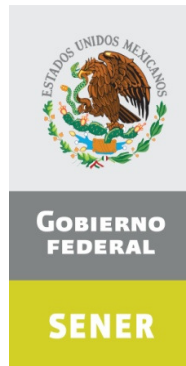


# NATURAL GAS MARKET OUTLOOK 2008-2017



Mexico, 2008

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**We deeply appreciate the participation of the following organisms and areas for integrating this outlook:**

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**Comisión Nacional para el Uso Eficiente de la Energía**  
**Comisión Reguladora de Energía**  
**Ecognv**  
**Ecomex**  
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**Pemex Gas y Petroquímica Básica**  
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# PRESENTATION

During the 1990's Mexico began to develop a natural gas domestic market as a response to the importance that sustainability policies have had at a worldwide level, and to the efficiency improvements of combined cycle plants for generating electricity. Thus, Mexico began promoting the use of cleaner and more efficient fuels.

After the reform of natural gas industry in 1995, Mexico established regulatory processes which have enhanced this industry through private complementary investments in the transportation, distribution and storage of this fuel. Likewise, Pemex has developed important reserves of non-associated natural gas in the North of Mexico; thereby, it ceased to be a marginal-used fuel and has become an essential feedstock for the modern economy of the country. Natural gas entered into every productive and consumption sector in a direct or indirect way, becoming its favorite fuel, able to harmonize economic and industrial progress with environmental preservation.

The recently approved Energy Reform invigorates Pemex and broadens its execution capacity. For the natural gas industry, the benefits of this reform will be obtained at the mid and long term. With the approval of new contracting conditions, Pemex will be able to explore and extract hydrocarbons and we Mexicans will be able to count on a better supply of natural gas and increase thus our reserves to grant energetic security on behalf of future generations.

Withal, the reform contains schemes that impulse actions in energy efficiency matters for a better profit of natural gas.

Furthermore, the reform invigorates the Energy Regulatory Commission (CRE) by giving it faculties for setting up systemic fares which will make the investment in this infrastructure, more attractive. This will also help on driving the expansion of transportation infrastructure for natural gas, invigorate the National Gas-Pipelines System (SNG) and provide it of redundancy as well as a better capacity. Thereby, natural gas could reach federal entities which are not currently receiving its supply due to lack of infrastructure.

The Ministry of Energy publishes the *Natural Gas Market Outlook 2007-2017* as a planning practice coordinated with the different entities of the Mexican energy sector; this, to complement the follow up and the strategic vision over this industry expansion in Mexico. The outlook, hence, includes the most complete information at-hand and explores the first scopes of the Energy Reform for the next ten years.

Georgina Kessel

Minister of Energy

# INTRODUCTION

The Ministry of Energy, complying Article 109 of the Natural Gas Regulation, publishes the *Natural Gas Market Outlook 2008-2017*, which contains the most updated information about the historical evolution and growth expectations of the natural gas domestic market, as well as its role in the worldwide context.

The first chapter reports in detail those events that took place in the natural gas (NG) domestic market during the term 1997-2007. This section goes deeply through the supply behavior displayed on every end-use sector and country's region. The chapter envisages meaningful aspects of the reserves evolution up to January 1st, 2008, their production, processing, foreign trade, retail price by end-use sector, and the current transportation and distribution infrastructure, to finally conclude with an analysis of those main factors that rendered the NG national balance during the term.

The evolution of its domestic demand towards 2017 can be found in Chapter Two, which shows the estimates made in regard to regional growth and final consumption sectors; it also displays the expected available production of Pemex in the market. In that sense, and since the Energy Reform has been recently approved, it only presents one planning scenario, expecting on deepen in its scopes. It is worthwhile saying that the prospected supply mentioned in this chapter acknowledges cost increases on oil-industry services for the past year, as well as it warns about the possible effects of the worldwide economic recession and its implications in the NG domestic market. The Liquefied Natural Gas (LNG) section describes the increases over the three considered regasification terminals towards 2017. As a new subject, it also includes a section named *Outlook of the Gas-Pipeline Infrastructure* which looks forward to show how the gas-pipeline system has been invigorated. Finally, it shows the NG domestic balance 2007-2017 and its respective regional balances.

# DOMESTIC NATURAL GAS MARKET

## 1997-2007

This chapter presents the historical statistics of the domestic natural gas market during the last 10 years, including supply, demand, foreign trade, infrastructure development, investment projects as well as natural gas prices until 2007.

In the analysis are emphasized some highlights in 2007, such as the increase of domestic natural gas production, and the liquefied natural gas (LNG) imports reached a record of 250 million cubic feet per day (mmcf) providing gas to domestic market from the Altamira regasification terminal. At the same time, domestic demand continued rising, motivated by projects within the electricity sector and by relative gas prices. The latter favored the consumption of gas over substitute fuels whose prices followed the increasing trend of crude oil prices on reference markets. Moreover, natural gas exports by the Reynosa area registered a historical maximum in the last year.

### 1.1 Natural gas consumption, 1997-2007

During 2007, Mexico's economic activities were slightly less dynamic than the previous year. Gross Domestic Product (GDP) reached a real annual growth of 3.3%, compared to 4.8% in 2006. This deceleration was mainly caused by lower foreign demand, although domestic expenses also decreased their expansion rate. On the other hand, the decrease of the total wages bill and of the income obtained through remittances from abroad also contributed to the deceleration of private consumption.

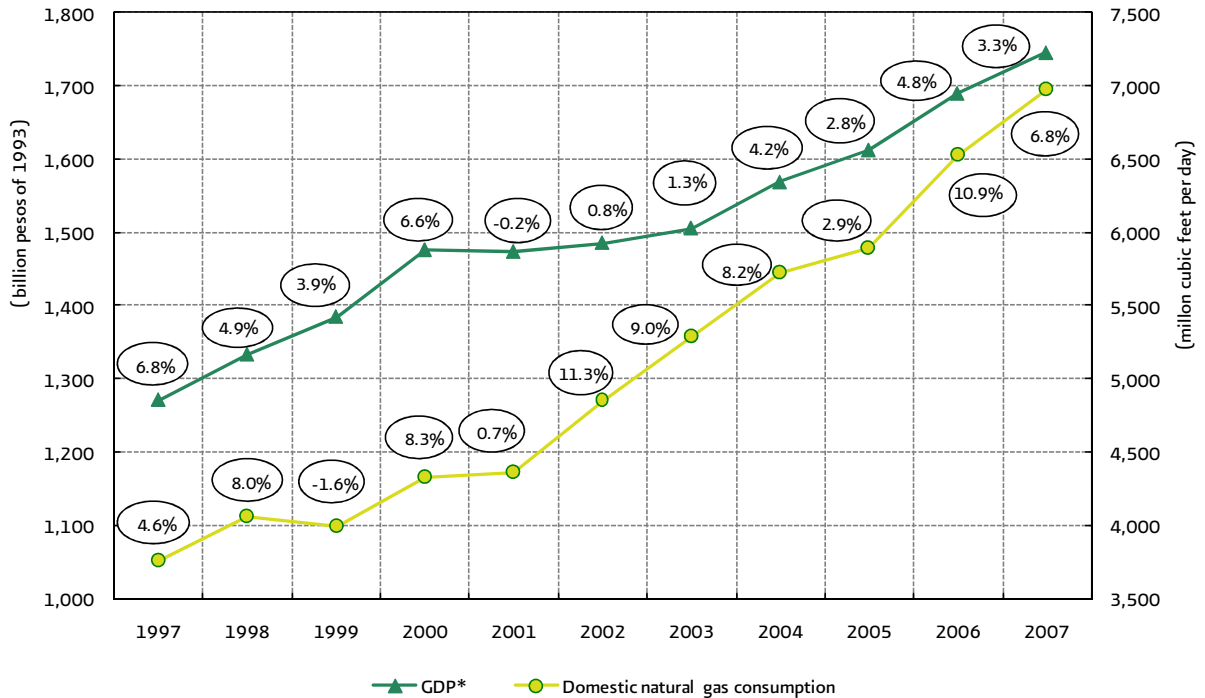
Inflation evolution in Mexico during 2007 was affected by the upward trend of international quotes for diverse raw materials, in particular those used as feedstock for food production. It is worth mentioning that in 2007 worldwide inflation picked up due to the price increase of energy sources and foodstuff, provoked by the increased domestic demand of several emerging economies. This was also reflected in Mexico's economic activities<sup>1</sup>.

Despite this environment, the increasing use of natural gas throughout the last decade continued in 2007 as well. Hence, natural gas consumption grew by 6.8% compared with the previous year, reaching an average of 6,975 mmcf. Though the growth rate of the country's economic activities in 2007 was lower than in 2006, the behavior of natural gas prices with regard to other fuels during the year favored a considerable growth in gas demand on the domestic market.

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<sup>1</sup> According to the *2007 Annual Report*, Bank of Mexico, April 2008.

**Graph 1**  
**Natural gas demand growth and GDP in Mexico, 1997-2007**



\* Figures are referred to base year 1993.  
 Source: IMP and INEGI.

The crude oil price volatility led to natural gas consumption, which in turn led to the price increase of oil-derived products competing with natural gas in end-use sectors. However, first-hand natural gas sales prices in Ciudad Pemex amounted to an average of 5.89 USD/MBTU in 2007, barely 0.02 USD/MBTU higher than in 2006.

Natural gas consumption percentage share by sectors in 2007 consisted of 37.8% by the electricity sector, 25.2% by the oil sector, 20.4% by domestic gas lifts, 14.9% by the industrial sector and the rest corresponded to the residential, services and transport sectors.

During 2007, the electricity sector consumption continued growing as of May, reaching a maximum in July with 2,882 mmcf. This was due mainly to the fact that fuel prices were attractive for public service electric power generation, including Independent Power Producers (IPP's) who maintained a consumption above 1,500 mmcf in June and July, while natural gas usage in the third quarter of the year for self-generation and electric power export remained high in comparison with the rest of the year.

The oil sector as a whole experienced a noticeable fall during November<sup>2</sup>. On the one hand, Pemex Exploración y Producción (PEP) and Pemex Petroquímica (PPQ) decreased their consumption in that month. In the first case, the decrease was caused by lower crude oil production activities in the last months of the year, and by the shutdown of the Usumacinta rig due to an accident by the end of October. On the other hand, PPQ's production activities reached their lowest level in November, even below the monthly average of 800 thousand tons of petrochemical products.

The industrial sector introduced incentives to maintain consumption above 1,000 mmcf/d, with the exception of April, July and September. This was possible partly due to the price elasticity of this fuel during 2007, as well as due to the price increase of some raw materials, favoring positive trends in the production indexes of specific branches of the sector, maintaining natural gas consumption.

**Chart 1**  
**Monthly natural gas consumption by sector in 2007**  
**(million cubic feet per day)**

Sector	January	February	March	April	May	June	July	August	September	October	November	December	Average
<b>Total</b>	<b>6,935</b>	<b>6,776</b>	<b>6,931</b>	<b>6,729</b>	<b>7,218</b>	<b>7,353</b>	<b>7,212</b>	<b>7,029</b>	<b>6,890</b>	<b>7,044</b>	<b>6,616</b>	<b>6,938</b>	<b>6,975</b>
Electricity	2,362	2,238	2,505	2,301	2,636	2,809	2,882	2,828	2,741	2,881	2,759	2,677	2,638
Oil	1,797	1,815	1,742	1,799	1,896	1,879	1,862	1,656	1,767	1,709	1,471	1,723	1,760
domestic gas lifts	1,499	1,521	1,524	1,530	1,540	1,533	1,389	1,386	1,365	1,249	1,172	1,386	1,424
Industrial	1,063	1,043	1,040	998	1,050	1,043	994	1,071	927	1,108	1,100	1,037	1,040
Residential	174	129	93	79	72	66	62	65	66	72	87	91	88
Services	38	28	24	20	22	21	21	22	21	22	26	22	24
Transport	2	2	2	2	2	2	2	2	2	2	2	2	2
Price of first-hand sales <sup>1</sup> (USD/MBTU)	4.73	6.08	6.45	6.10	6.74	6.95	6.21	5.12	4.71	5.62	5.85	6.11	5.89

<sup>1</sup> With reference to Ciudad Pemex.

Source: CRE and IMP.

### 1.1.1 Electricity sector

Currently Mexico possesses an effective installed capacity of 59,008 Megawatts (MW)<sup>3</sup> available for electric power generation. This item is composed by the added capacities authorized by Energy Regulatory Commission (CRE for its Spanish acronym) to permit-holders operating under the diverse modes allowed by the legal framework in force, as well as by the effective capacity<sup>4</sup> of public electricity service.

Installed capacity available in 2007 was 4.7% higher than in 2006, representing an increase of 2,671 MW. Approx. 84.6% of this capacity increase came from public service and the rest, from private service.

In public service, the highest capacity increase was generated by Independent Power Producers (IPP's), with a net growth of 1,070 MW, after the start of operations of the Iberdrola Energía Tamazunchale combined cycle plant, with 21 IPP's operating currently for Comisión Federal de Electricidad (CFE), in addition to a smaller capacity decrease in the Bajío El Sauz plant. CFE increased from 37,470 MW to 38,397 MW, as a result of the capacity added by diverse

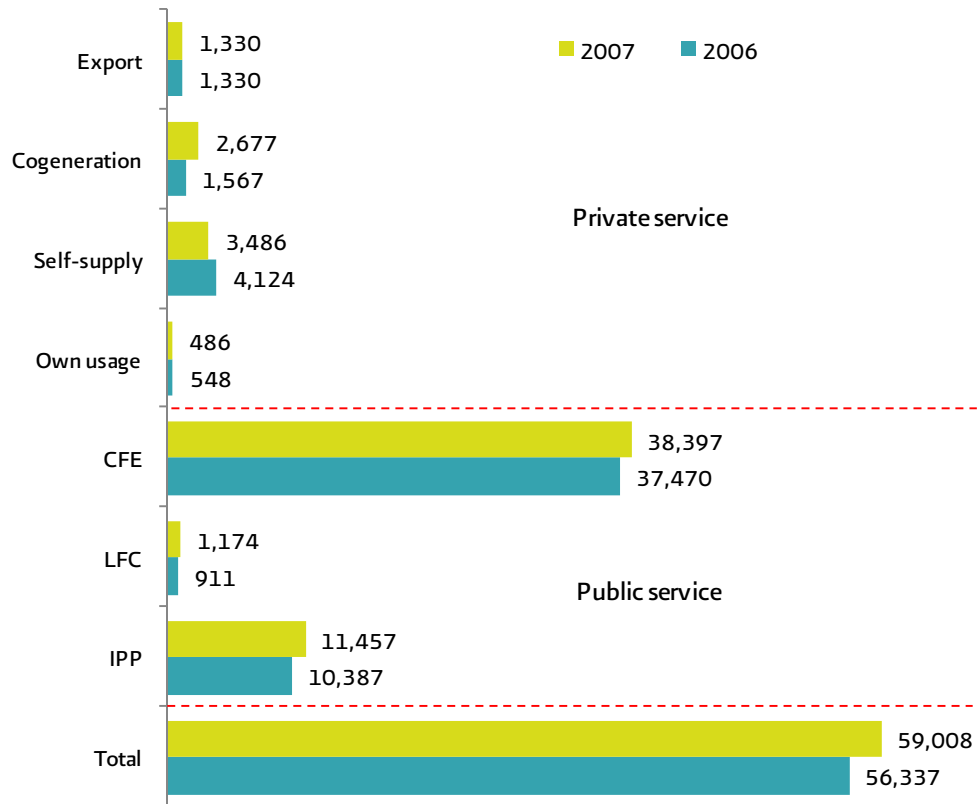
<sup>2</sup> Pemex is a holding company. Its subsidiaries and their activities are: Pemex Exploración y Producción (PEP) explores and develops the oil and natural gas reserves of Mexico; Pemex Petroquímica produces a variety of petrochemical raw materials.

<sup>3</sup> This total considers the best data available from permit-holders by October 2008.

<sup>4</sup> It is the maximum power in MW delivered by a unit in a sustained manner, considering environmental conditions and the physical state of facilities.

projects, such as the La Venta Wind-electric project, the El Cajón hydroelectric project, the addition of units to the Río Bravo combined cycle plant and some other internal combustion units, as well as modifications to the capacity of some plants, representing a decrease by 3.7 MW.

**Graph 2**  
**Effective installed electric power generation capacity in Mexico, 2006-2007**  
**(Megawatts)**



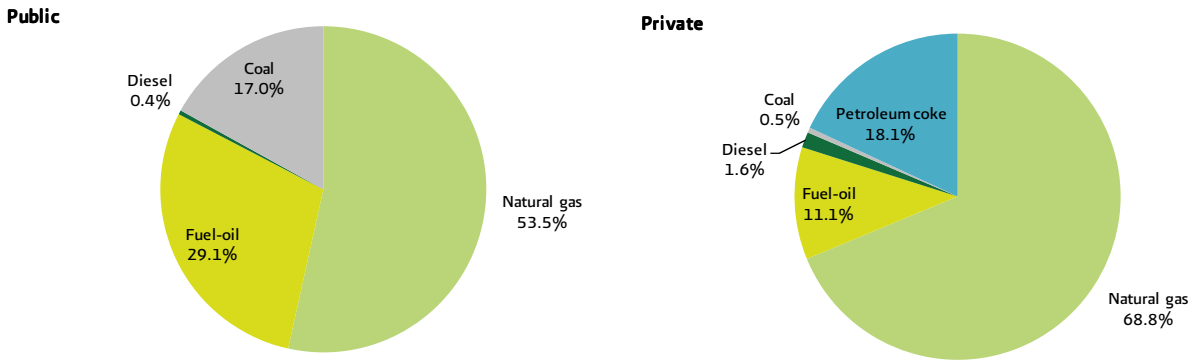
Source: CFE and CRE.

Private services registered an increase of 411 MW between 2006 and 2007. Cogeneration in this period increased from 1,567 MW to 2,677 MW. Electric power export capacity remained unaltered but, in the case of self-supply and own continuous usage, available capacity registered a decrease. It is worth mentioning that permits issued under the mode of continuous own usage corresponding to private companies generating electricity for their own operations prior to 1992, acknowledged after the amendments to the *Public Electricity Service Law* (PESL), have been migrating toward other self-generation modes.

During 2007, the total of fuels consumed in the domestic electricity sector amounted to 4,799.0 million cubic feet of natural gas equivalent per day (mmcfnged). From this consumption, 90.2% was destined to public service

generation and 9.8%, to private service. The fuel usage share in the electricity sector is 55.0% natural gas, 27.1% fuel-oil, 15.4% coal, 1.8% petroleum coke and 0.5% diesel.

**Graph 3**  
**Fuel consumption structure in the electricity sector, 2007**  
**(percentage share)**



Source: Sener, based on data from CFE, CRE and IMP.

**1.1.1.1 Public electricity sector (CFE, LFC and IPP’s)**

Public service-generated electric power is distributed through the National Electricity System (SEN for its Spanish acronym). By the end of 2007, SEN possessed 204 generation plants and 718 units employing diverse technologies. Thus the effective capacity available for public service was 51,028.521 MW as of December 31<sup>st</sup>, 2007, representing an increase by 2,259.9 MW with regard to the same date in 2006.

From the effective capacity available, 63.8% is based on hydrocarbons (fuel-oil, gas and diesel), 22.2% on hydroelectric plants, 9.2% on coal-electric plants, 1.9% on geothermal plants, 2.7% corresponds to the Laguna Verde nuclear-electric plant and 0.2% to La Venta and Guerrero Negro wind-electric plants.

The generation pool’s distribution reflects the goals towards the diversification of energy sources aimed at the sustainable development of the public electricity sector. While in 2006 the share of alternative energy sources<sup>5</sup> other than hydrocarbons represented 31.8% of the total effective capacity, by 2007 this value increased to 36.2%.

During 2007, fuel consumption was 4,327.8 mmcf. From this volume, natural gas represented 53.5%, being the only fuel type whose consumption increased between 2006 and 2007, from 2,058.7 to 2,314.0 mmcf. This increase in the public electricity service was generated by fuel price matrix behavior, the start of operations of new power-

<sup>5</sup> Includes hydroelectric, dual, coal-electric, nuclear-electric geothermal-electric and wind-electric generation technologies.

generation projects with technologies that favor natural gas consumption, and the withdrawal of units that use fuels other than natural gas (see chart 2).

**Chart 2**  
**Domestic fuel demand in the public electricity sector, 1997-2007<sup>6</sup>**  
**(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the public electricity sector <sup>1</sup>					Natural gas share (%) <sup>2</sup>
	Natural gas	Fuel-oil	Coal	Diesel	Total	
1997	537.7	2,128.0	443.7	34.2	<b>3,143.6</b>	17.1
1998	639.3	2,335.6	468.4	49.9	<b>3,493.2</b>	18.3
1999	705.2	2,294.0	474.5	45.2	<b>3,519.0</b>	20.0
2000	896.9	2,460.4	478.1	65.4	<b>3,900.7</b>	23.0
2001	1,076.6	2,366.3	571.2	48.0	<b>4,062.1</b>	26.5
2002	1,379.4	2,036.1	610.4	39.3	<b>4,065.2</b>	33.9
2003	1,590.6	1,753.7	695.7	94.5	<b>4,134.4</b>	38.5
2004	1,738.4	1,601.7	690.0	38.8	<b>4,068.9</b>	42.7
2005	1,679.7	1,671.9	747.6	34.7	<b>4,133.9</b>	40.6
2006	2,058.7	1,282.5	736.6	39.7	<b>4,117.5</b>	50.0
2007	2,314.0	1,260.5	734.8	18.6	<b>4,327.8</b>	53.5
aagr	15.7	-5.1	5.2	-5.9	<b>3.2</b>	

<sup>1</sup> Includes CFE, LFC and IPP's.

<sup>2</sup> Refers to the penetration of natural gas as a fuel in the public electricity sector.

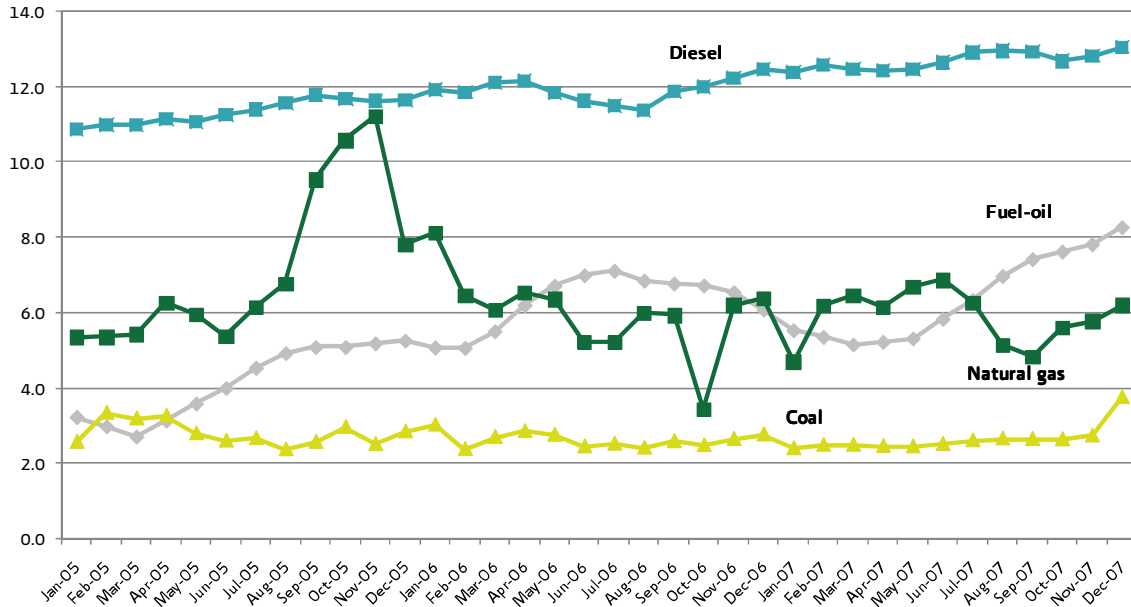
Source: Sener, based on data from CFE, IMP, LFC and Pemex.

During 2007, coal price continued being the cheapest option despite the December price increase, reaching 3.76 USD/MBTU. In fact, the demand of this fuel type in 2007 remained slightly below the 2006 figures, due to the fact that there were no changes in installed capacity and consumption remained the same. It is worth mentioning though that for the price of this fuel, coal-electric plants generate in base load.

The average annual fuel-oil price was 6.40 USD/MBTU in 2007, 1.6% higher than 2006 average price, it remained above the value of natural gas from July through December 2007. Thus, price conditions led to decrease in its consumption by considering price conditions, generation costs and the technology efficiency of both fuels. Price behavior was derived from international references to crude oil and its refined products.

<sup>6</sup> The acronym for annual average growth rate is aagr.

**Graph 4**  
**Fuel price<sup>1</sup> evolution for public electricity service, 2005-2007**  
**(dollars per million BTU)**



<sup>1</sup> Corresponds to the weighted average.  
 Source: CFE.

Price conditions undoubtedly favored the use of natural gas, there were however other factors as well. One of them was the available capacity increase for natural-gas-based power generation with the start of operations of the Tamazunchale combined cycle plant in June 2007 (1,135 MW). Other capacity additions took place in units 1, 2 and 4 of the Río Bravo combined cycle plant in October. LFC in turn started the operation of eight new 32-MW plants for its distributed energy project during 2007, all of them working with turbogas technology.

**1.1.1.2 Private electricity sector (self-generation and export)**

Electric power self-generation refers to self-supply, co-generation and continuous own usage modes. These three modes correspond to electricity generation destined to satisfy the needs of individuals and businesses, or of a group of members within private associations. Electricity export mode refers to, as its name indicates, electric power generation destined for use outside the national territory.

The private sector’s share increased in all above-mentioned activities during the last year. The number of permits granted by CRE to private entities increased from 580 to 648 in the self-generation entry between 2006 and 2007. 585 from these permits were operating by December 31<sup>st</sup>, 2007.

Nonetheless, fuel consumption in the private sector slightly decreased (1.1%) in 2007 when compared to the previous year. On the one hand, the use of natural gas for electricity export purposes was reduced, though natural gas volumes destined for self-generation increased from 195.4 mmcf to 202.1 mmcf. Despite this, natural gas continued representing 68.8% of fuels in this sub-sector. In short, the consumption intensity of natural gas, fuel-oil and petroleum coke registered small decreases within the private electricity service.

One of the causes of fuel usage decrease in 2007 was that many permit-holders chose to follow distributed generation strategies, that is, they generated in specific hours for consumption, and stopped buying electricity from CFE or LFC. In addition, large self-supplying businesses were transmitting energy to their partners, which fact was reflected in decreased local power generation and fuel consumption.

In 2007, self-supply permits for shopping centers in the services sector just boomed, registering small generation capacities, operating in specific hours and using internal combustion technologies, thus favoring diesel consumption.

**Chart 3**  
**Domestic fuel demand in the private electricity sector, 1997-2007**  
**(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the private electricity sector <sup>1</sup>					Total	Natural gas share (%) <sup>2</sup>
	Natural gas	Fuel-oil	Diesel	Petroleum coke	Coal		
1997	115.5	88.7	2.2	-	-	206.5	56.0
1998	116.2	92.9	2.5	-	-	211.6	54.9
1999	116.3	103.0	3.3	-	-	222.5	52.3
2000	114.5	117.0	2.5	-	-	234.0	48.9
2001	80.0	92.3	3.4	-	-	175.7	45.5
2002	122.0	68.0	5.3	-	-	195.4	62.4
2003	244.1	66.1	9.8	20.9	-	340.9	71.6
2004	311.9	76.6	2.5	69.4	-	460.3	67.8
2005	333.7	68.3	5.0	74.8	0.7	482.5	69.2
2006	330.8	53.3	5.4	85.6	1.1	476.2	69.5
2007	324.0	52.4	7.3	85.1	2.3	471.2	68.8
aagr	10.9	-5.1	12.5	-	-	8.6	

<sup>1</sup> Includes electricity self-generation and export.

<sup>2</sup> Refers to the penetration of natural gas as a fuel in the private electricity sector.

Source: Sener, based on data from CFE, CRE, IMP, LFC and Pemex.

### 1.1.2 Industrial sector

Economic growth in the industrial sector was 1.4% in 2007, reflecting the evolution of the manufacture sector by 1.0%. The construction, mining and electricity sectors grew by 2.1, 0.2 and 3.9%, respectively, with growth rates below the rates observed in 2006.

The manufacture industry's activity rate in 2007 was affected by the important deceleration of the automotive industry. In particular, the number of motor vehicles produced in Mexico showed an increase of only 2.0%, after the 21.1% growth in 2006. This evolution was the result of the combination of a 4.5% increase of units produced for export (27.9% increase in 2006) and of a -5.5% decrease of units destined for the domestic market. The domestic retail sale of new vehicles decreased by -3.5% in 2007, in response to a major second-hand vehicle import.

The automotive industry section corresponding to vehicle bodywork, engines and spare parts constituted one of the most dynamic manufacture branches in 2007, in addition to glass and glass products. In whole, 29 out of the 49 manufacture branches registered increases in 2007.

Fuel consumption in the industrial sector's manufacture branches reached 1,933.6 mmcfed during 2007, the highest in the last decade. This volume is composed by diverse fuel types. Natural gas is the most widely used fuel in the sector, covering 53.8% of the total. In 2007, petroleum coke replaced fuel-oil as the second most widely consumed fuel in the industrial sector's fuel basket, covering 18.1%.

Evidently, price conditions in 2007 did not favor fuel-oil consumption, whose quotes were affected by crude oil price increases. These impacts were not as dramatic in the case of residual fuels like petroleum coke, despite it being an oil-derived product. Moreover, some industries have chosen to adapt their technologies to petroleum coke consumption, among them the hydraulic cement, basic metal and chemical industries, all of which are intensive energy users whose consumption of aforementioned oil-derived product has been constantly increasing since 2005.<sup>7</sup>

**Chart 4**  
**Domestic fuel demand in the industrial sector, 1997-2007**  
**(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the industrial sector					Total	Natural gas share (%) <sup>1</sup>
	Natural gas	Fuel-oil	LP gas	Diesel	Petroleum coke		
1997	885.7	629.3	95.0	138.2	46.7	<b>1,794.9</b>	49.3
1998	962.7	628.4	99.1	137.9	58.4	<b>1,886.5</b>	51.0
1999	1,023.0	567.3	109.6	123.9	76.3	<b>1,900.1</b>	53.8
2000	1,019.2	530.9	120.5	135.4	98.3	<b>1,904.3</b>	53.5
2001	838.5	502.1	111.7	129.3	119.6	<b>1,701.2</b>	49.3
2002	965.5	388.9	114.6	123.7	170.9	<b>1,763.6</b>	54.7
2003	924.1	387.0	106.8	126.6	164.2	<b>1,708.7</b>	54.1
2004	956.5	391.3	109.7	154.0	227.5	<b>1,839.1</b>	52.0
2005	935.2	379.2	109.8	145.4	229.7	<b>1,799.4</b>	52.0
2006	1,014.0	305.3	115.5	141.0	302.3	<b>1,878.2</b>	54.0
2007	1,039.8	285.0	115.5	143.7	349.6	<b>1,933.6</b>	53.8
aagr	1.6	-7.6	2.0	0.4	22.3	<b>0.7</b>	

<sup>1</sup> Refers to the penetration of natural gas as a fuel in the industrial sector.  
Source: Sener, based on data from CFE, IMP, LFC and Pemex.

<sup>7</sup> See *Oil products prospective 2008-2017*, Sener.

During 2007, natural gas demand in the industrial sector registered 1,039.8 mmcf/d, representing a historical maximum within the industry and a 2.5% increase compared to 2006. By having a less volatile natural gas price scenario than in 2007, it favored consumption increase by industries that are intensive energy users, such as the basic metal industry (12.0 mmcf/d), the chemical industry (4.1 mmcf/d), the glass industry (5.7 mmcf/d), metal products (3.6 mmcf/d) and the group of food, beverages and tobacco (3.6 mmcf/d).

**Chart 5**  
**Natural gas demand by groups of the industrial sector's branches, 1997-2007**  
**(million cubic feet per day)**

Group of branches	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
<b>Total</b>	<b>885.7</b>	<b>962.7</b>	<b>1,023.0</b>	<b>1,019.2</b>	<b>838.5</b>	<b>965.5</b>	<b>924.1</b>	<b>956.5</b>	<b>935.2</b>	<b>1,014.0</b>	<b>1,039.8</b>	<b>1.6</b>
Basic metal industries	251.3	293.7	318.9	298.9	195.2	240.9	265.6	297.3	279.5	293.6	305.6	2.0
Chemistry	181.7	173.5	162.2	160.3	138.8	155.2	125.8	117.5	115.9	127.1	131.2	-0.2
Glass and glass products	96.1	97.3	91.9	91.8	77.9	101.9	91.0	93.6	95.0	105.6	111.3	-0.3
Metal products, machinery and equipment	68.0	77.7	89.8	91.8	84.4	105.8	96.8	103.2	103.4	106.9	110.5	0.9
Food, beverages and tobacco	67.6	72.3	79.9	82.2	67.5	77.2	79.3	82.6	89.1	92.3	95.8	0.8
Non-metallic mineral products	51.4	55.2	51.3	53.5	63.3	65.9	64.4	64.1	63.9	68.3	69.5	2.0
Paper and cardboard, printers and editorials	55.4	63.1	69.1	62.4	50.9	62.0	59.2	55.2	52.3	63.8	64.8	0.6
Textiles, clothing and leather industry	17.4	19.6	26.9	29.8	25.1	31.4	32.3	32.4	30.4	33.9	35.2	4.0
Mining	20.7	19.1	16.6	22.4	21.1	22.4	24.0	23.6	23.8	23.8	22.4	0.8
Beer and malt	10.3	13.6	24.3	26.5	17.1	19.0	16.4	15.9	15.3	18.9	16.6	2.7
Hydraulic cement	34.7	29.0	26.7	28.6	22.7	23.5	19.9	16.5	13.0	18.1	10.7	-49.5
Remaining branches	30.9	48.5	65.4	71.0	74.5	60.3	49.4	54.7	53.6	61.6	66.0	12.8

Source: IMP, based on data from CRE, Pemex and private companies.

### 1.1.3 Oil sector

The oil sector uses natural gas for the execution of its productive activities, and the oil industry is still the largest natural gas-consuming sector on the market. The industry's natural gas input consists of the natural gas demand used by subsidiaries (self-consumption) to perform essential activities and of volumes destined to internal recirculation, corresponding mainly to natural gas injected into wells to obtain crude oil.<sup>8</sup> The later usually named "gas lift".

Natural gas used by Pemex reached 3,184 mmcf/d during 2007, implying a 5.5% increase when compared to 2006. As to self-consumption by subsidiaries, last year registered an increase of 179 mmcf/d when compared to the previous year, motivated by PEP's higher consumption and by the upsurge of productive chains in PPQ.

<sup>8</sup> Dry gas is used after natural reservoir drive diminishes as secondary recovery method.

**Chart 6****Natural gas consumption in the oil sector, 1997-2007****(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Total</b>	<b>2,139</b>	<b>2,265</b>	<b>2,072</b>	<b>2,216</b>	<b>2,277</b>	<b>2,289</b>	<b>2,427</b>	<b>2,608</b>	<b>2,833</b>	<b>3,017</b>	<b>3,184</b>	<b>4.1</b>
Self-consumption	1,334	1,361	1,295	1,286	1,310	1,290	1,323	1,405	1,483	1,581	1,760	2.8
Exploración y Producción <sup>1</sup>	357	374	399	442	505	500	515	593	692	744	884	9.5
Refinación	180	194	198	207	230	238	270	262	276	281	284	4.7
Gas y Petroquímica Básica	216	256	247	264	258	256	252	255	251	263	268	2.2
Petroquímica	580	537	449	373	316	295	285	295	264	292	323	-5.7
Corporativo	1	1	1	1	1	0	1	0	0	0	0	-6.8
gas lift	805	904	777	930	967	999	1,104	1,203	1,350	1,436	1,424	5.9

<sup>1</sup> Includes consumption by Compañía Nitrógeno de Cantarell.

Source: Pemex.

During 2007, crude oil production amounted to 3,082 thousand barrels per day, 5.3% lower than in the previous year. This behavior was the result of higher-than-expected decline rates and of the water-oil contact progress in the Cantarell asset team. With crude oil production falling, smaller amounts of gas were required for supply of external energy into the reservoir in the form of injecting fluids to increase reservoir pressure (gas lift or natural gas reinjection) in PEP, registering a slight decrease of 0.9% with respect to 2006.

In terms of natural gas equivalent, Pemex used 2,114.6 mmcfnged of hydrocarbons during 2007. 83.2% of this feedstock came from natural gas, 10.9% from fuel-oil, 4.7% from diesel, and the rest corresponded to LP gas and gasoline types.

**Chart 7**

**Domestic fuel demand in the oil sector, 1997-2007**  
**(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the oil sector					Total	Natural gas share (%) <sup>1</sup>
	Natural gas	Fuel-oil	Diesel	LP gas	Gasolines		
1997	1,334.0	308.9	73.5	13.8	8.3	<b>1,738.6</b>	76.7
1998	1,361.4	289.0	71.1	25.5	7.8	<b>1,754.7</b>	77.6
1999	1,294.7	268.3	66.6	26.4	7.1	<b>1,663.1</b>	77.8
2000	1,286.1	246.2	64.7	27.4	6.0	<b>1,630.4</b>	78.9
2001	1,310.1	235.0	72.5	24.2	5.3	<b>1,647.1</b>	79.5
2002	1,289.7	241.0	67.9	16.7	4.9	<b>1,620.2</b>	79.6
2003	1,322.5	264.8	72.0	19.5	3.5	<b>1,682.4</b>	78.6
2004	1,405.1	280.5	91.8	23.7	3.5	<b>1,804.5</b>	77.9
2005	1,483.1	265.3	95.1	17.0	3.1	<b>1,863.7</b>	79.6
2006	1,580.9	234.7	86.8	20.2	3.2	<b>1,925.8</b>	82.1
2007	1,759.6	230.6	99.3	21.9	3.2	<b>2,114.6</b>	83.2
aagr	2.8	-2.9	3.1	4.7	-9.2	<b>2.0</b>	

<sup>1</sup> Refers to the percentage of natural gas as a fuel in the oil sector, without internal recirculation.

Source: IMP, based on data from Pemex.

The petrochemical industry's goal is to obtain high-value products from natural gas and refined products. This industry is integrated into interrelated production chains, it is capital-intensive and presents price cycles alternating high-yield periods with others that do not entirely cover costs.

Petrochemical industry within Pemex is integrated by four main chains, the two outstanding being ethylene and its derivatives, and aromatics, in addition to methane derivatives, as well as propylene and its derivatives. Raw material is available for the two former: ethane and naphtha (natural gasoline), in the above order. Ethane is obtained from gas, and its production is destined to petrochemical complexes.

During 2007, petrochemical production in PPQ increased by 14.1% with respect to 2006. This growth was due to increased ammonia and vinyl chloride production on the methane and ethane chain, respectively. In the case of methane derivatives, production in PPQ increased by 32.4% due to higher ammonia production, destined to urea and carbonic anhydride production, thereby compensating the decrease in methanol production. During 2007, almost only the Cosoleacaque petrochemical complex used natural as raw material, with the exception of November, when the Independencia Complex also consumed it for small-scale methanol production.

Chart 8

**Natural gas consumption and petrochemical production by PPQ<sup>1</sup>, 1997-2007**  
**(million cubic feet per day and thousand tons per year)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Natural gas consumption by use (mmcf/d)</b>	<b>580</b>	<b>537</b>	<b>449</b>	<b>373</b>	<b>316</b>	<b>295</b>	<b>285</b>	<b>295</b>	<b>264</b>	<b>292</b>	<b>323</b>	<b>-5.7</b>
Fuel	433	400	320	274	251	228	238	237	222	244	272	-4.5
Raw material	147	137	129	99	65	67	47	58	41	48	51	-10.0
<b>Petrochemical production (mty)</b>	<b>11,513</b>	<b>9,960</b>	<b>7,991</b>	<b>6,836</b>	<b>5,994</b>	<b>5,889</b>	<b>6,085</b>	<b>6,223</b>	<b>6,219</b>	<b>6,572</b>	<b>7,496</b>	<b>-4.2</b>
Methane derivatives	5,067	4,374	3,019	2,271	1,752	1,663	1,383	1,668	1,242	1,404	1,859	-9.5
Ethane derivatives	3,089	2,945	2,696	2,636	2,408	2,309	2,218	2,073	2,440	2,748	2,607	-1.7
Aromatics and derivatives	1,461	1,402	1,235	667	642	670	795	1,222	1,187	1,089	1,338	-0.9
Propylene and derivatives	377	243	193	180	127	115	125	116	104	24	47	-18.8
Others	1,519	996	848	1,083	1,065	1,133	1,563	1,145	1,246	1,307	1,645	0.8

<sup>1</sup> Includes only petrochemical products made by PPQ, and excludes products obtained by PR and ethane and sulfur from PGPB.

Note: Totals may vary due to the rounding-up of figures.

Source: Pemex Petroquímica and Pemex, 2008 Statistical Yearbook.

#### 1.1.4 Residential and services sectors

Residential and services sectors natural gas consumption decreased between 2002 and 2007. In the last year, total fuel demand by these sectors registered values close to 1,533.6 mmcf/d, 60.3% out of which was covered by LP gas, 32.4% by wood and 7.3% by natural gas.

During the period of analysis, consumption in these sectors was characterized by substitution trends among the three fuel types: on the one hand, natural gas has slightly displaced LP gas in response to the higher number of people having access to both fuels and being able to decide between the advantages of using one or the other, and on the other hand, the use of wood has decreased in rural communities with access to LP gas.

Some of the causes preventing the more intensive use of fuels in these sectors in the last years have been the efficiency increase of electric household appliances such as stoves and water heaters, and changes in habits, like a wider use of microwaves to replace stoves. As to official norms favoring the energy efficiency of fuels within the sectors, NOM-003-ENER-2000 is worth mentioning in connection with the thermal efficiency of water heaters for domestic and commercial use.<sup>9</sup>

<sup>9</sup> The Norm is applied to water heaters that use LP or natural gas as fuel, and that only provide hot water in liquid phase.

Chart 9

**Fuel consumption in the residential and services sectors, 1997-2007****(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the residential and services sectors				Natural gas share (%)
	Natural gas	LP gas	Wood	Total	
1997	81.9	927.6	584.6	<b>1,594.1</b>	5.1
1998	76.3	951.4	580.2	<b>1,607.9</b>	4.7
1999	76.7	983.7	576.0	<b>1,636.3</b>	4.7
2000	79.2	1,008.9	570.3	<b>1,658.4</b>	4.8
2001	84.7	987.6	563.0	<b>1,635.3</b>	5.2
2002	93.4	998.3	553.3	<b>1,644.9</b>	5.7
2003	99.8	986.0	542.6	<b>1,628.3</b>	6.1
2004	106.0	988.1	529.6	<b>1,623.7</b>	6.5
2005	107.1	946.1	518.8	<b>1,572.1</b>	6.8
2006	107.7	944.7	504.4	<b>1,556.9</b>	6.9
2007	111.8	925.3	496.5	<b>1,533.6</b>	7.3
aagr	3.2	-0.0	-1.6	<b>-0.4</b>	

Source: Sener, based on data from IMP, CRE, PGPB and Distributors.

On the other hand, LP gas share decreased from 65.8% to 60.3% in the period. Wood still has a high share as fuel in many low-income households (32.4%).

During decades, the penetration of natural gas has been limited due to several aspects, such as local distribution infrastructures and sales prices with respect to LP gas in the country's different regions. The deregulation of the natural gas market in 1995 intended to develop the distribution network and, as a result thereof, a higher number of users have now access to natural gas.

The residential sector registered a fall of 0.5% in the added consumption of natural gas and LP gas between 1997 and 2007, provoked by the 3.8% fall in LP gas demand, since natural gas consumption increased by 42.6% during the same period. In the services sector, the acceptance of natural gas in the decade has been slow; nonetheless it registered its historical maximum of 24 mmcf/d in 2007.

**Chart 10****Natural and LP gas consumption in the residential and services sectors, 1997-2007****(million cubic feet of natural gas equivalent per day)**

Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Total (mmcfnged)</b>	<b>1,009</b>	<b>1,028</b>	<b>1,060</b>	<b>1,088</b>	<b>1,072</b>	<b>1,092</b>	<b>1,086</b>	<b>1,094</b>	<b>1,053</b>	<b>1,052</b>	<b>1,037</b>	<b>0.3</b>
Natural gas (mmcfed)	82	76	77	79	85	93	100	106	107	108	112	3.2
Residential	62	56	57	60	64	71	81	86	87	84	88	3.6
Services	20	20	20	20	21	22	19	20	21	23	24	1.7
LP gas (mmcfed)	928	951	984	1,009	988	998	986	988	946	945	925	0.0
Residential	784	814	825	830	811	811	808	816	775	767	754	-0.4
Services	143	138	159	179	177	187	178	172	171	177	171	1.8

Note: Totals may vary due to the rounding-up of figures.

Source: IMP.

**1.1.5 Transport sector<sup>10</sup>**

A sector in which natural gas has not been able to reach consolidation is the automotive transportation sector. During 2007, the use of compressed natural gas (CNG) decreased from 2.0 to 1.9 mmcfed when compared to 2006. This industry that ventured into Mexico during 1999 has faced challenges preventing the expansion of service stations and higher numbers of conversions, participating with a share of barely 0.03% in the total of fuels consumed in the automotive transportation sector.

By the end of 2007, six service stations were operating in Mexico. Two in Monterrey, Nuevo León, owned by the company Gas Natural México (Monterrey), one in Gómez Palacio, Durango, by SIMSA group, and three in the Metropolitan zone of the Valley of Mexico, Toreo, Balbuena and Tacubaya, having the last three previously been owned by the company Ecomex and been acquired by the Colombian consortium Gazel by the end of 2007. The service station located in Tultitlán, Edo. de México, property of the Ecognv group, ceased operations since August 2007 due to financial issues.

<sup>10</sup> This sector includes only compressed natural gas for use in road vehicles.

**Chart 11**  
**Domestic fuel demand by the transport sector, 1997-2007**  
**(million cubic feet of natural gas equivalent per day)**

Year	Fuels in the automotive transportation sector					Natural gas share (%) <sup>1</sup>
	CNG	Gasolines	LP gas	Diesel	Total	
1997	-	2,390.6	29.4	1,203.9	<b>3,623.9</b>	-
1998	-	2,457.5	50.2	1,244.0	<b>3,751.7</b>	-
1999	0.0	2,454.3	101.2	1,242.0	<b>3,797.6</b>	0.00
2000	0.6	2,552.2	128.3	1,261.0	<b>3,942.2</b>	0.02
2001	1.3	2,644.3	136.9	1,251.8	<b>4,034.5</b>	0.03
2002	1.7	2,714.6	152.7	1,258.5	<b>4,127.6</b>	0.04
2003	2.0	2,883.8	156.0	1,331.9	<b>4,373.7</b>	0.05
2004	2.0	3,054.7	154.7	1,412.4	<b>4,623.8</b>	0.04
2005	1.9	3,224.7	137.3	1,514.8	<b>4,878.7</b>	0.04
2006	2.0	3,449.5	108.7	1,651.6	<b>5,211.8</b>	0.04
2007	1.9	3,651.3	112.2	1,737.4	<b>5,502.7</b>	0.03
aagr	n.a.	4.3	14.3	3.7	<b>4.3</b>	

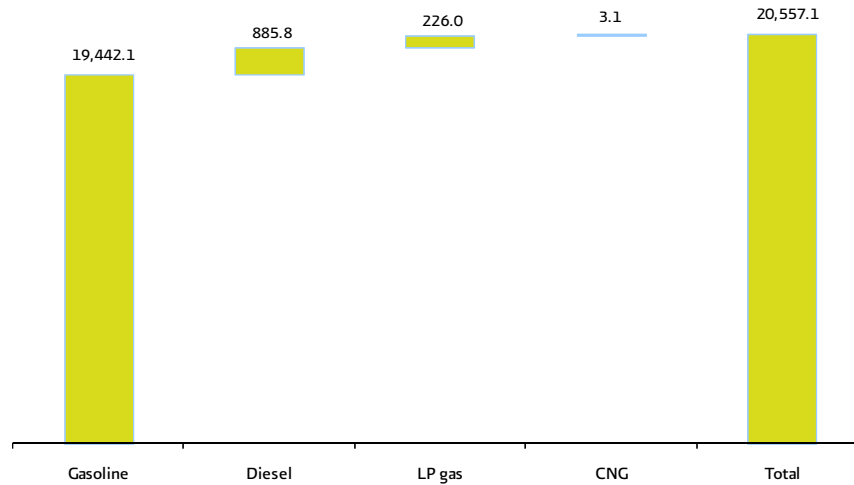
n.a.: Not applicable.

<sup>1</sup> Refers to the penetration of CNG with respect to all other fuel types within the automotive transportation sector.

Source: IMP, based on data from CRE, INEGI, Pemex and private companies.

Despite the decrease in total CNG consumption in 2007, the number of conversions increased to 3,136 units. Business strategies to lower CNG conversion costs through the diversification of equipment components have been effective. Accessible financing schemes to pay off the cost of motorization and agreements allowing users to convert to CNG through the payment of fees are still being promoted.

**Graph 5**  
**Domestic vehicle pool by fuel type, 2007**  
**(thousand units)**

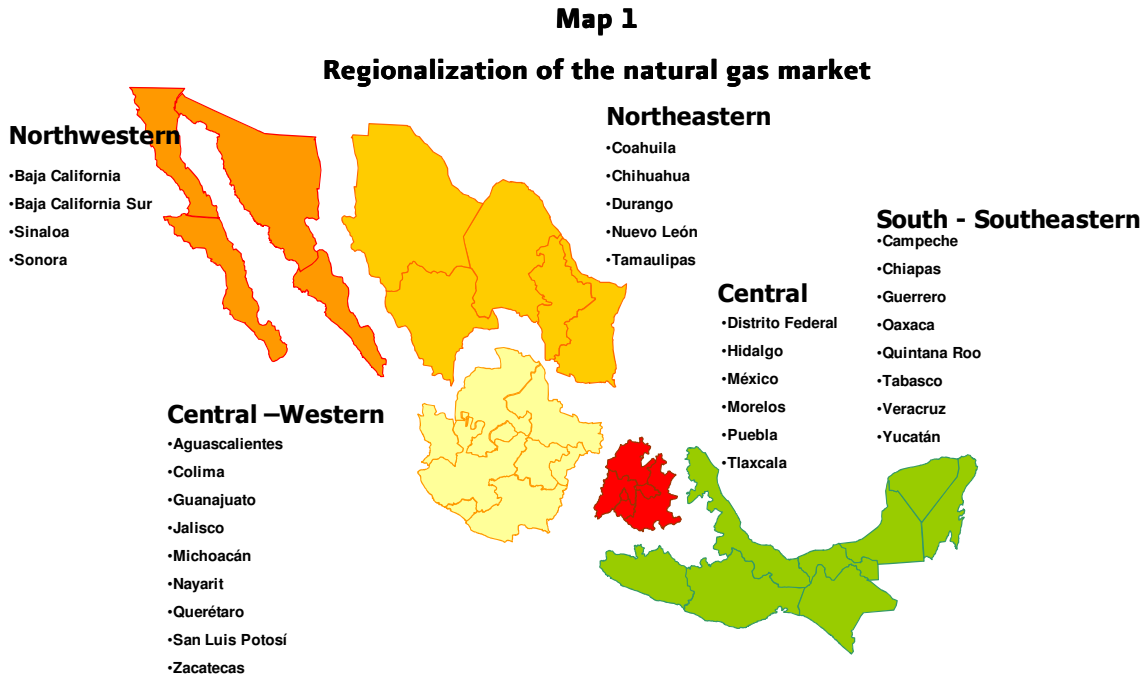


Source: IMP.

### 1.1.6 Regional consumption

In order to have comparable figures for the different domestic markets, regional analysis has been divided into five zones: Northwestern, Northeastern, Central-Western, Central and South-Southeastern zones. Map 1 provides details on the states composing each region.

Regional natural gas consumption is closely related to infrastructure distribution, to the location of industrial sectors, to oil-related activities, to electric power generation points and to population concentration. These factors are responsible for the development of natural gas market in Mexico. It is worth knowing that only eight states (Baja California Sur, Colima, Guerrero, Morelos, Nayarit, Quintana Roo, Sinaloa and Zacatecas) registered no natural gas consumption by the end of 2007.



Source: Sener.

Campeche, located in the South-Southeastern region is the main consumer state. During 2007 its demand amounted to 1,606 mmcf, or 23.0% of domestic total demand. Consumption has been noticeable in two other states within the same region: Veracruz and Chiapas, with 941 mmcf and 543 mmcf, respectively. In these three states, the oil sector has been generating high demands.

In the Northeastern region, Nuevo León and Tamaulipas states stand out. The former already possesses the culture of natural gas consumption, mainly in the residential and industrial sectors. Nuevo León registered a decrease in its consumption between 2006 and 2007, reaching 604 mmcf in the last year, while Tamaulipas had an annual increase of 14.3% between 1997 and 2007, meaning an accelerated growth in the last decade, as a result of the installation of combined cycle plants for electric power generation, the development of the Burgos Basin and two gas processing centers (GPC) installed in the state: Arenque in 2003 and Burgos in 2004.

**Chart 12**  
**Regional natural gas consumption by state, 1997-2007**  
**(million cubic feet per day)**

Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Domestic demand</b>	<b>3,760</b>	<b>4,060</b>	<b>3,993</b>	<b>4,326</b>	<b>4,358</b>	<b>4,851</b>	<b>5,287</b>	<b>5,722</b>	<b>5,890</b>	<b>6,531</b>	<b>6,975</b>	<b>6.4</b>
<b>Northwestern</b>	<b>12</b>	<b>16</b>	<b>25</b>	<b>60</b>	<b>97</b>	<b>154</b>	<b>257</b>	<b>312</b>	<b>334</b>	<b>391</b>	<b>377</b>	<b>41.1</b>
Baja California	1	6	11	36	63	100	180	227	248	283	267	76.5
Baja California Sur	-	-	-	-	-	-	-	-	-	-	-	-
Sinaloa	-	-	-	-	-	-	-	-	-	-	-	-
Sonora	11	10	14	24	34	54	77	85	86	109	110	25.7
<b>Northeastern</b>	<b>872</b>	<b>936</b>	<b>1,009</b>	<b>1,153</b>	<b>1,068</b>	<b>1,307</b>	<b>1,359</b>	<b>1,483</b>	<b>1,502</b>	<b>1,718</b>	<b>1,874</b>	<b>7.9</b>
Coahuila	137	142	147	142	110	145	127	128	122	130	135	-0.1
Chihuahua	107	131	150	181	180	213	224	221	199	230	258	9.2
Durango	38	41	43	50	40	45	38	39	72	99	108	11.0
Nuevo León	390	415	433	501	468	529	609	560	555	607	604	4.5
Tamaulipas	201	207	237	279	270	375	362	536	554	653	768	14.3
<b>Central-Western</b>	<b>324</b>	<b>359</b>	<b>382</b>	<b>390</b>	<b>345</b>	<b>472</b>	<b>498</b>	<b>520</b>	<b>518</b>	<b>565</b>	<b>627</b>	<b>6.8</b>
Aguascalientes	-	-	-	-	0	5	7	10	11	13	12	n.a.
Colima	-	-	-	-	-	-	-	-	-	-	-	-
Guanajuato	85	94	94	80	88	171	189	193	195	218	220	9.9
Jalisco	59	59	58	58	48	54	50	45	46	48	47	-2.2
Michoacán	102	125	131	130	84	98	128	136	126	135	140	3.2
Nayarit	-	-	-	-	-	-	-	-	-	-	-	-
Querétaro	71	71	87	105	107	125	100	110	115	121	112	4.7
San Luis Potosí	7	10	12	16	17	20	24	26	26	31	97	29.2
Zacatecas	-	-	-	-	-	-	-	-	-	-	-	-
<b>Central</b>	<b>535</b>	<b>578</b>	<b>613</b>	<b>609</b>	<b>615</b>	<b>605</b>	<b>652</b>	<b>646</b>	<b>604</b>	<b>643</b>	<b>639</b>	<b>1.8</b>
Distrito Federal	58	55	81	97	50	55	56	59	57	56	51	-1.2
Hidalgo	145	163	197	193	185	146	177	208	170	182	151	0.4
México	251	273	247	232	304	316	313	275	284	301	322	2.5
Morelos	-	-	-	-	-	-	-	-	-	-	-	-
Puebla	69	72	71	67	58	72	88	87	78	88	98	3.7
Tlaxcala	13	16	17	20	17	16	17	17	16	17	17	2.6
<b>South-Southeastern</b>	<b>2,016</b>	<b>2,170</b>	<b>1,964</b>	<b>2,115</b>	<b>2,233</b>	<b>2,313</b>	<b>2,521</b>	<b>2,761</b>	<b>2,932</b>	<b>3,214</b>	<b>3,458</b>	<b>5.5</b>
Campeche	557	663	581	740	818	879	1,047	1,253	1,462	1,550	1,606	11.2
Chiapas	256	285	291	305	360	359	360	358	404	472	543	7.8
Gerrero	-	-	-	-	-	-	-	-	-	-	-	-
Oaxaca	-	-	-	-	0	0	0	0	0	1	3	n.a.
Quintana Roo	-	-	-	-	-	-	-	-	-	-	-	-
Tabasco	274	285	282	291	276	258	249	236	221	213	215	-2.4
Veracruz	929	938	810	740	676	710	778	825	761	869	941	0.1
Yucatán	-	-	-	39	102	108	88	89	84	109	151	n.a.

n.a.: Not applicable.

Source: IMP, based on data from CFE, CRE, Sener, PGPB and private companies.

### 1.1.6.1 Northwestern region

This is the only region that is not connected to the National Gas Pipeline System (SNG for its Spanish acronym) hence has no access to domestic production. Regional consumption is concentrated in Baja California and Sonora since they possess hydrocarbon supply infrastructure. In both cases, demand is satisfied with gas imported through gas pipelines interconnected to systems on the US border, in California and Arizona. The Northwestern region has six interconnections: three in Baja California and three in Sonora. It is important to mention that in mid-April 2008, operation tests were performed at the liquefied natural gas terminal in Ensenada (Energía Costa Azul). This terminal will substitute imports through gas pipelines in Baja California in the near future.

Natural gas demand in the Northwestern region registered an annual average growth rate of 40.4% between 1997 and 2007, from 13 mmcf to 374 mmcf between those years. The region's consumption development in the last 10 years has been prompted by the electricity sector. First, CFE started to substitute fuel-oil with natural gas in some thermal-electric plants as of 1999. Then, demand in the sector increased as of 2001 due to the gas required by IPP's. Further on, consumption was intensified with the entry of electric power exporters whose technologies, like IPP's, use combined cycles. In fact, in 2007 the region's consumption decreased by 3.7% when compared to 2006, mainly provoked by the smaller requirement by IPP's and electric power exporters. Even so, by 2007 the electricity sector represented 92.3% of the region's total consumption.

**Chart 13**  
**Natural gas consumption in the Northwestern region, 1997-2007**  
**(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
<b>Supply</b>	<b>13</b>	<b>16</b>	<b>24</b>	<b>60</b>	<b>97</b>	<b>154</b>	<b>254</b>	<b>310</b>	<b>334</b>	<b>392</b>	<b>374</b>	<b>40.4</b>
<i>Regional production</i>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Import</b>	<b>13</b>	<b>16</b>	<b>24</b>	<b>60</b>	<b>97</b>	<b>154</b>	<b>254</b>	<b>310</b>	<b>334</b>	<b>392</b>	<b>374</b>	<b>40.4</b>
Isolated pipelines	13	16	24	60	97	154	254	310	334	392	374	40.4
Pemex pipelines	-	-	-	-	-	-	-	-	-	-	-	-
Liquefied natural gas	-	-	-	-	-	-	-	-	-	-	-	-
<i>Inter-Regional receipts</i>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Destination</b>	<b>12</b>	<b>16</b>	<b>25</b>	<b>60</b>	<b>97</b>	<b>154</b>	<b>257</b>	<b>312</b>	<b>334</b>	<b>391</b>	<b>377</b>	<b>41.1</b>
<b>Regional demand</b>	<b>12</b>	<b>16</b>	<b>25</b>	<b>60</b>	<b>97</b>	<b>154</b>	<b>257</b>	<b>312</b>	<b>334</b>	<b>391</b>	<b>377</b>	<b>41.1</b>
Oil sector	-	-	-	-	0	1	1	0	0	1	1	n.a.
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Refinación	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Gas y Petroquímica Básica	-	-	-	-	0	1	1	0	0	1	1	n.a.
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	-
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-	-
Industrial sector	11	14	16	20	14	19	17	21	24	27	27	9.5
Electricity sector	-	-	7	39	80	132	237	289	309	362	348	n.a.
Public	-	-	5	38	79	130	185	199	191	226	224	n.a.
Comisión Federal de Electricidad	-	-	5	38	69	105	100	88	82	109	115	n.a.
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	-
Productores Independientes de Energía	-	-	-	-	10	25	84	111	109	117	109	n.a.
Private	-	-	2	0	1	2	53	89	117	137	124	n.a.
Autoproducer electricity plants	-	-	2	0	1	2	0	0	0	1	2	n.a.
Electricity export	-	-	-	-	-	-	52	89	117	135	122	n.a.
Residential sector	1	2	1	1	2	2	2	2	2	1	1	0.8
Services sector	-	-	0	0	0	0	0	0	0	0	0	n.a.
Transport sector	-	-	-	-	-	-	-	-	-	-	-	-
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-	-
<i>Inter-Regional deliveries</i>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Stock variation and differences*</b>	<b>0</b>	<b>0</b>	<b>-1</b>	<b>-1</b>	<b>0</b>	<b>0</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>-3</b>	<b>n.a.</b>

n.a.: Not applicable.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Pemex, Sener and private companies.

### 1.1.6.2 Northeastern region

The Northeastern region has different consumption characteristics than other regions. It is the only region where all states consume natural gas and all sectors registered demand in 2007. Also, the most relevant volumes of hydrocarbon foreign trade flow through this region, since it has nine interconnections with the USA for natural gas import and export by pipelines, and operates the LNG regasification terminal in Altamira.

During 2007, the region consumed 1,874 mmcf, becoming the second most important region regarding domestic consumption. Demand share by state during 2007 was composed as follows: Tamaulipas, 41.0%, Nuevo León, 32.2%, Chihuahua, 13.8%, Coahuila, 7.2%, and Durango, 5.8%.

As to sectors, the electricity sector has had an important development in the region, with a natural gas consumption of 62.7% of the total. This sector grew at an annual rate of 16.2% between 1997 and 2007 as a result of consumption by IPP's as of 2001, since the consumption increase of CFE and of self-generators is quite different in volume. In fact, 10 IPP's were operating in the region in 2007, consuming 725 mmcf.

The industrial sector is another critical sector, whose consumption is not only relevant for the region itself, but also at national level, as it represents 37.0% of the industrial sector's domestic consumption. Demand by the residential sector has a smaller impact on regional demand, but it is still relevant for domestic consumption as a sector, representing more than two thirds of inland consumption (67.5%). It is explained that the Northeastern region concentrates the highest number of geographic zones in the country, namely ten.

**Chart 14**  
**Natural gas consumption in the Northeastern region, 1997-2007**

(million cubic feet per day)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
<b>Supply</b>	<b>909</b>	<b>983</b>	<b>1,174</b>	<b>1,279</b>	<b>1,325</b>	<b>1,648</b>	<b>1,891</b>	<b>1,956</b>	<b>1,838</b>	<b>2,069</b>	<b>2,169</b>	<b>9.1</b>
<b>Regional production</b>	<b>566</b>	<b>802</b>	<b>1,024</b>	<b>1,058</b>	<b>1,042</b>	<b>1,072</b>	<b>1,150</b>	<b>1,143</b>	<b>1,267</b>	<b>1,442</b>	<b>1,449</b>	<b>9.9</b>
Gas from PEP for operation <sup>1</sup>	19	20	25	32	35	36	38	36	36	35	35	6.2
Gas from PEP for recirculation	61	53	51	56	58	56	48	45	46	47	51	-1.9
Gas from PEP to refineries	21	18	17	12	6	22	5	1	1	2	2	-23.2
Dry gas from processing plants	108	147	211	235	265	312	361	470	595	829	970	24.6
Dry gas from producing fields	352	560	716	719	671	638	689	584	582	528	392	1.1
Ethane injected to dry gas pipelines	-	-	-	-	2	3	2	2	2	0	-	n.a.
Supplemental gas	4	4	4	5	5	5	6	4	5	1	-	n.a.
<b>Imports</b>	<b>97</b>	<b>135</b>	<b>145</b>	<b>221</b>	<b>283</b>	<b>576</b>	<b>742</b>	<b>814</b>	<b>572</b>	<b>626</b>	<b>719</b>	<b>22.2</b>
Isolated pipelines	56	114	139	146	131	184	215	299	322	380	392	21.5
Pemex pipelines	41	21	6	75	152	392	527	515	249	167	78	6.7
Liquefied natural gas	-	-	-	-	-	-	-	-	-	79	250	n.a.
<b>Inter-Regional receipts</b>	<b>246</b>	<b>46</b>	<b>5</b>	-	-	-	-	-	-	-	-	<b>n.a.</b>
<b>Destination</b>	<b>909</b>	<b>983</b>	<b>1,174</b>	<b>1,279</b>	<b>1,325</b>	<b>1,648</b>	<b>1,891</b>	<b>1,956</b>	<b>1,838</b>	<b>2,059</b>	<b>2,176</b>	<b>9.1</b>
<b>Regional demand</b>	<b>872</b>	<b>936</b>	<b>1,009</b>	<b>1,153</b>	<b>1,068</b>	<b>1,307</b>	<b>1,359</b>	<b>1,483</b>	<b>1,502</b>	<b>1,718</b>	<b>1,874</b>	<b>7.9</b>
Oil sector	96	86	80	108	130	141	150	156	162	168	188	6.9
Pemex Exploración y Producción	27	26	39	47	42	42	44	42	42	41	41	4.3
Pemex Refinación	39	32	32	43	75	87	94	101	104	105	122	12.2
Pemex Gas y Petroquímica Básica	10	10	9	9	8	9	12	13	17	23	24	8.8
Pemex Petroquímica	20	18	1	9	5	3	0	-	-	-	-	n.a.
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	-
Gas lifts (Repressuring)	61	53	51	56	58	56	48	45	46	47	51	-1.9
Industrial sector	361	394	425	436	340	397	348	356	348	371	384	0.6
Electricity sector	285	340	386	485	469	640	737	850	869	1,058	1,175	15.2
Public	228	274	318	427	434	582	599	679	702	915	1,029	16.2
Comisión Federal de Electricidad	228	274	318	427	428	385	381	281	240	284	304	2.9
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	-
Productores Independientes de Energía	-	-	-	-	6	197	218	397	463	631	725	n.a.
Private	57	65	67	59	35	57	138	172	167	143	146	10.0
Autoproducer electricity plants	57	65	67	59	35	57	138	172	167	143	146	10.0
Electricity export	-	-	-	-	-	-	-	-	-	-	-	-
Residential sector	51	47	50	51	53	55	60	61	61	57	59	1.5
Services sector	18	17	17	18	17	18	15	15	15	16	17	-0.4
Transport sector	-	-	-	0	0	0	0	0	0	0	0	n.a.
<b>Exports</b>	<b>37</b>	<b>32</b>	<b>136</b>	<b>24</b>	<b>25</b>	<b>4</b>	-	-	<b>24</b>	<b>33</b>	<b>139</b>	<b>14.2</b>
<b>Inter-Regional deliveries</b>	-	<b>15</b>	<b>29</b>	<b>103</b>	<b>232</b>	<b>336</b>	<b>532</b>	<b>473</b>	<b>312</b>	<b>309</b>	<b>163</b>	<b>n.a.</b>
<b>Stock variation and differences*</b>	-	-	-	-	-	-	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>-7</b>	<b>n.a.</b>

n.a.: Not applicable.

<sup>1</sup> Refers to formation gas. For balance purposes, the gas mix contemplated in this entry is considered equivalent to dry gas.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Gas del Litoral, Pemex, Senex and private companies.

### 1.1.6.3 Central-Western region

This region consumed 627 mmcf/d in 2007. Predominant are the industrial and electricity sectors, with shares of 47.3% and 41.8%, respectively. Both sectors have gone through processes to substitute fuel-oil with natural gas. The region's supply comes from the South-Southeastern and Northeastern regions.

During 2007, largest part of the regional demand was required by the states of Guanajuato (35%), Michoacán (22.3%), Querétaro (17.8%) and San Luis Potosí (15.4%). Guanajuato has increased its consumption in the last decade mainly through the electricity sector, while Michoacán registered increased consumption in the industrial sector and in self-generation, as did Querétaro. Consumption in San Luis Potosí in turn increased thrice when compared to 2006, due to the start of operation of the Tamazunchale combined cycle plant.

**Chart 15**  
**Natural gas consumption in the Central-Western region, 1997-2007**  
**(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 2007	1997- 2007
<b>Supply</b>	<b>324</b>	<b>359</b>	<b>382</b>	<b>390</b>	<b>345</b>	<b>472</b>	<b>498</b>	<b>520</b>	<b>518</b>	<b>565</b>	<b>627</b>		<b>6.8</b>
<i>Regional production</i>	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Imports</i>	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Inter-Regional receipts</i>	<b>324</b>	<b>359</b>	<b>382</b>	<b>390</b>	<b>345</b>	<b>472</b>	<b>498</b>	<b>520</b>	<b>518</b>	<b>565</b>	<b>627</b>		<b>6.8</b>
<b>Destination</b>	<b>324</b>	<b>359</b>	<b>382</b>	<b>390</b>	<b>345</b>	<b>472</b>	<b>498</b>	<b>520</b>	<b>518</b>	<b>565</b>	<b>627</b>		<b>6.8</b>
<i>Regional demand</i>	<b>324</b>	<b>359</b>	<b>382</b>	<b>390</b>	<b>345</b>	<b>472</b>	<b>498</b>	<b>520</b>	<b>518</b>	<b>565</b>	<b>627</b>		<b>6.8</b>
Oil sector	62	53	50	44	44	49	51	42	62	69	62		-0.1
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-		-
Pemex Refinación	35	53	50	44	44	49	51	42	62	69	62		5.7
Pemex Gas y Petroquímica Básica	-	-	-	-	0	0	-	0	-	-	0.0		n.a.
Pemex Petroquímica	27	-	-	-	-	-	-	-	-	-	-		n.a.
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-		-
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-		-
Industrial sector	201	234	246	248	191	230	249	267	259	288	296		4.0
Electricity sector	60	70	85	96	109	191	194	205	190	201	262		15.9
Public	34	51	61	65	86	156	165	179	166	174	232		21.2
Comisión Federal de Electricidad	34	51	61	65	84	81	96	97	91	95	88		10.1
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-		-
Productores Independientes de Energía	-	-	-	-	2	75	68	82	75	80	144		n.a.
Private	26	20	24	31	23	35	29	26	24	26	30		1.4
Autoproducer electricity plants	26	20	24	31	23	35	29	26	24	26	30		1.4
Electricity export	-	-	-	-	-	-	-	-	-	-	-		-
Residential sector	1	1	1	1	1	3	4	6	6	5	5		15.4
Services sector	0	1	1	1	1	0	1	1	1	2	2		23.4
Transport sector	-	-	-	-	-	-	-	-	-	-	-		-
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-		-
<i>Inter-Regional deliveries</i>	-	-	-	-	-	-	-	-	-	-	-		-
<b>Stock variation and differences*</b>	-	-	-	-	-	-	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		<b>n.a.</b>

n.a.: Not applicable.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Pemex, Sener and private companies.

#### 1.1.6.4 Central region

Consumption in the Central region was 639 mmcf during 2007, only 0.6% lower than in 2006. The most important sectors were the electricity and industrial sectors, with a share of 46.3% and 39.4% in regional demand, respectively. Just as the Central-Western region, the Central region is supplied by gas from Inter-Regional receipts. More than 50% of the region's consumption was concentrated in Estado de México, where the industrial sector has a very strong presence, followed by Hidalgo with 23.6%, and Puebla with 15.4%. As to the Federal District, consumption has been decreasing since 2005, while demand in Tlaxcala has not increased in the last few years.

During 2007, consumption by LFC has increased due to the installation of distributed generation turbogas plants. This consumption is reflected in the demand of Estado de México.

In 2007, the oil sector represented 9.9% of the total, though it registered a slight decrease in gas consumption due to lower requirement by the asset teams of PPQ and PR. On the other hand, Independencia Petrochemical Complex, in Puebla, decreased its methanol production, consuming less natural gas than in 2006, as did the Tula refinery.

**Chart 16**  
**Natural gas consumption in the Central region, 1997-2007**  
**(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
<b>Supply</b>	<b>535</b>	<b>578</b>	<b>613</b>	<b>609</b>	<b>615</b>	<b>605</b>	<b>652</b>	<b>646</b>	<b>604</b>	<b>643</b>	<b>639</b>	<b>1.8</b>
Regional production	-	-	-	-	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-	-	-	-	-
Inter-Regional receipts	<b>535</b>	<b>578</b>	<b>613</b>	<b>609</b>	<b>615</b>	<b>605</b>	<b>652</b>	<b>646</b>	<b>604</b>	<b>643</b>	<b>639</b>	<b>1.8</b>
<b>Destination</b>	<b>535</b>	<b>578</b>	<b>613</b>	<b>609</b>	<b>615</b>	<b>605</b>	<b>652</b>	<b>646</b>	<b>604</b>	<b>643</b>	<b>639</b>	<b>1.8</b>
Regional demand	<b>535</b>	<b>578</b>	<b>613</b>	<b>609</b>	<b>615</b>	<b>605</b>	<b>652</b>	<b>646</b>	<b>604</b>	<b>643</b>	<b>639</b>	<b>1.8</b>
Oil sector	70	80	89	101	83	68	101	88	69	73	63	-1.0
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Refinación	35	42	57	67	54	39	65	63	53	53	47	3.1
Pemex Gas y Petroquímica Básica	0	0	1	1	1	1	1	1	0	0	0	0.3
Pemex Petroquímica	34	36	31	33	28	28	35	24	15	19	15	-8.0
Pemex Corporativo	1	1	1	1	1	0	1	0	0	0	0	-6.8
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-	-
Industrial sector	211	217	241	221	209	226	227	238	232	246	252	1.8
Electricity sector	244	272	278	278	311	294	304	297	279	297	296	1.9
Public	217	247	260	259	293	271	282	274	256	275	276	2.4
Comisión Federal de Electricidad	193	208	220	224	254	236	249	245	227	244	219	1.2
Luz y Fuerza del Centro	24	38	40	35	38	35	33	29	29	30	57	8.9
Productores Independientes de Energía	-	-	-	-	-	-	-	-	-	-	-	-
Private	27	26	18	20	18	23	22	23	23	22	20	-2.9
Autoproducer electricity plants	27	26	18	20	18	23	22	23	23	22	20	-2.9
Electricity export	-	-	-	-	-	-	-	-	-	-	-	-
Residential sector	8	7	5	7	8	12	15	18	19	20	22	10.8
Services sector	2	2	1	0	2	4	3	3	4	4	5	8.4
Transport sector	-	-	0	1	1	2	2	2	2	2	2	n.a.
Exports	-	-	-	-	-	-	-	-	-	-	-	-
Inter-Regional deliveries	-	-	-	-	-	-	-	-	-	-	-	-
<b>Stock variation and differences*</b>	-	-	-	-	-	-	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>n.a.</b>

n.a.: Not applicable.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Pemex, Sener and private companies.

### 1.1.6.5 South-Southeastern region

The South-Southeastern region is the most important region regarding natural gas production and consumption due to the fact that large part of the asset teams of PEP and PGPB dedicated to natural gas extraction and processing is located in the region, and their facilities require considerable gas volumes for their operation. Consumption by these subsidiaries reached 1,447 mmcf/d, while gas for repressuring represented 1,373 mmcf/d in 2007. This means that, in terms of percentage share, 81.5% of regional consumption is used as feedstock, fuel and well injection fluid by Pemex subsidiaries.<sup>11</sup>

The electricity sector consumed an average of 558 mmcf/d of natural gas in 2007, representing 16.1% of regional consumption. From this value, IPP's consumed 72.5%. The South-Southeastern region is the second most important region in terms of operating IPP's, with a total of six: three in Veracruz (Tuxpan II, Tuxpan III and IV, Tuxpan V), two in Yucatán (Mérida III and Valladolid III) and one in Campeche (Transalta Campeche).

<sup>11</sup> Pemex Gas y Petroquímica Básica (PGPB) processes, transports, distributes, and commercializes natural gas, LPG and some basic petrochemical raw materials.

Almost half (49.6%) of domestic natural gas consumption is concentrated in the South-Southeastern region. Regional consumption in 2007 was distributed as follows: Campeche, 46.4%, Veracruz, 27.2%, Chiapas, 15.7%, Tabasco, 6.2%, Yucatán, 4.4%, the rest was consumed in Oaxaca, since Guerrero and Quintana Roo do not yet possess natural gas infrastructures. In Campeche, consumption is linked mainly to the oil sector, as this state concentrates PEP's activities and pneumatic pumping in the Campeche Bay, though the electricity sector also contributes to consumption.

In Veracruz, consumption mainly corresponds to the oil sector due to PEP's activities and to the activities of other subsidiaries at gas processing plants, petrochemical complexes and at the Minatitlán refinery. Another important part is used by the electricity and industrial sectors. Consumption in Chiapas is related to the oil sector only.

**Chart 17**  
**Natural gas consumption in the South-Southeastern region, 1997-2007**  
**(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
<b>Supply</b>	<b>3,160</b>	<b>3,202</b>	<b>3,015</b>	<b>3,033</b>	<b>3,032</b>	<b>3,062</b>	<b>3,177</b>	<b>3,483</b>	<b>3,780</b>	<b>4,100</b>	<b>4,576</b>	<b>3.8</b>
<b>Regional production</b>	<b>3,160</b>	<b>3,202</b>	<b>3,015</b>	<b>3,033</b>	<b>3,032</b>	<b>3,062</b>	<b>3,177</b>	<b>3,483</b>	<b>3,780</b>	<b>4,100</b>	<b>4,576</b>	<b>3.8</b>
Gas from PEP for operation <sup>1</sup>	136	155	167	153	162	165	172	206	365	435	550	15.0
Gas from PEP for recirculation	238	229	192	185	184	137	166	266	354	339	420	5.9
Gas from PEP to refineries	-	-	-	-	-	-	-	-	-	-	-	-
Dry gas from processing plants	2,692	2,669	2,498	2,556	2,539	2,603	2,668	2,674	2,552	2,615	2,577	-0.4
Dry gas from producing fields	29	39	34	33	39	59	73	231	416	624	942	41.8
Ethane injected to dry gas pipelines	47	94	114	98	99	88	93	106	92	87	87	6.4
Supplemental gas	20	16	10	8	9	9	4	0	-	-	-	n.a.
<b>Imports</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Inter-Regional receipts</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Destination</b>	<b>3,122</b>	<b>3,140</b>	<b>2,935</b>	<b>3,010</b>	<b>2,961</b>	<b>3,054</b>	<b>3,139</b>	<b>3,454</b>	<b>3,742</b>	<b>4,113</b>	<b>4,561</b>	<b>3.9</b>
<b>Regional demand</b>	<b>2,016</b>	<b>2,170</b>	<b>1,964</b>	<b>2,115</b>	<b>2,233</b>	<b>2,313</b>	<b>2,521</b>	<b>2,761</b>	<b>2,932</b>	<b>3,214</b>	<b>3,458</b>	<b>5.5</b>
Oil sector	1,106	1,142	1,075	1,033	1,053	1,031	1,019	1,118	1,190	1,270	1,447	2.7
Pemex Exploración y Producción <sup>2</sup>	330	347	360	395	463	458	471	551	651	704	843	9.8
Pemex Refinación	71	67	60	53	57	63	59	56	57	55	53	-2.9
Pemex Gas y Petroquímica Básica	205	246	238	254	250	246	238	241	233	238	243	1.7
Pemex Petroquímica	499	483	417	331	283	263	251	271	249	273	308	-4.7
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	-
Gas lifts (Repressuring)	744	851	726	874	909	943	1,056	1,157	1,303	1,390	1,373	6.3
Industrial sector	102	104	96	94	84	94	83	75	73	82	80	-2.4
Electricity sector	64	73	65	113	188	245	363	410	366	472	558	24.2
Public	58	68	61	108	185	240	360	408	363	469	553	25.3
Comisión Federal de Electricidad	58	68	61	81	113	112	105	102	93	104	149	9.9
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	-
Productores Independientes de Energía	-	-	-	27	72	128	255	306	271	365	404	n.a.
Private	6	6	5	5	2	5	3	2	3	3	4	-3.6
Autoproducer electricity plants	6	6	5	5	2	5	3	2	3	3	4	-3.6
Electricity export	-	-	-	-	-	-	-	-	-	-	-	-
Residential sector	-	-	-	-	-	-	-	-	-	-	-	-
Services sector	0	0	1	0	0	0	0	0	0	0	0	-6.1
Transport sector	-	-	-	-	-	-	-	-	-	-	-	-
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Inter-Regional deliveries</b>	<b>1,106</b>	<b>969</b>	<b>971</b>	<b>895</b>	<b>728</b>	<b>740</b>	<b>618</b>	<b>693</b>	<b>810</b>	<b>899</b>	<b>1,103</b>	<b>0.0</b>
<b>Stock variation and differences*</b>	<b>38</b>	<b>63</b>	<b>79</b>	<b>23</b>	<b>71</b>	<b>8</b>	<b>38</b>	<b>29</b>	<b>38</b>	<b>-12</b>	<b>15</b>	<b>n.a.</b>

n.a.: Not applicable.

<sup>1</sup> Refers to formation gas. For balance purposes, the gas mix contemplated in this entry is considered equivalent to dry gas.

<sup>2</sup> Includes consumption by Compañía de Nitrógeno Cantarell as of 2000.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Pemex, Sener and private companies.

## 1.2 Supply

### 1.2.1 Proved natural gas reserves by region<sup>12</sup>

Total remaining natural gas reserves<sup>13</sup>, also known as 3P reserves, reached 61,358.5 thousand million cubic feet (mmcf) by January 1<sup>st</sup>, 2008. According to the location of reservoirs, the Northern region concentrates 61.2% of the total; the Southern region, 16.6%; the Southwestern Marine region, 13.5%; and the Northeastern Marine region, 8.8%.

As to the origin of total natural gas reserves and the type of reservoirs, 75.1% of the total corresponds to gas associated to crude oil, and the remaining 24.9% are non-associated gas reserves.

**Chart 18**  
**Total remaining natural gas reserves, 1999-2008\***  
**(thousand million cubic feet)**

Year	Gas type	Total	Region			
			Northeastern Marine	Southwestern Marine	Northern	Southern
1999	Associated	64,271.6	8,311.8	4,584.2	39,045.3	12,330.3
	Non-associated	16,766.9	0.0	1,182.2	8,287.3	7,297.4
2000	Associated	62,049.6	8,897.9	4,979.3	36,853.0	11,319.4
	Non-associated	16,236.9	0.0	1,935.7	7,321.5	6,979.7
2001	Associated	60,010.5	8,161.3	4,663.7	36,319.6	10,865.9
	Non-associated	16,424.4	0.0	1,935.7	7,663.7	6,825.0
2002	Associated	55,049.1	7,916.5	3,982.5	33,424.6	9,725.5
	Non-associated	14,055.8	0.0	1,944.2	6,373.5	5,738.1
2003	Associated	52,010.8	6,919.5	3,627.6	32,659.2	8,804.5
	Non-associated	13,422.1	0.0	2,773.8	6,087.4	4,560.9
2004	Associated	50,412.8	6,437.4	3,480.7	32,365.6	8,129.1
	Non-associated	13,480.0	0.0	2,679.0	6,608.1	4,192.9
2005	Associated	49,431.5	6,036.5	3,574.9	32,373.3	7,446.8
	Non-associated	14,447.3	57.8	3,048.5	7,210.0	4,131.0
2006	Associated	48,183.0	6,130.7	2,961.6	31,726.6	7,364.1
	Non-associated	14,171.8	57.8	2,709.3	7,328.5	4,076.2
2007	Associated	47,403.0	5,658.9	3,280.4	31,436.5	7,027.2
	Non-associated	15,642.1	57.8	4,681.5	7,473.5	3,429.4
2008	Associated	46,067.0	5,325.0	3,163.0	30,594.1	6,984.9
	Non-associated	15,291.6	57.8	5,106.3	6,952.0	3,175.5

\* Figures by January 1<sup>st</sup> of each year.

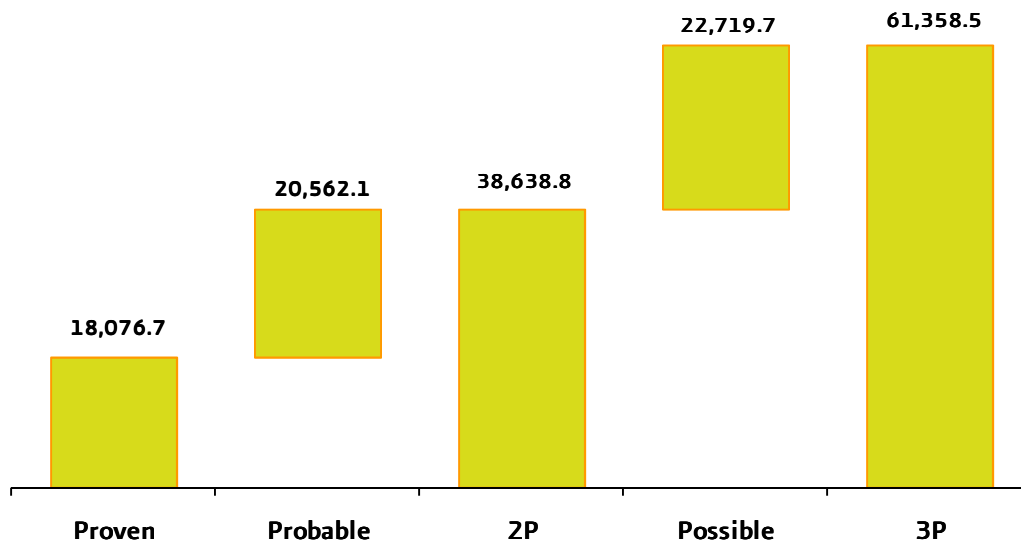
Source: Mexico's hydrocarbon reserves, Pemex Exploración y Producción, several years.

<sup>12</sup> Belongs to the regionalization of asset teams of Pemex Exploración y Producción.

<sup>13</sup> It is the difference between the original reserve and accrued hydrocarbon production on a given date.

Proved (1P) reserves were estimated according to the guidelines on reserves issued by the United States *Securities and Exchange Commission* (SEC). For probable and possible reserves, assessment is performed according to the definition issued by the *Society of Petroleum Engineers* (SPE) and the *American Association of Petroleum Geologists* (AAPG), as well as by the *World Petroleum Council* (WPC). These organizations recommend the best work practices for sustainable reserve models, based on technical criteria and using seismic, petrophysical, geological, reservoir engineering, production and economic data. The integration of total remaining reserves by category shows that 29.5% of them are proved, 33.5% are probable and 37.0% are possible reserves.

**Graph 6**  
**Total remaining natural gas reserves by category on January 1<sup>st</sup> 2008**  
**(thousand million cubic feet)**



Source: Mexico's hydrocarbon reserves 2008, Pemex Exploración y Producción.

The indicator commonly used in the petroleum industry is the reserves-production ratio (R/P). Mexico's gas reserve to production at 27.7 years is obtained for total (3P) reserves. For added proved plus probable (2P) reserves, the ratio is 17.5 years, and for proved (1P) reserves, it is 8.2 years. These ratios indicate the remaining life of the reserves at the present rate of production assuming no further discoveries. .

During 2007, 1,604.0 mmmcf of natural gas have been incorporated into the 3P reserve through discoveries<sup>14</sup>. Of those, 15.2% were added to proved reserve, 43.7%, to probable and 41.1%, to possible reserves. Of the total discoveries, 71.2% belongs to non-associated gas and the rest is associated to crude oil.

<sup>14</sup> Discoveries are the incorporation of reserves attributed to exploration well drilling that turn out to be producing wells in new hydrocarbon reservoirs.

Incorporated non-associated gas reserves amount to 1,141.7 mmmcf and are mainly concentrated in the Northern region and the Basin of the Deep Gulf of Mexico, reaching a total volume of 951.6 mmmcf. In the Basin of the Deep Gulf of Mexico, deep-water exploration efforts have been successful and lead to the discovery of the Lalail field with a gas reserve of 708.8 mmmcf. Up to this date, 6 wells have been drilled in the deep waters of the Gulf of Mexico, 4 of which - Nab-1, Noxal-1, Lakach and Lalail-1 - incorporated reserves. Lalail-1 is located in territorial waters of the Gulf of Mexico off the coasts of Veracruz, 22 kilometers from the Tabscoob-1 well and 93 kilometers northwest from the port of Coatzacoalcos, in a water depth of 806 meters.

Associated gas discoveries reached 462.3 mmmcf, 34.7% of which corresponds to gas associated to superlight oil reservoirs, 40.2%, to light oil and the remaining 25.1%, to heavy oil. Incorporations were mainly distributed in the basins of the Southeast, in the Northeastern Marine region, the Ayatsil-1 and Maloob-DL3 wells incorporated 102.7 mmmcf, in the Southwestern Marine region, the Kuil-1 well in the Abkatún-Pol-Chuc integrated asset team and the Xulum-101A well in the Litoral Tabasco integrated asset team discovered light and heavy crude oil reservoirs, respectively, reaching a total volume of 121.3 mmmcf. In the Southern region, the Paché-1 and Tajón-101 exploration wells in the Bellota-Jujo integrated asset team incorporated light and superlight crude oil reserves, with a gas content of 236.5 mmmcf.

**Chart 19**  
**Discoveries of Natural gas reserves by basin and region, 2007**  
**(thousand million cubic feet)**

Basin	Region	1P	2P	3P
<b>Total</b>		<b>244.3</b>	<b>944.8</b>	<b>1604.0</b>
<b>Burgos</b>		<b>49.4</b>	<b>80.4</b>	<b>168.4</b>
	Northern	49.4	80.4	168.4
<b>Deep Gulf of Mexico</b>		<b>0.0</b>	<b>242.6</b>	<b>708.8</b>
	Southwestern Marine	0.0	242.6	708.8
<b>Southeastern</b>		<b>160.6</b>	<b>556.2</b>	<b>650.6</b>
	Northeastern Marine	39.3	77.6	102.7
	Southwestern Marine	9.4	91.5	121.3
	Southern	111.8	387.1	426.6
<b>Veracruz</b>		<b>34.3</b>	<b>65.6</b>	<b>76.2</b>
	Northern	34.3	65.6	76.2

Source: Mexico's hydrocarbon reserves 2008, Pemex Exploración y Producción.

Thus in 2007, replaced percent of production with gas reserves additions<sup>15</sup> was 11.0% for the 1P reserve, 42.7% for 2P and 72.5% for 3P.

<sup>15</sup> Defined as the result of dividing reserves (1P, 2P and 3P) discovered in a specific period by production in the same period, without considering other elements such as appraisals, revisions and development.

Regarding dry gas, using the concepts and criteria of SEC<sup>16</sup>, proved reserves represented 13,162 mmmcf, with a decrease of 5.0% with respect to 2007. 69.9% of proved dry gas reserves are located onshore and the rest is found offshore (see chart 20).

**Chart 20**  
**Proved dry gas reserves by region, 1999-2008\***  
**(thousand million cubic feet)**

Region	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>Total</b>	<b>30,064</b>	<b>30,394</b>	<b>29,505</b>	<b>28,151</b>	<b>14,985</b>	<b>14,851</b>	<b>14,808</b>	<b>14,557</b>	<b>13,856</b>	<b>13,162</b>
Southern	8,231	9,237	8,655	8,335	7,571	7,181	6,464	6,245	5,453	5,199
Northern	17,873	16,402	16,311	15,586	3,231	3,565	4,181	4,412	4,332	4,006
Northeastern Marine	2,584	3,308	3,063	2,885	2,737	2,750	2,658	2,460	2,198	1,891
Southwestern Marine	1,376	1,447	1,476	1,345	1,446	1,355	1,505	1,440	1,873	2,066

\* Figures by January 1<sup>st</sup> of each year.

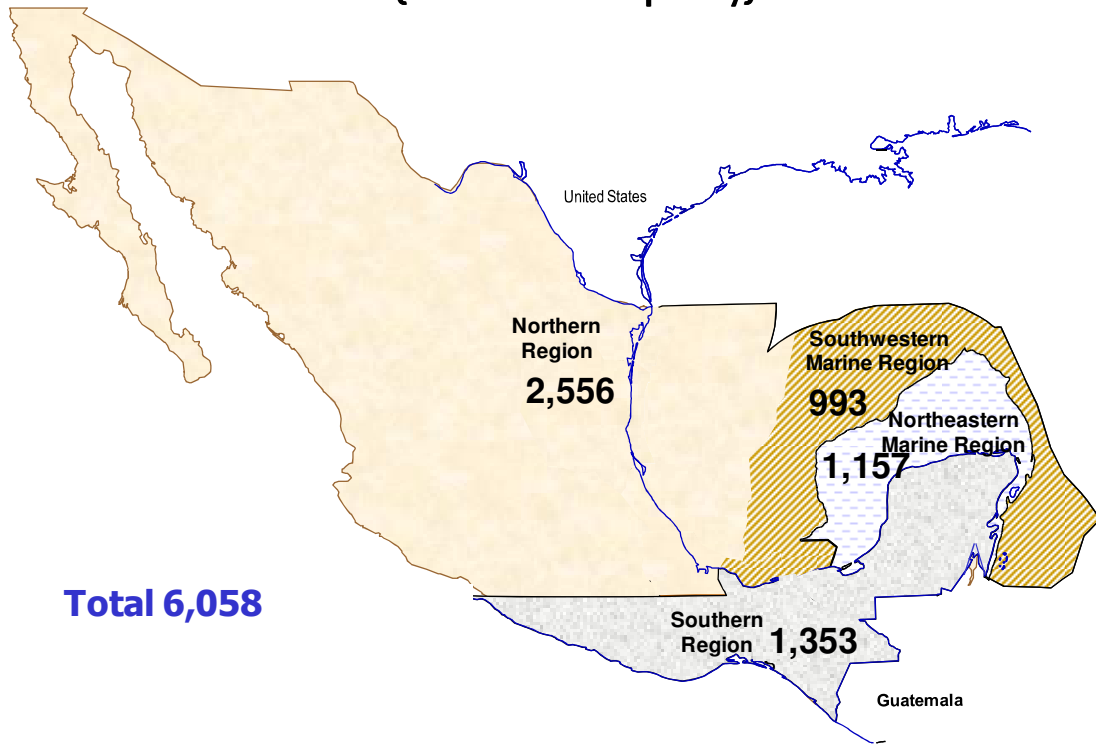
Source: Mexico's hydrocarbon reserves, Pemex Exploración y Producción, several years.

### 1.2.2 Natural gas extraction

During 2007, natural gas production reached 6,058 million cubic feet per day, with a positive variation of 13.1% with respect to the previous year, 56.9% out of which was associated gas and the rest, non-associated gas. Within the ascending trend in natural gas production allowing for a series of maximum values throughout the year, on October 27, 2007, a maximum historical value of 6,611 mmcf/d was reached.

<sup>16</sup> PEP has used this criterion since 2003.

**Map 2**  
**Natural gas extraction by region, 2007**  
**(million cubic feet per day)**



Source: Sener, based on data from Pemex.

Every region increased natural gas production in 2007, especially the Marine and Northern. Within the latter, the Burgos asset team stands out due to the productivity of its wells. Veracruz's due to the positive variation of production and Poza Rica-Altamira's due to the optimization of operations and infrastructure. In the Northeastern Marine Region, Cantarell stands out due to the production increase of its wells with high gas-oil ratio, despite the fact that the field is in its natural decline phase. In the Southwestern Marine region, the Litoral de Tabasco asset team stands out.

**Chart 21**  
**Natural gas extraction by region, 1997-2007**  
**(million cubic feet per day)**

Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Total extraction</b>	<b>4,467</b>	<b>4,791</b>	<b>4,791</b>	<b>4,679</b>	<b>4,511</b>	<b>4,423</b>	<b>4,498</b>	<b>4,573</b>	<b>4,818</b>	<b>5,356</b>	<b>6,058</b>	<b>3.1</b>
Northeastern Marine	640	686	648	737	794	831	940	947	928	920	1,157	6.1
Southwestern Marine	1,009	1,000	922	820	736	621	581	603	655	856	993	-0.2
Southern	2,046	2,067	1,996	1,857	1,743	1,704	1,630	1,495	1,400	1,352	1,353	-4.1
Northern	773	1,038	1,224	1,266	1,238	1,268	1,347	1,528	1,835	2,228	2,556	12.7

Note: Totals may not match due to the rounding-up of figures.

Source: *Annual report and Statistical yearbook*, Pemex.

Associated gas production amounted to 3,445 mmcf in 2007, representing an 11.5% increase with respect to the previous year, caused by the increased production of marine regions, particularly of the Northeastern region.

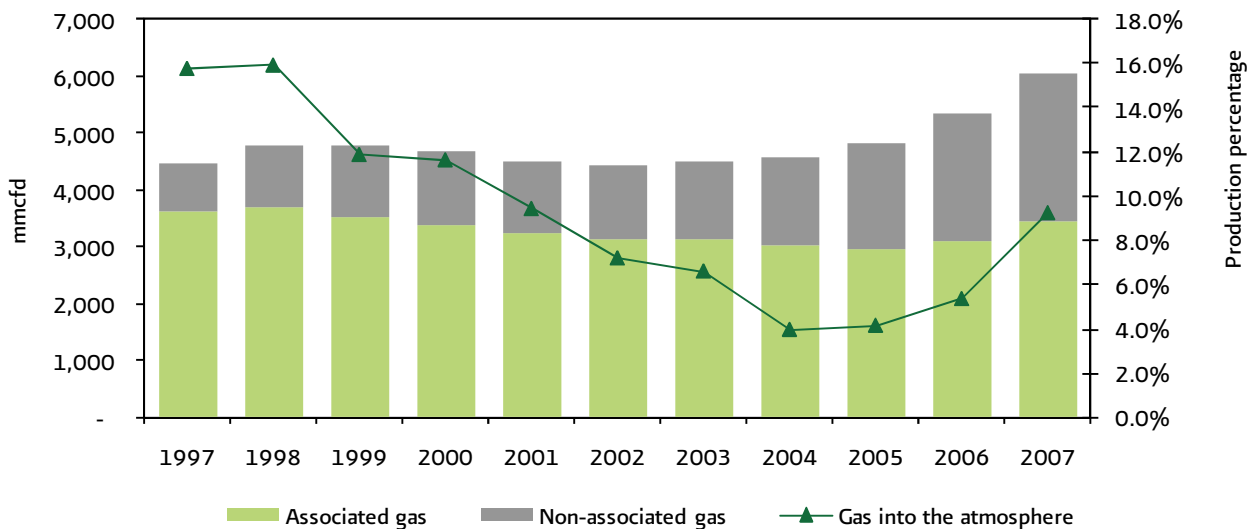
Associated gas production in the Cantarell asset team amounted to 945 mmcf, 31.7% more than in 2006, while in the Southwestern Marine region the Litoral de Tabasco asset team produced 448 mmcf, 30.5% more than the previous year.

Non-associated gas production in turn increased by 15.3% when compared to the previous year, reaching a volume of 2,613 mmcf in 2007. This value meant higher share of non-associated gas in total average production for a year (43.1%). As to the origin of production, the Northern region contributed 2,424 million cubic feet per day, 92.8% of the total of non-associated gas and 321 mmcf more than in 2006; worth mentioning are the Burgos and Veracruz asset teams, registering a production of 1,412 and 921 mmcf, respectively. This region has been a key factor for the production increase of both non-associated gas and of the domestic total.

It is worth knowing that production reached 189 mmcf by the end of 2007 through Financed Public Works Contracts. This amount represented 13.4% of the total production of the Burgos integrated asset team.

**Graph 7**

**Natural gas production by type and percentage of gas released into the atmosphere<sup>1</sup>, 1997-2007**



<sup>1</sup> Includes flaring and natural gas vented into the atmosphere on fields.

Source: Sener, based on data from the *Annual report and Statistical yearbook*, Pemex.

The availability of natural gas for PEP during 2007 ascended to 7,211 mmcf, 9.7% higher than the previous year. Of the total available, 84.0% came from field production and the rest from the production differences of PGPB gas plants. PEP consumed 785 mmcf for operations.

The amount of gas released into the atmosphere was 560 mmcf, almost twice the volume of the previous year, generating a usage percentage of 90.8% compared with the production in 2007. This is attributed to operational issues and to the maintenance of compression equipment on rigs, to the increase of nitrogen content in the production of the

Northeastern Marine region, to works performed on the line from Atasta to Ciudad Pemex-Nuevo Pemex and to the contingency caused by explosions on two gas PGPB pipelines.

**Chart 22**  
**Natural gas production and distribution at PEP, 1997-2007**  
**(million cubic feet per day)**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	agr
<b>Availability</b>	<b>5,180</b>	<b>5,611</b>	<b>5,532</b>	<b>5,589</b>	<b>5,478</b>	<b>5,472</b>	<b>5,619</b>	<b>5,742</b>	<b>5,984</b>	<b>6,571</b>	<b>7,211</b>	<b>3.4</b>
Production	4,467	4,791	4,791	4,679	4,511	4,423	4,498	4,573	4,818	5,356	6,058	3
Sour gas	3,704	3,776	3,567	3,445	3,294	3,164	3,133	2,994	2,937	3,075	3,415	-1
Sweet gas	763	1,015	1,223	1,234	1,216	1,260	1,365	1,579	1,881	2,281	2,644	13
From Pemex Gas y Petroquímica Básica	712	820	741	909	967	1,048	1,121	1,169	1,166	1,215	1,153	5
<b>Distribution</b>	<b>5,180</b>	<b>5,611</b>	<b>5,532</b>	<b>5,589</b>	<b>5,478</b>	<b>5,472</b>	<b>5,620</b>	<b>5,742</b>	<b>5,984</b>	<b>6,571</b>	<b>7,211</b>	<b>3.4</b>
Own consumption	357	374	398	406	439	443	441	521	618	665	785	8
Into the atmosphere	706	765	569	545	425	318	296	180	198	286	560	-2
CO <sub>2</sub>	105	104	102	95	78	52	43	27	16	15	13	-19
Gas	601	660	468	450	347	266	254	153	182	271	547	-1
Net packaging	-1	-1	6	11	6	10	7	2	-19	3	-8	n.a.
CO <sub>2</sub> injected into reservoirs	n.d.	n.d.	n.d.	1	9	26	25	31	23	9	8	n.a.
Condensation in pipelines	258	283	270	242	271	241	261	233	240	267	244	-1
To Pemex Refinación	21	18	17	12	6	22	5	1	1	2	2	-23
To Pemex Gas y Petroquímica Básica	3,838	4,174	4,271	4,372	4,321	4,411	4,585	4,775	4,923	5,340	5,621	4
Directly to pipelines	381	599	750	752	710	697	763	815	998	1,152	1,334	13
To processing plants *	3,457	3,575	3,521	3,620	3,611	3,714	3,823	3,960	3,926	4,188	4,287	2
Sweetening	3,090	3,181	3,074	3,165	3,176	3,208	3,325	3,296	3,118	3,162	3,150	0
Cryogenic	367	393	447	455	435	506	498	664	807	1,025	1,138	12

n.d.: Not available; n.a.: Not applicable

\* Includes gas for repressuring.

Note: Sums may not match due to the rounding-up of figures.

Source: Energy Information System

As to gas distribution, PGPB received 5,621 mmcf/d, representing 77.9% of the availability. The difference corresponded to the shrinking of compression and transportation volumes, to shipping to Pemex Refinación, to the shipping of CO<sub>2</sub> for injection into reservoirs, and to statistical differences.<sup>17</sup>

During 2007, PEP performed diverse activities for the commercialization and incorporation of wet sweet gas coming from the Nejo field in the Burgos integrated asset team into SNG. In December, it incorporated natural gas production from the Tinta field into aforementioned system through the execution of a transportation service agreement with PGPB, allowing for the handling of this hydrocarbon under conditions that differ from the conditions provided for in SNG's General Conditions for Transportation.

<sup>17</sup> Pemex Refinación (PR) transforms crude oil into a variety of oil products.

In order to ensure the commercialization of natural gas coming from the development of the fields in the Burgos and Veracruz integrated asset teams, PEP carried out the corresponding negotiations with PGPB to create interconnection to SNG at the points of Nejo, Tinta, Papán and Mareógrafo.

In compliance with the *Natural Gas Regulation*, PEP -before the Energy Regulatory Commission- has initiated the procedure to obtain natural gas transportation permits for own usage at the La Isla and Tecominoacán 119 interconnections, located in the Southern region, which shall supply natural gas to the artificial production system operating with pneumatic pumping on exploited fields.

### 1.2.3 Natural gas processing

Wet gas processing at plants reached 4,288 mmcf/d, 3.3% higher than in 2006, due mainly to the increased production and supply of wet sweet gas. Wet sweet gas processing registered a volume of 1,125 mmcf/d, 18.5% higher than the previous year; this increase was the result of increased production registered in the Burgos basin; wet sour gas production registered 3,162 mmcf/d, with a negative variation of 1.3%. Considering both processing currents, the ten Gas Processing Complexes (GPC's) reached a dry gas production of 3,546 mmcf/d during 2007, representing a 3.0-% increase when compared to the volume obtained in 2006.

**Chart 23**

### **Natural gas processing, dry gas production<sup>1</sup> and dry gas from producing fields, 1997-2007**

**(million cubic feet per day)**

Gas type	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Wet processed gas	3,338	3,568	3,527	3,691	3,677	3,770	3,853	3,963	3,879	4,153	4,288	2.5
Wet sour gas	3,088	3,177	3,071	3,220	3,227	3,260	3,360	3,349	3,153	3,203	3,162	0.2
Wet sweet gas	250	391	456	471	450	510	492	614	726	950	1,125	16.2
Dry gas from processing plants	2,799	2,816	2,709	2,791	2,804	2,916	3,029	3,144	3,147	3,445	3,546	2.4
Dry gas from producing fields	381	599	750	752	710	697	763	815	998	1,152	1,334	13.3

Note: Totals may not match due to the rounding-up of figures.

n.a.: Not applicable.

<sup>1</sup> Does not include ethane to dry gas pipelines

<sup>2</sup> Includes the Cangrejera, Morelos and Pajaritos Centers.

Source: Pemex.

During the decade, PEP's increased supply of gas coming directly from fields has increased the dry gas available for PGPB. This sweet gas from the fields has grown at an average annual rate of 13.3% between 1997 and 2007, representing 26.8% of the gas contributed by PGPB to domestic supply. Large part of this gas comes from the development of non-associated gas fields mainly in the Burgos basin.

PGPB possesses 10 gas processing complexes,<sup>18</sup> eight of which are located in the South-Southeastern region (in Chiapas, Tabasco and Veracruz) and two in the Northeastern region (in Tamaulipas). The complexes have a total of 20

<sup>18</sup> Administratively, the Coatzacoalcos GPC has been functioning as such since April 1997, with the integration of the refrigerated terminal, the sulfur terminal, the Morelos and Cangrejera fractionating plants, the Cangrejera and Pajaritos cryogenic plants, as well as 600 km of pipelines for transportation and integration.

sweetening plants and 19 cryogenic plants, with an installed capacity of 4,503 mmcf and 5,742 mmcf, respectively. Thus, during 2007 the usage percentage of sweetening plants was 70.2%; while of cryogenic plants, 74.3%.

**Chart 24**  
**PGPB: installed capacity and natural gas production, 2007**  
**(million cubic feet per day)**

Processing center	Installed capacity for sour gas sweetening	Installed capacity for liquid recovery	Sour gas sweetening process	Sweet gas liquid recovery process	Dry gas production <sup>1</sup>
<b>Total</b>	<b>4,503</b>	<b>5,742</b>	<b>3,162</b>	<b>4,264</b>	<b>3,546</b>
Cactus	1,960	1,275	1,404	995	784
Cd. Pemex	1,290	915	884	760	710
Matapionche	109	125	67	65	60
Nuevo Pemex	880	1,550	668	1,062	814
Poza Rica	230	290	109	105	90
Arenque	34	33	31	24	28
Cangrejera <sup>2</sup>		30			
La Venta		182		137	119
Pajaritos <sup>2</sup>		192		130	
Reynosa		350		183	178
Burgos		800		804	763

Note: Totals may not match due to the rounding-up of figures.

<sup>1</sup> Does not include ethane to dry gas pipelines

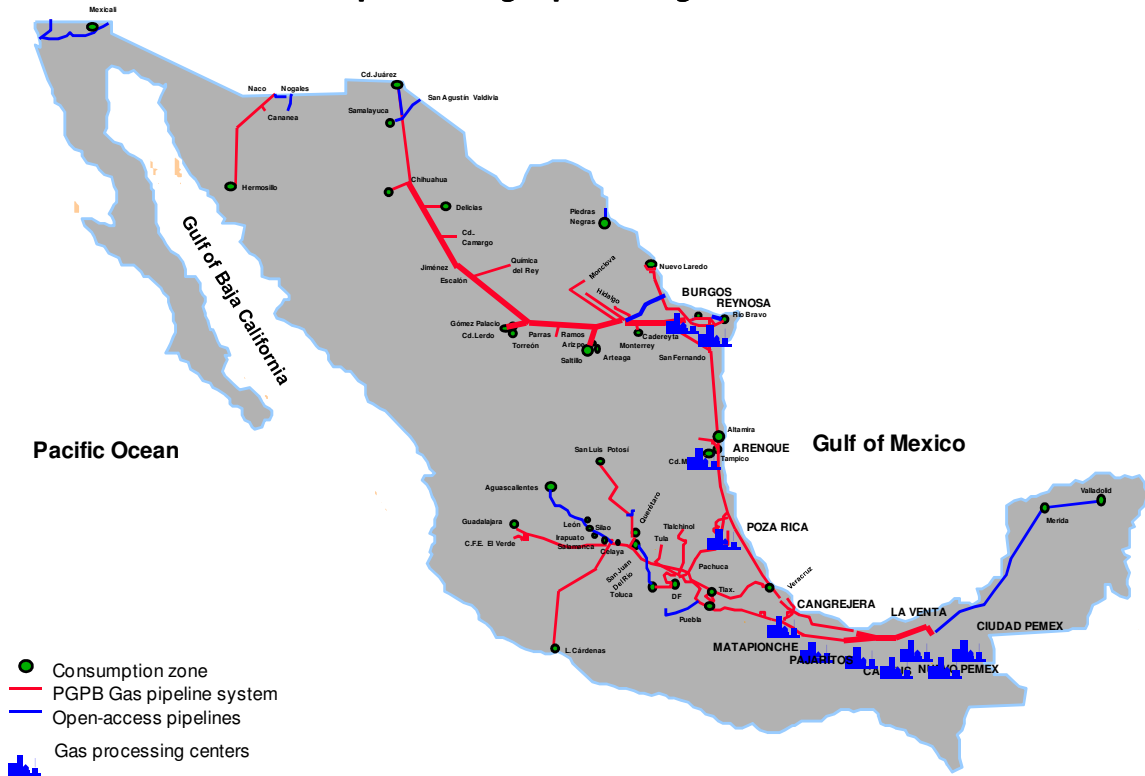
<sup>2</sup> Considered to be part of the Coatzacoalcos GPC.

Source: Sener, based on data from PGPB.

As a result of the coordinated participation of subsidiary organisms of PEP and PGPB, a growth strategy known as the "Integrated Burgos Project" has been defined with the objectives of increasing domestic gas supply through the exploitation of fields with non-associated gas reserves in the Burgos basin, and of having available the asset teams necessary for the handling of larger gas volumes in the Reynosa area.

On January 15, 2007, the construction of cryogenic plants 5 and 6 initiated at the Burgos Gas Processing Center; they shall have a processing capacity of 200 million cubic feet per day each. By the end of the year, the physical progress of the construction was 61%. These plants are expected to start operations by the end of 2008.

**Map 3**  
**Pipeline and gas processing center network**



Source: Sener.

Domestic gas supply consists in dry gas processed by PGPB, gas used by PEP for operations and recirculation, and other currents that complete PGPB's supply. Hence, 17.6% of dry gas supply in Mexico comes from PEP; it does not reach the domestic market, with the exception of a marginal volume delivered to PR; 82.4% comes from PGPB, and it is sold both on domestic and foreign markets, and is used as gas feedstock by Pemex's other subsidiaries (see chart 25).

**Chart 25**  
**Domestic natural gas supply, 1997-2007**  
**(million cubic feet per day)**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
<b>Total</b>	<b>3,726</b>	<b>4,004</b>	<b>4,039</b>	<b>4,091</b>	<b>4,074</b>	<b>4,134</b>	<b>4,326</b>	<b>4,626</b>	<b>5,046</b>	<b>5,543</b>	<b>6,025</b>	<b>4.9</b>
<b>Supply by PEP</b>	<b>476</b>	<b>475</b>	<b>452</b>	<b>438</b>	<b>445</b>	<b>417</b>	<b>429</b>	<b>555</b>	<b>803</b>	<b>858</b>	<b>1,058</b>	<b>8.3</b>
Formation, used by PEP	454	457	435	426	439	394	424	554	802	856	1,057	8.8
For operation	155	175	192	186	197	201	209	243	401	470	586	14.2
For recirculation	299	282	243	240	242	193	214	311	400	386	471	4.6
Gas from PEP to refineries	21	18	17	12	6	22	5	1	1	2	2	-23.2
<b>Supply by PGPB</b>	<b>3,251</b>	<b>3,529</b>	<b>3,587</b>	<b>3,654</b>	<b>3,629</b>	<b>3,717</b>	<b>3,898</b>	<b>4,071</b>	<b>4,244</b>	<b>4,685</b>	<b>4,967</b>	<b>4.3</b>
Dry gas from processing plants	2,799	2,816	2,709	2,791	2,804	2,916	3,029	3,144	3,147	3,445	3,546	2.4
Dry gas from producing fields	381	599	750	752	710	697	763	815	998	1,152	1,334	13.3
Ethane injected to dry gas pipelines	47	94	114	98	101	91	95	108	94	87	87	6.4
Supplemental gas	24	20	14	13	14	13	10	4	5	1	-	n.a.

Source: Sener, based on data from PEP and PGPB.

#### 1.2.4 Transportation and distribution infrastructure

The country's natural gas transportation infrastructure consists of gas pipelines across the national territory, mainly SNG<sup>19</sup> and the Naco-Hermosillo systems, both of which belong to PGPB, as well as of border gas pipelines interconnected with the south of the United States, some of them connected to SNG and other independent ones in private hands.

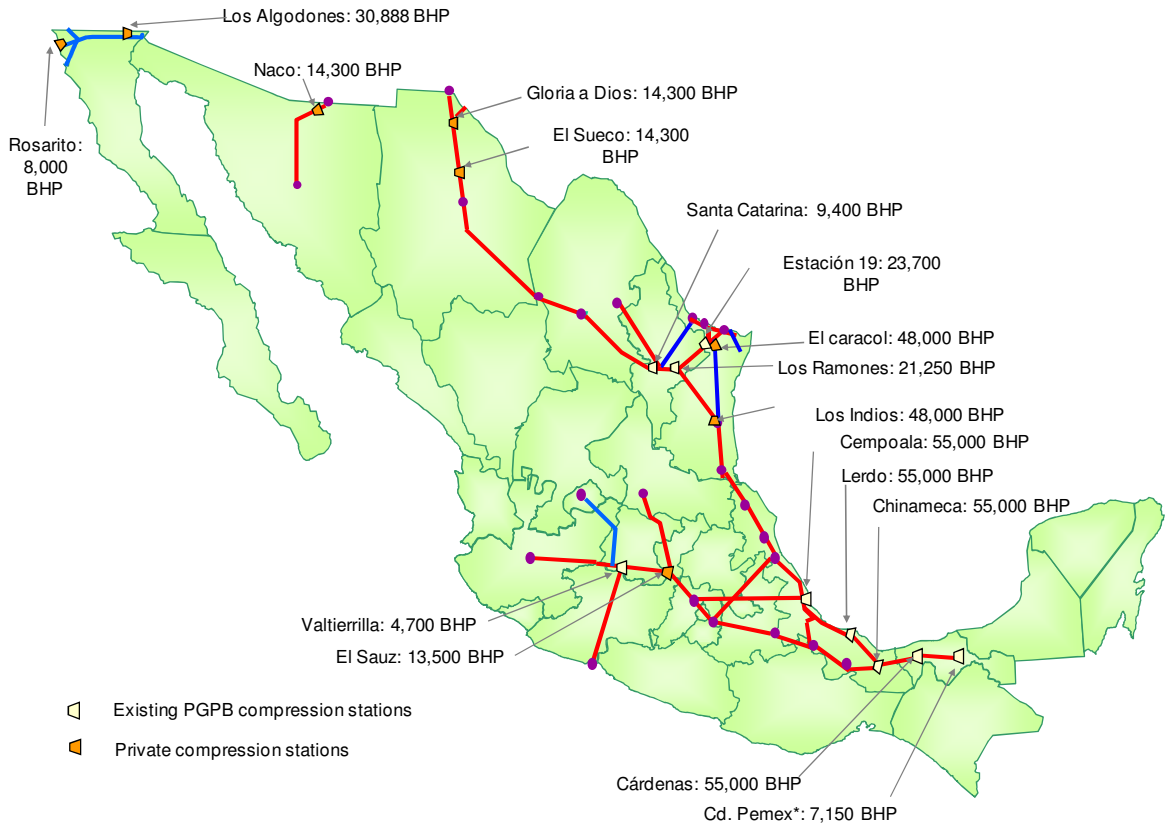
Transportation systems are integrated by pipelines of diverse diameters and lengths, pig traps, section valves, trunk valves, air passages as well as river, highway and railroad crossings. Along the pipelines there are compression stations allowing for pressure increase in order to make the product arrive, under optimum operating conditions, at its destination. These systems transport and distribute gas on a continuous basis 24/7, 365 days of the year.

Currently, gas transportation is a market open for competition. PGPB transports natural gas to large consumers as well as to cities, while distribution in the interior takes place through private companies. Companies that have issued distribution permits in different geographic areas of the country by CRE possess their own gas pipelines. Moreover, some open-access transporters have interconnected to SNG, conveying and selling gas that passes through their pipelines to third parties.

SNG extends over 8,704 km and crosses 18 states of the Republic, while the separate Naco-Hermosillo system has a length of 339 km and is connected with Arizona in the United States. By the end of 2007, Pemex was operating 9 compression stations, 8 of which are property of PGPB and one – the Cd. Pemex station – is owned by PEP. All of them are incorporated into SNG.

<sup>19</sup> It starts in Chiapas passing through Tabasco and Veracruz until Tamaulipas with 24-, 36- and 48-inch diameter lines. It then extends through Nuevo León, Coahuila, Durango and Chihuahua states with 24- and 36-inch diameter lines. There are also three important 18-, 24- and 36-inch lines crossing the central part of the country through Veracruz, Puebla, Tlaxcala, Hidalgo, México, Querétaro, Guanajuato, San Luis Potosí, Michoacán and Jalisco.

**Map 4**  
**Distribution of natural gas compression stations, 2007**  
**(HP)**



\* Property of PEP  
 Source: PGPB.

By the end of 2007, Pemex’s installed compression capacity was 286,200 HP. This capacity is lower than that of 2006, which was 293,850 HP. It is explained by the fact that the Chávez compression station was dismantled and the Ojo Caliente compression station was removed from service, both of them on the SNG line crossing Coahuila state.

Domestic gas demand increase is triggering the need of installing more compression capacity to convey gas in the central regions. The Emiliano Zapata Compression Station in Veracruz and the 48-inch diameter and 22-km long delivery pipeline to Jalapa will allow for increased natural gas transportation capacity on the 48-inch diameter Cempoala-Santa Ana pipeline, increasing from 914 to 1,270 mscfd, permitting to handle demand growth in the country’s central region. When this document was concluded, the station had a physical progress of 94.5% and works are expected to conclude during 2008.

In addition, there is also a power capacity of 183,148 HP from eight private compression stations. The 17 compression stations’ accrued total transportation capacity is 469,348 HP (see chart 26).

**Chart 26**  
**Natural gas compression stations, 2007**  
**(horse power)**

<b>PGPB compression</b>		
<b>Region</b>	<b>Station</b>	<b>Installed Power (HP)</b>
Northeastern	Chavez	Dismantled
Northeastern	Ojo Caliente	Removed from service
Northeastern	Santa Catarina	9,400
Northeastern	Los Ramones	21,250
Northeastern	Estación 19	23,700
Central-Western	Valtierrilla	4,700
South-Southeastern	Cempoala	55,000
South-Southeastern	Lerdo	55,000
South-Southeastern	Chinameca	55,000
South-Southeastern	Cardenas	55,000
South-Southeastern	Cd. Pemex*	7,150
<b>Total PGPB compression</b>		<b>286,200</b>
<b>Private Compression</b>		
<b>Region</b>	<b>Station</b>	<b>Installed Power (HP)</b>
Northwestern	Rosarito	8,000
Northwestern	Los Algodones	30,888
Northwestern	Naco	14,300
Northeastern	Gloria a Dios	14,300
Northeastern	El Sueco	6,160
Northeastern	El Caracol	48,000
Northeastern	Los Indios	48,000
Central-Western	El Sauz	13,500
<b>Total private compression</b>		<b>183,148</b>
<b>Total compression</b>		<b>469,348</b>

\* Property of PEP  
Source: PGPB.

### 1.2.5 Private sector

In order to propel a policy aimed at the use of natural gas, a clean-burning, efficient and safe fuel, the Mexican government undertook a structural reform in 1995 within this industry, with the purpose of maximizing the benefits of this fuel and of developing a gas pipeline infrastructure according to the country's needs. The reform consisted in allowing private participation in activities previously reserved for the State through Pemex, including: transportation, storage and distribution of natural gas, as well as foreign trade and trading on national territory.

The 1995 reform was different from most of the restructuring processes that were taking place in other sectors since, instead of completely privatizing the industry's activities, it sought the incorporation of a scheme for the coexistence of the public (Pemex) and private sectors within the constitutional framework in force. As a result, the state

company would participate in the fuel supply chain as gas provider through first-hand sales, transportation permit-holder of the SNG and seller.

According to the industry's long-term vision for natural gas, reforms to the *Regulatory Law for Constitutional Article 27 in the Petroleum Branch* were introduced and the *Natural gas regulation* was issued. Their purpose was to redefine the sphere of the oil industry and establish the general guidelines of the natural gas industry's regulatory framework, as well as to provide legal certainty to investors interested in this sector.

#### **1.2.5.1 Distribution**

With the release of the *Natural gas regulation* in 1995, CRE started defining geographic distribution zones and bidding processes to grant natural gas distribution permits in aforementioned areas. Up to this date, 22 definitive permits have been granted to private consortiums with national and foreign capital share for the distribution of natural gas in different geographic zones of the country.

Distribution activities have been concentrated in the Northeastern and Central regions, since natural gas consumption markets in these states have grown, allowing for infrastructure development projects. According to the *2007 Annual report* of CRE, distribution permit-holders reported a coverage of 1,888,229 users in 2007, that is, 50,900 more than in 2006.

CRE expects that, by the end of the second five-year period, permit-holders will have a coverage of 2,671,109 users, with investments of 619.1 million dollars and natural gas supply networks with an accrued length of 38,656 km, handling average volumes of 926.2 mmcf/d for all users (see chart 27).

Chart 27

### Situation of natural gas distribution permit-holders by the end of the second five-year period by region

Permit-holder	Location	Length (km) by end of Q2	Average volume mmmcf	Coverage of users by end of Q2	Investment (thousand dollars) <sup>1</sup>
<b>Total domestic</b>		<b>38,656</b>	<b>926.2</b>	<b>2,671,109</b>	<b>619,071</b>
<b>Total of Northeastern Region</b>		<b>23,976</b>	<b>456.6</b>	<b>1,311,695</b>	<b>245,527</b>
1 Cía. Nacional de Gas	Piedras Negras	700	7.2	27,549	2,083
2 DGN de Chihuahua	Chihuahua	1,664	33.0	80,342	37,829
3 Gas Natural de México (Saltillo)	Saltillo-Ramos Arispe-Arteaga	1,829	32.1	91,263	24,671
4 Cía. Mexicana de Gas	Monterrey	1,429	63.4	75,654	6,829
5 Gas Natural de México (Nvo. Laredo)	Nuevo Laredo, Tamaulipas	910	5.9	41,582	6,309
6 Gas Natural de Juárez	Ciudad Juárez	3,814	30.7	200,148	70,948
7 Gas Natural del Río Pánuco	Río Pánuco	655	23.3	29,828	4,808
8 Tamauligas	Norte de Tamaulipas	754	14.3	42,541	4,828
9 Gas Natural México (Monterrey)	Monterrey	11,351	231.9	687,570	75,705
10 DGN La Laguna Durango	Torreón-Gómez Palacio-Ciudad Lerdo-Durango	870	14.7	35,218	11,517
<b>Total of Central Region</b>		<b>11,072</b>	<b>325.7</b>	<b>1,097,802</b>	<b>281,010</b>
11 Gas Natural México (Toluca)	Toluca	1,327	33.7	60,485	27,805
12 Comercializadora Metrogas	Distrito Federal	4,246	84.4	632,629	165,528
13 Consorcio Mexi-Gas	Valle Cuautitlán-Texcoco	4,263	151.8	324,293	61,874
14 Distribuidora de Gas Natural México <sup>2</sup>	Valle Cuautitlán-Texcoco	95	8.7	4	9,304
15 NATGASMEX	Puebla-Tlaxcala	1,142	47.2	80,391	16,498
<b>Total of Central - Western Region</b>		<b>2,811</b>	<b>131.5</b>	<b>220,650</b>	<b>88,568</b>
16 Distribuidora de Gas de Querétaro	Querétaro	1,628	43.7	68,228	34,757
17 Gas Natural México (Bajío)	Silao-León-Irapuato	17	11.3	55,381	9,059
18 Gas Natural México (Bajío Norte)	Zona Bajío Norte	11	31.5	47,238	6,579
19 Distribuidora de GN de Jalisco	Guadalajara	1,155	45.0	49,803	38,174
<b>Total of Northwestern Region</b>		<b>796</b>	<b>12.4</b>	<b>40,962</b>	<b>3,967</b>
20 DGN de Mexicali	Mexicali	281	10.0	19,263	3,285
21 Gas Natural del Noroeste	Hermosillo	392	1.8	17,184	0
22 Distribuidora de Gas de Occidente	Cananea, Sonora	123	0.6	4,515	682

<sup>1</sup> Thousand dollars of December 2007. Belongs to the original investment in the maximum revenue resolutions.

<sup>2</sup> Companies still in the first five-year period.

Source: CRE.

#### 1.2.5.2 Open-access transportation

Open-access transportation is a regulated activity (subject to permits), and consists in receiving, conveying and delivering natural gas through gas pipelines on paths approved by CRE, providing reliable uninterrupted services, whenever this service mode is feasible and available for users, pursuant to the general service conditions.

By the end of 2007, no modifications had been made to open-access transportation permits, that is, the 20 permits are still granted, including SNG and the Naco-Hermosillo gas pipeline, both of them property of PGPB; there are another 18 permits issued to private carriers. The total number of open-access permits adds up to a length of 11,511.5 km, with investment programs worth 1,744.4 million dollars, both figures being committed for the end of the fifth anniversary of the issuance of all permits.

From the 18 permits issued for open-access transportation to private businesses, 14 are operating, three have not been constructed and one is in the construction process (see chart 28).

**Chart 28**  
**Open-access natural gas transportation permits by December 2007**

Permit-holder	Location	Length* (km)	Average volume mscfd	Investment* (million dollars)	Status
1 Gasoductos de Chihuahua	San Agustín Valdivia - Samalayuca	38.0	328.4	18.2	Operating
2 Igasamex Bajío	Huimilpan - San José Iturbide	2.5	12.7	0.3	Operating
3 Energía Mayakan	Ciudad Pemex - Valladolid	710.0	285.1	276.9	Operating
4 FINSA Energéticos	Matamoros, Tamps.	8.0	7.9	0.2	Operating
5 Gasoductos del Bajío	Valtierrilla - Aguascalientes	203.0	90.1	56.5	Operating
6 Transportadora de GN de Baja California	San Diego - Rosarito	36.0	809.4	28.2	Operating
7 Pemex Gas y Petroquímica Básica	Naco - Hermosillo, Son.	339.0	109.9	22.1	Operating
8 Pemex Gas y Petroquímica Básica	Sistema Nacional de Gasoductos	8,704.0	5,107.0	436.5	Operating
9 Kinder Morgan	Cd. Mier - Monterrey	137.2	374.3	82.0	Operating
10 Ductos de Nogales	Frontera México - EUA - Nogales	14.9	15.4	4.1	Under construction
11 Gasoductos Baja Norte	Los Algodones - Tijuana, B.C.	217.0	400.0	124.6	Operating
12 Tejas de Gas de Toluca	Palmillas - Toluca	123.2	96.1	31.0	Operating
13 Transportadora de Gas Zapata	Puebla - Cuernavaca	164.2	165.6	75.9	Construction about to start
14 El Paso Gas Transmission de México	Naco - Agua Prieta, Son.	12.5	215.1	6.6	Operating
15 Gasoductos de Tamaulipas	Reynosa - San Fernando	114.2	2,460.0	238.7	Operating
16 Gasoductos del Río	Valle Hermoso, Tamps.	57.9	409.7	39.3	Operating
17 Conceptos Energéticos Mexicanos	Tijuana, B.C.	1.6	9.4	0.8	Operating
18 Transportadora de Gas Natural de la Huasteca	Terminal de GNL Altamira, Tamps.-Tamazunchale, S.L.P.	127.0	349.2	163.0	Operating
19 Tejas Gas de la Península	Valladolid - Nizuc y Punta Venado-Valladolid-Nizuc, Quintana Roo	234.5	6.5	139.5	Construction about to start
20 Terranova Energía	Matamoros-Argüelles Tamps	256.9	1.2	N.D.	Construction about to start
<b>Domestic total</b>		<b>11,501.5</b>	<b>11,253.0</b>	<b>1,744.4</b>	

\* Figure committed for the fifth anniversary of the permit.

n.d.: not available.

Source: CRE.

### 1.2.6 Domestic natural gas prices

The Directive on the determination of prices and fees of regulated natural gas-related activities issued by CRE has the objective of establishing the methodologies that, ought to be used by regulated companies for the determination of prices and fees within the natural gas industry. The activities regulated by this Directive include first-hand sales as well as the transportation, storage and distribution of natural gas.

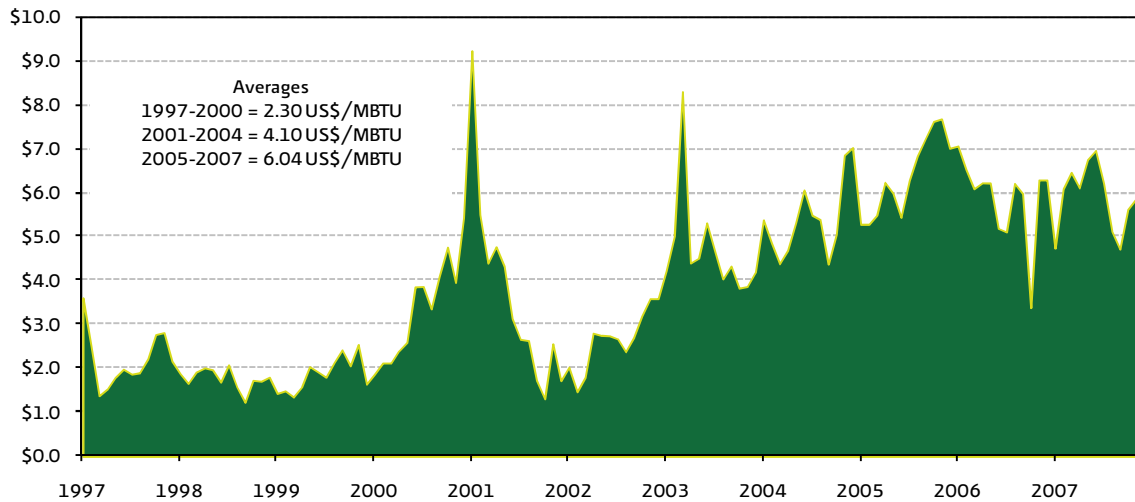
Different prices have been established depending on the regulated activity on the natural gas value chain in question, being first-hand sales price the most relevant for establishing the price offered by PGPB under contract to its

clients. Article 8 of the Natural gas regulation establishes that the methodology to calculate maximum natural gas price for first-hand sale<sup>20</sup> must reflect opportunity costs and gas competitiveness conditions with respect to the international market and the place where the sale takes place.

Acknowledging the south of Texas as a relevant market for Mexican gas, and in particular the American gas pipeline known as Texas Eastern Transmission Corp. South Texas zone (Tetco), the value of the opportunity cost of dry gas in Reynosa and the price in Cd. Pemex (Tabasco) are obtained by means of a netback mechanism.

Natural gas price in Cd. Pemex during 2007 registered an average similar to that of 2006, barely 0.02 US\$/MBTU higher, with a value of 5.89 US\$/MBTU. The indicator's behavior directly obeys movements in the reference; however, this indicator registered its minimum value of 4.71 US\$/MBTU in September and its maximum in June with a price of 6.95 US\$/MBTU.

**Graph 8**  
**Natural gas first-hand sales prices in Ciudad Pemex, 1997-2007**  
**(dollars per million BTU)**



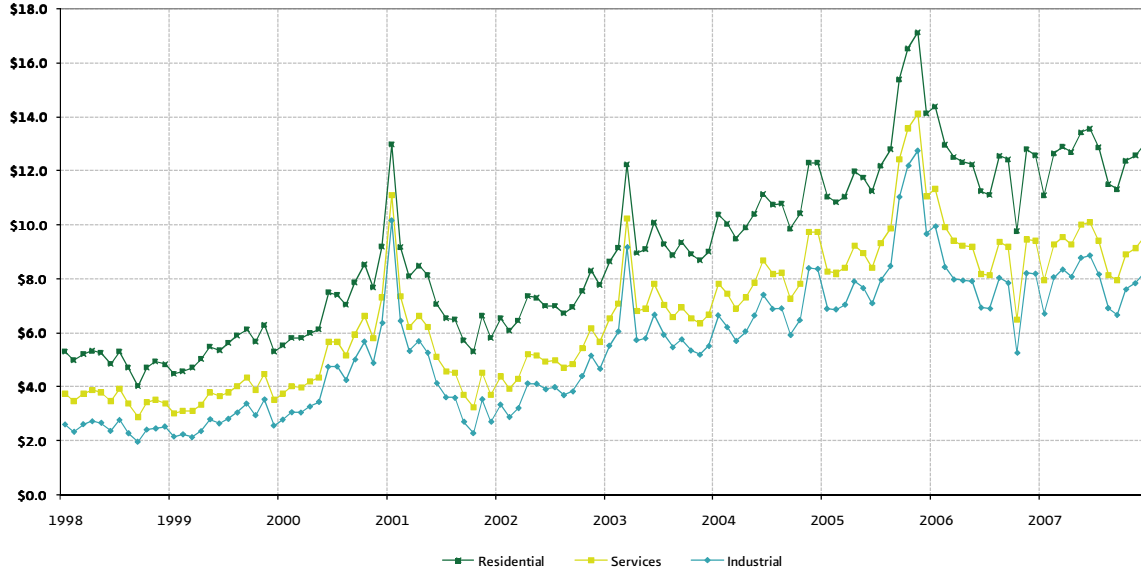
Source: Sener, based on data from CRE.

During 2007, natural gas prices to the public applied by distributors<sup>21</sup> in the different sectors were in a situation similar to that of first-hand sales prices, that is, very similar on average to those registered in 2006, though slightly higher. Thus, domestic average natural gas prices to the public were: 12.49 US\$/MBTU for users in the residential sector, 9.10 US\$/MBTU for the services or commercial sector and 7.87 US\$/MBTU in the industrial sector. The average of these prices was 9.82 US\$/MBTU, barely 1.1% higher than those in 2007 (see graph 9).

<sup>20</sup> It is the highest price Petróleos Mexicanos may charge for gas delivered at the exit of processing plants or at the point or points of delivery determined by the buyer.

<sup>21</sup> In each geographic distribution zone, distribution companies apply the price at which they acquired the gas, specific distribution charges by client type, service and consumption range, with the authorization of CRE, and create their price to the public.

**Graph 9**  
**Domestic average natural gas prices to the public before VAT by sector<sup>1</sup>, 1998-2007**  
**(dollars per million BTU)**



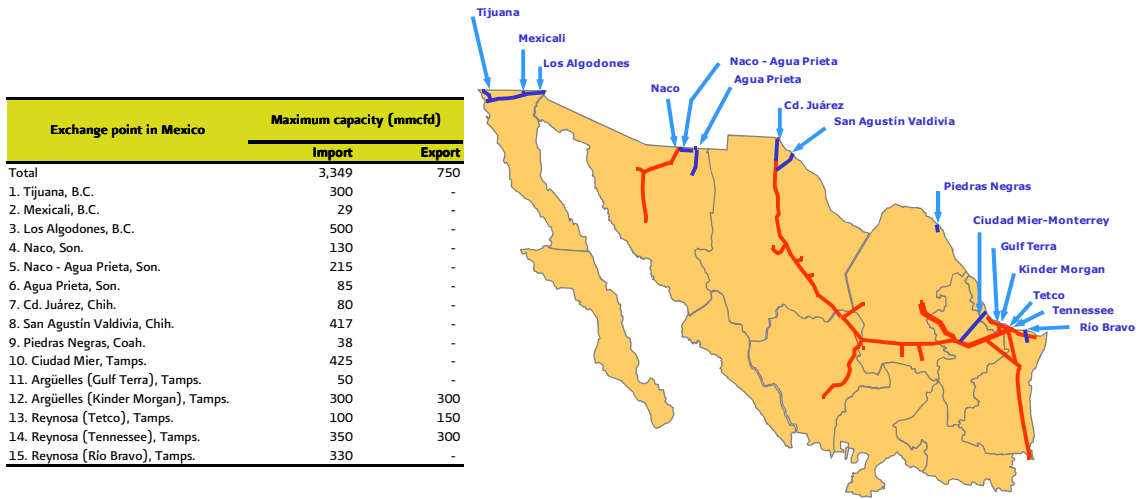
<sup>1</sup> Refers to the average price of invoices from all distributors in the country.  
 Source: Sener, based on data from CRE.

**1.2.7 Foreign trade**

Imports during 2007 took place through gas pipelines distributed along the US border and through LNG loads arriving at the Altamira regasification terminal. A total of 1,094 mmcf were imported during 2007, 844 mmcf of which entered the country via pipelines interconnected with the United States and the rest came from the Altamira regasification terminal.

In 2007, the number of gas pipelines interconnected with the United States remained the same, namely 15 interconnection points with an accrued maximum transportation capacity of approximately 3,349 mmcf for gas importing purposes, considering the capacities contracted on a reliable and uninterrupted basis at each interconnection point. Eight of these interconnections are separate systems not reached by domestic production, and the seven remaining have access to SNG.

**Map 5**  
**Natural gas interconnection capacity with the United States**  
**(million cubic feet per day)**



Source: Sener, based on data from CRE, IMP, PGPB and private companies.

Three of the pipelines interconnected with SNG (Kinder Morgan, Tetco and Tennessee) may be used both ways to export a maximum gas volume of 750 mmcf/d to the south of Texas (see map 5). In fact, during 2007 a total volume of 1.39 mmcf/d was exported, the highest volume in the last decade.

As to the use of interconnections, 2007 was the third consecutive year when the Gulf Terra and Tetco pipelines were not used for imports, because for PGPB such imports continued decreasing in the Reynosa area. Likewise, the Tijuana gas pipeline has not been activated for gas import since 2002, since the Baja California area is supplied mostly through the flow imported through Los Algodones.

**Chart 29**  
**Natural gas foreign trade by interconnection point, 1997-2007**  
**(million cubic feet per day)**

Entry point in Mexico	Importers	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Total imports</b>		<b>109</b>	<b>151</b>	<b>168</b>	<b>281</b>	<b>380</b>	<b>729</b>	<b>996</b>	<b>1,124</b>	<b>905</b>	<b>1,018</b>	<b>1,094</b>
1. Tijuana, B.C.	Public electricity sector <sup>1</sup>	-	-	-	26	57	-	-	-	-	-	-
2. Mexicali, B.C.	Private	1	6	11	11	6	10	8	11	11	14	14
3. Los Algodones, B.C.		-	-	-	-	-	90	172	216	237	268	253
	PGPB	-	-	-	-	-	4	21	12	7	14	10
	Public electricity sector <sup>1</sup>	-	-	-	-	-	86	99	115	113	119	121
	Private	-	-	-	-	-	-	52	89	117	135	122
4. Naco, Son.		12	10	7	15	25	43	51	36	37	63	59
	PGPB	12	10	7	15	16	18	19	10	9	31	34
	Public electricity sector <sup>1</sup>	-	-	-	-	10	24	32	26	28	32	25
	Private	-	-	-	-	-	-	14	38	38	36	37
5. Naco, Son.	Public electricity sector <sup>1</sup>	-	-	-	-	-	-	14	38	38	36	37
6. Agua Prieta, Son.	Private	-	-	6	8	9	11	9	10	10	10	11
7. Ciudad Juárez, Chih. <sup>2</sup>		53	110	132	141	124	178	186	201	191	210	236
	PGPB	53	110	132	141	124	178	167	170	170	184	207
	Public electricity sector <sup>1</sup>	-	-	-	-	-	-	19	31	21	25	30
8. Piedras Negras, Coah.		3	4	7	5	6	6	6	7	6	6	6
	PGPB	3	4	1	-	-	-	-	-	-	-	-
	Private	-	-	5	5	6	6	6	7	6	6	6
9. Ciudad Mier, Tamps.	PGPB	-	-	-	-	-	-	170	172	102	56	62
10. Argüelles (Gulf Terra), Tamps.	PGPB	11	7	-	2	-	13	8	2	-	-	-
11. Argüelles (Kinder Morgan), Tamps.	PGPB	-	-	-	13	116	206	179	167	72	49	12
12. Reynosa (Tetco), Tamps.	PGPB	30	14	5	1	4	39	15	2	-	-	-
13. Reynosa (Tennessee Gas, PMX), Tamps.	PGPB	-	-	1	60	33	133	155	172	75	62	4
14. Reynosa (Tennessee Gas, RB), Tamps.		-	-	-	-	-	-	23	92	125	165	149
	PGPB	-	-	-	-	-	-	23	59	45	54	57
	Public electricity sector <sup>1</sup>	-	-	-	-	-	-	-	33	80	111	92
15. Altamira LNG Regasification Terminal, Tamps.	Private	-	-	-	-	-	-	-	-	-	79	250
<b>Total exports</b>		<b>37</b>	<b>32</b>	<b>136</b>	<b>24</b>	<b>25</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>24</b>	<b>33</b>	<b>139</b>
1. Reynosa (SNG-PGPB)	PGPB	37	32	136	24	25	4	-	-	24	33	139

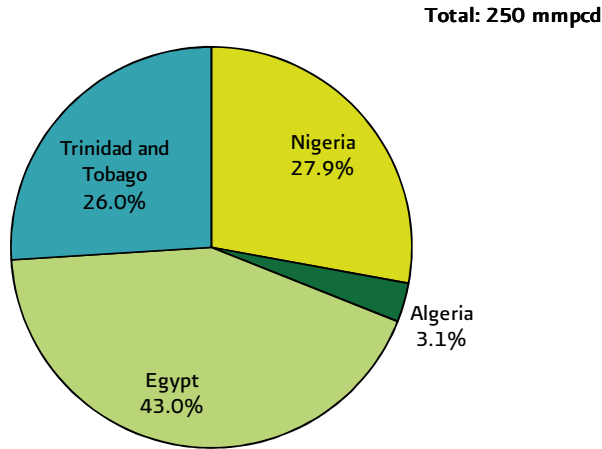
<sup>1</sup> Includes Comisión Federal de Electricidad and Independent Power Production.

<sup>2</sup> Includes San Agustín Valdivia and Ciudad Juárez imports.

Source: IMP, based on data from CFE, PGPB, Gas del Litoral and other private companies.

LNG imports in Mexico continued increasing during 2007. The Altamira LNG Regasification Terminal reached half of its commercial supply capacity last year, delivering a total of 250 mmcf for consumption by CFE plants. This volume represented 22.8% of the country's total natural gas imports in 2007. The Altamira LNG terminal received a total of 32 natural gas loads in liquid state between January and December 2007, coming from Algeria, Nigeria, Egypt and Trinidad and Tobago (see graph 10).

**Graph 10**  
**Liquefied natural gas imports by country of origin, 2007**  
**(percentage share)**



Note: Totals may not match 100% due to the rounding-up of figures.  
 Source: Gas del Litoral.

### 1.2.8 Supply-demand balance, 1997-2007

Domestic natural gas balance for the 1997 to 2007 period shows that domestic dry gas supply registered a historical maximum toward the last year of the period, reaching 6,025 mmcf. However, this volume has not been sufficient to cover domestic demand, though in 2007 supply increased more than demand when compared to 2006.

Domestic supply registered an annual growth rate of 4.9% between 1997 and 2007, from 3,726 mmcf in 1997 to 6,025 mmcf in 2007, supplying 86.4% of domestic consumption during the last year. This positive variation, observed mainly in 2007 with respect to the immediately previous year, was a consequence of the fact that every PEP region increased its production, especially the marine and the Northern regions, with an outstanding productivity of wells in the Northern region's Burgos Asset Team. This was reflected in larger dry gas processing volumes in PGPB plants, mainly in the Burgos gas processing complex, and in higher availability of dry gas directly from fields.

The above situation had a noticeable impact on total imports by PGPB in 2007, which fell by 65 mmcf with respect to 2006. It is worth mentioning that PGPB carries out imports through isolated systems; the decrease of its import balance entering SNG is however noticeable, since it decreased from 167 mmcf in 2006 to 78 mmcf in 2007. Although production increase in Pemex also had an influence, LNG import increase to 250 mmcf at the Altamira regasification terminal set free an internal demand previously covered by supply and by PGPB imports through gas pipelines. This allowed PGPB to export 139 mmcf of the production in 2007, reaching a maximum volume in the last decade within this entry.

Domestic natural gas demand increased by 6.8% in comparison with 2006, reaching a volume of 6,975 mmcf in 2007. Domestic demand increase was due mainly to the start of operation of the Iberdrola Energía Tamazunchale IPP and the Río Bravo combined cycle plant of CFE and, to a smaller extent, to the start of 8 turbogas units owned by LFC.

A variable that favored natural gas consumption in 2007 was that average prices were very similar to those registered in 2006 and, even in intensive consumption sectors like the electricity and industrial sectors, natural gas price remained under the price of oil-derived products such as fuel-oil that registered crude oil price increase on reference markets. As a result, relative price levels generated a 12.4% increase in natural gas consumption within the public electricity sector and of 2.5% in the industrial sector, and a fuel-oil demand decrease of 1.7% and 6.6% in the same sectors, respectively.

**Chart 30**  
**Domestic natural gas balance, 1997-2007**  
**(million cubic feet per day)**

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	agr 1997-2007
<b>Supply</b>	<b>3,835</b>	<b>4,155</b>	<b>4,207</b>	<b>4,372</b>	<b>4,454</b>	<b>4,863</b>	<b>5,323</b>	<b>5,750</b>	<b>5,952</b>	<b>6,561</b>	<b>7,119</b>	<b>6.4</b>
<b>Domestic Production (Dry gas)</b>	<b>3,726</b>	<b>4,004</b>	<b>4,039</b>	<b>4,091</b>	<b>4,074</b>	<b>4,134</b>	<b>4,326</b>	<b>4,626</b>	<b>5,046</b>	<b>5,543</b>	<b>6,025</b>	<b>4.9</b>
Gas from PEP for operation <sup>1</sup>	155	175	192	186	197	201	209	243	401	470	586	14.2
Gas from PEP for recirculation	299	282	243	240	242	193	214	311	400	386	471	4.6
Gas from PEP to refineries	21	18	17	12	6	22	5	1	1	2	2	-23.2
Dry gas from processing plants	2,799	2,816	2,709	2,791	2,804	2,916	3,029	3,144	3,147	3,445	3,546	2.4
Dry gas from producing fields	381	599	750	752	710	697	763	815	998	1,152	1,334	13.3
Ethane injected to dry gas pipelines	47	94	114	98	101	91	95	108	94	87	87	6.4
Supplemental gas	24	20	14	13	14	13	10	4	5	1	-	n.a.
<b>Imports</b>	<b>109</b>	<b>151</b>	<b>168</b>	<b>281</b>	<b>380</b>	<b>729</b>	<b>996</b>	<b>1,124</b>	<b>905</b>	<b>1,018</b>	<b>1,094</b>	<b>25.9</b>
Isolated pipelines <sup>2</sup>	68	130	163	206	228	338	469	609	656	773	766	27.3
Pemex pipelines <sup>3</sup>	41	21	6	75	152	392	527	515	249	167	78	6.7
Liquefied natural gas	-	-	-	-	-	-	-	-	-	79	250	n.a.
<b>Demand</b>	<b>3,797</b>	<b>4,092</b>	<b>4,129</b>	<b>4,350</b>	<b>4,383</b>	<b>4,856</b>	<b>5,287</b>	<b>5,722</b>	<b>5,914</b>	<b>6,563</b>	<b>7,114</b>	<b>6.5</b>
<b>Inland consumption</b>	<b>3,760</b>	<b>4,060</b>	<b>3,993</b>	<b>4,326</b>	<b>4,358</b>	<b>4,851</b>	<b>5,287</b>	<b>5,722</b>	<b>5,890</b>	<b>6,531</b>	<b>6,975</b>	<b>6.4</b>
Oil sector	1,334	1,361	1,295	1,286	1,310	1,290	1,323	1,405	1,483	1,581	1,760	2.8
Pemex Exploración y Producción <sup>4</sup>	357	374	399	442	505	500	515	593	692	744	884	9.5
Pemex Refinación	180	194	198	207	230	238	270	262	276	281	284	4.7
Pemex Gas y Petroquímica Básica	216	256	247	264	258	256	252	255	251	263	268	2.2
Pemex Petroquímica	580	537	449	373	316	295	285	295	264	292	323	-5.7
Pemex Corporativo	1	1	1	1	1	0	1	0	0	0	0	-6.8
Gas lifts (Repressuring)	805	904	777	930	967	999	1,104	1,203	1,350	1,436	1,424	5.9
Industrial sector	886	963	1,023	1,019	838	966	924	957	935	1,014	1,040	1.6
Electricity sector	653	756	821	1,011	1,157	1,501	1,835	2,050	2,013	2,390	2,638	15.0
Public	538	639	705	897	1,077	1,379	1,591	1,738	1,680	2,059	2,314	15.7
Comisión Federal de Electricidad	513	601	665	835	949	920	932	814	733	836	875	5.5
Luz y Fuerza del Centro	24	38	40	35	38	35	33	29	29	30	57	8.9
Independent Power Producers	-	-	-	27	89	425	625	896	918	1,192	1,382	n.a.
Private	116	116	116	115	80	122	244	312	334	331	324	10.9
Autoproducer electricity plants	116	116	116	115	80	122	192	223	217	195	202	5.7
Electricity export	-	-	-	-	-	-	52	89	117	135	122	n.a.
Residential sector	62	56	57	60	64	71	81	86	87	84	88	3.6
Services sector	20	20	20	20	21	22	19	20	21	23	24	1.7
Transport sector	-	-	0	1	1	2	2	2	2	2	2	n.a.
<b>Exports</b>	<b>37</b>	<b>32</b>	<b>136</b>	<b>24</b>	<b>25</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>24</b>	<b>33</b>	<b>139</b>	<b>14.2</b>
<b>Stock variation and differences*</b>	<b>38</b>	<b>63</b>	<b>78</b>	<b>23</b>	<b>71</b>	<b>8</b>	<b>35</b>	<b>27</b>	<b>38</b>	<b>-2</b>	<b>5</b>	<b>n.a.</b>

n.a.: Not applicable.

<sup>1</sup> Refers to formation gas. For balance purposes, the gas mix contemplated in this entry is considered equivalent to dry gas.

<sup>2</sup> Includes consumption by Compañía de Nitrógeno Cantarell as of 2000.

\* Includes differences and packaging.

Source: IMP, based on data from CRE, CFE, Gas del Litoral, Pemex, Sener and other private companies.

# EVOLUTION OF THE DOMESTIC MARKET OF NATURAL GAS 2008-2017

The Energy Reform, published on November 2008, allows Pemex to invigorate its capacity for exploring and exploiting oil and natural gas. Nonetheless, it is still necessary to deeply know its scopes to incorporate the impacts it will have over the natural gas (NG) domestic market with a higher degree of certainty. On this account, the current edition displays only one scenario which includes the up-to-date estimated benefits; in fact, these benefits are reflected towards the prospected mid-term and will continue on evaluation as more information is available.

The modifications over the regulatory framework of the Energy Reform will let Pemex face challenges that will modernize it and will give it more flexibility. Its impact will be reflected on its production, since it will allow a better exploitation of hydrocarbons reserves and, thus, an increase of the national gas production. Likewise, it allows the state-owned company to impulse actions in terms of energy efficiency for the better use of natural gas.

Furthermore, to encourage the expansion of conveyance infrastructure for NG and to invigorate the Gas-Pipelines National System (SNG for its acronym in spanish) by providing it with redundancy and a bigger transportation capacity; the Energy Reform also enhances the Energy Regulatory Commission (CRE) in its regulatory tasks, providing it with faculties for setting systemic fares which may make investments on this kind of infrastructure, more attractive. Withal, NG would reach those federal entities which are not currently receiving it due to lack of infrastructure.

## 2.1 Analysis of the NG prospective demand

The estimated demand of NG market for the next ten years is mainly supported by a macroeconomic scenario based upon the General Criteria of Economic Politics 2008, published by the Ministry of Finance and Public Credit (SHCP for its acronym in spanish); the hydrocarbons price scenario authorized by the Ministry of Energy; and, the foreseen worldwide economic recession that will impact fuels demand.

In addition to the estimated economic growth, NG demand merges the trends in each end-use sector, that is, it considers private and public infrastructure projects as well as the best information available at this outlook closure.

As a result of the components and independent variables already mentioned, NG domestic consumption will have an annual average growth of 3%, moving from 6,975 million cubic feet per day (mmcfd) in 2007 to 9,374 mmcfd in 2017. During 2007-2017 the electricity sector will present the largest volume growth towards the last year of the term, with a total of 1,420 mmcfd in regard to 2007.

**Chart 31**  
**Natural Gas Demand by Sector, 2007-2017**  
**(million cubic feet per day)**

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>6,975</b>	<b>7,273</b>	<b>8,244</b>	<b>8,258</b>	<b>8,228</b>	<b>8,328</b>	<b>8,495</b>	<b>8,662</b>	<b>8,851</b>	<b>9,235</b>	<b>9,374</b>	<b>3.0</b>
Oil <sup>1</sup>	3,184	3,359	4,248	4,105	3,977	3,847	3,844	3,830	3,795	3,920	3,850	1.9
Electricity	2,638	2,804	2,880	2,982	3,049	3,182	3,321	3,468	3,660	3,886	4,058	4.4
Industrial	1,040	985	980	1,024	1,045	1,132	1,154	1,179	1,204	1,230	1,261	1.9
Residential	88	98	107	115	123	130	137	143	149	154	157	6.0
Services	24	23	26	28	30	32	34	36	37	38	39	5.1
Transport	2	3	3	3	4	4	4	5	6	6	8	15.3

<sup>1</sup>Includes Gas lifts (Repressuring).

Source: IMP based on information from CFE, CRE, Pemex, Sener and private companies.

### 2.1.1 Electricity sector

The development planning of the electricity market seeks to estimate the future paths of maximum demand and consumption of electricity at national, sectorial and regional levels for the next ten years. This helps to identify the requirements of energy and capacity needed to fulfill the consumption, taking into account the electricity provided by the Federal Power Commission (CFE), the Light and Power Company (LFC) in the public sector, as well as the one provided by self-generation.

Thus, the planning for fuel demand is a result of the programming of the required centrals which will fulfill future needs of electricity. On the other hand, it is through this planning that the opportunity to vary fuels for generating electricity is envisaged, and hence, the incorporation of new technologies.

The *Development National Plan* and the *Energy Sectorial Program 2007-2012* set down diversification goals for the generation portfolio to 2012, including a share of renewable sources that would reach 26% of its capacity.

In the last years, private industry has played an important role in generating electricity, mainly through self-generation and cogeneration. The construction of new centrals based upon new schemes will significantly influence the development of SEN, since the reserve requirements will be modified and it will be necessary to adapt the electricity network to provide backup and the needed transmission services.

#### 2.1.1.1 Natural gas demand in public electricity sector

The program for expanding the SEN is created by selecting those projects that minimize current costs of investment, operation and energy not supplied in the studied landscape. Within this selection, combined-cycle technology will still be competitive towards 2017; this will considerably raise NG demand of the public electricity sector through 2007-2017.

NG consumption of the PIE's will increase from 1,382 mmcf/d to 2,538 mmcf/d in-between 2007-2017; all the centrals under this modality will be of combined cycle. On the other hand, CFE demand will raise from 875 mmcf/d to 1,082 mmcf/d in this same term, in which there are projects for converting turbogas plants into combined-cycle ones to

increase electricity generation. LFC will contribute in a marginal way to the demand, for its requirements will be 1.3% of gas for the public electricity sector.

Even if there is a wide range of technologies for generating electricity, the benefits of combined cycle will make that NG covers 70.6% of fuels consumption by 2017; coal, 18.1%; fuel oil, 11%; and a marginal use of diesel. A novelty here will be the conversion of two units of 150 MW in the thermoelectric Altamira which will use petroleum coke from 2012 on. Nowadays, this plant consumes fuel oil, and to change to petroleum coke it will be necessary its conversion to a fluidized bed technology.

Against the future possibility of NG supply limitations, due to a provision reduction of Pemex or high price volatility, CFE has planned to diversify its provisional services by means of regasification terminals for liquefied natural gas (LNG) in Altamira, Ensenada and, shortly in Manzanillo, which will grant the existence of NG within the schedule.

**Chart 32**  
**Fuels Demand in the Public Electricity Sector, 2007-2017**  
**(million cubic feet of natural gas equivalent per day)**

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>4,327.8</b>	<b>3,983.7</b>	<b>4,201.3</b>	<b>4,279.7</b>	<b>4,261.3</b>	<b>4,399.5</b>	<b>4,413.1</b>	<b>4,607.7</b>	<b>4,856.1</b>	<b>5,002.3</b>	<b>5,191.5</b>	<b>1.8</b>
Comisión Federal de Electricidad	2,887.0	2,423.8	2,438.9	2,485.6	2,459.7	2,565.6	2,525.3	2,582.9	2,649.1	2,573.2	2,605.7	-1.0
Luz y Fuerza del Centro	56.9	43.6	29.2	28.8	23.4	13.8	13.8	13.8	13.8	13.8	48.0	-1.7
Independent Power Producers	1,383.9	1,516.3	1,733.2	1,765.3	1,778.2	1,820.1	1,874.0	2,011.0	2,193.2	2,415.3	2,537.8	6.3
<b>Coal</b>	<b>734.8</b>	<b>534.9</b>	<b>777.2</b>	<b>814.6</b>	<b>840.5</b>	<b>875.1</b>	<b>899.0</b>	<b>903.0</b>	<b>899.0</b>	<b>894.8</b>	<b>941.6</b>	<b>2.5</b>
Comisión Federal de Electricidad	734.8	534.9	777.2	814.6	840.5	875.1	899.0	903.0	899.0	894.8	941.6	2.5
<b>Fuel oil</b>	<b>1,260.5</b>	<b>1,006.1</b>	<b>923.2</b>	<b>858.1</b>	<b>750.9</b>	<b>718.2</b>	<b>572.9</b>	<b>617.5</b>	<b>679.2</b>	<b>604.4</b>	<b>571.0</b>	<b>-7.6</b>
Comisión Federal de Electricidad	1,260.5	1,006.1	923.2	858.1	750.9	718.2	572.9	617.5	679.2	604.4	571.0	-7.6
<b>Diesel</b>	<b>18.6</b>	<b>23.8</b>	<b>11.2</b>	<b>15.5</b>	<b>11.9</b>	<b>14.6</b>	<b>10.6</b>	<b>9.4</b>	<b>8.7</b>	<b>7.6</b>	<b>11.2</b>	<b>-5.0</b>
Comisión Federal de Electricidad	16.9	23.8	11.1	15.4	11.9	14.6	10.5	9.4	8.7	7.5	11.1	-4.0
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	-
Independent Power Producers	1.8	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	-29.4
<b>Petroleum coke</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>35.3</b>	<b>48.5</b>	<b>48.5</b>	<b>48.5</b>	<b>48.5</b>	<b>48.5</b>	<b>n.a.</b>
Comisión Federal de Electricidad	-	-	-	-	-	35.3	48.5	48.5	48.5	48.5	48.5	n.a.
<b>Natural gas</b>	<b>2,314.0</b>	<b>2,418.9</b>	<b>2,489.7</b>	<b>2,591.5</b>	<b>2,657.9</b>	<b>2,791.6</b>	<b>2,930.6</b>	<b>3,077.8</b>	<b>3,269.2</b>	<b>3,495.5</b>	<b>3,667.7</b>	<b>4.7</b>
Comisión Federal de Electricidad	874.9	859.0	727.4	797.4	856.3	957.7	1,042.9	1,053.1	1,062.2	1,066.5	1,081.9	2.1
Luz y Fuerza del Centro	56.9	43.6	29.2	28.8	23.4	13.8	13.8	13.8	13.8	13.8	48.0	-1.7
Independent Power Producers	1,382.1	1,516.3	1,733.1	1,765.2	1,778.1	1,820.0	1,873.9	2,011.0	2,193.2	2,415.2	2,537.8	6.3

n.a.: Not applicable

Source: IMP, based on information from CFE, Pemex and private companies.

### 2.1.1.2 Fuels demand in the private electricity sector

The electricity self-generation sector takes into consideration self-supply, cogeneration and electricity continuum own-uses. For 2009-2017, NG consumption will remain unchangeably; the increase during 2008 is due to a larger utilization rate of the existing equipments (there are companies that generated electricity just a part of 2007, but from 2008 on, will generate it all year long), and to the set on stream of six new companies which use NG as its main inflow. Besides, a certain utilization rates recovery is expected.

These six new projects will have a power of 233 MW for generating 966 GWh, and will consume 21.37 mmcf. Electricity exports will remain constant, with three companies working in Baja California and consuming 122 mmcf.

Four of the new concessionaires are grouped in the modality of self-supply, and two in cogeneration, from which electricity will be just for local utilization. The regasification company located in Ensenada, Baja California will start operations in two stages: in 2008, and in 2010, to supply fuel to Baja California and, the remnant to the United States. There is another company in Torreon, Coahuila which might begin operations in the middle of 2010 (see chart 33).

Petroleum coke and fuel oil consumption will not show any important shift; diesel displays an increase since 38 new peaker plants (or peaker power plants, which generate electricity at peak hours of in emergencies) will open. Nevertheless, the most significant increases on private electricity generation will come from aeolic energy in the Istmo de Tehuantepec, and coal in the north of the country where a new project will begin operations by 2013 to remotely provide electricity to their associates in the mining industry.

**Chart 33**

**Fuels Demand in the Private Electricity Sector, 2007-2017**  
(million cubic feet of natural gas equivalent per day)

Sector	Product	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Autoproducer electricity plants</b>	<b>Total</b>	<b>350.2</b>	<b>414.7</b>	<b>421.1</b>	<b>421.4</b>	<b>421.6</b>	<b>421.4</b>	<b>497.0</b>	<b>497.0</b>	<b>497.0</b>	<b>496.6</b>	<b>497.0</b>	<b>3.6</b>
	Fuel oil	52.4	53.1	53.1	53.1	53.1	53.1	53.1	53.1	53.1	53.1	53.1	0.1
	Petroleum coke	85.1	84.9	85.1	85.1	85.1	84.9	85.1	85.1	85.1	84.9	85.1	0.0
	Diesel	7.3	9.0	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	3.5
	Coal	3.4	4.5	4.5	4.5	4.5	4.5	79.9	79.9	79.9	79.7	79.9	37.3
	Natural gas	202.1	263.4	268.1	268.5	268.7	268.7	268.7	268.7	268.7	268.7	268.7	2.9
<b>Electricity export</b>	<b>Natural gas</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>122.0</b>	<b>0.0</b>

Source: IMP, based on information from CFE, CRE, Pemex and private companies.

**2.1.2 Industrial sector**

For the next ten years it is intended an upward trend on NG demand with an aagr of 1.9%. The total national demand of NG will rise from 6,975 mmcf in 2007 to 9,374 mmcf in 2017. From NG total consumption, the industrial sector represented 14.9% in 2007 and will be located in 13.4% by 2017. This estimation is linked to the expected economic performance of the industrial sector within the period (see chart 34).

**Chart 34**

**Natural Gas Regional Demand in the Industrial Sector, 2007-2017**  
(million cubic feet per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>1,039.8</b>	<b>985.3</b>	<b>980.3</b>	<b>1,023.8</b>	<b>1,045.0</b>	<b>1,132.2</b>	<b>1,154.4</b>	<b>1,179.3</b>	<b>1,203.8</b>	<b>1,230.3</b>	<b>1,260.8</b>	<b>1.9</b>
Northwestern	26.7	25.8	25.0	25.2	25.5	25.7	26.1	26.4	26.8	27.3	28.0	0.5
Northeastern	384.4	362.5	343.8	343.7	354.8	366.3	377.9	389.6	401.4	415.0	430.9	1.1
Central-Western	296.4	273.2	295.2	332.9	335.5	352.7	355.0	357.1	358.9	361.1	363.9	2.1
Central	251.9	245.5	236.9	242.0	248.8	255.9	263.5	273.7	283.8	293.3	303.9	1.9
South-Southeastern	80.4	78.4	79.5	79.9	80.4	131.4	131.9	132.4	132.9	133.5	134.2	5.2

Source: IMP, based on information from BANXICO, CRE, EIA, IEA, INEGI, PEMEX, SENER and private companies.

From all industrial fuels<sup>22</sup>, NG will be the mostly consumed in industrial activity, being its average share estimated on 50.6% during the term. The latter, due to that some companies are substituting fuel oil, firewood and LPG for NG; coal, petroleum coke and – in less degree – diesel, in their production processes. Fuel-oil price behavior will affect its future demand, thus, it might be substituted by NG and other products.

The projection of NG demand within the industrial sector takes into account two stages: one, called *trend projection* based upon the demand expected behavior in regard to energy efficiency, economic growth and prices; and another called *estimation of substitution*, which expects that LPG and fuel oil will be replaced for NG due to the new distribution infrastructure.

Trend estimation was applied for twelve groups of branches according to the intensity of NG consumption and its importance within the industrial sector demand (see chart 35).

In spite of the fact that a moderate growth is expected in industrial activity, according to the intensity of NG consumption, basic-metals industry will have a high demand of electricity, having a raise from 29.4% in 2007 to 30.2% in 2017.

In the chemical industry, NG will still be one of the most important feedstocks in production processes for generating steam and thermal energy. In the next ten years, its average consumption will be of 152.9 mmcf. The raise in 2012 comes along with the entry into operation of the Proyecto Etileno XXI (Ethylene XXI Project) in Coatzacoalcos, Veracruz. In fact, average annual growth rates of 2.9% are expected throughout the term.

By using NG, this project will give more viability to petrochemical industry, particularly to the production chain ethane-ethylene-polyethylene. It is intended the construction of one plant of ethylene, two of polyethylene, one of ethylene oxide, and one of polypropylene<sup>23</sup>. Products derived and transformed from ethane, specifically ethylene and polyethylene, will feed the chemical industry for manufacturing plastic products for construction, motor carrier and toy industries, amongst others.

For the branch of metal products, machinery and equipment, it is intended a demand growth of 27 mmcf. Dynamism in the branch of automotive bodywork, engines, spare parts and accessories will provoke a larger demand of NG with an annual growth of 2.2% (see chart 35 and graph 11).

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<sup>22</sup> It considers coal, fuel oil, petroleum coke, diesel, NG, LPG and firewood.

<sup>23</sup> Government Second Report, 2008.

**Chart 35**  
**Natural Gas Demand by Branch Group, 2007-2017**  
**(million cubic feet per day)**

Branch Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>1,039.8</b>	<b>985.3</b>	<b>980.3</b>	<b>1,023.8</b>	<b>1,045.0</b>	<b>1,132.2</b>	<b>1,154.4</b>	<b>1,179.3</b>	<b>1,203.8</b>	<b>1,230.3</b>	<b>1,260.8</b>	<b>1.9</b>
Basic metal industries	305.6	270.6	269.4	300.6	307.7	330.9	339.1	348.0	357.8	368.5	380.5	2.2
Chemistry	131.2	125.6	124.8	124.9	124.3	175.2	175.6	175.7	174.9	175.2	175.0	2.9
Metal products, machinery and equipment	110.5	110.7	110.1	114.3	119.3	123.5	126.9	129.6	131.7	134.0	137.5	2.2
Glass and glass products	111.3	106.2	108.1	110.1	112.5	114.4	116.3	118.3	120.2	122.3	125.0	1.2
Food, beverages and tobacco	95.8	94.2	94.5	96.2	98.1	99.9	101.8	103.6	105.3	107.1	109.0	1.3
Non-metallic mineral products	69.5	68.9	66.5	68.0	69.7	71.1	72.6	74.0	75.5	77.1	79.1	1.3
Paper and cardboard, printers and editorials	64.8	66.9	68.2	70.6	73.5	77.0	80.7	84.8	89.3	95.2	101.9	4.6
Textiles, clothing and leather industry	35.2	29.9	28.3	28.2	27.9	27.5	27.4	27.3	27.1	27.0	27.1	-2.6
Mining	22.4	22.6	21.8	21.1	20.5	20.1	19.7	19.5	19.5	19.5	19.6	-1.3
Beer and malt	16.6	17.2	17.3	17.6	17.9	18.2	18.6	18.9	19.2	19.5	19.9	1.8
Hydraulic cement	10.7	10.2	9.9	9.5	9.1	8.8	8.4	8.1	7.8	7.5	7.2	-3.8
Remaining branches	66.0	62.2	61.5	62.8	64.2	65.6	67.3	71.5	75.5	77.3	79.0	1.8

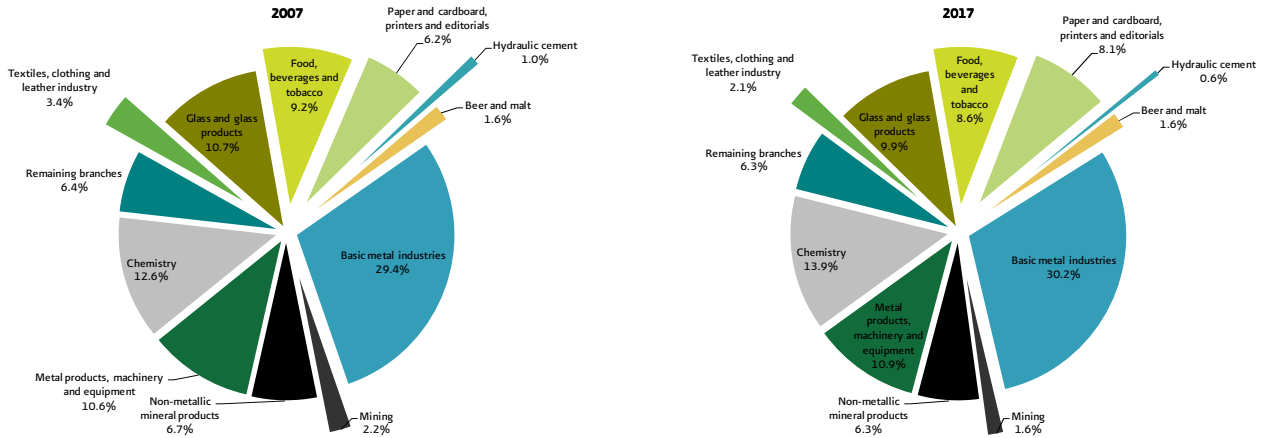
Source: IMP, based on information from BANXICO, CRE, EIA, IEA, INEGI, PEMEX, SENER and private companies.

The average volume of electricity that the glass industry will demand is estimated on 115 mmcf. Constructing plants of flat glass and glass containers in various states will enhance a larger share in NG demand which will rise from 111.3 mmcf in 2007 to 125 mmcf in 2017. This branch production is mainly destined to automotive sector and food in glass containers.

The branch of paper and cardboard, printing and publishers uses NG to generate steam for drying systems. In the future, this branch will have the highest annual average growth within the industrial sector (4.6%), that is, an increase of 37.1 mmcf through the term.

Within the next ten years, the construction industry will display a negative growth prospective, for housing as well as for developing urban and touristic infrastructure; this, due to the worldwide crisis which will cause a drop upon the demand of materials such as bricks, porcelain, tiles and other products made with non-metallic minerals (see graph 11 and chart 35).

**Graph 11**  
**Demand Structure by Branch Group in the Industrial Sector, 2007 and 2017**  
**(percentage share)**



Source: IMP, based on information from BANXICO, CRE, EIA, IEA, INEGI, PEMEX, SENER and private companies.

According to the demand projection by component, from 2012 on there will be a gradual substitution of LPG and fuel oil for NG, due to a new distribution infrastructure, specifically in the urban zones of Cuautla and Cuernavaca. Thus, the cumulative substitution of LPG and fuel oil will be of 22.6 mmcf/d (see chart 36).

**Chart 36**  
**Industrial Demand of Natural Gas by Component Projection, 2007-2017**  
**(million cubic feet per day)**

	Trend	Substitution*	Project Ethylene XXI	Total
2007	1,039.8	-	-	<b>1,039.8</b>
2008	985.3	-	-	<b>985.3</b>
2009	980.3	-	-	<b>980.3</b>
2010	1,023.8	-	-	<b>1,023.8</b>
2011	1,045.0	-	-	<b>1,045.0</b>
2012	1,082.1	0.01	50.0	<b>1,132.2</b>
2013	1,103.9	0.44	50.0	<b>1,154.4</b>
2014	1,126.0	3.30	50.0	<b>1,179.3</b>
2015	1,147.8	6.02	50.0	<b>1,203.8</b>
2016	1,173.9	6.41	50.0	<b>1,230.3</b>
2017	1,204.4	6.44	50.0	<b>1,260.8</b>

\* It refers to the substitution of fuel oil and LPG due to a new infrastructure for distributing NG to the industry.

Source: IMP, based on information from BANXICO, CRE, EIA, IEA, INEGI, PEMEX, SENER and private companies.

### 2.1.3 Oil sector

Natural gas is used within the oil sector as fuel in pipelines, refineries, gas processing plants, pneumatic pumping, electricity generation and raw material amongst other uses. Historically, oil sector has had the largest NG consumption; in 2007, PEP required 45.6% from the total to inject oil wells. Nonetheless, the electricity sector demand will overpass oil's by 2016.

Within the next ten years, Pemex branches' demand will have an annual growth of 2.1%, standing out the 442 mmcf increase of Pemex refining, linked to the new refining capacity to be installed, first, in 2014 and then in 2016. For internal recirculations (gas lifts), these will reach its maximum gas requirements by 2014 and 2015 (1,770 mmcf) and will decline to 1,694 mmcf by 2017.

**Chart 37**  
**Natural Gas Demand of the Oil Sector, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>3,184</b>	<b>3,359</b>	<b>4,248</b>	<b>4,105</b>	<b>3,977</b>	<b>3,847</b>	<b>3,844</b>	<b>3,830</b>	<b>3,795</b>	<b>3,920</b>	<b>3,850</b>	<b>1.9</b>
Self-consumption	1,760	1,974	2,637	2,531	2,328	2,118	2,077	2,061	2,025	2,173	2,157	2.1
Exploración y Producción <sup>1</sup>	884	1,006	1,717	1,529	1,295	1,034	920	753	672	684	679	-2.6
Refinación	284	324	326	347	346	352	414	564	600	728	726	9.8
Gas y Petroquímica Básica	268	275	242	256	295	325	334	336	345	353	343	2.5
Petroquímica	323	369	351	397	393	408	408	408	408	408	408	2.4
Corporativo	0	0	0	0	0	0	0	0	0	0	0	0.0
gas lift	1,424	1,386	1,611	1,575	1,649	1,729	1,768	1,770	1,770	1,747	1,694	1.7

<sup>1</sup> Includes the consumption of Compañía de Nitrógeno of Cantarell.

Source: Pemex.

Natural gas use in PPQ will rise between 2007 and 2012, and later on will remain steady until 2017; the use of gas as fuel will rise from 276 mmcf to 340 mmcf, and as raw material will rise from 46 mmcf to 68 mmcf. There are various projects to favor the use of NG as fuel, like enlarging the production of ethylene, ethylene oxide and high-density polyethylene (HDPE) in the Petrochemical Complex Morelos; and enlarging aromatics and styrene production lines in Petrochemical Complex La Cangrejera. The use of NG as raw material will increase since – from 2010 on – it will be considered an additional plant of ammonia in the Petrochemical Complex Cosoleacaque.

**Chart 38**  
**Natural Gas Demand of Pemex Petroquímica<sup>1</sup>, 2007-2017**  
**(million cubic feet per day)**

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>323</b>	<b>369</b>	<b>351</b>	<b>397</b>	<b>393</b>	<b>408</b>	<b>408</b>	<b>408</b>	<b>408</b>	<b>408</b>	<b>408</b>	<b>2.4</b>
Fuel	276	315	304	329	327	340	340	340	340	340	340	2.1
Raw material	46	53	47	68	66	68	68	68	68	68	68	3.8

<sup>1</sup> It does not include Ethylene XXI Project, which is included in the industrial sector.

Source: PPQ.

### 2.1.4 Residential and Services Sectors

For the next ten years it is intended a 5.8% growth of NG consumption in residential and services sectors, which represents a raise of 85 mmcf/d; from this volume 69.6 mmcf/d correspond to residential sector and 15.4 mmcf/d to services' (see chart 39).

**Chart 39**  
**Demand of Natural Gas and LPG, Residential and Services Sectors, 2007-2017**  
**(million cubic feet of natural gas equivalent per day)**

Year	Natural gas	LP Gas	Total	Natural gas Share (%)	Inhabitants	Consumption of NG and LPG per inhabitant *	Growth (%)
2007	111.8	925.3	1,037	10.8	105,790,725	9.8	
2008	121.6	946.2	1,068	11.4	106,682,518	10.0	2.1
2009	132.7	954.8	1,088	12.2	107,550,697	10.1	1.0
2010	143.6	961.6	1,105	13.0	108,396,211	10.2	0.8
2011	153.3	957.1	1,110	13.8	109,219,931	10.2	-0.3
2012	162.4	949.7	1,112	14.6	110,022,552	10.1	-0.6
2013	170.7	943.4	1,114	15.3	110,804,591	10.1	-0.5
2014	178.7	937.7	1,116	16.0	111,566,783	10.0	-0.5
2015	186.1	931.8	1,118	16.7	112,310,260	10.0	-0.5
2016	192.0	925.7	1,118	17.2	113,036,756	9.9	-0.7
2017	196.8	919.1	1,116	17.6	113,746,425	9.8	-0.8
<b>aagr</b>	5.8	-0.1	0.7	5.0	0.7	0.0	

\* Cubic feet per day

Source: IMP, based on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

For 2017, the total consumption of NG and LPG will be of 1,116 million cubic feet of natural gas equivalent; nevertheless, it is expected a greater penetration of NG and a gradual decrease of LPG demand within these sectors (see graph 12).

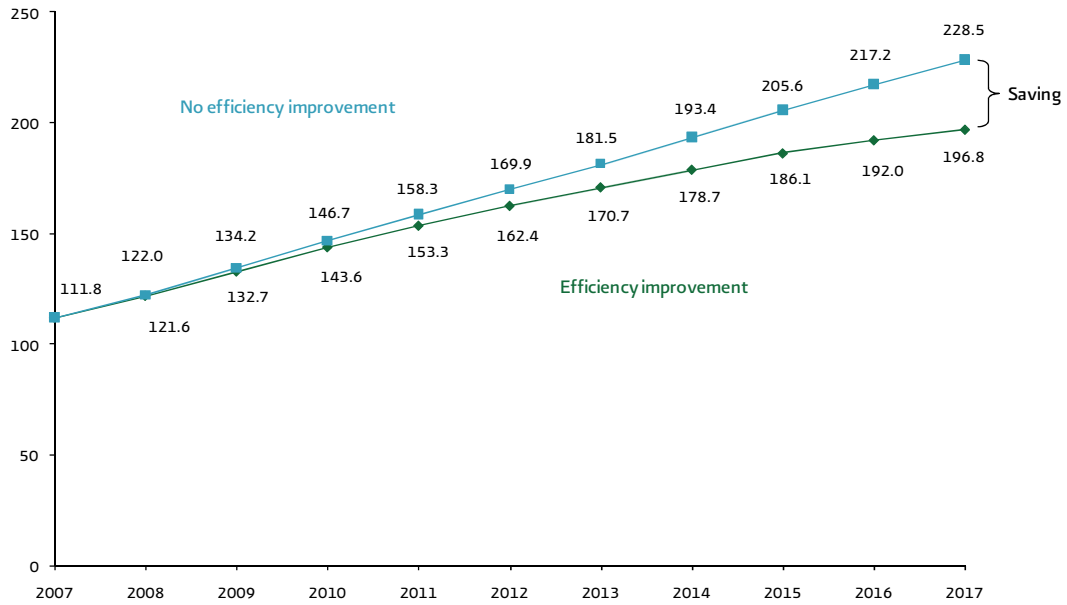
**Graph 12**  
**Demand of Natural Gas and LPG, Residential and Services Sectors, 2007-2017**  
**(million cubic feet of natural gas equivalent per day)**



Source: IMP, based on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

It is worthwhile mentioning that the efficiency of solar and conventional heaters, as well as electronic ignition stoves will foster a saving of NG in the residential and services sectors (31.8 mmcf by 2017). The Residential sector will show the largest saving (25 mmcf) whilst services' is estimated on 6.7 mmcf (see graph 13).

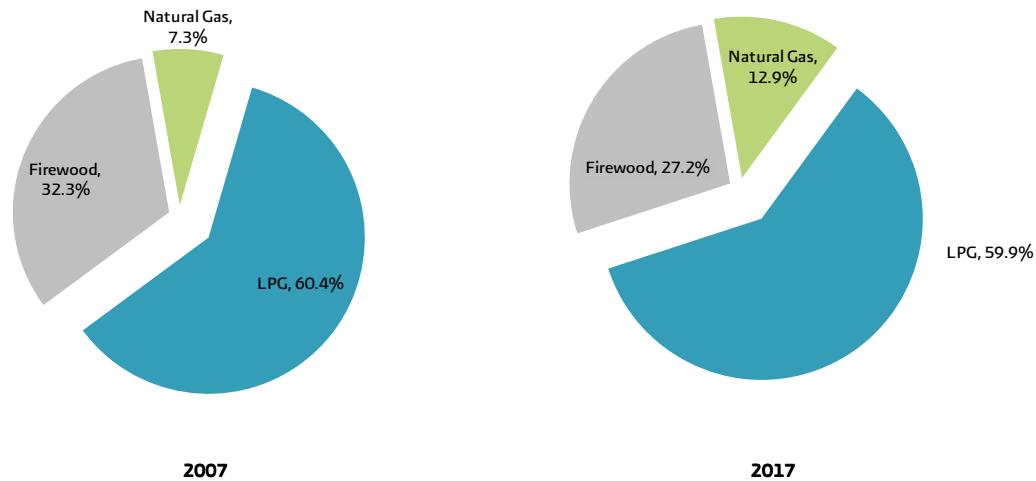
**Graph 13**  
**Natural Gas Saving in Residential and Services Sectors, 2007-2017**  
**(million cubic feet of natural gas equivalent per day)**



Source: IMP, based on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

Throughout the prospected term, LPG consumption will decrease slightly; nonetheless, it will have the largest share within these sectors by 2017 (59.9%). This decrease will be reflected on a larger use of NG – from 7.3% in 2007 to 12.9% in 2017. The use of firewood in these sectors will gradually fall 5.1% for the next decade. This shows that fuel substitution will have a double effect: NG instead of LPG, and LPG instead of firewood (see graph 14).

**Graph 14**  
**Fuels Demand in Residential and Services Sectors, 2007 and 2017**  
**(percentage share)**



Source: IMP, based on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

Natural gas is commonly used at home in stoves and boilers, either combination or traditional ones. In some zones it is also used for heating houses as well as in air-conditioner and cooling systems. Its intended total average demand for 2007-2017 will be of 127.4 mmcf/d, with an annual average growth of 6%. For Central-Western, Central and Northeastern regions, it is expected a larger consumption due to strategic plans to set down infrastructure for distributing NG in residential complexes (see chart 40).

**Chart 40**  
**Natural Gas Demand by Region, Residential Sector, 2007-2017**  
**(million cubic feet per day)**

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>87.8</b>	<b>98.1</b>	<b>106.8</b>	<b>115.5</b>	<b>123.1</b>	<b>130.2</b>	<b>136.8</b>	<b>143.1</b>	<b>149.1</b>	<b>153.5</b>	<b>157.4</b>	<b>6.0</b>
Northwestern	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.3
Northeastern	59.2	65.8	69.7	73.4	76.4	78.9	81.1	83.1	85.0	85.8	86.5	3.9
Central-Western	5.0	7.5	9.1	10.9	12.7	14.4	16.2	17.9	19.5	21.0	22.1	16.0
Central	22.1	23.2	26.3	29.5	32.3	35.0	37.7	40.3	42.7	44.9	46.9	7.8
South-Southeastern	-	-	-	-	-	-	-	-	-	-	-	n.a.

n.a.: Not applicable

Source: IMP, base on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

In the services sector, NG will still be consumed mainly in central heating processes, air conditioner, food preparation, and hot water for hotels, restaurants, laundries, offices, etc. There is intended an average of 31.7 mmcf/d to satisfy NG demand in this sector for the next ten years (see chart 41)

**Chart 41**

**Natural Gas Demand by Region, Services Sector, 2007-2017**  
(million cubic feet per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total</b>	<b>24.0</b>	<b>23.5</b>	<b>25.9</b>	<b>28.1</b>	<b>30.2</b>	<b>32.2</b>	<b>33.9</b>	<b>35.6</b>	<b>37.1</b>	<b>38.5</b>	<b>39.4</b>	<b>5.1</b>
Northwestern	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5
Northeastern	16.8	17.8	19.1	20.2	21.1	22.1	22.8	23.4	24.0	24.6	24.7	3.9
Central-Western	2.1	2.2	2.6	3.0	3.4	3.8	4.1	4.5	4.8	5.1	5.3	9.9
Central	4.7	3.4	4.1	4.8	5.5	6.2	6.8	7.5	8.1	8.6	9.1	6.8
South-Southeastern	0.2	-	-	-	-	-	-	-	-	-	-	-

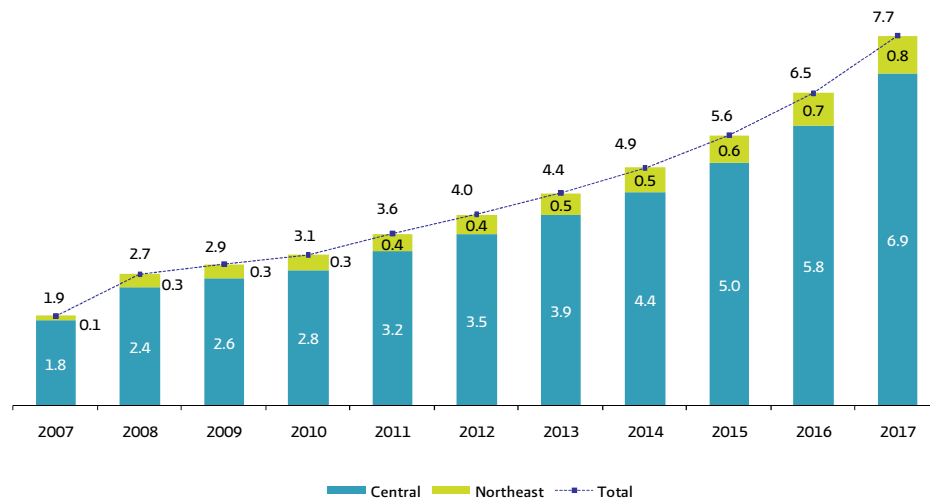
Source: IMP, based on information from Banxico, CONAGUA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

### 2.1.5 Transport sector

For 2017, transport domestic demand of NG will be of 7.7 mmcf/d and its annual average growth of 15.3%. The central region will remain as the largest consumer (6.9 mmcf/d); northeastern region will reach 0.8 mmcf/d by the end of the term. The aagr during 2007-2017 in the central region will be of 14.6%; and the northeast one will be of 23.2%. The factors taken into account for the prospective demand are: price, efficiencies, minimum number of kilometers needed to recover the investment in a compressed natural gas (CNG) vehicle, and the economic growth (see graph 15).

**Graph 15**

**Natural Gas Regional Demand in transport Sector, 2007-2017**  
(million cubic feet per day)



Source: IMP based on information from Pemex, Sener and private companies.

The fuels' price scenario is based on the expectations of yield per liter in CNG vehicles and in the competitive prices of this fuel, which will be more attractive than LPG's.

The contrast between the different return on investment (ROI) minimum runs and the average intensity use shows how profitable it will be using NG in intensive vehicles. In fact, CNG-technology companies have lowered their prices and have increased opportunities for conversions by even lending fuel tanks.

Nonetheless, to decide upon investing in a CNG-technology vehicle takes into consideration the few existing service stations, fuel supply, amongst other factors like the availability of this kind of vehicles and the dissemination of information upon CNG technologies; thus, it is intended an annual average growth of 17.2% for CNG vehicles fleet. By 2017, 15.4 thousand units of CNG vehicles are expected, from which 89.7% will be located in the central region, and 10.3% in the northeastern one (see chart 42).

**Chart 42**  
**Compressed Natural Gas Stations and Vehicle Fleet by Region, 2007-2017**  
**(units and thousand of units, respectively)**

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr
<b>Total of stations</b>	7	7	7	7	8	9	10	11	13	15	20	11.1
<b>Total of vehicle fleet</b>	3.1	3.7	4.1	4.6	5.3	6.1	7.0	8.3	9.9	12.1	15.4	17.2
<b>Northeast</b>												
Stations (units)	3	3	3	3	3	3	3	3	3	3	4	2.9
Vehicle fleet (thousand units)	0.5	0.4	0.4	0.5	0.5	0.6	0.7	0.9	1.0	1.3	1.6	12.5
<b>Central</b>												
Stations (units)	4	4	4	4	5	6	7	8	10	12	16	14.9
Vehicle fleet (thousand units)	2.6	3.4	3.7	4.1	4.7	5.4	6.3	7.4	8.9	10.9	13.8	17.9

Source: IMP based on information from Pemex, Sener and private companies.

Based upon the estimated fleet raise and the growth plans of CNG distributors, 20 CNG stations will be opened by 2017, from which 16 are to be located in the northeastern region and four in the central one.

For the central region demand and its vehicle fleet forecast it has been taken into account the establishment of the Green Plan in Mexico City; here, in the section called "Air", as well as in the strategy for increasing the efficiency passenger/load transported, is displayed the intention of substituting the 100% of taxis for less-polluting units before 2012. Mexico City's Office, along with Nacional Financiera, will give credits for buying new-technology vehicles. By 2008 a renewal of 35 thousand taxis is expected and, according to the Ministry of Roads and Transportation of D. F., by 2012 all of them will use NG, be electric or hybrids.

Albeit this, the scenario is still conservative in regard to the plans mentioned above and, hence, a credibility factor has been applied to the estimated figures. For determining this factor it has taken into account: typical NG consumptions, distributors' investment projects, delays in the settling of stations, and investment costs.

## 2.2 Natural Gas supply

For this Outlook, NG supply has its origins in a projects' portfolio that contains investment opportunities associated to the prospected hydrocarbon reserves and resources which have already been documented up to 2008, in accordance to the Business Plan of Pemex Exploration and Production (PEP).

PEP has formed a projects' portfolio that identifies possible oil and gas production profiles considering the potential development of to-incorporate reserves by means of exploratory activity; investments for exploration and exploitation; possible development in deepwater; and, development of Chicontepec Project (also called Aceite Terciario del Golfo). Production opportunities are selected in accordance to its profitability, thus, some of them are deferred upon the estimated budget for the next ten years.

From the considered extraction of NG and its corresponding characterization for the term 2008-2017, PEP estimated the amount and quality of the gas to be given to PGPB for injecting gas pipelines or to be processed in its complexes. Withal, PGPB evaluated the dry-gas demand to be traded and injected to the SNG for the next ten years.

### 2.2.1 PEP production scenario

The premises considered for PEP projects portfolio have been widely displayed in the *Crude-Oil Market Outlook 2008-2017*, hence this section stands out the most relevant aspects in terms of NG production for the next years as follows:

- Update the development strategy in Cantarell and Burgos.
- Invigorate execution capacity of the Project Aceite Terciario del Golfo (Chicontepec) by adding drilling equipments.
- Enhance exploratory activity and the future development in deepwater, beginning gas production from 2013 on, mainly with Lakach project.
- Keep on exploring basins of Burgos, Veracruz; Tampico-Misantla; and southeastern ones.
- Production of Southern and Southeastern regions projects remains steady thanks to an exploitation strategy that includes drilling development wells, major repairs, and the set on stream of new discoveries.

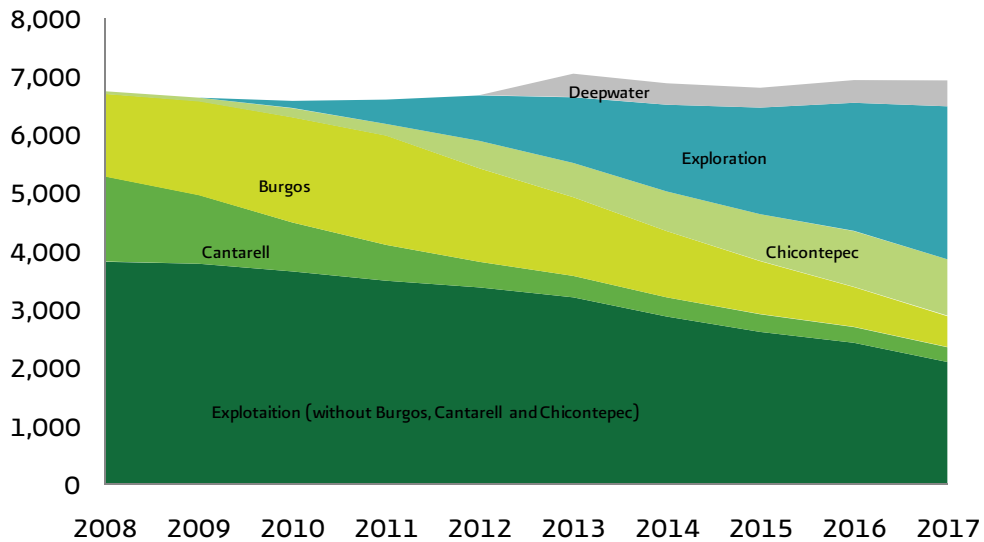
This scenario allows fulfilling the goal of 6,000 mmcf/d during the term. In fact, PEP production scenario keeps on levels higher than 6,500 mmcf/d in the term 2008-2017. These average-production levels will rely on the success of exploratory activity, generally subjected to a high degree of uncertainty; the availability of appropriate resources, financial and technical; and, the execution capacity of a materials and services market which supply them efficiently in accordance to the performance pace of PEP projects.

In the short-term the existing production fields will keep their production, though exploratory projects like the one in Burgos will contribute until 2010 and will enlarge its production up to reaching a maximum on NG production by 2013.

Taking advantage of the knowledge and characterization of oil fields, PEP foresees that exploitation will have a base of sweet-wet gas which will be increased gradually through the term, whilst sour-wet gas and dry gas will decrease towards 2017. The increase of sweet-wet gas production is mainly due to the contributions of the projects Crudo Ligerio Marino, Cantarell, Antonio J. Bermudez, Ku-Maloob-Zaap and Chuc; whilst dry-gas production will come from projects Burgos, Lakach, Rio Bravo, Veracruz and Lankahuasa.

In the planning scenario, the exploitation activity in Burgos will be increasingly kept during the first years of the term, and will reach its maximum by 2011 when it is expected a volume of 1,876 mmcfd. From 2012 on, its share in exploitation activity decreases towards 2017. It is worthwhile mentioning that this estimation only considers the part of Burgos that is being currently exploited, including the Financed Public Works Contracts (FPWC) in the national production.

**Graph 16**  
**Natural Gas Production by Project Category, 2008-2017**  
**(million cubic feet per day)**



Note: Burgos includes the contributions of FPWC.  
 Source: Pemex Exploración y Producción.

For Lakach project, there are great expectations on incorporating production from 2013 on; the gas coming from this project could contribute with a volume of 398 mmcf from that year on and will reach its maximum of 438 mmcf by 2017. This gas production will become the first one coming from a deepwater project in Mexico. Indeed, the challenge in deepwater is important since it intends to establish commercial production in water-depths of more than 500 meters.

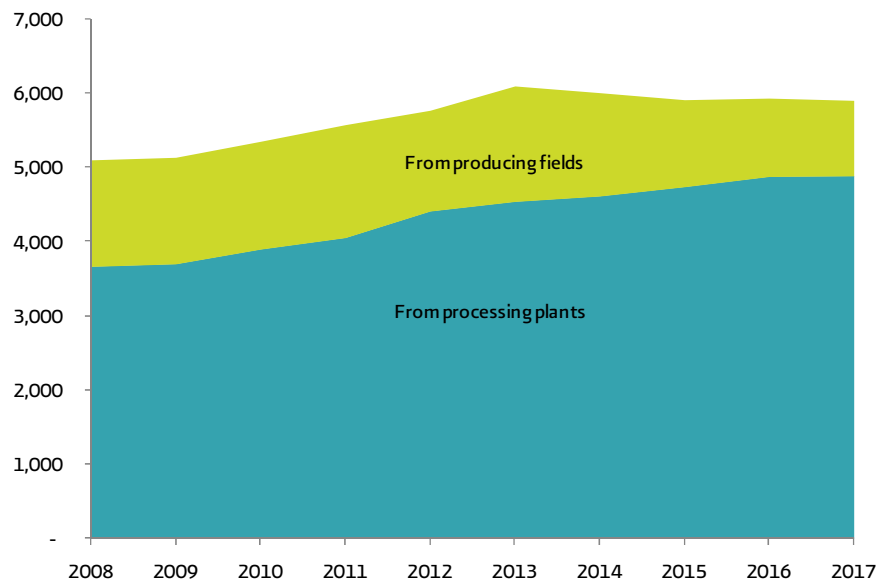
In Chicontepec – another essential project – an intense drilling will be kept to maintain its crude-oil production and thus, favor non-associated gas production (this paleochannel crude-oil quality's has a high relation oil/gas). In this way, it is expected an incremental development on gas production that will reach 968 mmcf by 2017.

### 2.2.2 Dry gas supply of PGPB

Even if the PEP production level is higher than 6,500 mmcf, the amount of gas given to PGPB is less than the already mentioned one; this, since part this gas is used in performing activities, injection for stimulating crude oil wells, and losses like burned gas and shrinkage during the transportation of the fluid and its liquids.

Amongst the gas' qualities PEP gives to PGPB, sour-wet and sweet-wet are used to feed PGPB plants, whilst dry gas is injected into pipelines. For the gas sent to PGPB plants, the average volume during this term will be less than 5,500 mmcf, expecting thus that these plants will get an average of 4,330 mmcf of dry gas; furthermore, it will be necessary to increase its processing capacity to move from a production of 3,658 mmcf in 2008 to 4,878 mmcf by 2017.

**Graph 17**  
**PGPB Dry Gas Supply, 2008-2017**  
**(million cubic feet per day)**



Note: It does not include ethane got from the fractionation of gas streams fed to PGPB plants that is injected into gas pipelines.  
Source: Pemex Gas y Petroquímica Básica.

The supply of dry gas coming directly from the fields will depend more on the dynamic of PEP exploitation activity, reaching its maximum by 2013 with 1,554 mmcf/d; towards 2017, it is expected a smaller supply.

### 2.3 PGPB investments for the processing and transportation of natural gas

The investment program for PGPB is supported by PEP hydrocarbons scenario at the same term, which foresees a growth in NG availability of 1.9% annual average, and a maximum supply of 6,942 mmcf/d by 2013; this, mainly due to an increase in sweet-wet gas coming from Aceite Terciario del Golfo, Agua Dulce Marino and Coatzacoalcos.

Such program proposes an investment of 46,291 million pesos (MXN) at 2008 prices. This amount will be mainly focused toward projects granting the processing of PEP natural gas supply and the performance of PGPB facilities, in accordance to the guidelines established in the *Energy Sector Program 2007-2012*, the strategic objectives set up in the company's business model and, the budget rules derived from the Energy Reform.

In this context, 42% of the resources (19,350 million MXN) will be invested in strategic projects, and 58% (26,941 million MXN) in performing projects. These resources are focused towards value creation, performance efficiency, maintenance excellence for assisting the technological and systems integration, and for managing processes.

In this way, sour-gas process capacity will increase 4%; sulfur removal, 1%; liquids removal, 11%; and, natural gas liquid fractionation, 9%.

Within the projects granting the processing of NG supplied PEP stand out the following:

- Construct three cryogenic plants in the area of Poza Rica, Veracruz with a joint capacity of 600 mmcf/d.
- An integral Project within the area of Coatzacoalcos, Veracruz for processing sweet-wet gas coming from the assets Cinco Presidentes, Agua Dulce Marino and Coatzacoalcos Marino; these will have a cryogenic capacity of 600 mmcf/d and which includes a cryogenic plant of 200 mmcf/d and which includes a cryogenic plant of 200 mmcf/d that will substitute the current one installed in the Natural Gas Processing Plant La Venta.
- A gas sweetening plant of 150 mmcf/d and a sulfur removal plant of 20 Tpd (its location has not been defined already) for processing gas coming from Delta del Bravo.

For transportation matters there are significant projects listed on chart 43:

**Chart 43****PGPB Projects for transportation Infrastructure**

<b>Project</b>	<b>Start operations</b>	<b>HP Capacity</b>
<b>Compression station</b>		
Emiliano Zapata	2009	35,000
Norte <sup>(1)</sup>	2010	30,800
Santa Ana	2011	24,000
Omealca	2011	14,100
Soto la Marina y Macarela	2011	50,000
Compression station Zirahuen, and repotentiatiion station Valtierra.	2011	18,800
<b>Gas pipelines</b>	<b>Start operations</b>	<b>Capacity mmmcf/d</b>
Beltway San Pedro de las Colonias, Coah.	2011	-
Beltway Cárdenas, Tab.	2013	-
Beltway Torreón	2015	-
Gas-pipeline Poza Rica-Punta de Piedra	2012	450
Gas-pipeline Cocos-Cangrejera	2014	650
Gas-pipeline (2) La Venta-Cangrejera	2014	450
Gas-pipeline (2) Matamoros-Est. 19	2016	200

<sup>(1)</sup> Backup capacity to SNG

<sup>(2)</sup> Sweet-wet gas

Source: Pemex Gas y Petroquímica Básica.

On developing these investments PGPB will be able to increase the aggregated value of its operations by granting the optimal use of PEP's hydrocarbon supply; timely care of its demand; and, the safe and trustable operation of its assets.

## 2.4 Outlook of gas-pipelines infrastructure

The Ministry of Energy has paid special attention for fulfilling projects on the transportation infrastructure needed to develop NG market.

To make investments in NG infrastructure more attractive, two main ideas have been worked out. The first, is to promote throughout the country the expansion of NG transportation infrastructure, and invigorate the SNG by giving it redundancy and a larger transportation capacity.

### 1. Systemic fares

CRE has established a new zoning for transportation rates, reducing zones from eighteen to five. Likewise, it considers the implementation of a new scheme of fares that acknowledges the benefits each new development of storage and transportation infrastructure brings to current users in an interconnected system.

To be incorporated to the new scheme of Systemic fares, the new NG storage and transportation systems should fulfill some characteristics:

- To integrate or be part of a gas-pipeline interconnected system;
- To bring systemic benefits like: improving security conditions, continuity, eliminating bottlenecks, give redundancy, close circuits, improve integrated-systems efficiency, as well as increase NG injection sites; and,
- Homologate, if possible, the conditions for service provision within the integrated systems.

In accordance to the benefits they can bring to the SNG and to the current and future users of NG, some of the projects displayed here may be considered for this new fare's scheme.

## **2. Government supports**

The Infrastructure National Fund has been created to impulse the development of storage and transportation infrastructure of NG, such as the generation of developmental poles; collection of new investments (industrial and commercial); and, creation of new jobs.

To this regard, the Infrastructure National Fund has authorized projects on NG storage and transportation. This policy considers economic contributions on sunk costs for covering up to the 50% cost of studying the economic viability of the projects, including the social benefits derived from their performance. Depending upon its results, the Infrastructure National Fund will evaluate contributing with capital (resources on sunk costs) to those projects showing positive results, even if they are not feasible from a economic-finance point of view.

### **Natural Gas Transportation Projects**

#### **a. Gas-Pipeline Manzanillo - Guadalajara**

The gas-pipeline Manzanillo - Guadalajara will supply NG coming from the Storage and Regasification Terminal of Liquefied Natural Gas (LNG Terminal) in the lagoon of Cuyutlan in Manzanillo, Colima, to the Thermoelectric Centrals Manzanillo I and II (located in the vicinity of Manzanillo), and to those CFE will develop in the western part of the country. Likewise, this gas pipeline will bring gas to the industrial sector of Colima and Jalisco.

This pipeline will be the corner stone for constructing a circuit for NG transportation between Guadalajara and the north of Mexico, merging it with the project gas-pipeline central west-north central that takes NG to central states.

Though CFE has determined the minimum diameter for this pipeline, the final developer of this project might be able to change it according to the NG potential demand of the industry and distributors of the region.

Furthermore, the gas pipeline Manzanillo-Guadalajara will invigorate the SNG by giving it more performance flexibility and increasing the certainty of NG supply within the country, particularly in the central-western region which will have one more injection point of this fuel and that has been, up to date, kept aside from the its benefits.

According to CFE requirements and the potential demand growth of the zone, the gas pipeline should have a length between 250 and 300 km with flexibility to operate bidirectionally.

Nowadays, CFE has a bidding process for providing NG transportation from the LNG Terminal to the thermoelectric Centrals of Manzanillo and Guadalajara for a term of 25 years. The winner of this bidding will be free to set additional capacity to the required one by CFE; this, in accordance to the demand that can aggregate in the vicinity during the coming years. In the measure that capacity generates more supply certainty, it will bring systemic benefits.

Derived from CFE requirements, this project should begin operations during the first semester of 2011.

#### **b. Gas-Pipeline Central Western-North Central**

This project will close a large circuit in the SNG connecting the western zone with the northern one, thus developing and widening NG national market.

It will have a length between 750 and 900 km and, even if its trajectory has not been defined yet, one of its extremes would be in the western zone of the SNG (Jalisco or Aguascalientes), and the other in the northern one (Durango or Saltillo) going through states that have lacked of this kind of infrastructure.

It will provide NG a second conveyance path North-South and South-North for reaching new consumers, enhancing the certainty of supply and giving systemic benefits to the existing consumers. Besides, its development will enable conveying NG to this region with Mexican gas injected in the Southeastern Mexico, the basin of Burgos, and the USA.

The stages of this development will depend on the NG current potential and demand. It shall be mentioned that, for the benefits it will bring to the SNG and to the existing and future NG consumers, this gas pipeline might be considered for the new fare's scheme and for the Infrastructure National Fund.

#### **c. Gas-Pipeline Central-Central**

This is a bidirectional gas pipeline with a length around 250 and 280 km that will close a circuit between Tlaxcala and Estado de Mexico (going through Morelos) in the central region.

Its construction will give an alternative pathway to supply Estado de Mexico, particularly the vicinity of Toluca, increasing thus the performance flexibility of the SNG and the supply certainty.

To support this gas-pipeline development, the systemic benefits over western and central users will be considered, besides of being a candidate for the Infrastructure National Fund. Depending on

the results from the study, the Infrastructure National Fund will evaluate the possibility of giving economic support to its construction.

**d. Gas-Pipeline Gulf-Central**

This pipeline will have an additional transportation capacity for giving out NG production from Proyecto Aceite Terciario del Golfo and thus, satisfying the growing demand of the central zone, as well as connecting with the main gas pipeline (with a 48 in diameter) located throughout the Gulf of Mexico.

The project envisages the construction of a 290 km-length gas pipeline that will depart from the Gulf of Mexico heading to the central region, with a transportation capacity of nearly 400 mmcfd.

The final project will be able to incorporate as much transportation capacity as its developer considers convenient, adding also private companies demand.

**e. Gas-Pipeline Gulf Northern-Central**

This project considers constructing a gas pipeline which will close the circuit between the current line of Naranjos, Veracruz-Tamazunchale, San Luis Potosi, and the SNG in Guanajuato. Its total length is estimated around 290 and 300 km, and its conveyance capacity in 400 MMcfd.

Its development will allow moving gas from southern Mexico or Proyecto de Aceite Terciario del Golfo; or – where appropriate – from the LNG terminals of Altamira, and/or the basin of Burgos, to central and western Mexico. The development of this gas pipeline and the one of Central Western-North Central will interconnect more directly the LNG terminals of Altamira and Manzanillo.

This project will invigorate the SNG by giving it more performance flexibility and systemic benefits, which implies higher certainty supply for new and already-existing consumers within the interconnected system.

To develop this project, PGPB will do a public bidding in 2009 through which the NG conveyance service will be contracted to begin operations by 2012.

**f. Gas-Pipeline Central-Northern**

This project plans to increase transportation capacity in the Central-Northern region (Chihuahua), currently provided by gas coming from the USA. It implies constructing a gas pipeline of about 300 km length; its diameter will be determined according to the infrastructure to be used.

The final project will be defined by the developer, who will be able to consider on its supply a gas pipeline with the systemic benefits this project can bring to obtain the benefits of the fare's scheme.

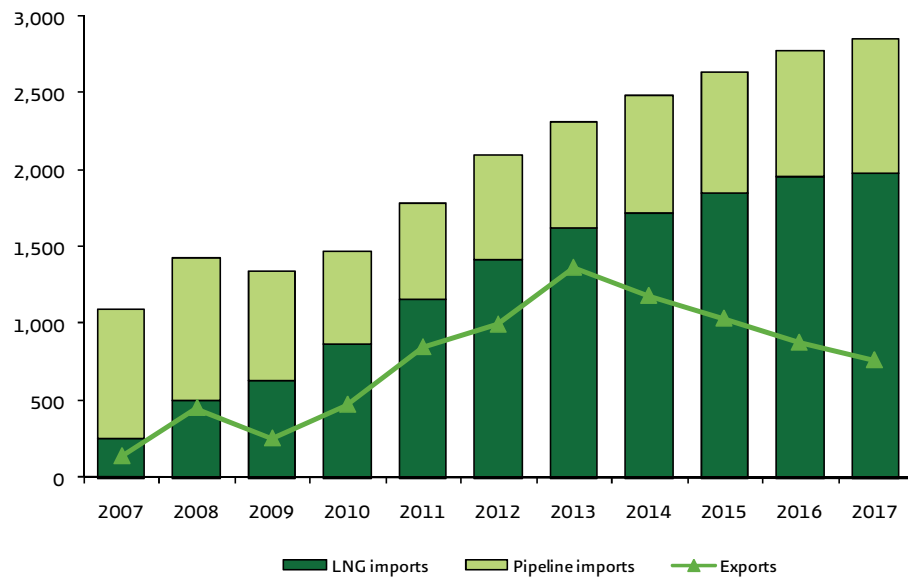
The growing demand within the zone requires that this development begins operations by 2012, which is why a contract scheme over its conveyance service is being prepared.

**2.5 Natural Gas foreign trade**

Within a growing domestic market, foreign trade dynamics turn out meaningful to fulfill NG requirements and to support the development of the domestic supply. As a result of the strategies for supply diversification, the imports

composition will change during the term 2007-2017. It is intended that by the end of the period three LNG terminals – whose imports will double those from gas pipelines - will be operating.

**Graph 18**  
**Natural Gas Foreign Trade, 2007-2017**  
**(million cubic feet per day)**



Source: Pemex Gas y Petroquímica Básica.

On the other hand, upon improving the exploitation of natural gas reserves, joined to optimize the use of productive infrastructure, and the gradual displacement of LNG coming from Altamira to be used by CFE, this will cause an increase on the exports from Reynosa by 2013, when Pemex foresees its maximum production level.

Furthermore, exports of the northwestern region will raise as the LNG terminal of Ensenada increases its levels of regasified gas in such a way that, towards 2017, it will import 985 mmcf/d of LNG and will export 607 mmcf/d to the USA.

### 2.5.1 Liquefied Natural Gas

To ensure NG supply, the national energy policy establishes strategies for diversifying NG supply sources, fostering thus, regasification terminals which import LNG. In fact, this outlook considers in its planning scenario imports from the terminals of Altamira, Ensenada and Manzanillo.

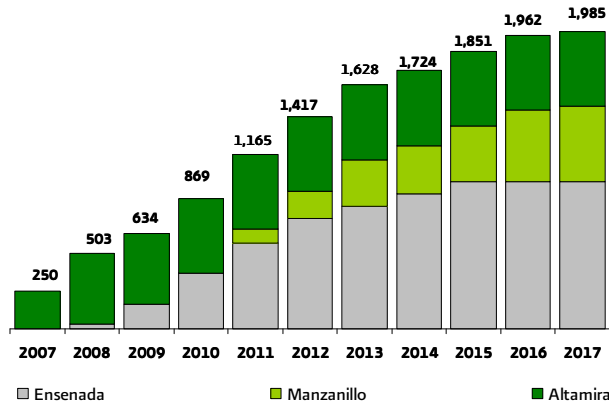
Altamira and Ensenada are currently on commercial operation and will gradually approach to the programmed and concessioned regasification capacity granted by the CRE. The LNG terminal of Altamira began operations on 2006, and

by 2007 it reached half of its regasification capacity. By the end year of 2008 it is intended to reach a volume of 470 mmcf/d, and by 2010, its maximum concessioned capacity of 500 mmcf/d. In accordance to CFE planning, this terminal will keep supplying gas to the centrals Altamira V, Tamazunchale I, Tuxpan II and V, aside from expecting the Central Valle de Mexico II to receive gas by 2013.

The project Energia Costa Azul, located in Ensenada, Baja California, initiated imports on April, 2008, when the cooling and start tests were applied to this terminal, but it will be until July, 2008 that it will begin operations. Its construction needed and investment of about 875 million USD, and has a regasification capacity of 1000 mmcf/d. In the future, the gas processed in this terminal will be used by electricity generating plants and various industries of Baja California through a new gas pipeline of 72.42 km (45 mi) interconnected with the existing ones within the area (Gas-pipeline Bajanorte). Even if the terminal’s owner is Sempra Energy, half of its capacity is claimed by Shell, which may supply gas to a combined-cycle plant that exports electricity, and the rest will be traded in California and Arizona (USA).

The last LNG terminal will be installed in Manzanillo Colima by 2011. This project is led by CFE and will have an average consumption of 90 mmcf/d during its first year, reaching 500 mmcf/d by 2017. Its gas will be destined mainly to the generation centrals that will be repotentiated in Manzanillo, and to two combined-cycle ones that will be located in the West during 2014 and 2015, aside of supplying two centrals in Guanajuato.

**Graph 19**  
**Liquefied Natural Gas Imports, 2007-2017**  
**(million cubic feet per day)**



Source: Sener.

**2.6 Prospective balance of natural gas supply-demand, 2007-2017**

During the term 2007-2017 it is intended a less dynamic growth of the NG domestic demand in regard to the historical term. While the domestic demand grew 6.4% during the last decade, it is forecasted to increase just 3%.

Nevertheless, the growth of NG domestic demand will be one of the most dynamic in the fuels national market. By 2017, the estimated NG demand will reach a volume of 9,374 mmcf/d. In the future, most of NG demand growth will come from the electricity sector (1,420 mmcf/d); oil and industrial sectors will follow in importance with 667 mmcf/d

and 221 mmcf each. It is important to mention that sectors with a lesser share in consumption will have a high dynamism throughout the decade. Residential, services, and transport sectors will increase their demand at an average annual growth rate of 6%, 5.1%, and 15.3% respectively. It is expected that by expanding the gas-pipelines system, new distribution zones might be developed, promoting thus residential and services sectors demand. On transport sector, it is expected a strong impulse for increasing compressed natural gas (CNG) vehicle fleet in large cities.

National supply will have a pace growth of 1.9%, reaching a dry-gas production of 7,289 mmcf by 2017. Upstream production will come from projects on-shore basins, along with an increase on shallow-water activities and deepwater development, for example, adding production through Lakach project by 201, while Pemex Exploration and Production will go on exploitation projects in Cantarell, Ku-Maloob-Zaap, Crudo Ligerio Marino, Burgos and Veracruz, as well as continue its intensive activity in Chicontepec. By 2017, PEP will require 1,318 mmcf from this upstream production to use them for its performance and for pneumatic bumping to oil wells.

By backing up the mentioned projects, PGPB will gradually dispose of NG in its processing plants, raising its dry-gas supply at an average annual rate of 3.2% and reaching a volume of 4,878 mmcf by 2017. Along with this, it will inject 1,012 mmcf of dry gas coming directly from PEP's fields to the SNG, and 81 mmcf of ethane from fractioning plants. In this sense, PGPB investments will focus mainly towards projects assuring the processing of PEP's gas supply, and in operating the company's assets under the best practices of security, health and environmental protection.

Thus, NG foreign trade will be very dynamic; the trade will show a deficit throughout the term 2007-2017, having a minimum gross balance of 934 mmcf during 2011, and an imports gross balance of 2,085 mmcf by the end of the term. It is foreseen that NG imports will grow 160% in regard to 2007; the latter due to this outlook considers using the regasification capacity claimed by Shell in the project Energia Costa Azul (LNG terminal of Ensenada), with which nearly 70% of 2017' NG imports will come from LNG contracts of the three regasification terminals considered during the analyzed term.

**Chart 44**  
**Natural Gas Domestic Balance, 2007-2017. Planning Scenario**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	agr 2007-2017
<b>Supply</b>	<b>7,119</b>	<b>7,733</b>	<b>8,499</b>	<b>8,733</b>	<b>9,078</b>	<b>9,326</b>	<b>9,865</b>	<b>9,847</b>	<b>9,888</b>	<b>10,115</b>	<b>10,140</b>	<b>3.6</b>
<b>Domestic Production (Dry gas)</b>	<b>6,025</b>	<b>6,305</b>	<b>7,157</b>	<b>7,262</b>	<b>7,294</b>	<b>7,222</b>	<b>7,548</b>	<b>7,358</b>	<b>7,246</b>	<b>7,335</b>	<b>7,289</b>	<b>1.9</b>
Gas from PEP for operation <sup>1</sup>	586	666	1,360	1,178	940	650	548	397	321	338	334	-5.5
Gas from PEP for recirculation	471	470	572	618	671	754	834	896	940	989	984	7.6
Gas from PEP to refineries	2	2	-	-	-	0	1	-	-	-	-	n.a.
Dry gas from processing plants	3,546	3,658	3,694	3,889	4,045	4,403	4,532	4,604	4,730	4,868	4,878	3.2
Dry gas from producing fields	1,334	1,433	1,431	1,453	1,521	1,354	1,554	1,393	1,170	1,052	1,012	-2.7
Ethane injected to dry gas pipelines	87	75	100	123	117	62	79	68	86	88	81	-0.7
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	<b>1,094</b>	<b>1,429</b>	<b>1,342</b>	<b>1,471</b>	<b>1,784</b>	<b>2,104</b>	<b>2,317</b>	<b>2,489</b>	<b>2,642</b>	<b>2,780</b>	<b>2,851</b>	<b>10.1</b>
Isolated pipelines	766	771	708	602	620	687	689	766	791	818	865	1.2
Pemex pipelines	78	155	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	250	503	634	869	1,165	1,417	1,628	1,724	1,851	1,962	1,985	23.0
<b>Demand</b>	<b>7,114</b>	<b>7,727</b>	<b>8,499</b>	<b>8,733</b>	<b>9,078</b>	<b>9,326</b>	<b>9,865</b>	<b>9,847</b>	<b>9,888</b>	<b>10,115</b>	<b>10,140</b>	<b>3.6</b>
<b>Inland consumption</b>	<b>6,975</b>	<b>7,273</b>	<b>8,244</b>	<b>8,258</b>	<b>8,228</b>	<b>8,328</b>	<b>8,495</b>	<b>8,662</b>	<b>8,851</b>	<b>9,235</b>	<b>9,374</b>	<b>3.0</b>
Oil sector	1,760	1,974	2,637	2,531	2,328	2,118	2,077	2,061	2,025	2,173	2,157	2.1
Pemex Exploración y Producción <sup>2</sup>	884	1,006	1,717	1,529	1,295	1,034	920	753	672	684	679	-2.6
Pemex Refinación	284	324	326	347	346	352	414	564	600	728	726	9.8
Pemex Gas y Petroquímica Básica	268	275	242	256	295	325	334	336	345	353	343	2.5
Pemex Petroquímica	323	369	351	397	393	408	408	408	408	408	408	2.4
Pemex Corporativo	0	0	0	0	0	0	0	0	0	0	0	0.0
Gas lifts (Repressuring)	1,424	1,386	1,611	1,575	1,649	1,729	1,768	1,770	1,770	1,747	1,694	1.7
Industrial sector	1,040	985	980	1,024	1,045	1,132	1,154	1,179	1,204	1,230	1,261	1.9
Electricity sector	2,638	2,804	2,880	2,982	3,049	3,182	3,321	3,468	3,660	3,886	4,058	4.4
Public	2,314	2,419	2,490	2,591	2,658	2,792	2,931	3,078	3,269	3,496	3,668	4.7
Comisión Federal de Electricidad	875	859	727	797	856	958	1,043	1,053	1,062	1,067	1,082	2.1
Luz y Fuerza del Centro	57	44	29	29	23	14	14	14	14	14	48	-1.7
Independent Power Producers	1,382	1,516	1,733	1,765	1,778	1,820	1,874	2,011	2,193	2,415	2,538	6.3
Private	324	385	390	390	391	391	391	391	391	391	391	1.9
Autoproducer electricity plants	202	263	268	268	269	269	269	269	269	269	269	2.9
Electricity export	122	122	122	122	122	122	122	122	122	122	122	0.0
Residential sector	88	98	107	115	123	130	137	143	149	154	157	6.0
Services sector	24	23	26	28	30	32	34	36	37	38	39	5.1
Transport sector	2	3	3	3	4	4	4	5	6	6	8	15.3
<b>Exports</b>	<b>139</b>	<b>454</b>	<b>255</b>	<b>475</b>	<b>850</b>	<b>998</b>	<b>1,370</b>	<b>1,186</b>	<b>1,038</b>	<b>880</b>	<b>765</b>	<b>18.6</b>
<b>Stock variation and differences*</b>	<b>5</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>n.a.</b>

<sup>1</sup> The gas mix considered here is equivalent to dry gas.

<sup>2</sup> Includes consumption from Compañía de Nitrógeno Cantarell from 2000 on.

\* Includes differences and packing.

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

## 2.7 Natural gas regional balances

The planning scenario displayed in the latter section, belongs to the basic supply and demand in a unique scenario, since the effects of the oil reform need to be evaluated to more accurately incorporate its impact over gas industry.

**Chart 45**  
**Natural Gas Balance of the Northwestern Region, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr 2007-2017
<b>Supply</b>	<b>374</b>	<b>420</b>	<b>420</b>	<b>499</b>	<b>703</b>	<b>908</b>	<b>1,010</b>	<b>1,090</b>	<b>1,174</b>	<b>1,221</b>	<b>1,234</b>	<b>12.7</b>
<b>Regional production</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for operation	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for recirculaciones	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP to refineries	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from processing plants	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from producing fields	-	-	-	-	-	-	-	-	-	-	-	n.a.
Ethane injected to dry gas pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	<b>374</b>	<b>420</b>	<b>420</b>	<b>499</b>	<b>703</b>	<b>908</b>	<b>1,010</b>	<b>1,090</b>	<b>1,174</b>	<b>1,221</b>	<b>1,234</b>	<b>12.7</b>
Isolated pipelines	374	387	256	130	129	171	189	187	189	235	248	-4.0
Pemex pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	-	33	164	369	575	737	821	903	985	985	985	n.a.
<b>Inter-Regional receipts</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Destination</b>	<b>377</b>	<b>420</b>	<b>420</b>	<b>499</b>	<b>703</b>	<b>908</b>	<b>1,010</b>	<b>1,090</b>	<b>1,174</b>	<b>1,221</b>	<b>1,234</b>	<b>12.6</b>
<b>Regional demand</b>	<b>377</b>	<b>420</b>	<b>420</b>	<b>439</b>	<b>431</b>	<b>498</b>	<b>541</b>	<b>547</b>	<b>556</b>	<b>614</b>	<b>627</b>	<b>5.2</b>
Oil sector	1	-	1	1	1	1	1	1	1	1	1	-0.3
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Refinación	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Gas y Petroquímica Básica	1	-	1	1	1	1	1	1	1	1	1	-0.3
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-	n.a.
Industrial sector	27	26	25	25	25	26	26	26	27	27	28	0.5
Electricity sector	348	393	393	411	403	469	513	517	527	584	596	5.5
Public	224	255	253	271	264	330	373	378	387	444	456	7.4
Comisión Federal de Electricidad	115	127	122	140	141	196	224	224	226	216	200	5.7
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	n.a.
Independent Power Producers	109	129	131	132	122	133	148	153	161	228	256	8.9
Private	124	137	140	140	140	140	140	140	140	140	140	1.2
Autoproducer electricity plants	2	15	18	18	18	18	18	18	18	18	18	25.6
Electricity export	122	122	122	122	122	122	122	122	122	122	122	0.0
Residential sector	1	2	2	2	2	2	2	2	2	2	2	2.3
Services sector	0	0	0	0	0	0	0	0	0	0	0	0.5
Transport sector	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Exports</b>	-	-	-	<b>61</b>	<b>272</b>	<b>410</b>	<b>468</b>	<b>544</b>	<b>618</b>	<b>607</b>	<b>607</b>	n.a.
<b>Inter-Regional deliveries</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Stock variation and differences*</b>	<b>-3</b>	<b>-0</b>	-	-	-	-	-	-	-	-	-	<b>n.a.</b>

\* Includes differences and packing

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

**Chart 46**  
**Natural Gas Balance of Northeastern Region, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr 2007-2017
<b>Supply</b>	<b>2,169</b>	<b>2,492</b>	<b>2,548</b>	<b>2,872</b>	<b>3,124</b>	<b>2,968</b>	<b>3,072</b>	<b>2,923</b>	<b>2,804</b>	<b>2,699</b>	<b>2,648</b>	<b>2.0</b>
<b>Regional production</b>	<b>1,449</b>	<b>1,483</b>	<b>1,627</b>	<b>1,901</b>	<b>2,133</b>	<b>1,952</b>	<b>1,791</b>	<b>1,657</b>	<b>1,505</b>	<b>1,400</b>	<b>1,369</b>	<b>-0.6</b>
Gas from PEP for operation	35	38	38	44	50	46	44	41	38	39	45	2.3
Gas from PEP for recirculaciones	51	48	39	44	53	36	44	48	46	40	34	-3.9
Gas from PEP to refineries	2	2	-	-	-	0	1	-	-	-	-	n.a.
Dry gas from processing plants	970	930	951	1,083	1,109	1,015	970	959	919	885	946	-0.2
Dry gas from producing fields	392	465	599	730	921	854	732	609	502	436	344	-1.3
Ethane injected to dry gas pipelines	-	0	-	-	-	-	-	-	-	-	-	n.a.
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	<b>719</b>	<b>1,009</b>	<b>922</b>	<b>972</b>	<b>991</b>	<b>1,016</b>	<b>1,001</b>	<b>1,078</b>	<b>1,102</b>	<b>1,083</b>	<b>1,117</b>	<b>4.5</b>
Isolated pipelines	392	383	452	472	491	516	501	578	602	583	617	4.6
Pemex pipelines	78	155	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	250	470	470	500	500	500	500	500	500	500	500	7.2
<b>Inter-Regional receipts</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>280</b>	<b>188</b>	<b>198</b>	<b>217</b>	<b>162</b>	<b>n.a.</b>
<b>Destination</b>	<b>2,176</b>	<b>2,492</b>	<b>2,548</b>	<b>2,872</b>	<b>3,124</b>	<b>2,968</b>	<b>3,072</b>	<b>2,923</b>	<b>2,804</b>	<b>2,699</b>	<b>2,648</b>	<b>2.0</b>
<b>Regional demand</b>	<b>1,874</b>	<b>1,920</b>	<b>2,031</b>	<b>2,092</b>	<b>2,153</b>	<b>2,164</b>	<b>2,170</b>	<b>2,281</b>	<b>2,385</b>	<b>2,427</b>	<b>2,490</b>	<b>2.9</b>
Oil sector	188	195	197	208	213	211	226	223	229	231	238	2.4
Pemex Exploración y Producción	41	43	43	49	56	53	50	47	44	46	51	2.2
Pemex Refinación	122	130	130	129	129	130	151	149	160	160	160	2.7
Pemex Gas y Petroquímica Básica	24	23	24	29	29	28	25	26	25	25	27	1.0
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas lifts (Repressuring)	51	48	39	44	53	36	44	48	46	40	34	-3.9
Industrial sector	384	362	344	344	355	366	378	390	401	415	431	1.1
Electricity sector	1,175	1,230	1,362	1,403	1,434	1,449	1,418	1,514	1,599	1,630	1,674	3.6
Public	1,029	1,049	1,181	1,221	1,252	1,266	1,236	1,332	1,417	1,448	1,492	3.8
Comisión Federal de Electricidad	304	339	313	315	329	302	262	285	283	262	228	-2.8
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	n.a.
Independent Power Producers	725	710	868	906	923	964	974	1,047	1,134	1,185	1,264	5.7
Private	146	181	181	182	182	182	182	182	182	182	182	2.2
Autoproducer electricity plants	146	181	181	182	182	182	182	182	182	182	182	2.2
Electricity export	-	-	-	-	-	-	-	-	-	-	-	n.a.
Residential sector	59	66	70	73	76	79	81	83	85	86	86	3.9
Services sector	17	18	19	20	21	22	23	23	24	25	25	3.9
Transport sector	0	0	0	0	0	0	0	1	1	1	1	23.2
<b>Exports</b>	<b>139</b>	<b>454</b>	<b>255</b>	<b>415</b>	<b>578</b>	<b>588</b>	<b>901</b>	<b>642</b>	<b>420</b>	<b>273</b>	<b>158</b>	<b>1.3</b>
<b>Inter-Regional deliveries</b>	<b>163</b>	<b>119</b>	<b>262</b>	<b>366</b>	<b>392</b>	<b>216</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>n.a.</b>
<b>Stock variation and differences*</b>	<b>-7</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>n.a.</b>

<sup>1</sup> The gas mix considered here is equivalent to dry gas.

\* Includes differences and packing.

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

**Chart 47**  
**Natural Gas Balance of the Central-Western Region, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr 2007-2017
<b>Supply</b>	<b>627</b>	<b>715</b>	<b>730</b>	<b>792</b>	<b>819</b>	<b>934</b>	<b>1,047</b>	<b>1,073</b>	<b>1,131</b>	<b>1,229</b>	<b>1,329</b>	<b>7.8</b>
<b>Regional production</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for operation	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for recirculaciones	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP to refineries	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from processing plants	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from producing fields	-	-	-	-	-	-	-	-	-	-	-	n.a.
Ethane injected to dry gas pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	-	-	-	-	<b>90</b>	<b>180</b>	<b>307</b>	<b>320</b>	<b>366</b>	<b>476</b>	<b>500</b>	n.a.
Isolated pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	-	-	-	-	90	180	307	320	366	476	500	n.a.
<b>Inter-Regional receipts</b>	<b>627</b>	<b>715</b>	<b>730</b>	<b>792</b>	<b>729</b>	<b>754</b>	<b>741</b>	<b>753</b>	<b>765</b>	<b>752</b>	<b>829</b>	<b>2.8</b>
<b>Destination</b>	<b>627</b>	<b>715</b>	<b>730</b>	<b>792</b>	<b>819</b>	<b>934</b>	<b>1,047</b>	<b>1,073</b>	<b>1,131</b>	<b>1,229</b>	<b>1,329</b>	<b>7.8</b>
<b>Regional demand</b>	<b>627</b>	<b>715</b>	<b>730</b>	<b>792</b>	<b>819</b>	<b>934</b>	<b>1,047</b>	<b>1,073</b>	<b>1,131</b>	<b>1,229</b>	<b>1,329</b>	<b>7.8</b>
Oil sector	62	75	79	79	79	79	89	89	92	91	91	4.0
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Refinación	62	75	78	78	78	77	87	87	89	89	89	3.8
Pemex Gas y Petroquímica Básica	0	0	1	1	2	2	2	2	2	2	2	52.5
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-	n.a.
Industrial sector	296	273	295	333	335	353	355	357	359	361	364	2.1
Electricity sector	262	358	345	366	389	484	583	605	656	751	846	12.4
Public	232	326	312	333	356	452	551	572	623	718	814	13.4
Comisión Federal de Electricidad	88	101	69	90	113	209	312	325	332	369	446	17.6
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	n.a.
Independent Power Producers	144	225	243	244	243	243	238	247	292	349	368	9.9
Private	30	32	32	32	32	32	32	32	32	32	32	0.7
Autoproducer electricity plants	30	32	32	32	32	32	32	32	32	32	32	0.7
Electricity export	-	-	-	-	-	-	-	-	-	-	-	n.a.
Residential sector	5	7	9	11	13	14	16	18	20	21	22	16.0
Services sector	2	2	3	3	3	4	4	4	5	5	5	9.9
Transport sector	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Inter-Regional deliveries</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Stock variation and differences*</b>	<b>0</b>	-	-	-	-	-	-	-	-	-	-	n.a.

\* Includes differences and packing.

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

**Chart 48**  
**Natural Gas Balance of the Central Region, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr 2007-2017
<b>Supply</b>	<b>639</b>	<b>627</b>	<b>569</b>	<b>604</b>	<b>641</b>	<b>644</b>	<b>691</b>	<b>730</b>	<b>792</b>	<b>854</b>	<b>893</b>	<b>3.4</b>
<b>Regional production</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for operation	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP for recirculaciones	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas from PEP to refineries	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from processing plants	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from producing fields	-	-	-	-	-	-	-	-	-	-	-	n.a.
Ethane injected to dry gas pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
Isolated pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Inter-Regional receipts</b>	<b>639</b>	<b>627</b>	<b>569</b>	<b>604</b>	<b>641</b>	<b>644</b>	<b>691</b>	<b>730</b>	<b>792</b>	<b>854</b>	<b>893</b>	<b>3.4</b>
<b>Destination</b>	<b>639</b>	<b>627</b>	<b>569</b>	<b>604</b>	<b>641</b>	<b>644</b>	<b>691</b>	<b>730</b>	<b>792</b>	<b>854</b>	<b>893</b>	<b>3.4</b>
<b>Regional demand</b>	<b>639</b>	<b>627</b>	<b>569</b>	<b>604</b>	<b>641</b>	<b>644</b>	<b>691</b>	<b>730</b>	<b>792</b>	<b>854</b>	<b>893</b>	<b>3.4</b>
Oil sector	63	86	85	86	89	95	100	100	111	111	110	5.8
Pemex Exploración y Producción	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex Refinación	47	66	68	69	69	74	79	80	91	91	91	6.7
Pemex Gas y Petroquímica Básica	0	1	0	0	3	4	3	3	3	3	3	19.5
Pemex Petroquímica	15	20	17	17	17	17	17	17	17	17	17	1.2
Pemex Corporativo	0	0	0	0	0	0	0	0	0	0	0	0.0
Gas lifts (Repressuring)	-	-	-	-	-	-	-	-	-	-	-	n.a.
Industrial sector	252	246	237	242	249	256	264	274	284	293	304	1.9
Electricity sector	296	266	214	239	262	248	280	304	342	391	416	3.5
Public	276	240	187	213	235	222	253	277	315	364	390	3.5
Comisión Federal de Electricidad	219	196	158	184	212	208	205	179	180	180	167	-2.7
Luz y Fuerza del Centro	57	44	29	29	23	14	14	14	14	14	14	-1.7
Independent Power Producers	-	-	-	-	-	-	34	84	121	171	175	n.a.
Private	20	26	26	26	26	26	26	26	26	26	26	2.8
Autoproducer electricity plants	20	26	26	26	26	26	26	26	26	26	26	2.8
Electricity export	-	-	-	-	-	-	-	-	-	-	-	n.a.
Residential sector	22	23	26	29	32	35	38	40	43	45	47	7.8
Services sector	5	3	4	5	5	6	7	7	8	9	9	6.8
Transport sector	2	2	3	3	3	4	4	4	5	6	7	14.6
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Inter-Regional deliveries</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Stock variation and differences*</b>	<b>0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>n.a.</b>

\* Includes differences and packing.

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.

**Chart 49**  
**Natural Gas Balance of the South-Southeast Region, 2007-2017**  
**(million cubic feet per day)**

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	aagr 2007-2017
<b>Supply</b>	<b>4,576</b>	<b>4,822</b>	<b>5,531</b>	<b>5,361</b>	<b>5,161</b>	<b>5,270</b>	<b>5,757</b>	<b>5,701</b>	<b>5,742</b>	<b>5,935</b>	<b>5,920</b>	<b>2.6</b>
<b>Regional production</b>	<b>4,576</b>	<b>4,822</b>	<b>5,531</b>	<b>5,361</b>	<b>5,161</b>	<b>5,270</b>	<b>5,757</b>	<b>5,701</b>	<b>5,742</b>	<b>5,935</b>	<b>5,920</b>	<b>2.6</b>
Gas from PEP for operation	550	628	1,322	1,134	890	604	505	356	283	299	290	-6.2
Gas from PEP for recirculaciones	420	422	533	575	618	717	790	848	894	949	950	8.5
Gas from PEP to refineries	-	-	-	-	-	-	-	-	-	-	-	n.a.
Dry gas from processing plants	2,577	2,728	2,743	2,806	2,936	3,388	3,562	3,645	3,811	3,983	3,932	4.3
Dry gas from producing fields	942	968	832	723	600	500	821	784	668	616	668	-3.4
Ethane injected to dry gas pipelines	87	75	100	123	117	62	79	68	86	88	81	-0.7
Supplemental gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Imports</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
Isolated pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Pemex pipelines	-	-	-	-	-	-	-	-	-	-	-	n.a.
Liquefied natural gas	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Inter-Regional receipts</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Destination</b>	<b>4,561</b>	<b>4,815</b>	<b>5,531</b>	<b>5,361</b>	<b>5,161</b>	<b>5,270</b>	<b>5,757</b>	<b>5,701</b>	<b>5,742</b>	<b>5,935</b>	<b>5,920</b>	<b>2.6</b>
<b>Regional demand</b>	<b>3,458</b>	<b>3,591</b>	<b>4,493</b>	<b>4,331</b>	<b>4,183</b>	<b>4,089</b>	<b>4,045</b>	<b>4,031</b>	<b>3,987</b>	<b>4,112</b>	<b>4,036</b>	<b>1.6</b>
Oil sector	1,447	1,618	2,275	2,157	1,946	1,733	1,661	1,647	1,593	1,740	1,716	1.7
Pemex Exploración y Producción <sup>2</sup>	843	963	1,674	1,480	1,239	981	870	706	628	638	628	-2.9
Pemex Refinación	53	54	51	72	71	71	97	247	260	388	386	22.0
Pemex Gas y Petroquímica Básica	243	251	215	224	260	290	303	314	322	322	311	2.5
Pemex Petroquímica	308	349	335	381	376	391	391	391	391	391	391	2.4
Pemex Corporativo	-	-	-	-	-	-	-	-	-	-	-	n.a.
Gas lifts (Repressuring)	1,373	1,338	1,572	1,531	1,596	1,692	1,724	1,721	1,724	1,707	1,659	1.9
Industrial sector	80	78	79	80	80	131	132	132	133	134	134	5.2
Electricity sector	558	557	566	564	561	532	528	529	536	531	526	-0.6
Public	553	549	556	553	551	522	518	519	526	521	515	-0.7
Comisión Federal de Electricidad	149	97	65	69	61	43	39	40	40	39	41	-12.2
Luz y Fuerza del Centro	-	-	-	-	-	-	-	-	-	-	-	n.a.
Independent Power Producers	404	452	491	484	489	479	479	479	486	482	475	1.6
Private	4	8	10	10	10	10	10	10	10	10	10	9.6
Autoproducer electricity plants	4	8	10	10	10	10	10	10	10	10	10	9.6
Electricity export	-	-	-	-	-	-	-	-	-	-	-	n.a.
Residential sector	-	-	-	-	-	-	-	-	-	-	-	n.a.
Services sector	0	-	-	-	-	-	-	-	-	-	-	n.a.
Transport sector	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Exports</b>	-	-	-	-	-	-	-	-	-	-	-	n.a.
<b>Inter-Regional deliveries</b>	<b>1,103</b>	<b>1,224</b>	<b>1,037</b>	<b>1,030</b>	<b>978</b>	<b>1,182</b>	<b>1,712</b>	<b>1,671</b>	<b>1,755</b>	<b>1,823</b>	<b>1,884</b>	<b>5.5</b>
<b>Stock variation and differences*</b>	<b>15</b>	<b>7</b>	-	-	-	-	-	-	-	-	-	<b>n.a.</b>

<sup>1</sup> The gas mix considered here is equivalent to dry gas.

<sup>2</sup> Includes consumption from Compañía de Nitrógeno Cantarell from 2000 on.

\* Includes differences and packing.

Source: IMP, based on information from Banxico, CFE, CNA, CONAPO, CRE, INEGI, Pemex, Sener and private companies.