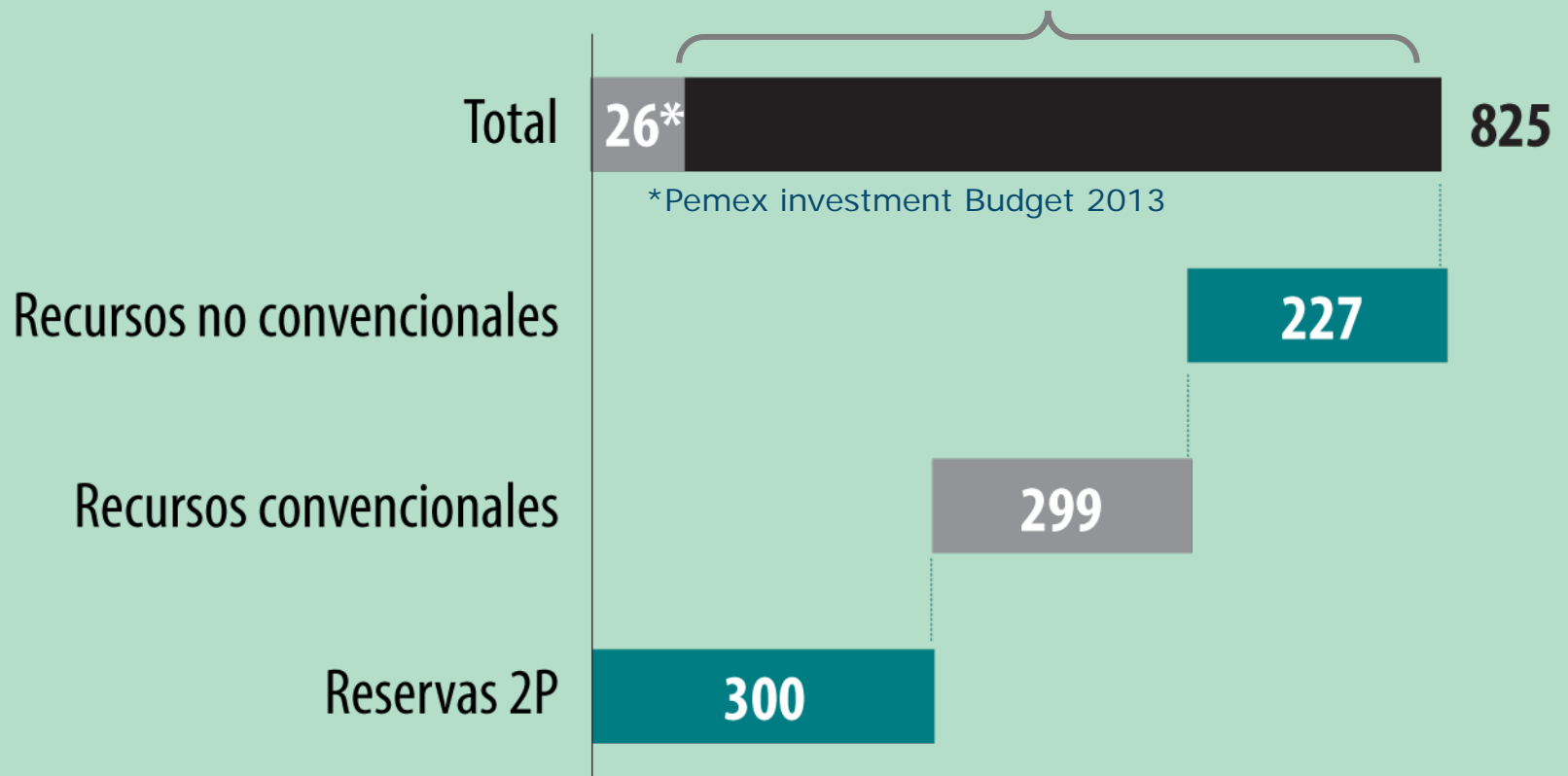
Source: PEMEX

- Five projects account for over 80% of national output
- Oil output has fallen by about 800,000 b/d since 2004
- Declining production portfolio → operating costs on the rise
- New discoveries are smaller and more expensive to develop

INVESTMENTS REQUIRED TO DEVELOP EXISTING OPPORTUNITIES FAR EXCEED PEMEX'S BUDGET AS WELL AS ITS PROJECT EXECUTION CAPABILITIES

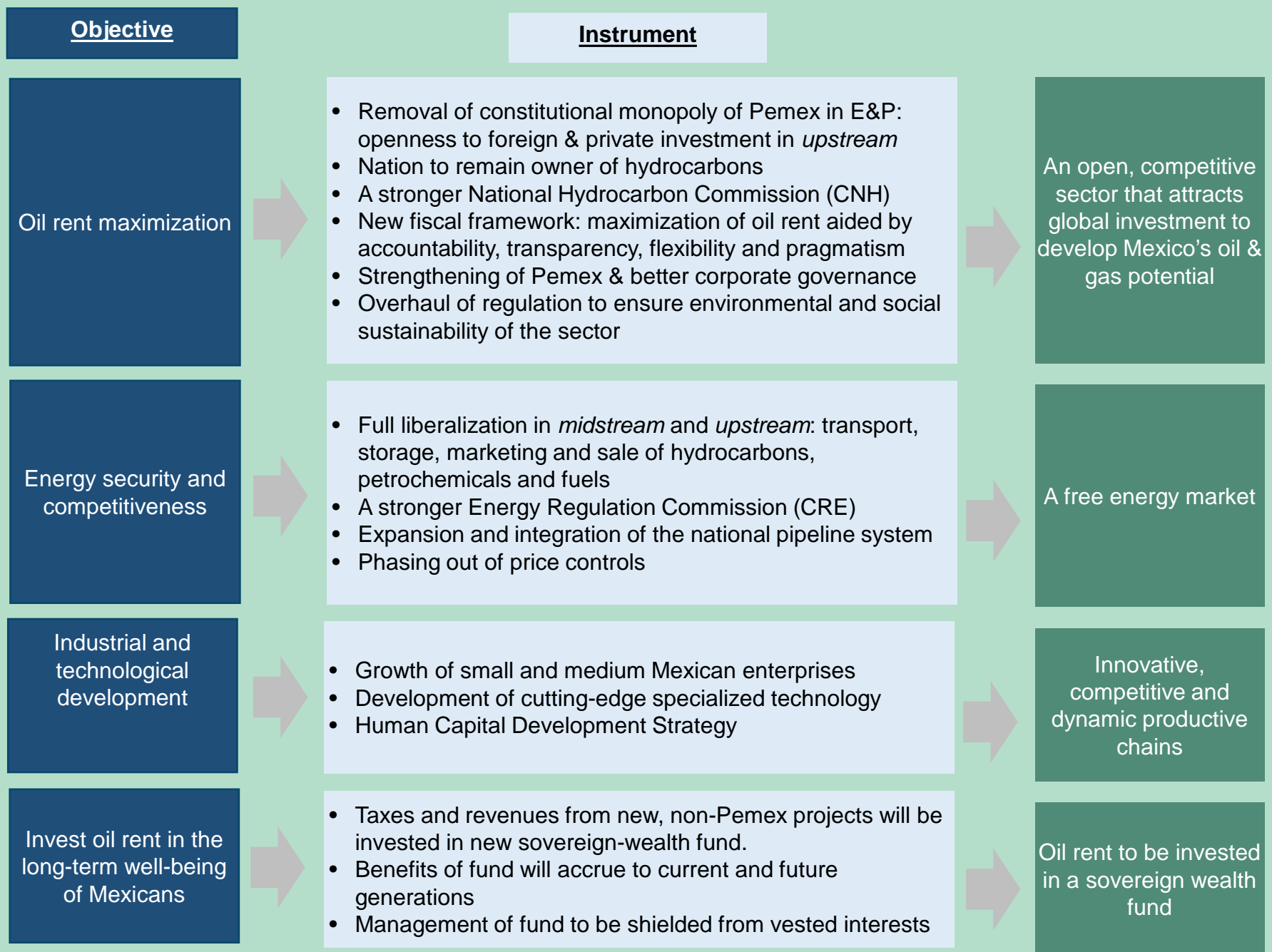
ESTIMATED OF
INVESTMENT REQUIRED
USD billion

PEMEX TAKE MORE
THAN **30 YEARS**



Source: IMCO estimate. Please refer to methodological for further information.

THE SECTOR WE ENVISION



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