

LIQUEFIED PETROLEUM GAS MARKET OUTLOOK

2008-2017



México, 2008

Ministry of Energy

Georgina Kessel Martínez
Minister of Energy

Jordy Herrera Flores
Undersecretary of Energy Planning and Technological Development

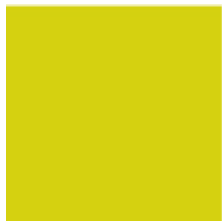
Mario Gabriel Budebo
Undersecretary of Hydrocarbons

Benjamín Contreras Astiazarán
Undersecretary of Electricity

María de la Luz Ruiz Mariscal
General Administrator

Verónica Irastorza Trejo
General Director of Energy Planning

Héctor Escalante Lona
Press Unit General Director



Participants:

Verónica Irastorza Trejo
General Director of Energy Planning

Virginia Doniz González
Director of National Energy Politics Integrating

Antonio Adrián Castillo Guerrero
Head Department of Sectorial Programs

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Legal Affairs Unit from the Ministry of Energy

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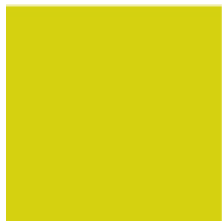
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PRESENTATION

Liquefied Petroleum Gas (LPG) is a main input for domestic economy; used in more than 70% of Mexican homes, it is strongly rooted within the country and is number one in *per-capita* consumption worldwide.

For the past years, LPG market conditions have generated larger demands in its service and supply. Hence, the new performances of this industry have been adapted to the demanding conditions of an efficient and competitive economy, focused in settling down strong bases and eradicate those problems issued by the performance and interaction amongst its shareholders.

This outlook incorporates the new regulatory frame for LPG industry included in the LPG Regulation, as well as the benefits derived from the recently approved Oil Reform. In fact, this new reform looks forward on granting certainty on the supply and quality service of this fuel at the time that it seeks to fulfill those security principles coming along with the production, conveyance, storage, distribution and handling of LPG. Thereupon, it assures to foster a more effective competition and a better performance of LPG industry, offering thus a better service and more alternatives to the market.

The challenges will keep on growing, requiring thus larger investments in every stage of the supply chain. This will encourage the development of infrastructure, will broaden its services' range on behalf of concessionaires and end-users, and will enrich the sector's efficiency; as well as it will cover from production centers to end users, looking forward to improve social welfare and provide better security conditions.

Under this account, the Ministry of Energy introduces the *Liquefied-Petroleum-Gas Market Outlook, 2008-2017*, which compiles current and expected information about supply and demand of this sector for the next ten years. The forecasts show LPG demand will keep a steady pace; thereupon, it is needed to keep an adequate supply and to invigorate investment opportunities within the country to develop a new infrastructure that will be able to increase the performance flexibility to profit this recourse on behalf of future generations.

Georgina Kessel
Minister of Energy

INTRODUCTION

This current edition of the *Liquefied Petroleum Gas Market Outlook, 2008-2017* is published in the pursuit of having a tool for understanding this market's behavior, and to comply with Article 8° from the *Liquefied Petroleum Gas Regulation*. Its main objective is to analyze throughout five chapters the market's current situation, and the domestic supply and demand expectations for the next ten years.

The first chapter points out that, for the past five years, LPG historical demand has displayed patterns of decline, contrary to the boom it had at the beginning of the 1990's. Such a behavior is put into detail, the same as its regional distribution by state and fuels' use. In regard to LPG supply, it shows the current situation of the infrastructure that provides the demand. Within the new subjects, it includes a seasonal analysis, aside from broadening the analysis of firewood and the automotive transportation sector's behavior.

The next chapter explains the sectorial and regional expectations of the demand of LPG, as well as the plans anticipated on the part of PEMEX to cover this demand appear. The case of the transport sector is analyzed, main driver of the decrease of the national demand and the analysis of the industrial sector is analyzed too. Combined to the plans of investment on the part of PEMEX and in order to satisfy the needs with the country, this chapter approaches the awaited complementary requirements in private investments.



LPG'S DOMESTIC MARKET

This chapter presents the historical development of Mexico's liquefied petroleum gas (LPG) market, analyzing its development by region, state and sector, as well as its relation with demand, supply and prices during the period between 1997 and 2007. For this purpose, reference is made to the study of variables that determine LPG's consumption, pointing out some of the milestones in sector development as well as the evolution of price mechanisms and infrastructure.

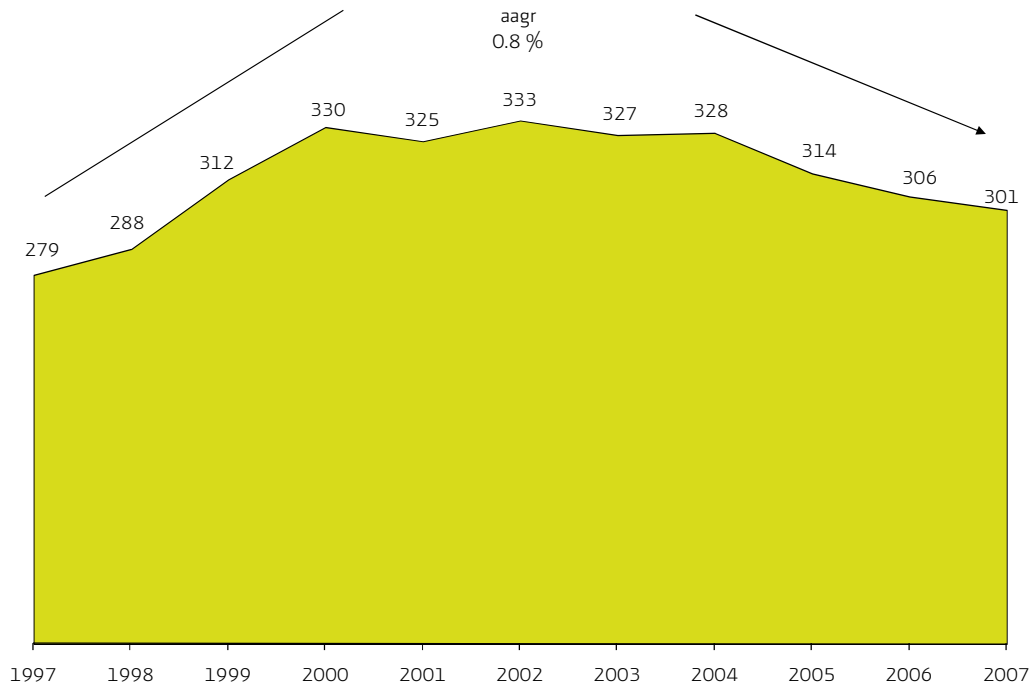
The effects brought on by the efficiency improvement of water heaters and stoves, and the impact of microwave oven usage on residential LPG's demand is also analyzed. Emphasis is made on foreign trade and on demand-supply balance as well.

1.1 Demand between 1997 and 2007

Mexico's LPG demand increased by 0.8% between 1997 and 2007, reaching 301.3 tbd by the end of this period. The main destination of demand is the residential sector, representing 65% of domestic total volume. The only sector that experienced growth in 2007 was the automotive transportation sector, increasing its share in consumption from 3% to 10%.

During the last ten years, domestic consumption has registered relevant growth figures in some periods and falls in others. Between 1997 and 2000, demand grew at an average annual rate of 5.8%. From 2000 through 2004 the market presented variations, though the falling tendency prevailed. As of 2004, LPG's consumption was reduced by 2.8%, while in 2007 sales levels have shown a decrease for the third consecutive year. See graph 1.

Graph 1
Domestic LPG sales, 1997-2007
(thousand barrels per day)

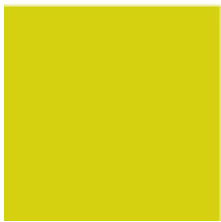


Source: IMP, based on data from Pemex and Sener.

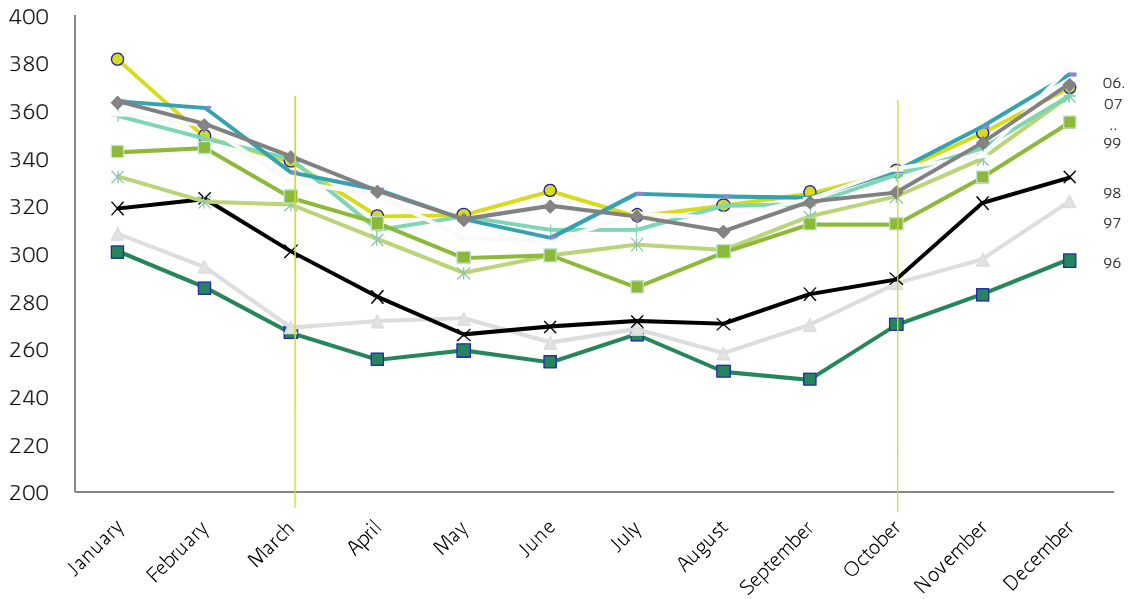
Decreased demand is explained by the increasing penetration of natural gas in the residential and services sectors, and by the change of consumption habits favoring substitute equipment, such as microwave ovens for food heating. On the other hand, demand decrease is also caused by the price increase to the customer of the energy source in real terms and by fuel savings, due to increased efficiency achieved through technology substitution in appliances such as water heaters and stoves.

The seasonal variation of LPG demand is associated to a cyclic quarterly consumption pattern related to water heating and food cooking, which are the two main uses of this fuel in the residential sector. Climatic conditions also influence consumption patterns, causing variations in demand depending on the time of the year or on seasonal changes, as shown in graph 2.

LPG market has shown seasonal variation patterns every year, being the period between October and March the highest consumption period and the months of April through September, the lowest demand span. In the last years, these two periods have registered differences of up to 74 tbd.



Graph 2
Annual seasonal variation pattern in LPG demand
(thousand barrels per day)



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

1.1.1 Sales by region and state

LPG demand regionalization implies the division of the Mexican territory into areas with similar characteristics, and represents a basic methodological tool in energy-related planning, as it provides market knowledge for comparable information purposes. The regional division used in this document has been established by the National Indicators System created by the Office of the President of the Republic, and it sets five regions (see figure 1).

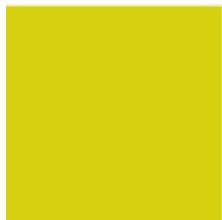
Figure 1
LPG's market regionalization



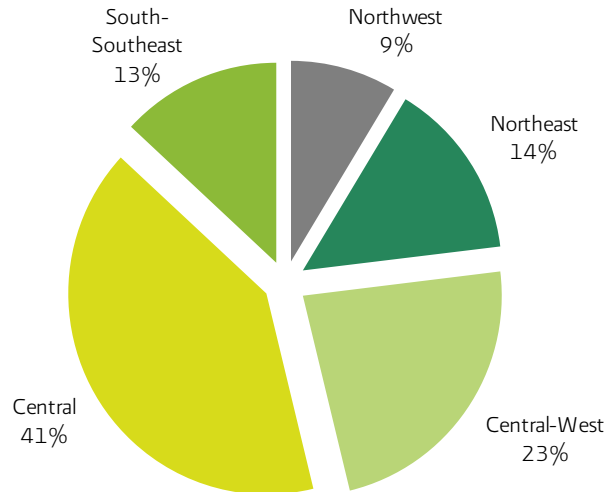
Source: Office of the President of the Republic.

To analyze the country's historical LPG consumption in greater detail, this document also includes LPG sales by federal entity between 1997 and 2007.

As seen in Graph 3 and Chart 1, the Central and Central-Western regions concentrate almost two-thirds of domestic demand, equal to 122.6 tbd and 69.7 tbd, respectively. The Northeastern and South-Southeastern regions concentrate 43.5 tbd and 39.5 tbd respectively, individually representing one-seventh of the LPG volume consumed in the country. The Northwestern region in turn has the lowest regional consumption with 26.1 tbd, equal to 9% of the total, due mainly to its low contribution to industrial GDP.



Graph 3
Regional distribution of internal LPG sales, 2007



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

Throughout the last ten years (1997-2007), the region registering the highest annual LPG sales at national level has been the Central region with 1.7%. The South-Southeastern region in turn has been increasing its demand levels by representing 1.6%, almost leveling with the Central region. LPG usage for vehicle carburetion, demand by the construction of new housing complexes and the increasing substitution of wood and other non-conventional energy sources, mainly in the South-Southeastern region, are other factors that might explain this increase.

Chart 1
Internal LPG sales by region and federal entity, 1997-2007
(thousand barrels per day)

Region/State	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
Domestic	278.7	287.7	312.1	330.3	325.3	332.6	327.5	328.2	314.1	306.0	301.3	0.8
Northwestern	26.7	27.7	29.0	29.6	29.0	29.2	28.5	28.9	27.8	26.7	26.1	-0.2
Baja California	8.8	9.7	10.4	10.3	10.3	10.5	10.5	11.2	11.1	11.1	11.3	2.5
Baja California Sur	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.8	1.9	5.3
Sinaloa	6.6	7.1	7.5	8.0	7.8	7.7	7.4	7.3	6.9	6.4	6.0	-1.0
Sonora	10.1	9.8	9.9	9.9	9.5	9.4	8.9	8.8	8.1	7.5	6.9	-3.8
Northeastern	50.1	48.5	51.3	54.3	52.0	53.2	51.3	51.3	47.5	44.4	43.5	-1.4
Coahuila	11.3	11.2	12.4	13.0	12.0	11.9	11.5	11.2	10.1	9.2	8.8	-2.5
Chihuahua	16.0	14.8	14.6	14.7	13.9	13.9	13.2	13.8	12.8	12.3	12.2	-2.7
Durango	3.8	3.6	3.0	2.9	3.3	3.7	3.6	3.9	3.9	3.6	3.5	-0.8
Nuevo León	10.4	10.7	12.1	13.6	13.0	13.4	13.3	12.8	11.7	10.7	9.3	-1.1
Tamaulipas	8.5	8.2	9.1	10.1	9.8	10.2	9.8	9.6	9.0	8.8	9.6	1.2
Central-Western	64.8	68.0	75.1	80.7	78.8	78.5	76.7	74.9	71.5	70.2	69.7	0.7
Aguascalientes	3.2	3.8	4.5	5.3	5.2	5.0	4.9	4.2	3.9	3.5	3.4	0.8
Colima	1.3	1.4	1.6	1.8	1.8	1.7	1.6	1.6	1.7	1.6	1.7	2.5
Guanajuato	12.1	12.9	14.3	16.1	15.6	14.9	14.4	13.8	13.4	13.7	13.7	1.3
Jalisco	22.6	23.1	24.7	25.8	24.7	25.1	24.7	25.8	24.6	23.9	23.5	0.4
Michoacán	10.2	10.8	11.8	12.7	12.5	12.5	12.5	12.0	11.5	11.4	11.4	1.1
Nayarit	2.0	2.2	2.4	2.6	2.4	2.4	2.5	2.6	2.5	2.4	2.4	1.5
Querétaro	3.5	3.8	4.9	5.5	5.6	5.6	5.3	4.7	4.1	3.8	3.5	0.2
San Luis Potosí	5.4	5.5	5.9	6.1	6.1	6.2	5.8	5.5	5.5	5.4	5.5	0.2
Zacatecas	4.4	4.5	4.9	4.9	5.0	5.1	4.9	4.8	4.4	4.5	4.5	0.2
Central	103.6	108.5	118.3	123.2	123.8	129.3	128.9	130.8	126.3	124.6	122.6	1.7
Distrito Federal	25.4	26.6	28.7	29.4	29.7	32.6	32.5	32.9	31.8	31.6	30.8	1.9
Hidalgo	10.1	10.5	11.4	11.7	11.8	12.9	12.9	13.1	12.6	12.5	12.2	1.9
México	46.8	48.9	52.7	54.0	54.6	60.0	59.8	60.6	58.6	58.1	56.7	1.9
Morelos	5.0	5.1	6.1	6.5	5.6	1.5	1.7	2.2	2.3	2.3	2.3	-7.7
Puebla	12.3	12.7	14.2	16.7	16.8	17.8	17.7	17.1	15.9	15.2	16.1	2.7
Tlaxcala	3.9	4.7	5.3	4.9	5.3	4.5	4.4	4.9	5.2	4.8	4.5	1.3
South-Southeastern	33.6	35.0	38.3	42.5	41.6	42.4	42.1	42.3	40.9	40.1	39.5	1.6
Campeche	0.9	0.8	0.9	1.0	1.0	1.1	1.1	1.0	0.9	0.9	0.9	0.2
Chiapas	4.0	4.2	4.8	5.4	5.5	5.8	5.7	5.8	5.6	5.3	5.2	2.8
Guerrero	4.2	4.4	4.6	4.9	4.6	4.1	4.0	3.9	3.8	3.7	3.6	-1.4
Oaxaca	3.3	3.5	3.8	4.2	4.2	4.3	4.3	4.4	4.3	4.3	4.4	2.7
Quintana Roo	1.6	1.7	1.9	2.1	2.2	1.5	1.7	2.2	2.4	2.5	3.0	6.2
Tabasco	3.1	3.1	3.8	4.0	4.0	4.2	4.3	4.4	4.1	4.1	3.6	1.7
Veracruz	14.0	14.5	15.6	17.5	16.8	17.2	16.9	16.8	15.9	15.5	15.4	0.9
Yucatán	2.5	2.7	2.9	3.3	3.2	4.1	4.0	3.9	3.9	3.7	3.5	3.3

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

States within the Metropolitan zone of the Valley of Mexico (ZMVM for its Spanish acronym) - Estado de México, Hidalgo, Tlaxcala and the Federal District - represent the highest domestic consumption volume spot, with almost one-third of the total, making it the zone with the highest number of LPG consumers in the country. The Federal District in particular registered a 1.9-% increase between 1997 and 2007 due to growing real estate demand in the last years.



Most distributors are installed in ZMVM in order to service the urban market in the area. An increasing number of plants and distributors have settled down in surrounding entities as well, such as Hidalgo and Estado de México, registering larger operation volumes at these points and implying increased LPG consumption in such entities.

1.1.2 Sales by sector

LPG is composed by light hydrocarbons known as liquefied gases¹. In terms of its origin, LPG is considered a by-product of natural gas processing and crude oil refining. Although LPG is gaseous at atmospheric pressure; at environmental temperatures it may be liquefied at relatively low pressures (one liter of liquid transforms into 272 liters of gas for propane and 237 liters of gas for butane). Though it is transported and stored in liquid phase, it transforms into gas from the very moment it is used.

Due to these characteristics, LPG has been considered an alternative fuel used worldwide at large scales (in the automotive area), with clear advantages and benefits when it compared to other fuels. Its properties include the following:

- **Availability.** Its physical and chemical advantages allow for its compression and condensation until turning it into liquid for storage in tanks and later use.
- **Transportability.** Due to its high power-to-weight ratio, LPG may easily be transported through diverse means²; this flexibility may be exploited in both urban and rural areas, including remote regions where access to other energy sources is impossible or restricted. Its use does not depend on the existence of networks as in the case of natural gas or electricity.
- **Unlimited useful life.** Unlike other fuels that are prone to be affected by climatic or environmental influences, LPG properties do not deteriorate with time; it does not evaporate, stratify or gelatinize as other liquids when stored for long periods.

¹ The most widely used is propane (C₃H₈) and butane (C₄H₁₀), and consists in the combination of both for heating purposes.

² For more information, consult the section dealing with Transportation in this chapter.

- **Energy density.** Compared to other traditional fuels equivalent in volume, LPG energy is several times higher, thus its high level of yield and versatility turn it into a universal fuel capable of substituting any other liquid or gas fuel in any application type.
- **Temperature control.** Flame temperature of appliances running on LPG may be adjusted easily and quickly to the specific usage needs.
- **Low environmental impact.** Since LPG is a clean-burning fuel that does not produce smoke or residual ash, it helps eliminate many health risks associated to the use of other fuels indoors. In case of leaks, LPG does not pollute water aquifers nor does it infiltrate to the soil.
- **Compatibility and flexibility.** LPG is not only compatible with hybrid systems using renewable energies but also with new technologies like fuel cells and micro-turbines.

Depending on its final use, LPG demand is divided into the following economic sectors: residential, services, industrial, automotive transportation, and agriculture and livestock.

Chart 2
Internal LPG sales by sector, 1997-2007
(thousand barrels per day)

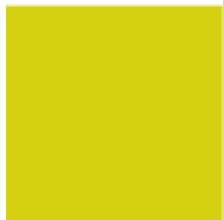
Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	278.7	287.7	312.1	330.3	325.3	332.6	327.5	328.2	314.1	306.0	301.3	0.8	-1.5
Residential	203.8	208.2	211.2	214.2	209.3	209.2	208.2	210.1	200.1	198.1	194.6	-0.5	-1.8
Services	37.2	35.2	40.7	46.3	45.7	48.2	45.8	44.4	44.1	45.8	44.2	1.7	-3.6
Industrial ¹	24.7	25.4	28.1	31.1	28.8	29.5	27.5	28.3	28.3	29.8	29.8	1.9	-0.1
Automotive transport	7.6	12.8	25.9	33.1	35.4	39.4	40.2	39.8	35.4	28.1	28.9	14.3	3.1
Agriculture-livestock	5.4	6.1	6.2	5.5	6.1	6.3	5.7	5.5	6.2	4.2	3.8	-3.3	-8.4

¹ Includes butane, iso-butane and propane used as feedstock in the Central region.

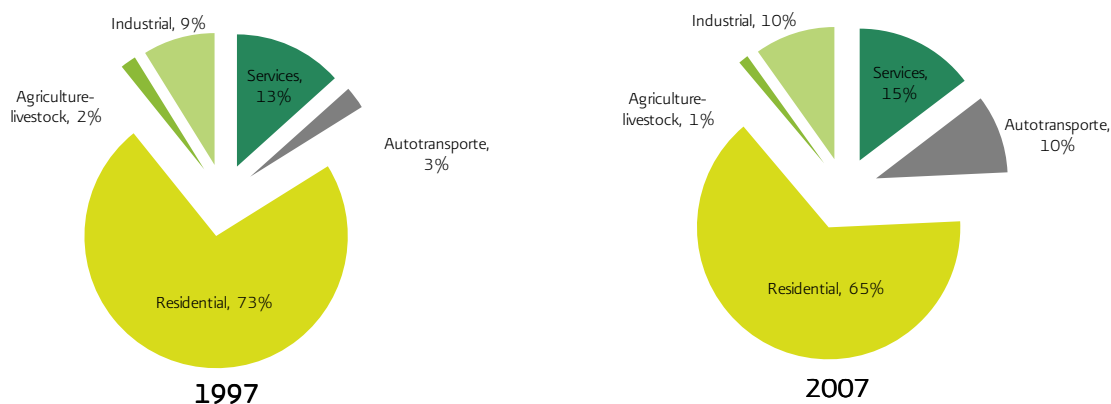
Source: IMP, based on data from Pemex and Sener.

In terms of use in each sector, LPG has been a reliable fuel for domestic use and services in view of its simple and quick installation and use. Within the industrial and automotive transportation sectors, it has been a valuable option due to its relatively low toxicity and impurity levels when compared to other fossil fuels. LPG applications in the agriculture-livestock sector are also an alternative for the proper and efficient handling of diverse activities.

In view of the boom that took place between 1998 and 2003, LPG sales for vehicle carburetion purposes represented the most dynamic application by sectors with a growth rate of 14.3% between 1997 and 2007. Its share in total domestic volume also increased during the same period from 3% in 1997 to 9.6% in 2007.



Graph 4
LPG sales distribution by sectors, 1997 and 2007



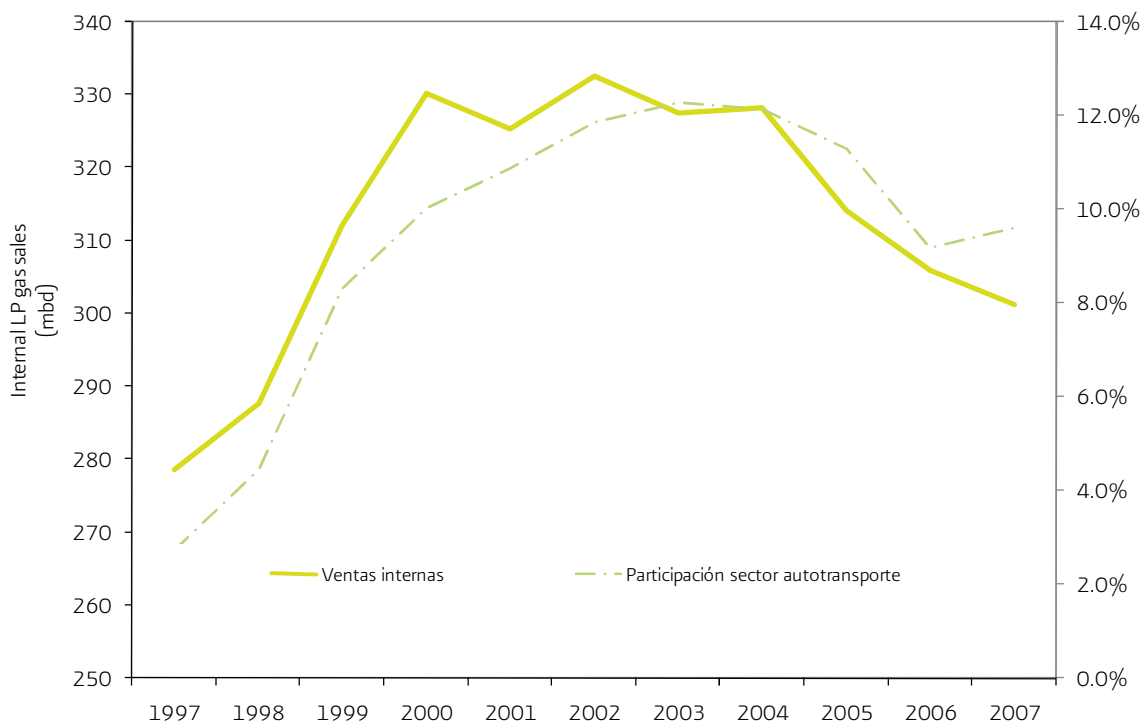
Source: IMP, based on data from Pemex and Sener.

Until 2003, domestic LPG sales were mainly driven by the automotive transportation sector, due to the boom of conversion processes toward the use of carbureting gas in utility vehicles as a consequence of gasoline price increases. In 2007, the automotive transportation sector's share was similar to that of the industrial sector, representing 10% of the total. See chart 2 and graph 4.

The residential and services sectors in turn have maintained an average joint share of 80% between 1997 and 2007. This means that these sectors have reached a consolidated maturity stage with optimum coverage and market penetration levels with few possibilities to grow.

On the other hand, the automotive transportation sector has represented a new opportunity area for LPG for almost a decade; but despite its relevant sales increases, for the last five years it has shown signs of stagnation. Graph 5 shows this relation with correlated tendencies between both series.

Graph 5
Domestic LPG sales and share of the automotive transportation sector, 1997-2007



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

Throughout the last decade, LPG's demand in the residential sector has decreased by 0.5%. Natural gas infrastructure expansion in urban and residential zones, fuel savings through heating appliances manufactured under new thermal efficiency standards, LPG price increases in the last years and the use of fire wood and other non-commercial energy sources in rural areas have been some of the reasons favoring lower LPG demand in this sector.

The following sections analyze the residential and automotive transportation sectors in order to study the elements that have determined domestic LPG demand between 1997 and 2007.

1.1.2.1 Residential sector

LPG's presence in Mexico dates back to 1946, when it was launched as a strategy to combat the demand of vegetative fuels used more widely in those times, such as fire wood and charcoal, in addition to refined oil as complementary fuel. Supported in the beginning by government policies based on fostering and subsidies, LPG

managed to infiltrate most Mexican households, displacing other traditional fuels in few years and directly improving the population's living standards by providing them with a cleaner, attainable, manageable and safer energy source. LPG is currently the main fuel option in our country, as approximately 7 out of 10 households use it, thus ranking first in worldwide consumption per capita.

In 2007, the number of households using LPG to meet their energy-related needs of cooking, water heating and indoors heating reached 19.5 million, representing an increase of 1.8% with regards to 2006. Households that used LPG represent 71% of the domestic total. See chart 3.

The Central and Central-Western regions concentrate the highest number of households that use LPG, representing three-fifths of the domestic total. In the country's Northeastern region, LPG use in the residential sector is lower, due to the existence of natural gas supply infrastructure. In the South-Southeastern region, the lack of infrastructure and lower income levels explain the lower number of households using LPG to meet their energy needs.

Chart 3
Private households in Mexico that use LPG*, 2000-2007
(thousand households)

Concept	Region	2001	2002	2003	2004	2005	2006	2007	aagr 2001-2007
Total households	Domestic	23,477	24,132	24,793	25,460	26,132	26,809	27,491	2.7
	Northwestern	1,935	2,003	2,073	2,143	2,214	2,286	2,359	3.4
	Northeastern	3,402	3,508	3,614	3,721	3,829	3,938	4,047	2.9
	Central-Western	5,155	5,285	5,417	5,550	5,684	5,819	5,955	2.4
	Central	7,716	7,925	8,135	8,347	8,559	8,772	8,985	2.6
	South-Southeastern	5,269	5,410	5,554	5,699	5,846	5,994	6,144	2.6
Households that use LP gas	Domestic	17,580	17,789	17,903	18,311	18,794	19,161	19,501	1.7
	Northwestern	1,691	1,756	1,805	1,887	1,933	1,999	2,046	3.2
	Northeastern	2,240	2,278	2,286	2,320	2,350	2,358	2,313	0.5
	Central-Western	4,346	4,443	4,515	4,587	4,687	4,813	4,878	1.9
	Central	6,269	6,195	6,100	6,234	6,457	6,538	6,724	1.2
	South-Southeastern	3,034	3,115	3,199	3,283	3,367	3,453	3,539	2.6
Households that use LP gas (%)	Domestic	75	74	72	72	72	71	71	-0.9
	Northwestern	87	88	87	88	87	87	87	n.a.
	Northeastern	66	65	63	62	61	60	57	n.a.
	Central-Western	84	84	83	83	82	83	82	n.a.
	Central	81	78	75	75	75	75	75	n.a.
	South-Southeastern	58	58	58	58	58	58	58	n.a.

* Figures for 2001 through 2007 are estimates obtained from Conapo and IMP. They do not include new estimates that consider the 2005 Census.

n.a.: does not apply

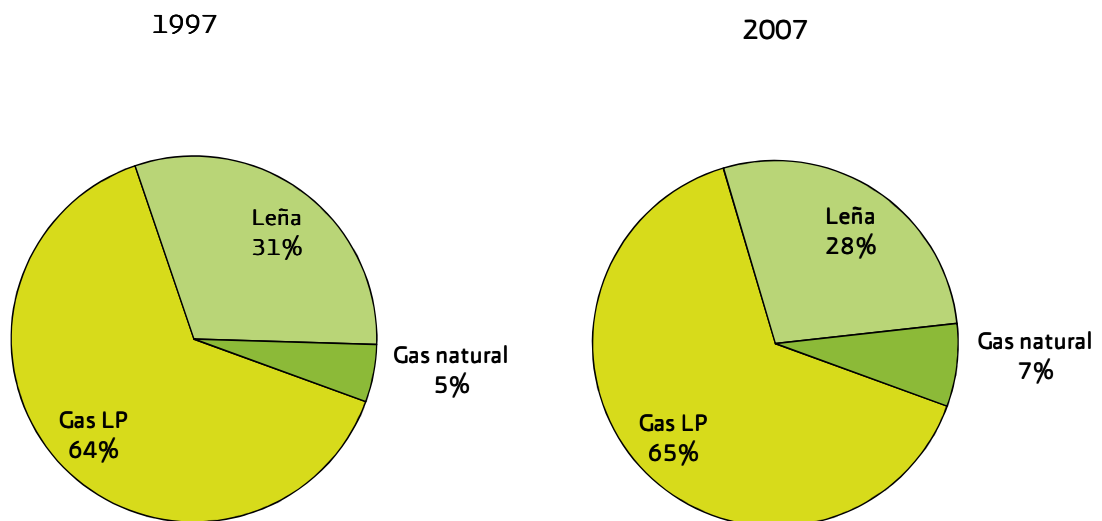
Source: IMP, base on data from CONAPO, INEGI, Pemex and Sener.

Energy demand in the Mexican residential sector is composed by fire wood and natural gas. Depending on the household type -rural or urban-, the share of these fuels varies according to the substitution degree of alternative fuels, making each of them penetrate the market and reduce consumption. In the last ten years, the

share of fire wood has been decreasing from 31% to 28%, from 1997 until 2007. LPG and natural gas consumption in turn has been absorbing this decrease. See graph 6.

Approximately 53% of the volume of LPG consumed in 2007 by the residential sector was distributed through portable containers (a.k.a. cylinders) of different capacities; this Graph is 8% lower than the one registered in 2006; and 47% was distributed through networks and bulk tanks. For some years, supply through bulk tanks has been increasing, gradually displacing cylinders. The expansion of housing construction, issues attributed to the iteration in the handling and filling of cylinders, and the higher safety associated to the use of bulk tanks are only some of the causes that have lead to this tendency.

Graph 6
Distribution of the residential sector's internal sales by fuel type, 1997 and 2007
(percentage share)



Source: IMP, based on data from Pemex y Sener.

Fire wood has many advantages as a fuel since it is a local energy source produced and sold on an almost constant basis in the same region where it is used, and does not depend on imports for supply. It is a renewable and affordable energy source, and it is up to 6 times cheaper than electricity, 5 times than gas and 4 times than oil. Despite these facts, its best use and application depends on the type of fire wood used –dry or humid- and on the energy efficiency of the heating device.

By 2004, INEGI stated that little over than one-fourth of the population in Mexico, between 25 and 28 million inhabitants, cooked with fire wood. The same study stated that 19 million inhabitants use this energy source as the only fuel for cooking. The highest usage percentages are found in rural and semi-urban households. There are 11 states with high fire wood consumption levels, among them Michoacán, Chiapas and Oaxaca³. Due to this fact, fire wood is considered substitute and complementary fuel for LPG in the residential and commercial sectors of certain regions.

Compared to LPG, natural gas consumption had a growth rate of 3.1% between 1997 and 2007; this is attributable to the existence of supply infrastructure and to supply network expansion programs in the 21 distribution zones, leading to increasing customers and higher shares within the residential sector's energy source market of the. In relative terms, residential LPG demand decreased by 3.5 tbd when compared to the 2006 volume, representing a negative growth rate of half a percentage point throughout the last ten years. See chart 4.

Chart 4
Internal regional LPG and natural gas sales in the residential sector, 1997-2007
(thousand barrels of LPG equivalent per day)

Fuel	Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total		219.9	222.6	225.6	229.4	225.9	227.9	230.6	232.3	222.3	219.8	216.5	-0.2	-1.5
LP gas		203.8	208.2	211.2	214.2	209.3	209.2	208.2	210.1	200.1	198.1	194.6	-0.5	-1.8
	Northwestern	18.0	20.9	20.5	18.7	18.8	18.0	16.6	16.2	16.0	14.8	15.0	-1.8	1.6
	Northeastern	31.2	30.5	31.8	29.4	28.3	29.4	28.0	27.9	25.9	22.5	22.0	-3.4	-2.2
	Central-Western	52.1	53.3	55.1	55.8	55.6	55.6	54.8	53.9	51.0	51.6	50.9	-0.2	-1.3
	Central	75.9	76.6	75.4	79.3	76.3	76.2	78.9	82.3	81.7	81.7	78.3	0.3	-4.1
	South-Southeastern	26.6	27.0	28.4	31.0	30.3	29.9	29.9	29.7	25.5	27.7	28.4	0.7	2.7
Natural gas		16.1	14.4	14.4	15.2	16.6	18.6	22.3	22.2	22.2	21.7	21.9	3.1	1.0
	Northwestern	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.3	0.2	0.4	0.4	0.4	4.7
	Northeastern	13.4	11.9	12.7	12.8	13.7	14.9	16.0	15.8	15.7	14.8	14.8	1.0	0.1
	Central-Western	0.3	0.3	0.2	0.2	0.3	0.4	1.0	1.4	1.4	1.4	1.3	14.9	-8.8
	Central	2.1	1.8	1.2	1.8	2.2	3.0	4.8	4.7	4.8	5.2	5.5	10.3	5.8
	South-Southeastern	-	-	-	-	-	-	-	-	-	-	-	n.a.	n.a.

n.a.: does not apply

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

Though the higher penetration of natural gas has indeed affected the growth of LPG consumption, mainly in the residential and services sectors, it is worth mentioning that due to its implicit cost and supply logistics, installation of natural gas networks assumes the existence of markets whose economic, demographic and technical dimensions allow for the development and operation of an efficient and economically profitable pipeline distribution system. This means that many areas will not be supplied through natural gas networks, which represents new market opportunities for LPG.

In addition, there are other fuels with potential to be substituted by LPG. Biomass, fire wood, coal and kerosene (refined petroleum) are still consumed in rural areas not serviced by LPG and natural gas distribution.

³ Program for the sustainable use of fire wood in Mexico: from stove construction to technology appropriation, Omar Masera and Rodolfo Díaz, CONANP, Mexico, 2007.

This situation not only restrict access of the population to energy sources, damaging the environment by exploiting forest resources in a more intensive manner, but it also represents a health risk due to the issues related to the combustion of these energy sources in households, such as asphyxia by carbon monoxide and chronic respiratory diseases⁴, not to mention increased pollutant emission to the environment. See chart 5.

Despite LPG representing an efficient alternative for traditional fuels used on rural markets, there are well-identified hurdles preventing LPG from contributing in a more significant way. Recent studies show that the problems faced by LPG at global level⁵ may be classified into the following: 1) accessibility for consumers, 2) attainability and 3) acceptance of the product. Accessibility refers to the infrastructure required for the customer to access LPG, that is, the development needed for fuel supply through efficient distribution, filling and delivery. Attainability refers to the capacity of paying for the fuel, usually through tax treatments due to low consumption demand. Product acceptance refers to the idiosyncratic breakup of social relations subjected to shifting processes in uses and habits.

⁴ These diseases include lung cancer, emphysema and chronic bronchitis. For more information, consult *Household fuels and ill-health in developing countries*, World LP Gas Association, 2005.

⁵ *Developing rural markets for LP gas: key barriers and success factors*, World LP Gas Association, 2005.



Chart 5
Advantages and disadvantages of LPG for cooking purposes
compared to biomass and kerosene

Concept	LP gas vs biomass	LP gas vs kerosene
Ease of use	LP gas is easier to ignite, control and store than biomass.	Kerosene is easier to control and ignite than biomass, but more instable than LP gas. Storage is recommended in small amounts to minimize possible accidents.
Safety	The risk of accidents with LP gas in the residential sector is low if proper measures are taken. As LP gas is stored in pressurized containers, odorants are added to detect leaks and minimize accidents.	The risks of kerosene are related to its use and storage, including accidental poisoning, fires and burns.
Ease of transportation	Local LP gas transportation requires low-pressure cylinders, which may be heavy.	Kerosene does not require special containers for transportation or storage.
Environmental impact	Typically, LP gas produces lower environmental emissions than biomass.	The polluting levels of kerosene are not as low as that of LP gas.
Impact on ecosystem	There is lower pressure on natural resources that generate biomass, decreasing deforestation and erosion and increasing the availability of biomass residues for the improvement of soils and crops in certain regions.	

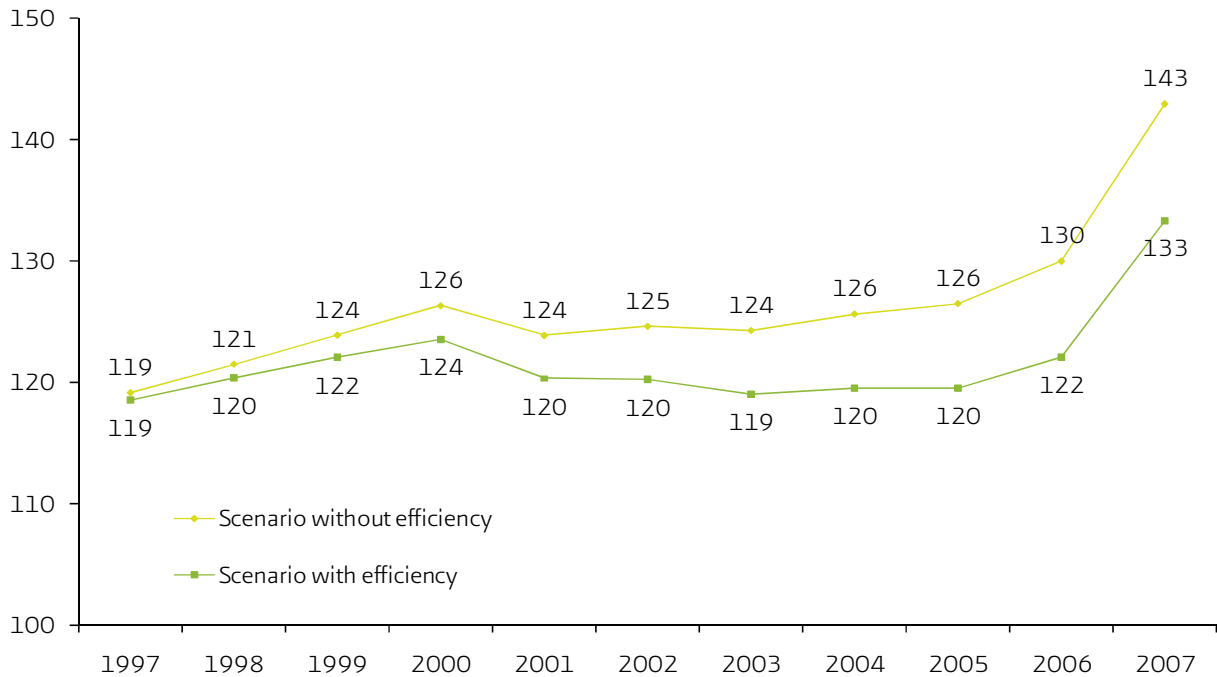
Source: Sener, based on data from *Household fuels and ill-health in developing countries*, World LPG Association, 2005.

On the other hand, Pemex and IMP have been carrying out studies to identify the causes of LPG demand decrease in the last years. For this reason, they have developed action lines to monitor the main factors that determine demand, in order to gather more elements to identify such events. In this sense, results have been concentrating on water heating, studying the technical efficiencies achieved through new stoves and the use of microwave ovens as elements of impact on LPG use.

For this purpose, the study considered the population, the number and characteristics of households, the thermal efficiency of water heaters and stoves, the substitution degree of LPG by microwave ovens, as well as the fuels used in the residential sector for water heating and cooking purposes (natural gas, LPG and fire wood).

Based on the above, the study determined that the impact of the thermal efficiency change of water heaters on domestic LPG demand in 2007 was of 9.6 tbd, as seen on graph 7. Along with the increased penetration of appliances with improved efficiency, general savings have also increased, explaining the gap between 1997 and 2007, even despite the recent fall in domestic LPG demand.

Graph 7
Domestic LPG demand
for water heating purposes, 1997-2007
(thousand barrels per day)

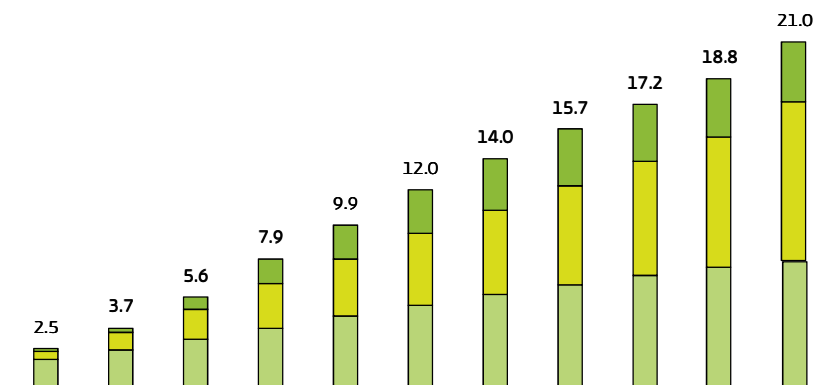


Source: IMP, based on data from CONAPO and INEGI.

In the case of food cooking, total savings of 21 tbd have been generated by changes in consumption patterns, as well as by the technical improvement in appliances, such as microwave ovens, water heaters and electric stoves. The highest increase when compared to 2006 was represented by water heater substitution, reaching 21.5% and 9.6 tbd. See graph 8.



Graph 8
LPG savings in residential consumption due to technical improvements and changes in consumption patterns*
 (thousand barrels per day)



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
■ Displacement of LP gas by microwave ovens	0.1	0.2	0.7	1.5	2.0	2.6	3.1	3.4	3.5	3.5	3.6
■ Savings due to the gradual improvement of water heater efficiency	0.5	1.1	1.8	2.7	3.5	4.3	5.2	6.0	6.9	7.9	9.6
■ Savings due to gradual changes toward electric stoves	1.8	2.4	3.1	3.8	4.4	5.1	5.7	6.3	6.9	7.4	7.8
Total savings	2.5	3.7	5.6	7.9	9.9	12.0	14.0	15.7	17.2	18.8	21.0

* Solar energy panels are considered as of 2008.

Source: IMP, based on data from CONAPO and INEGI.

Though the residential sector’s share in domestic LPG demand has been decreasing in the last years, it is still the main destination of this fuel. This sector is one of the largest markets worldwide, as it is the main consumer per capita and ranks second in average consumption per household.

1.1.2.2 Automotive transportation sector

Fuels that compose demand in the automotive transportation sector are gasoline, carbureting LPG⁶ and compressed natural gas. By 2007, these fuels represented 781.8 tbd, with gasoline representing almost the entire consumption with 97.2% of the market. It is followed by LPG and compressed natural gas with 2.7%. It is worth mentioning that the market share of compressed natural gas is marginal; it is a result of its low expansion level in the last ten years due to lack of investment and incentives for infrastructure and supply station development. See chart 6.

⁶ Also known as vehicle LP gas or autogas.

Chart 6

Sales of gasoline, carbureting LPG and compressed natural in the automotive transportation sector by region, 1997-2007
(thousand barrels of gasoline equivalent per day)

Fuel	Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aaagr 1997-2007	Var. % 2006-2007
Total		503.3	521.2	530.3	555.7	576.7	594.4	630.2	665.6	697.7	739.1	781.8	4.5	5.8
Gasoline		497.8	511.7	511.0	531.4	550.6	565.3	600.5	636.1	671.5	718.3	760.3	4.3	5.9
	Northwestern	63.8	65.2	64.6	66.8	68.7	67.3	72.8	78.9	85.6	92.2	98.3	4.4	6.6
	Northeastern	92.3	96.0	93.5	98.2	101.9	103.8	115.4	121.8	129.0	139.4	147.3	4.8	5.7
	Central-Western	108.7	111.9	113.6	119.0	125.1	130.9	137.8	147.1	155.3	165.8	175.8	4.9	6.0
	Central	164.3	168.8	170.4	175.0	179.2	183.3	188.4	194.3	200.6	210.4	218.6	2.9	3.9
	South-Southeastern	68.7	69.7	69.0	72.4	75.7	79.9	86.1	94.0	101.0	110.5	120.3	5.8	8.9
Carbureting		5.5	9.5	19.1	24.2	25.9	28.8	29.4	29.1	25.9	20.5	21.1	14.4	3.2
LP gas														
	Northwestern	0.2	0.6	1.7	2.9	2.9	3.3	3.7	3.7	3.0	1.9	1.9	23.9	-4.2
	Northeastern	1.9	3.1	3.6	6.4	6.6	6.9	6.5	7.2	6.0	5.4	5.1	10.6	-3.9
	Central-Western	1.3	2.5	5.2	7.6	7.4	6.7	6.0	5.5	5.4	3.9	3.4	10.2	-12.3
	Central	1.7	2.4	6.3	5.2	6.6	8.6	9.5	9.0	6.8	6.9	8.8	17.8	27.5
	South-Southeastern	0.4	0.9	2.2	2.1	2.4	3.3	3.7	3.7	4.7	2.4	1.9	17.4	-19.8
Compressed natural gas														
	Northwestern	-	-	0.2	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.3	n.a	-8.7
	Northeastern	-	-	-	-	-	-	-	-	-	-	-	n.a	n.a
	Central-Western	-	-	-	0.0	0.0	0.0	0.00	0.02	0.02	0.03	0.02	n.a	-35.4
	Central	-	-	-	-	-	-	-	-	-	-	-	n.a	n.a
	South-Southeastern	-	-	0.2	0.1	0.2	0.3	0.37	0.36	0.34	0.35	0.33	n.a	-6.5
	South-Southeastern	-	-	-	-	-	-	-	-	-	-	-	n.a	n.a

n.a.: does not apply

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

In the automotive transportation sector, fuel growth is driven mainly by the number of units with technology for development. In the case of LPG and compressed natural gas vehicles, the original plant-manufactured unit (OEM) must undergo a conversion process. In order for this conversion to be made, savings must be generated due to fuel price differences and the vehicle's efficiency or yield, measured by the consumption ratio in liters and distance driven.

The beginning of the 90's marked a cornerstone for the carbureting LPG market in view of low unit conversion costs and attractive price differences between gasoline and gas, fostering the consumption of gas as carburetor, and leading to a boom in the mid 90's, fostering the expansion of distribution fleets –mainly in the food and beverage industry– using this fuel and taking it to its historical maximum levels, with annual average growth rates close to 5%.

Between 1995 and 2000, LPG consumption in the automotive transportation sector increased at an annual average rate of almost 50%, while carburetion tank sales for conversion increased by an average of 55.5% from 1997 through 2000. The release of the 1999 Liquefied Petroleum Gas Regulation (not in force) provided higher certainty to this market by defining the regulations related to this activity and acknowledging the figure of carburetion stations for self-consumption purposes.

Although other consumption sectors have increased their demand, the increase of sales volumes in the automotive transportation sector explained growing domestic LPG demand during the second half of the 90's and later. Notwithstanding this fact, carbureting LPG market has recently faced a series of difficulties undermining demand and its possibilities for future growth.



However, along with above-mentioned conversion increases, with the increase of the vehicle fleet and the number of customers using carbureting LPG, the number of low-quality conversions performed in workshops with no qualified technical personnel and no adherence to specific technical standards has also increased. These deficient conversions produced lower-than-expected vehicle yields, reflected in economic losses due to fuel costs and conversion expenses. Part of the customers even decided to return using gasoline in their vehicles trying other options, such as diesel.

Chart 7 shows the fall in LPG tank sales for carburetion in the last ten years. The maximum sales level was reached in 1999, followed by decreasing trends with an annual average decrease rate of 23.3%. By 2007, decrease represented 59.3% with respect to the immediately previous period.

Chart 7
Domestic LPG tank sales for carburetion, 1998-2007

Concepts	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr (1998-2007)	Var. % 2006-207
Sales of tanks automotive LPG (units)	65,440	116,145	91,906	65,766	83,623	50,416	40,363	18,912	14,786	6,015	23.3	-59.3
Capacity of sold tanks (mb)	63.8	112.0	87.6	61.9	76.9	42.2	34.1	15.1	10.9	3.7	-27.2	-66.3

Source: IMP based on data from private companies.

LPG has been used for decades in Mexico for vehicle carburetion. 70% of vehicles converted to LPG are concentrated in the Northwestern, Northeastern and Central-Western regions, jointly representing 155 thousand vehicles. The Northwestern region has been the most dynamic with an annual growth rate of 29.5% between 1997 and 2007. All regions experienced a decrease in 2007 when compared to 2006. See chart 8.

Chart 8
Regional distribution of the carbureting LPG vehicle fleet, 1997-2007
(thousand vehicles)

Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
Total	45	81	172	254	292	336	331	329	305	235	226	17.5
Northwestern	4	10	31	58	67	76	78	79	68	52	50	29.5
Northeastern	16	27	33	58	71	83	74	78	68	51	49	11.6
Central-Western	13	25	53	86	90	90	82	75	75	58	56	15.7
Central	8	11	34	30	38	54	60	62	51	40	38	16.3
South-Southeastern	3	8	21	21	25	34	37	37	44	34	33	25.4

Source: IMP, based on data from AMIA, INEGI and Sener.

When compared, LPG has several technical advantages over other liquid fuels like gasoline and diesel; in terms of energy, it is a fuel that does not require additives that are usually added to gasoline, and its octane ratio

is higher than 100. Since it is a dry fuel, LPG needs not to be diluted with lubricants in automobiles, saving oil and filter costs. As for storage, tanks used for LPG are manufactured with special alloys in order to contain pressure and provide the resistance required for transportation.

LPG is a fuel that causes low pollution levels, thus its use benefits cities with strict environmental issues, eliminating the need of vehicle circulation restriction programs (“Hoy no circula” program in ZMVM), as well as in closed spaces where industrial vehicles and forklifts are operated.

A relevant aspect in the unit-conversion to LPG has been fuel price, since differences have been sufficiently large as to make it cost-effective in the long-term. The difference between gasoline and LPG price is known as relative price, and it defines the degree of comparison between both prices.

Historically, relative price has behaved according to the existing price regimes and product types, since there have been different fuel formulas making prices vary due to new technical specifications. However, between 1997 and 2007 historical differences of up to 85% have been observed, specifically in 1999 –which, as already mentioned, was a cornerstone in market development-, leading to the massive conversion of gasoline vehicles to LPG. Nonetheless, this difference was reduced considerably shortly after and during 2006 LPG was just slightly cheaper than gasoline. See graph 9.

Graph 9
Relative gasoline*/LPG** price, 1997-2007



*Average price of the gasoline known as Magna, without considering border zones.

**Average weighted public price, corrected in terms of efficiency with respect to Magna gasoline.

Source: IMP, based on data from Pemex.

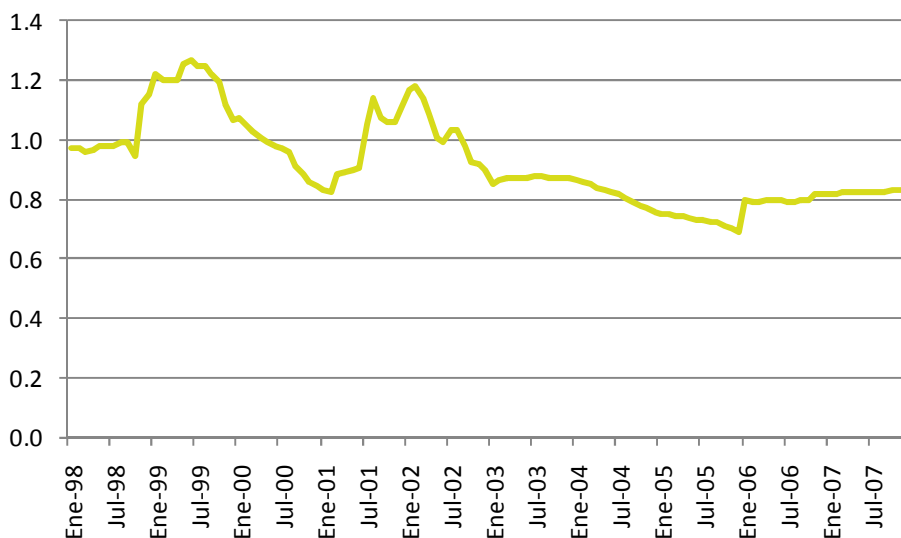


In the last 5 years, diesel has played an important role within the light vehicle market⁷ introducing new models. From 2003 through 2007, 21 categories of classes 6 through 2 have been introduced on the Mexican market, decreasing the competitiveness of the LPG automobile industry.

The economic and operative advantages of diesel represent strong competition for LPG. Under a sales strategy based on trained and permanent technical support and differed financing plans, vehicle manufacturers have launched diesel units. While diesel units coming from the manufacturer (OEM⁸) bear warranty conditions provided by the manufacturer, most units converted to LPG lack this feature, as they have been modified to use LPG when originally they worked with gasoline.

Since 2001, diesel prices have been lower than LPG prices. In nominal terms, Pemex Diesel average price in 2007 was 15% lower than that of carbureting LPG, and this difference is expected to increase in the future.

Graph 10
Relative*/LPG** price, 1998-2007



*Vs. Average Pemex Diesel price.

** Average weighted price to the public, corrected in terms of efficiency with respect to Pemex Diesel.

Source: IMP, based on data from Pemex.

⁷ Categories 1, 3, 4, 5 and 6 of light trucks with net vehicle weights of (NVW) ranging from less than 2,722 kg, up to heavy trucks with NVW of 10,400 to 10,800 kg. Source: AMIA.

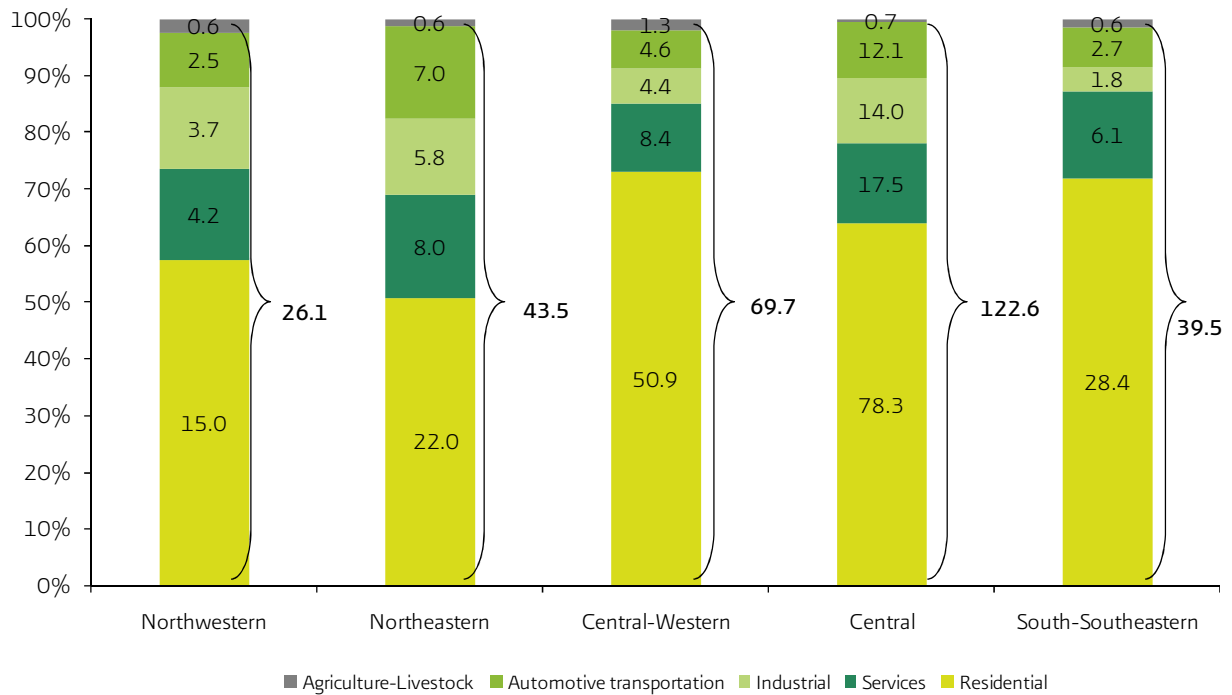
⁸ OEM: acronym for Original Equipment Manufacture.

1.1.3 Regional analysis

Regionalization is a result of the combination of physical characteristics, climatic conditions and activities at state levels, considered homogeneous up to a certain point. LPG consumption patterns differ from one region to other, depending on habits and practices, population density, economic activities, available income, existing infrastructure and availability of alternative energy sources.

Graph 11 presents the distribution of LPG demand by region and sector in 2007. The residential sector in the Central region concentrates little more than one-fourth of domestic consumption (25.9%), followed by the Central-Western region with one-sixth of the residential demand (16.8%).

Graph 11
Regional LPG demand composition by sector, 2007
(percentage structure)



Source: Sener, based on data from IMP.

The following sections describe the specific characteristics of each regional LPG market.

a) Northwestern Region

Consumption in 2007 represented 26.1 tbd, turning it into the region with the lowest demand on national level (8.7% of the total). The reason behind this low demand is that annual decreases of 0.2% have been observed as of 2001, caused by decreased consumption in the border cities of Tijuana and Mexicali, where the largest fuel sales of the state of Baja California are concentrated. At the same time, the Northwestern region has the lowest number of households at national level, with only 8.6% of the total. See chart 9.

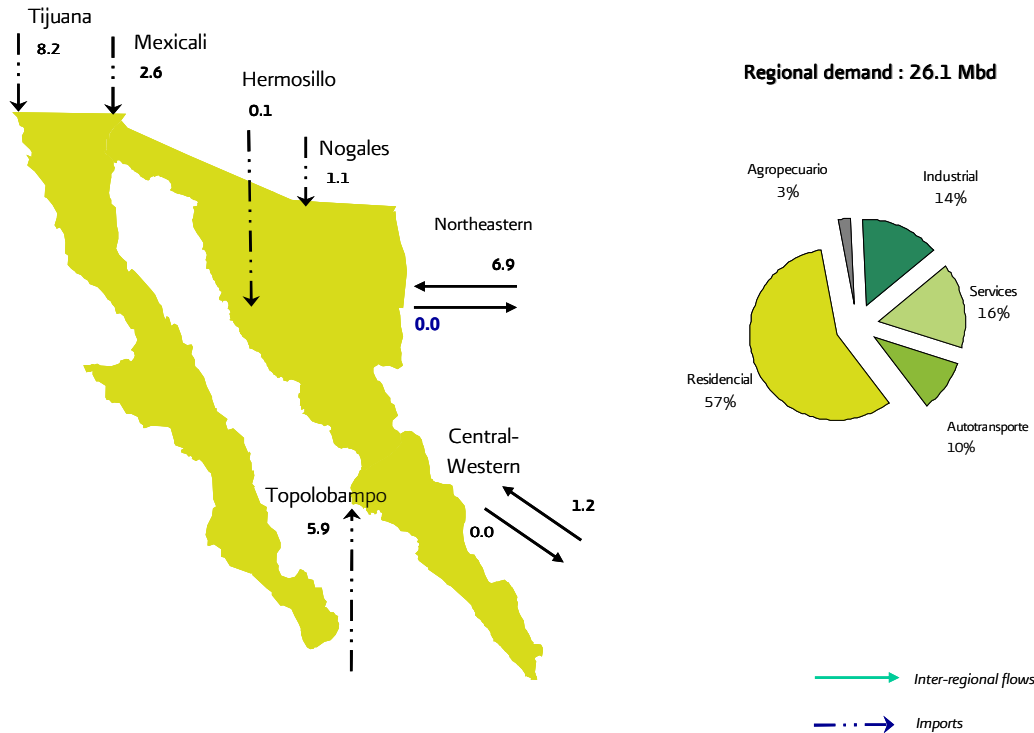
Chart 9
LPG sales by sector in the Northwestern region, 1997-2007
(thousand barrels per day)

Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	26.7	27.7	29.0	29.6	29.0	29.2	28.5	28.9	27.8	26.7	26.1	-0.2	-2.5
Residential	18.0	20.9	20.5	18.7	18.8	18.0	16.6	16.2	16.0	14.8	15.0	-1.8	1.6
Services	3.9	2.8	3.3	3.6	3.1	3.3	3.9	4.4	4.5	5.0	4.2	0.9	-15.5
Industrial	2.6	2.3	2.1	2.5	2.4	2.5	2.2	2.5	2.5	3.7	3.7	3.7	1.2
Automotive transportat	0.3	0.8	2.4	3.9	3.9	4.5	5.0	5.1	4.1	2.7	2.5	23.7	-4.3
Agriculture-Livestock	1.9	0.8	0.7	1.0	0.8	0.8	0.7	0.7	0.7	0.7	0.6	-10.6	-7.4

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

Since there is no hydrocarbon production in the Northwestern region, demand is satisfied by foreign trade, through imports as well as land and sea transfers from the country's other regions. In 2007, almost 70% of regional demand was covered by imports, and the rest corresponded to regional domestic product flows. See figure 2.

Figure 2
LPG flows in the Northwestern region, 2007
(thousand barrels per day)



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

b) Northeastern Region

The Northeastern region consumed 43.5 tbd of LPG in 2007, representing 14.4% of the domestic total. This volume was 2.2% lower than the one registered the previous year, as seen in chart 10. In the last 10 years, demand has fallen by an average of 1.4% per year, turning the region into the one with the greatest variation at national level. Although many Pemex's LPG production facilities are located in this region, this fuel must be imported due to logistic reasons, since in some cases this option is more feasible than regional inputs coming from longer distances at higher costs to satisfy internal demand.

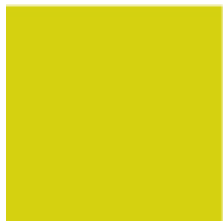


Chart 10
LPG sales by sector in the Northeastern region, 1997-2007
 (thousand barrels per day)

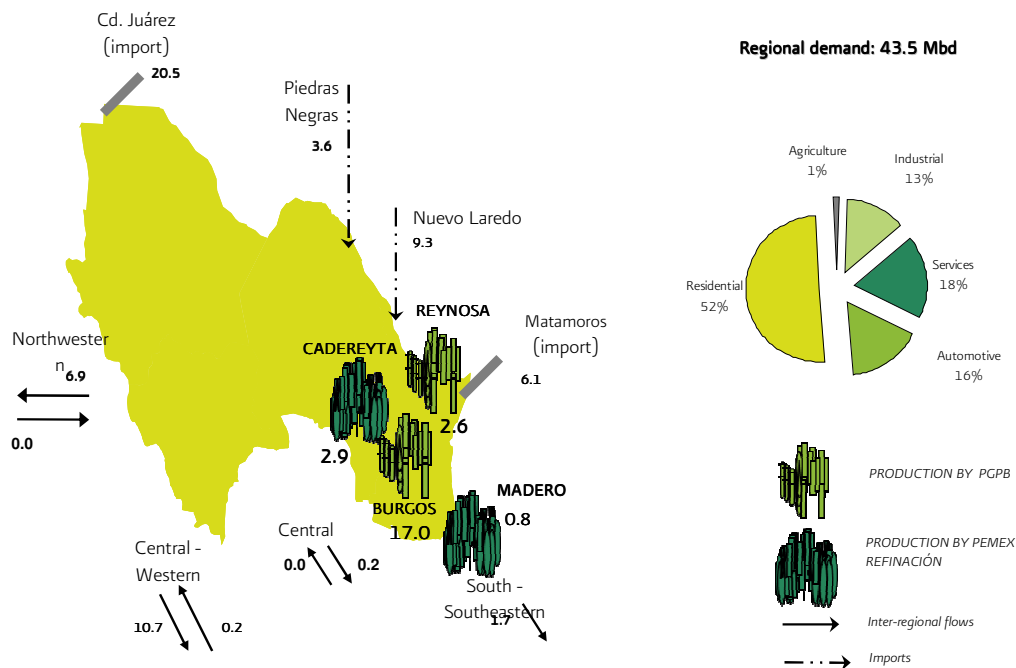
Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	50.1	48.5	51.3	54.3	52.0	53.2	51.3	51.3	47.5	44.4	43.5	-1.4	-2.2
Residential	31.2	30.5	31.8	29.4	28.3	29.4	28.0	27.9	25.9	22.5	22.0	-3.4	-2.2
Services	7.7	6.0	6.5	8.5	8.0	8.0	7.8	7.1	7.5	7.8	8.0	0.3	2.5
Industrial	6.8	5.4	6.0	6.1	4.8	4.8	5.1	5.0	4.7	6.0	5.8	-1.5	-2.8
Automotive transporta	2.6	4.1	4.9	8.8	9.1	9.4	8.8	9.9	8.2	7.3	7.0	10.4	-4.0
Agriculture-Livestock	1.8	2.5	2.0	1.6	1.9	1.6	1.6	1.4	1.2	0.8	0.6	-10.8	-27.0

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

The use of LPG as a fuel for cooking and water heating is still the first choice for this region, since the residential sector represents 50% of consumption. Although demand has decreased in real terms by an average 1.4% per year, both the services and the automotive transportation sectors have experienced growth in the last ten years when compared to 2007, with 0.3% and 10.4%, respectively. See figure 3.

This region possesses 8 of the 21 natural gas distribution zones of the country, which halts the expansion of LPG consumption not only in the residential but also in the services sector.

Figure 3
LPG flows in the Northeastern region, 2007
 (thousand barrels per day)



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

c) Central-Western Region

LPG is a well-established fuel in the Central-Western region, since 82% of the total of households use LPG for their energy-related needs; the main destination is the residential sector with 73%. See chart 11.

Chart 11
LPG sales by sector in the Central-Western region, 1997-2007
(thousand barrels per day)

Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	64.8	68.0	75.1	80.7	78.8	78.5	76.7	74.9	71.5	70.2	69.7	0.7	-0.7
Residential	52.1	53.3	55.1	55.8	55.6	55.6	54.8	53.9	51.0	51.6	50.9	-0.2	-1.3
Services	6.4	5.8	7.3	8.0	7.6	8.2	7.7	7.4	7.1	7.9	8.4	2.7	6.0
Industrial	3.4	4.4	4.1	4.7	4.1	3.9	4.0	4.0	3.8	4.2	4.4	2.6	5.9
Automotive transporta	1.8	3.4	7.1	10.4	10.1	9.1	8.3	7.5	7.4	5.3	4.6	10.1	-12.4
Agriculture-Livestock	1.0	1.2	1.5	1.7	1.5	1.7	1.9	2.0	2.3	1.2	1.3	2.7	10.6

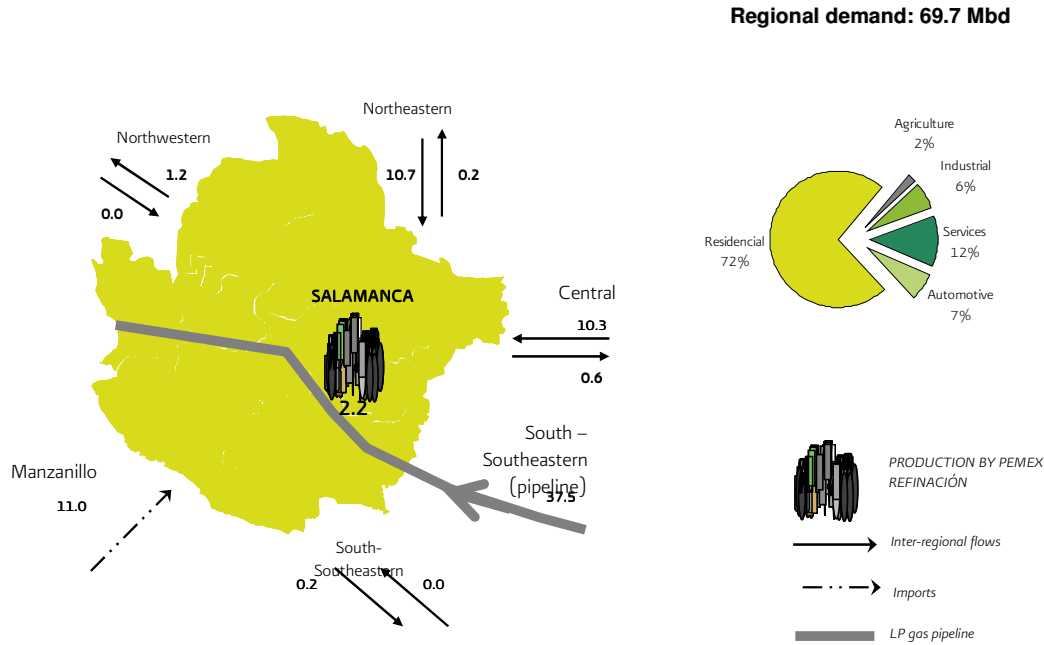
Source: IMP, based on data from Pemex and Sener.

In terms of supply, the region has the first refinery built in Mexico, located in the municipality of Salamanca, Guanajuato. Its contribution however only represents 3.1%, since the largest supply flow comes by land through the Cactus-Zapopan LPG pipeline, connecting LPG producing areas in the South-Southeastern region with the main consumption zones in the Central and Central-Western part of Mexico, representing 53.8% of the total regional. Imports through the maritime terminal of Manzanillo amounted to 1.1 tbd, that is, 15.8% of the region's demand.

Jalisco, Guanajuato and Michoacán states represent nearly two-thirds of the region's demand, since their consumption amounts to 48.6 tbd. See figure 4.



Figure 4
LPG flows in the Central-Western region, 2007
 (thousand barrels per day)



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

d) Central Region

The Central region is the largest LPG consumer in Mexico. Little over one-third of domestic consumption is represented by Estado de México, Puebla and the Federal District. This region concentrates the largest number of customers in terms of households and inhabitants, giving it significant potential.

Regional demand in 2007 amounted to 122.6 tbd, representing 35% of domestic consumption. In terms of sectors, the residential sector prevails in the use of LPG as fuel (63.8%), followed by the services sector (14.3%) and by the industrial and automotive transportation sectors; see chart 12. Nonetheless, the automotive transportation sector has represented the key alternative option in face of the extensive growth of the existing automotive market; hence its growth during the last 10 years has been 17.5%, representing an increase of 27.4% with respect to 2006.

Chart 12
LPG sales by sector in the Central region, 1997-2007
 (thousand barrels per day)

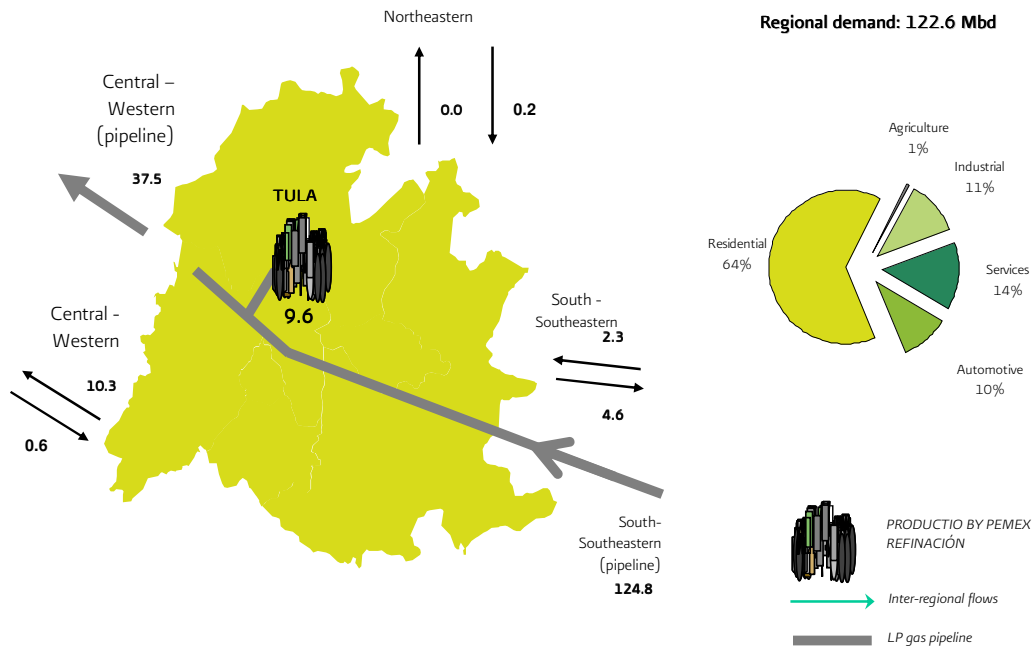
Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	103.6	108.5	118.3	123.2	123.8	129.3	128.9	130.8	126.3	124.6	122.6	1.7	-1.6
Residential	75.9	76.6	75.4	79.3	76.3	76.2	78.9	82.3	81.7	81.7	78.3	0.3	-4.1
Services	14.4	15.5	18.4	20.1	21.0	23.0	21.3	20.4	19.7	18.8	17.5	2.0	-6.9
Industrial	10.4	11.8	14.3	15.6	15.8	16.6	14.5	14.9	14.4	13.9	14.0	3.0	1.2
Automotive transporta	2.4	3.2	8.5	7.2	9.0	11.8	13.0	12.3	9.3	9.5	12.1	17.5	27.4
Agriculture-Livestock	0.6	1.4	1.8	1.0	1.7	1.6	1.2	0.9	1.2	0.9	0.7	1.4	-19.7

Includes: feedstock to the industrial sector.

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

Most of the LPG consumed in this region arrives through the pipeline coming from Cactus, Chiapas (124.8 tbd) and from the refinery in Tula, Hidalgo managed by PR (9.6 tbd). This supply is destined entirely to the Federal District's market, while the rest is sent to the Central-Western region. In this region, the industrial sector is an important destination of LPG, with sales concentrated in Estado de México and Hidalgo states. See chart 12 and figure 5.

Figure 5
LPG flows in the Central region, 2007
 (thousand barrels per day)



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

e) South-Southeastern Region

The South-Southeastern region is characterized by possessing the largest supply infrastructure on the domestic market. Only one-sixth of the total LPG production is kept in the region to satisfy energy needs, which in 2007 amounted to 45.2 tbd⁹.

This region also concentrates LPG imported through tankers that unload the product at the Pajaritos refrigerated maritime terminal. More than 70% of the production volume and imports, which in 2007 amounted to 194.1 tbd, was sent to satisfy demand in the country's other regions, mainly to the Central and Central-Western regions, through the Cactus-Zapopan LPG pipeline. See chart 13 and figure 6.

Chart 13
LPG sales by sector in the South-Southeastern region, 1997-2007
(thousand barrels per day)

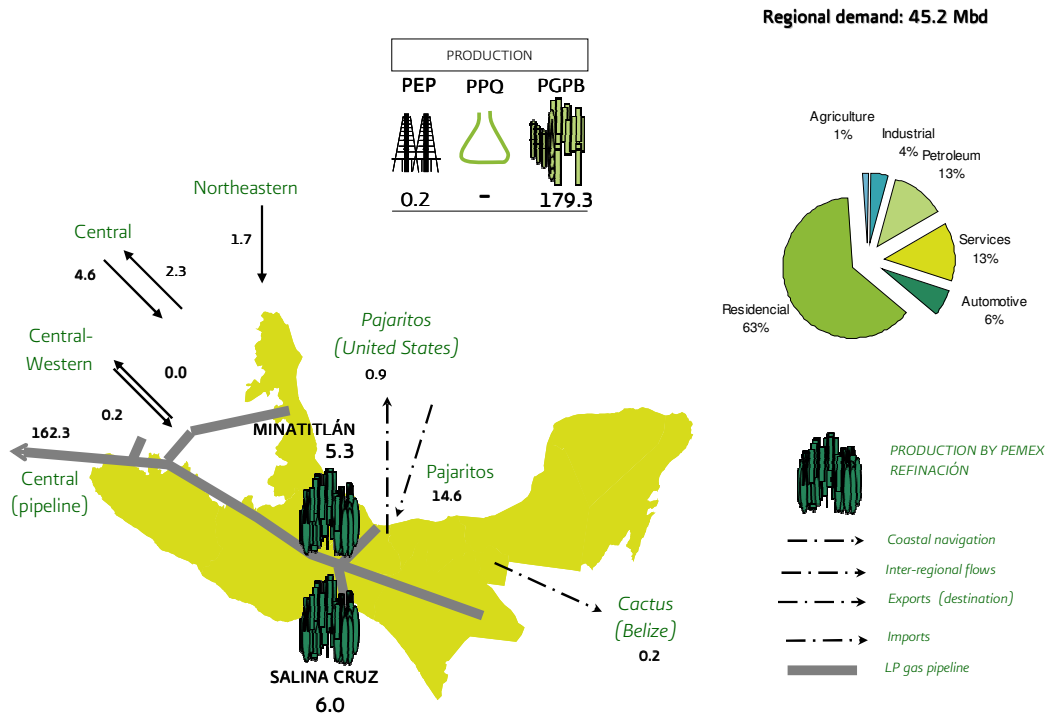
Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	33.6	35.0	38.3	42.5	41.6	42.4	42.1	42.3	40.9	40.1	39.5	1.6	-1.4
Residential	26.6	27.0	28.4	31.0	30.3	29.9	29.9	29.7	25.5	27.7	28.4	0.7	2.7
Services	4.9	5.2	5.1	6.2	6.0	5.6	5.0	5.0	5.3	6.3	6.1	2.2	-4.1
Industrial	1.5	1.4	1.6	2.2	1.7	1.7	1.7	1.9	2.9	2.1	1.8	1.7	-15.7
Automotive transporta ¹	0.5	1.3	3.0	2.8	3.3	4.6	5.1	5.1	6.4	3.3	2.7	17.3	-19.9
Agriculture-Livestock	0.1	0.1	0.2	0.2	0.3	0.6	0.3	0.6	0.8	0.7	0.6	20.9	-7.3

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

With an LPG production of 179.5 tbd in 2007, equal to 80% of the domestic total, the region is a main energy source which concentrates production and processing facilities of the national oil industry. As a result of this intensive activity, in 2007 5.7 tbd were used to meet the oil industry's requirements; being more than three-quarters of that volume iso-butane deliveries to PR for the production of products with high octane rating, whereas the rest was propane self-consumption, to be used as refrigerant at the industrial facilities of Pajaritos, Ciudad Pemex, Nuevo Pemex and Cactus, as well as at Pemex Petroquímica (PPQ) petrochemical complexes.

⁹ Considering the oil sector's self-consumption.

Figure 6
LPG flows in the South-Southeastern region, 2007
 (thousand barrels per day)



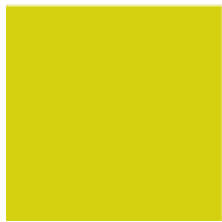
Source: IMP, based on data from Pemex and Sener.

1.1.4 LPG price evolution

A maximum price policy has been set since March 2003, implemented through decrees issued by the Federal Executive Power. This policy affects both MPV prices and final user sales prices. The decrees have undergone amendments in order to extend their term and to update the price scheme according to the most recent conditions within the industry.

An exception regime shall prevail during the decrees' term, substituting the regulating principles in MPV LPG price matters established in RGLP (LPG Regulation).

This policy shall be maintained until CFC issues the declaration on effective competition conditions on the LPG market in terms of article 7 of the Federal Economic Competition Law.



As mentioned in chapter II, the final user price of LPG is determined for each of the country's 145 distribution zones. Maximum LPG price is established according to the following formula:

$$PV_{UF}^{MAX} = PVPM + FLETE + MC + IVA$$

where:

I. MPV price (*PVPM*) is determined by CRE and is established according to the provisions of article one, fractions II and III, of the Decree on maximum first-hand and final user sales prices of liquefied petroleum gas, published on January 1st, 2007 in DOF.

II. Freight from the shipping center to storage plants for distribution (*FLETE*) are estimated transportation costs from shipping centers to the plants of distributing companies, determined by PEMEX.

III. Commercialization margin (*MC*) is determined by Sener and it considers the costs of a distribution plant, as well as the costs and expenses related to the distribution of the energy source and distributors' profits.

IV. Value Added Tax (*IVA*) according to each region in the country.

V. Maximum sales price of liquefied petroleum gas to final users (PV_{UF}^{MAX}), established by SE.

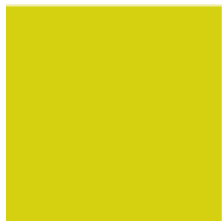
Chart 14
LPG price mechanism evolution, 2000-2008

Period	Price regulating entity	Applied criteria	Market situation
May 2000-February 2001	CRE (MPV price)	Price linked to Mont Belvieu. Mobile average of 3 months with a maximum monthly increase of 2%	16 price regions Free price
March 2001-June 2001	CRE (MPV price) Ministry of Economy (public sales price)	Constant regional Pemex Prices (MPV price). Maximum public sales price (constant)	16 price regions Public sales price managed by the regulating entity
July 2001	CRE (MPV price) Ministry of Economy (public sales price)	Price linked to Mont Belvieu in t-1 (MPV price). Maximum price (public sales price)	16 price regions Public sales price managed by the regulating entity
August 2001-February 2003	CRE (MPV price) Ministry of Economy (public sales price)	Price linked to Mont Belvieu in t-1 under FOB sales scheme for each Pemex supply terminal (MPV price). Maximum price (public sales price)	65 price regions Public sales price managed by the regulating entity
March 2003-December 2004	CRE (MPV price) Ministry of Economy (public sales price)	Decree setting final user sales price	MPV price subject to the methodology determined by CRE MPV price and public sales price managed by the corresponding regulating entity
January 2004-December 2005	CRE (MPV price) Ministry of Economy (public sales price)	Decree setting final user sales price	New MPV price methodology comes into effect, issued by CRE MPV price and public sales price managed by the corresponding regulating entity
January 2005-December 2005	CRE (MPV price) Ministry of Economy (public sales price)	Decree setting final user sales price	MPV price methodology based on mobile average of 12 months and increases between 0.75% and 1.75%. In November, the number of price regions increased to 145 MPV price and public sales price managed by the corresponding regulating entity
January 2006-December 2006	CRE (MPV price) Ministry of Economy (public sales price)	Decree setting final user sales price	New MPV price methodology comes into effect, issued by CRE RES/407/2005 National weighted average of final user sales price will increase on a monthly basis by 0.33% throughout the year MPV price and public sales price managed by the corresponding regulating entity
January 2007-December 2007	CRE (MPV price) Ministry of Economy (public sales price)	Decree setting final user sales price	New MPV price methodology comes into effect, issued by CRE RES/001/2007 National weighted average of final user sales price will increase on a monthly basis by 0.33% throughout the year MPV price and public sales price managed by the corresponding regulating entity
January - April 2008	CRE (MPV price) Ministry of Economy (public sales price)	Monthly decree setting final user sales price	Decreases establish that MPV prices and final user sales prices shall be determined in such as way as to create an average national weighted final user sales price increase of 0.032 pesos per kilogram, with respect to the national average weighted price of the preceding month MPV price and public sales price managed by the corresponding regulating entity

Source: Sener, based on data from CRE.

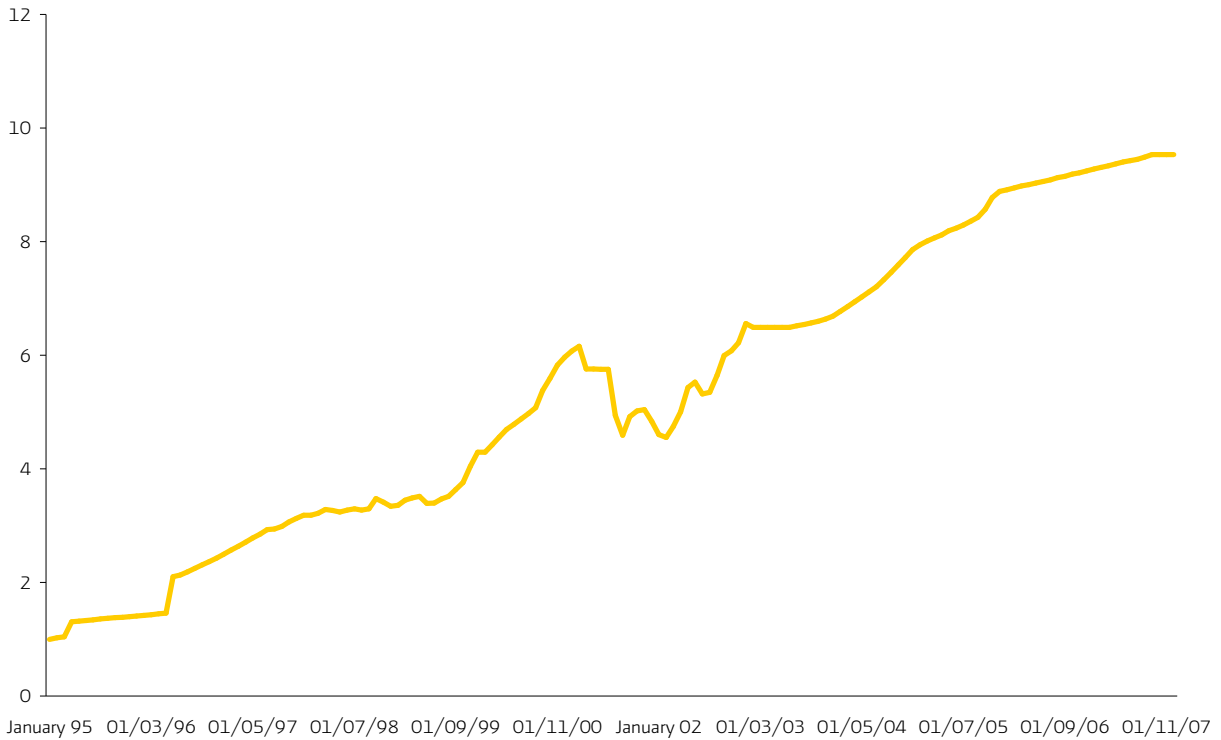
Since LPG is a basic commodity to Mexican families, its maximum prices are set through MPV and final user price decrees. Price policies directly affect LPG consumption, thus its control allows for stability in the selection of LPG as fuel.

From 1995 through February 2003, domestic nominal LPG price increased by a monthly average of 1.95%, but with the entry of the decree in March 2003 and until June 2007, average monthly increase was 0.72%. On the other hand, between 1995 and February 2003, domestic average weighted LPG prices registered an increase of approx. 550%, while as of the entry of the Decree and until the end of 2007, increase was 46.8%. See graph 12.



In 2007, consumer support through internal LPG price control represented an amount little over than 10 billion pesos, which is expected to increase substantially during 2008.

Graph 12
Nominal* LPG price to the public, 1995-2007
 (pesos per kilogram)



* The average of authorized prices

Source: Sener based on data from Pemex.

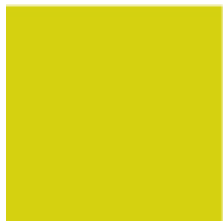
1.1.4.1 LPG and natural gas price comparisons

To compare the two most widely used gas fuels in Mexico, this section presents the different energy equivalences in terms of prices to allow for comparison by sector, considering their calorific values.

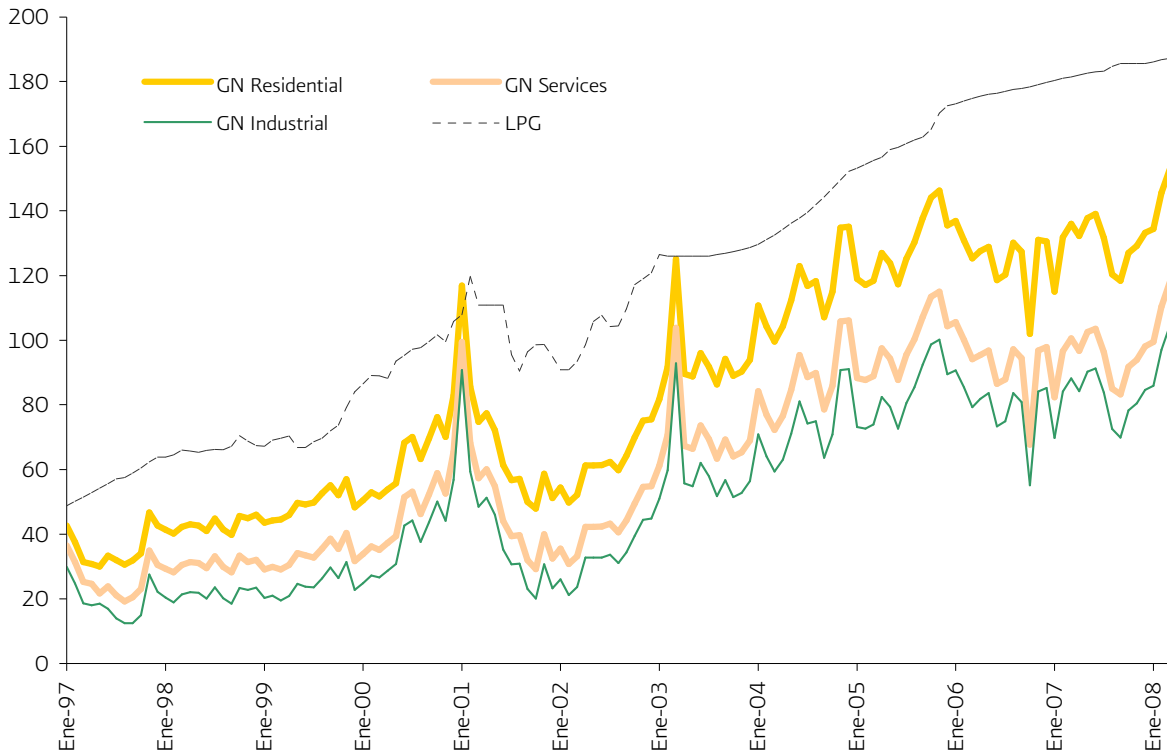
Preference levels within a sector for a specific fuel determine the usage intensity of the fuel in question. Therefore, competition and the substitution of LPG by natural gas are observed mainly in the residential sector. LPG has to face the growth potential of natural gas in geographic areas the latter is expanding its networks. The decision of using either depends mainly on supply infrastructure and on specific needs. See graph 13.

In terms of sectors, LPG price does not depend on a specific use or application, and has only one price. As opposed to this, the final price of natural gas varies by sector and the mechanism to determine price in Mexico incorporates the reference price in the south of Texas, making it more volatile in cases of fluctuations.

Average natural gas price in 2007 for the residential sector increased by 3% with respect to 2006 prices, reaching 129.3 pesos per Giga-calorie (pesos/Gcal). Average natural gas price for the services sector in turn reached 94.2 pesos/Gcal by the end of the period, representing an increase of 0.9% when compared to 2006. In 2007, natural gas price in the industrial sector was 81.5 pesos/Gcal, 63% lower than in the residential sector. Comparing LPG prices to consumers, in 2007 natural gas price for the residential, services and industrial sectors was 42%, 95% and 125% lower, respectively.



Graph 13
Natural gas prices by sector and LPG price to the public, 1997-2008
 (pesos per Giga-calorie*)



Note: Prices are only indicative as they correspond to estimates, considering a series of consumption-related assumptions in each sector.

*March 2008

Source: CRE.

1.2 Supply between 1997 and 2007

Reliable and efficient LPG supply is fundamental to cover the energy needs of Mexican economy. To fulfill this market, PGPB processes wet gas and the sour condensate produced by Pemex Exploración y Producción (PEP). In contrast, Pemex Refinación (PR) obtains LPG through oil distillation in refineries.

LPG characteristics in Mexico vary depending on domestic production and international supply. The type of gas reservoirs from which wet gas is produced, the composition of the extracted crude oil, the configuration and

complexity of production and processing facilities and the quality of imported international supply are some of the main factors that determine LPG's composition.

On the other hand, international composition of LPG considers a typical average mix consisting of 90% propane and 10% butanes (n-butane and iso-butane) called *HD-5*. According to the Gas Processors Association; the exact proportion of this combination varies by country, depending on international prices, on the availability of components and, especially, on the climatic conditions that favor LPG with higher butane content in warmer regions and propane in cold areas. LPG distributed in Mexico is usually composed of approximately 60% propane and 40% butane, with higher calorific values than those of other fuels, allowing for higher yield in its use.

Domestic LPG supply for 2007 consisted of gas processed by PGPB and PR, representing 73.2%, equivalent to 226 tbd. Imports in turn represented the rest of gas supply with 82.9 tbd, a figure that was 6.2 tbd higher than in 2006. Domestic production came mainly from natural gas processing and crude oil refining, with 88% from PGPB, and 8.7% from PR.

1.2.1 Supply evolution and structure

In 2007, LPG supply in Mexico amounted to 308.9 tbd, 3% lower than in 2006. The historical period between 1997 and 2007 registered a light increase of 0.7% as to available volume, resulting from a 10-tbd production decrease in PR. Production in PGPB increased by 22 tbd.

Both domestic production by PGPB and imports have shown similar growth dynamics between 1997 and 2007, since both grew by an annual average of 1.2%. However, when compared to levels reached in 2006, there was lower availability of production by PGPB, reflected in a 7.6-% decrease, and offset with more imports, which grew by 8.1%.

Although domestic production decreased by 15.8 tbd with respect to 2006, that is, by 6.5%, production by PGPB increased at an annual average rate of 1.2% in the last ten years, from 176.8 tbd in 2006 to 198.9 tbd in 2007. See chart 15.



Chart 15
LPG supply in Mexico, 1997-2007
 (thousand barrels per day)

Origin	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	287.0	303.3	328.2	349.6	334.4	337.5	332.6	339.6	320.7	318.5	308.9	0.7	-3.0
Production	213.5	226.1	234.4	228.9	234.6	235.9	247.2	255.0	247.8	241.8	226.0	0.6	-6.5
PGPB	176.8	195.9	201.2	203.6	205.5	204.7	212.1	224.9	215.4	215.3	198.9	1.2	-7.6
Refinación	36.6	30.1	33.1	25.2	29.0	31.2	34.7	28.9	31.4	26.1	26.8	-3.0	2.7
Petroquímica	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	n.a.	n.a.
Exploración y producción	-	-	-	-	-	-	0.5	1.2	1.0	0.3	0.2	n.a.	-28.4
Import	73.5	77.2	93.8	120.7	99.8	101.6	85.3	84.6	72.9	76.7	82.9	1.2	8.1

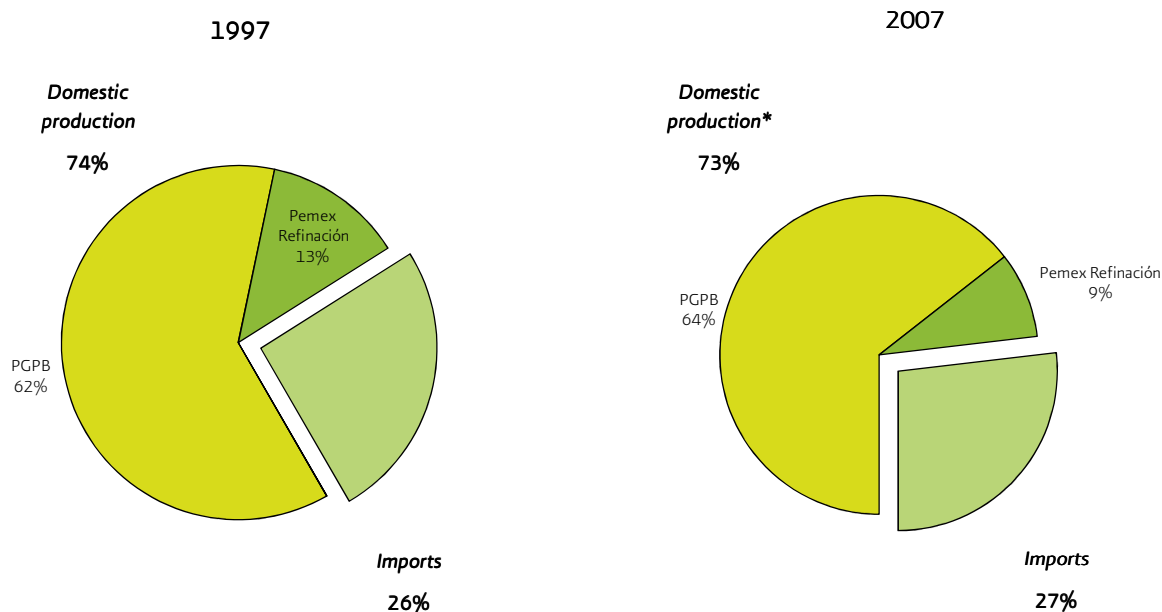
n.a.: does not apply

Source: IMP, based on data from Pemex.

The origins of domestic LPG supply suffered slight changes in the last years. While in 1997 its share in domestic production was 74% and the share of import was 26%, in 2007 these contributions were slightly modified, becoming 73% and 27%, respectively. See graph 14.

As mentioned above, LPG composition varies according to its origin. LPG produced at the Gas Processing Complexes (GPC) during the processing of wet gas consists mainly of propane and butane, together with small parts of lighter or heavier elements, such as ethane and pentane. In turn, LPG obtained at the refineries contains relevant amounts of olefins. Since the quality of both sources may vary considerably, Pemex blends different mixes in order to comply with official standards and offer homogeneous products across the country.

Graph 14
LPG supply origin in Mexico, 1997 and 2007



* Both years had marginal production: in 1997 by PPQ and in 2007, by PEP.

Source: Pemex.

Most of the domestic LPG came from the GPC of PGPB, which represented 88% in 2007, while PR contributed with 12%. PEP and PPO contributed marginal product amounts, coming from the Culebras field in Nuevo León and from the Coatzacoalcos petrochemical complex. See chart 16.

Chart 16
LPG production by PGPB, 1997-2007
(thousand barrels per day)

GPC*	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	176.8	195.9	201.2	203.6	205.5	204.7	212.1	224.9	215.4	215.3	198.9	1.2	-7.6
Burgos	-	-	-	-	-	-	-	6.3	9.9	14.5	17.0	n.a.	17.3
Cactus	44.7	37.8	46.4	42.2	41.7	43.9	45.7	48.8	40.2	45.0	35.5	-2.3	-21.2
Cangrejera	46.0	51.8	41.5	33.6	38.0	44.6	37.9	43.7	43.6	44.1	39.1	-1.6	-11.2
Matapionche	3.1	2.6	2.4	3.1	2.6	2.6	2.3	2.4	2.2	2.2	2.1	-3.9	-7.3
Morelos	49.3	44.6	37.2	44.5	42.1	40.8	48.8	41.2	42.1	46.3	41.8	-1.6	-9.6
Nuevo Pemex	27.2	53.4	67.7	73.9	74.4	65.1	68.9	75.7	70.4	57.8	57.8	7.8	0.1
Poza Rica	5.0	3.3	2.4	2.3	2.2	2.0	2.0	2.2	2.7	2.3	3.0	-5.0	29.0
Reynosa	1.4	2.5	3.6	4.1	4.4	5.8	6.6	4.5	4.4	3.2	2.6	5.9	-19.2

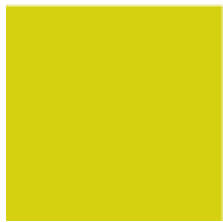
* Gas Processing Complex

Source: Pemex.

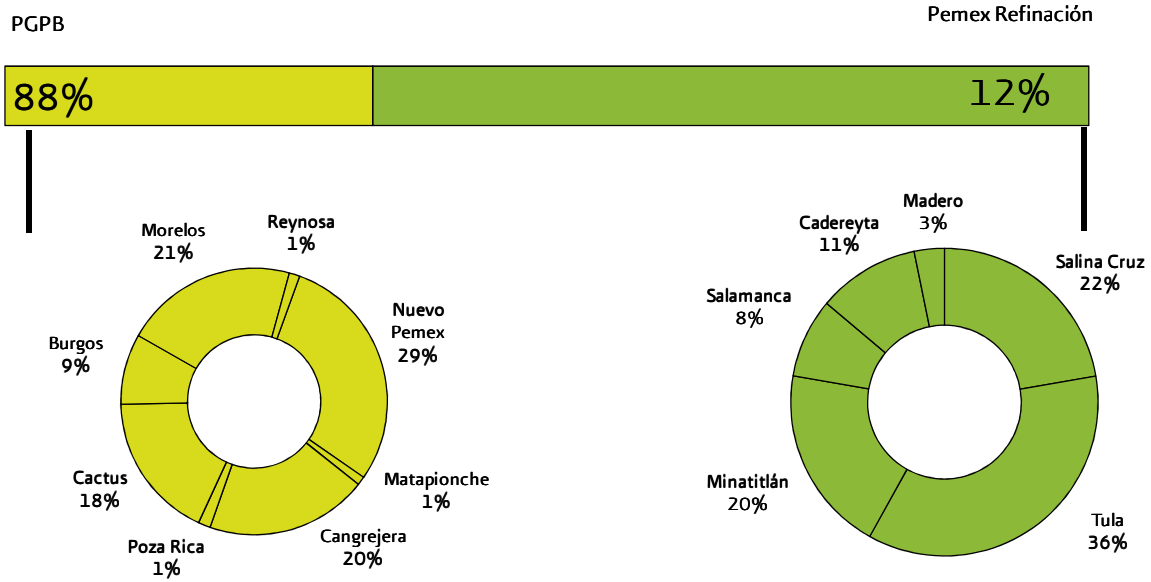
PGPB owns ten GPC for LPG production. Eight of them are located in the South-Southeastern region (Chiapas, Tabasco and Veracruz) and two in the Northeastern region (Tamaulipas). In 2007, GPC's in the South-Southeastern region concentrated almost 90% of PGPB's production, reaching 174.2 tbd.

Ciudad Pemex, Cactus and Nuevo Pemex are Pemex's largest complexes. They handle most (92%) sour gas sweetening processes; 85% of sweet gas processing (liquid recovery) and large part of sulfur recovery. As for condensates, almost all sweetening processes take place in the Cactus and Nuevo Pemex complexes, while large part of fractionating processes is carried out in Cactus, Nuevo Pemex and the Coatzacoalcos Area. Nuevo Pemex ranks first in contribution to domestic supply with 29.1% of the total, followed by Morelos, Cangrejera and Cactus with 21%, 19.7% and 17.8%, respectively. See chart 15.

The construction of modular cryogenic plants 5 and 6 of the Burgos GPC started in January 2007, at Station 19 in Reynosa. Each processing plant has a processing capacity of 200 MMcfd, which by the end of 2008 will allow for an infrastructure capable of processing, at this complex alone, 1,200 million cubic feet of sweet wet gas per day coming from the Burgos Basin. Investment takes place under the Pidiregas scheme and 422.2 million pesos have been spent so far.



Graph 15
Domestic LPG production composition by subsidiary and facility*, 2007



* Gas Processing Complexes of PGPB and Pemex Refinación refineries.
Source: Pemex.

During 2007, the total crude oil volume processed in the National Refining System (SNR) amounted to 1,269.8 thousand barrels per day, 1.1% less than in 2006. The factors explaining this variation in processed volume included delays in the dispatch of products due to adverse climatic conditions; lower quality of crude oil due to high sediment, water, salt and heavy metal content; operative issues at the 74 primary plants of the Madero and Salina Cruz refineries; high fuel-oil inventories, electric power supply failures in Minatitlán and gas supply issues resulting from assaults on gas and oil pipelines in Salamanca. These factors have led to lower LPG availability by PR in 2007.

The Tula refinery has contributed with the largest volume to LPG production in PR, representing 36% of the total, followed by Salina Cruz and Minatitlán with 22.3% and 19.7%, respectively. The joint LPG production of these three refineries represented more than three-quarters of the total volume produced by PR in 2008. Regarding 2007 levels, both the Salamanca and Salina Cruz refineries decreased their LPG production. See chart 17.

Chart 17
LPG production by Pemex Refinación, 1997-2007
(thousand barrels per day)

Refinery	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007	Var. % 2006-2007
Total	36.6	30.1	33.1	25.2	29.0	31.2	34.7	28.9	31.4	26.1	26.8	-3.0	2.7
Cadereyta	5.8	5.0	1.9	0.8	1.9	2.1	2.5	3.2	3.3	2.5	2.9	-6.7	17.7
Madero	4.4	3.3	3.9	2.4	0.9	0.2	1.4	1.3	1.3	0.4	0.8	-15.2	103.9
Minatitlán	3.1	4.3	7.2	5.6	8.3	6.9	6.5	5.0	6.5	5.0	5.3	5.3	4.7
Salamanca	3.8	2.9	2.2	2.4	2.5	3.3	3.5	3.3	3.8	3.3	2.2	-5.1	-31.6
Salina Cruz	8.6	4.3	6.5	5.9	5.3	6.5	8.4	8.9	8.3	6.6	6.0	-3.6	-9.6
San Martín Texmelucan	0.0	-	-	-	-	-	-	-	-	-	-	n.a.	n.a.
Tula	10.8	10.3	11.4	8.1	10.1	12.3	12.3	7.2	8.1	8.3	9.6	-1.2	15.4

n.a.: does not apply

Source: IMP based on data from Pemex.

1.2.2 Transportation

Servicing LPG to the domestic market is a highly complex task. PGPB is responsible for first-hand sales and uses different transportation means to carry the product from the production and import facilities to the six maritime and onshore distribution terminals operating in the country.

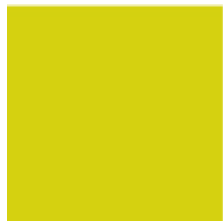
The transportation of hydrocarbon from production and import zones to consumption centers takes place through the national gas pipeline infrastructure, integrated by the National Gas Pipeline System of PGPB and private systems, in addition to tankers, semi-trailers, and bobtails owned by private companies.

Pipeline transportation systems represent 12,067 kilometers, and PGPB possesses 15 compression stations as well as five pumping stations. This infrastructure transports a daily average of 4,000 MMcfd of natural gas and 182 tbd of LPG.

As to LPG transportation pipelines, Mexico possesses a network of 1,835 kilometers. Currently, three main PGPB pipelines transport an average total volume of 235 tbd. The Cactus-Guadalajara pipeline, with a total extension of 1,231 kilometers, moves around 89% of the volume of the two main pipelines, more than 7.5% of which corresponds to the Hobbs-Estación Méndez pipeline. In 2007, 189.5 tbd were transported; this figure is 4.5% lower than that of 2006 due to the reduction of demand.

From these points, LPG is sent to the 858 private distribution plants. LPG is stored and distributed from there to final customers through bobtails and portable containers by delivery trucks.

In order to increase infrastructure in the benefit of consumers, in December 2007 commercial operations started on a 12-inch diameter 188-kilometer long pipeline that begins at the interconnection point between



Burgos and the pumping station in Reynosa, Tamaulipas, and ends at the delivery facility in Monterrey, Nuevo León, with a capacity to transport 30 tbd of LPG. This work includes a delivery terminal near Monterrey with a capacity of 40 thousand barrels (two 20-tb spheres) and eight filling devices. The "Burgos-Monterrey" System is the first LPG pipeline transportation system constructed by a private company in Mexico.

LPG transportation through pipelines is the most efficient means of transportation by land, since it is safer, implies lower costs, operates 24/7 and is capable of moving larger product volumes in shorter times. The 1,835 kilometers of the National Liquefied Gas System start in Cactus, Chiapas, crosses Tabasco, Veracruz, Puebla, Estado de México, Hidalgo, Querétaro and Guanajuato, and ends in Zapopan, Jalisco. Along the system there are 5 pumping stations with 20, 22 and 14-inch diameter lines.

Since the entry into force of the FOB mode (Incoterm: free on board) in Pemex first-hand sales, the transportation fleet has been expanded through private initiative. In 2007, almost 3 thousand semi-trailers and double semi-trailers were available with capacities of 45 thousand to 70 thousand liters for the transportation of large LPG volumes from Pemex supply terminals to the plants for its distribution to consumers.

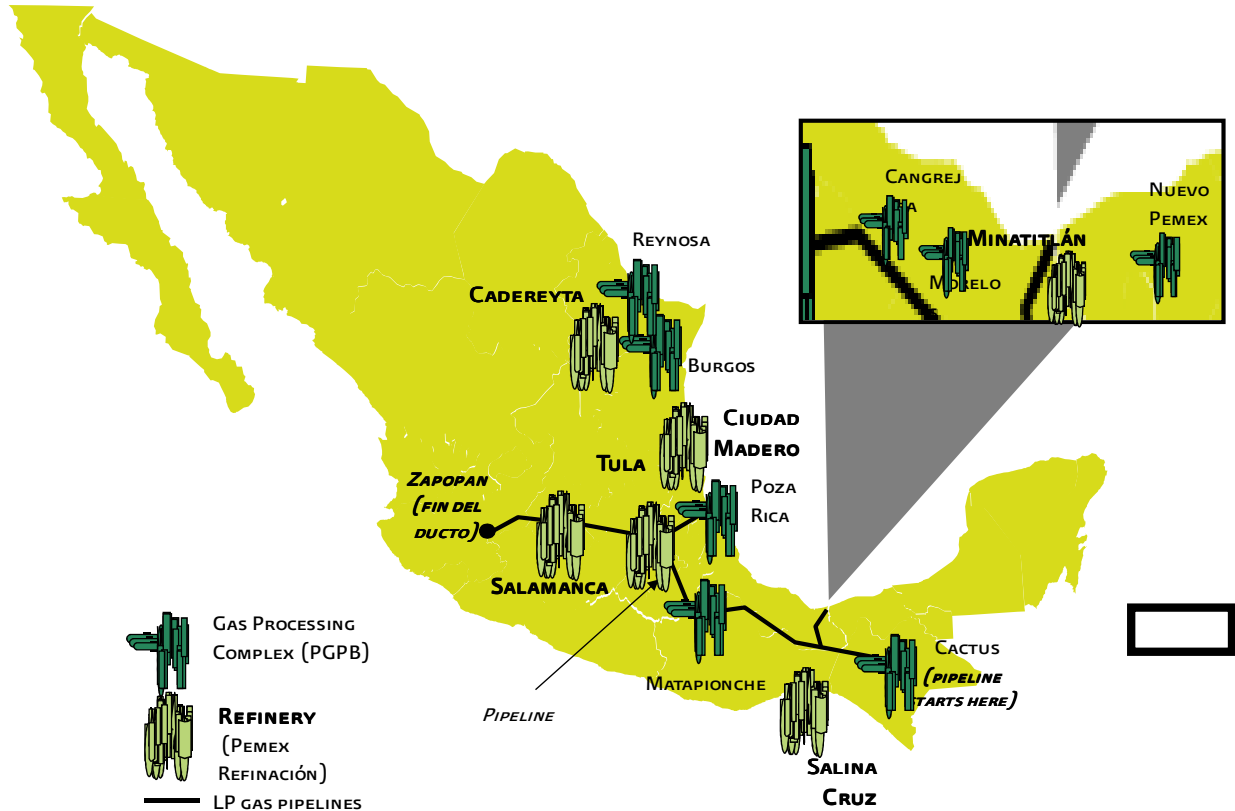
1.2.3 *Distribution*

LPG value chain starts with production, concentrated in the southeastern part of the country; continues with transportation through a liquefied gas pipeline network, to be sent to private distribution companies that finally deliver it to final customers.

LPG distribution network in Pemex extends from the Cactus processing center to Guadalajara, with branches connecting Pajaritos and with multiple connection points to Pemex distribution terminals. Manzanillo and Topolobampo are supplied by sea through tankers carrying imported product, and the remaining terminals are supplied through bobtails and tank trucks.

Figure 7 shows PGPB and PR production centers as well as the National Gas Pipeline System, conveying LPG from producing zones located in the South-Southeastern region to the supply terminals located in the main consumption areas of the Central and Central-Western regions.

Figure 7
Domestic LPG* production and National Gas Pipeline System, 2007
(thousand barrels per day)



*Does not include production by PEP or by PPQ.

Source: PGPB.

From the 31 supply terminals¹⁰ –maritime and land– operating in the country, LPG is supplied to private storage plants for later distribution to service stations for vehicle carburetion purposes and to other users through bobtails and delivery trucks with transportable containers (cylinders).

Figure 8 shows the 31 supply terminals that serve as destination to the Pemex production platform and imports through the private infrastructure of distributors. Coastal navigation along the Pacific coast is also included; since it is required to transfer LPG by sea from producing zones in the South-Southeastern region to the high-demand areas of the Northwestern region. See chart 18.

¹⁰ There are 30 distribution terminals, including the land terminal of Pajaritos and the sea terminal of Salina Cruz, undertaking first-hand sales.

Figure 8
LPG supply terminals in Mexico, 2007



Source: Pemex.

LPG from the terminals located in the Central-Western, Central and South-Southeastern regions is supplied through the pipeline running between Cactus, Chiapas, and Zapopan, Jalisco. As to the other terminals, located in the Northwestern and Northeastern regions, fuel is supplied mainly through imports either by sea or land.

Chart 18
Characteristics of supply terminals operated by PGPB, 2008

Region	Terminal	Product origin	Supply capacity (mbd)	Filling devices
Domestic			496	82
Northwestern			48	8
	Rosarito, B.C.	Imported by sea (not operating)	24	4
	Topolobampo, Sin.	Imported by sea	24	4
Northeastern			102	17
	Burgos, Tamps.	Burgos GPC	24	4
	Cadereyta, N. L.	Cadereyta Refinery	24	4
	Cd. Juárez, Chih.	Imported	36	6
	Reynosa, Tamps.	Reynosa GPC	18	3
Central-Western			108	18
	Abasolo, Gto.	LPG-pipeline	60	10
	Zapopan, Jal.	LPG-pipeline	48	8
Central			143	24
	Puebla, Pue.	LPG-pipeline	48	8
	Tepeji del Río, Hgo.	LPG-pipeline	60	10
	Tula, Hgo.	Tula Refinery and LPG-pipeline	36	6
South-Southeastern			96	15
	Cactus, Chis.	Cactus GPC	24	4
	Matapionche, Ver.	Matapionche GPC	12	2
	Pajaritos, Ver.	Cangrejera GPC and Morelos GPC	12	2
	Poza Rica, Ver.	Poza Rica GPC	24	4
	Tierra Blanca, Ver.	LPG-pipeline	24	3

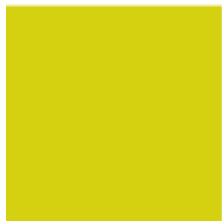
¹ Refrigerated terminal

Source: Pemex.

1.2.4 Storage

Storage is related to the first phase of the local LPG distribution chain, where the product is received. General confinement takes place in refrigerated tanks and cylinders or sphere-shaped steel tanks. Tanks may be underground, semi-buried or completely above the surface. All tanks are pressurized or refrigerated. Refrigerated storage keeps the product in liquid state under minimum pressure.

One of the risks in this type of practices is related to safety, as the LPG industry is subject to all types of risks, whose origin may be technical, as in faulty equipment at refineries, on board of vessels or in pipelines; or natural, as the uncertainty in reservoir prospection or climate-related phenomena. Bearing this in mind, Pemex has prepared a new sustainable development model that forms part of an institutional strategy. The model's objectives include compliance with environmental standards, elimination of unregulated environmental risks and ensuring the feasibility and sustainability of business plans.



In terms of infrastructure, the country possesses 26 distribution terminals owned by PGPB and 942 storage plants for distribution purposes, owned by private companies with national capital.

The nominal storage capacity of LPG supply terminals is 2,520 thousand barrels and 1,998 thousand barrels in terms of pumping. The refrigerated terminal in Pajaritos, Veracruz, possesses almost half of the country's storage volume. See chart 19.

The Northeastern and South-Southeastern regions concentrate little over half of the country's supply terminals. The concentration of LPG storage facilities in these areas is due to economic and logistic decisions directly related to the vicinity of hydrocarbon producing regions, as is the case of terminals in Veracruz and Tamaulipas.

Due to the seasonal nature of demand and price volatility, some countries have developed storage strategies for the entire year; in summer, they confine the product at facilities with a special design or underground, as demand and prices are low, and then use these reserves in the winter when consumption and prices increase. This practice allows for increasing supply certainty and maintaining constant production, regardless of the variations in sales, adding an economic benefit based on market development.

LPG storage reinforces the country's energy security, provides confidence to both distributors and consumers, and guarantees fuel supply in cases of contingencies affecting the supply scheme. In this sense, parallel to fuel distribution activities from production and import centers to consumption points, most distribution terminals and private distribution plants possess devices for the storage and confinement of fuel demanded in the country.

Chart 19
Storage capacity at LPG supply terminals, 2008

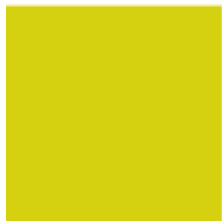
Region	Terminal	Pumping capacity (barrels)	Nominal capacity (barrels)
Domestic		1,803,008	2,278,760
Northwestern		352,000	440,000
	Rosarito, Baja California	192,000	240,000
	Topolobampo, Sinaloa	160,000	200,000
Northeastern		102,880	168,600
	Burgos, Tamaulipas	32,000	80,000
	Cadereyta, Nuevo León	36,000	45,000
	Cd. Juárez, Chihuahua	24,000	30,000
	Reynosa, Tamaulipas	10,880	13,600
Central-Western		101,200	126,500
	Abasolo, Guanajuato	2,400	3,000
	Salamanca, Guanajuato	42,800	53,500
	Zapopan, Jalisco	56,000	70,000
Central		227,600	284,500
	Puebla, Puebla	48,000	60,000
	San Juan Ixhuatepec, México	-	-
	San Martín Texmelucan, Puebla	32,000	40,000
	Tepeji del Río, Hidalgo	3,600	4,500
	Tula, Hidalgo	144,000	180,000
South-Southeastern		1,019,328	1,259,160
	Cactus, Chiapas	32,000	40,000
	Matapionche, Veracruz	8,928	11,160
	Pajaritos, Veracruz	8,000	10,000
	Poza Rica, Veracruz	24,000	30,000
	Refrigerada Pajaritos, Veracruz	920,000	1,135,000
	Salina Cruz, Oaxaca	2,400	3,000
	Tierra Blanca, Veracruz	24,000	30,000

Source: Pemex.

There are opportunities in Mexico for the expansion of current storage infrastructure through private investment, in order to secure timely supply, to manage demand in a better form, to decrease dependence on imports and to buffer the impact of international prices.

1.2.5 Delivery to consumers

LPG distribution to consumers is up to private Mexican companies with national capital. The infrastructure of permit-holders includes 858 storage plants for distribution purposes, whose capacities range between 145 barrels and 20.5 thousand barrels.



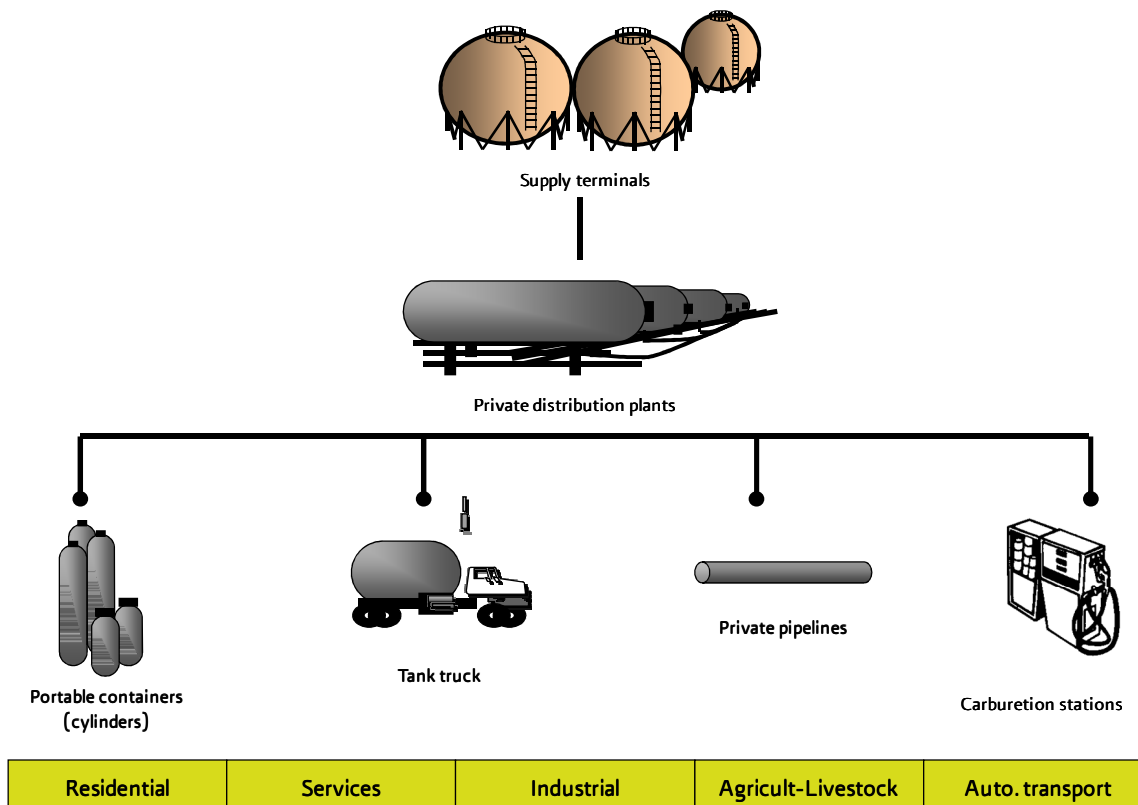
There are several practices to deliver the product to final users. A distributor usually handles the contact between LPG supply deposits and retail sellers. However, whole-sellers/suppliers may also directly deliver to customers. Distributors may be branches of whole-sellers/suppliers, or third party companies contracted by the latter.

LPG distribution to customers in the different sectors across the country is responsibility of legally constituted private distribution Mexican companies. To carry out their work, these permit-holders have an important logistic platform that in 2007 consisted in the following:

- 942 storage and distribution plants, operating under the current safety regulations and with storage capacities ranging between 7.6 and 3,407 thousand liters.
- 2,621 operating carburetion stations, 2,216 (85%) of which are dedicated to LPG sales to the public for carburetion purposes and 405 (15%) work under the self-consumption mode.
- More than 6,213 tank trucks with storage dimensions between 5,500 and 24,000 liters to dispatch LPG to bulk tanks, having the latter diverse storage capacities ranging from 100 to 5,000 liters.
- Almost 12,211 vehicles for the distribution of transportable containers with capacities of 10, 20, 30, and 45 kilograms.
- Approximately 2,789 semi-trailers and double semi-trailers with storage capacities from 25,500 to 47,500 liters, used mainly for the transportation of large LPG volumes from Pemex supply terminals to private distribution plants.

By the end of 2007, the preferred storage capacity of private permit-holders was 500 thousand liters with 132 LPG storage and distribution plants in that category, followed by 250 thousand liter storage capacity with 128 plants. From the total of operating plants, 43% had only one storage tank, 35% had two storage tanks and the remaining 22% was distributed between 3 and 19 storage tanks.

Figure 9
LPG distribution to consumers



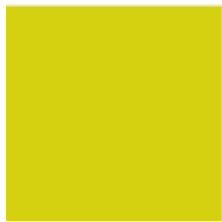
Source: Sener

1.3 Foreign trade between 1997 and 2007

In the last 10 years, Mexico's trade balance of oil-derived products presented a deficit. In 2007, it had a negative balance of 11,738.6 million dollars. LPG trade reflected the same trade deficit pattern. By 2007, Mexico had imported 82.9 tbd.

LPG imports increased at a rate of 1.2% from 1997 through 2007, reaching 82.9 tbd by the end of the period, 8.1% higher than in 2006. This behavior was the result of domestic production decrease by PR. Imports represented 36.7% of domestic production and 27% of internal sales, 15.7 and 9.6 percentage points higher than in 2006, respectively.

Exports levels in turn have decreased by 15.3% between 1997 and 2007. In terms of volume, exports have decreased by 4.3 tbd in the same period.



Land imports arrive from the United States and are moved by semi-trailers, bobtails and pipelines. Currently, LPG imports by land take place at different points along the US border, through pipelines located in Ciudad Juárez (Hobbs-Méndez) and in Matamoros (King Ranch, property of Penn Octane) to distribute the product to other parts of the country.

The origin of imports by sea is rather diverse, and depends on the available international supply. Imports by sea take place through two maritime terminals located on the Pacific coast and one in the Gulf of Mexico: Pajaritos, Topolobampo and Manzanillo.

Imports by sea in 2007 took place through strategically located terminals. The Pajaritos terminal represented 14.6 tbd, the largest terminal with a contribution of 46.3%, followed by the Manzanillo terminal with almost 35% and by the Topolobampo terminal with 18.9%. Exports reached a level of one thousand barrels per day in 2007. Cactus, Chiapas, registered the same volume as in 2006, i.e. 0.2 tbd, to Belize. The Pajaritos maritime terminal in Veracruz exported 0.9 tbd to the United States; this figure is one tbd lower than in 2006. See Figure 10.

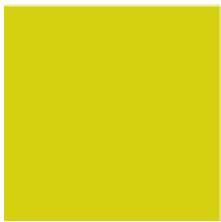
Figure 10
LPG's foreign trade in Mexico, 2007
(thousand barrels per day)



Source: Pemex.

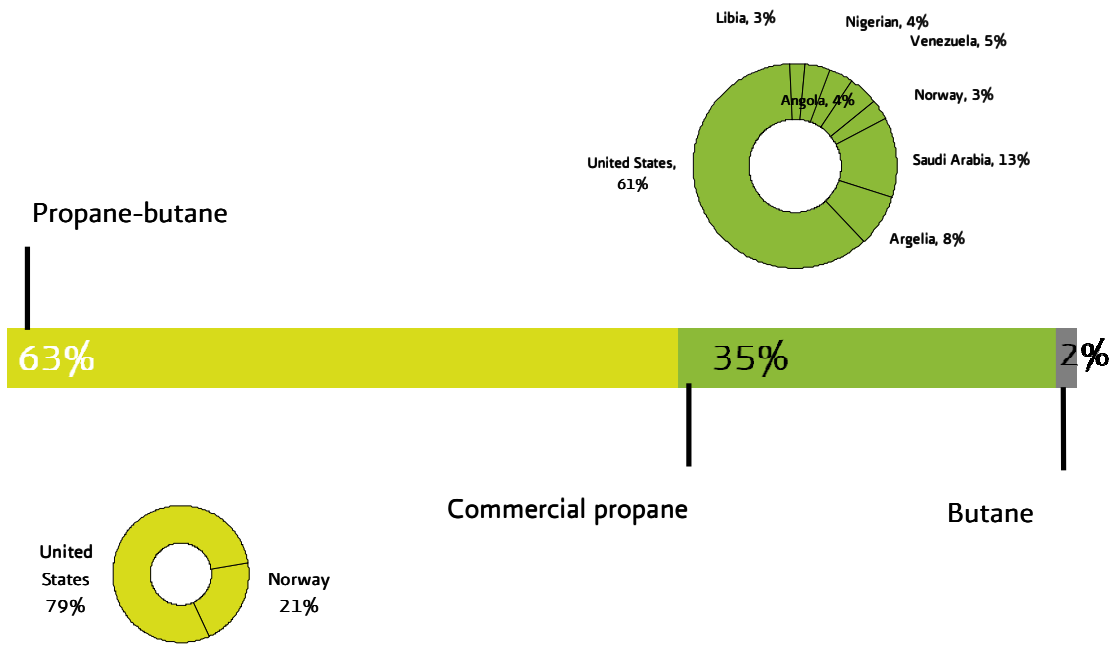
Usually, LPG supply on international scale is divided into four key products: butane-propane combinations, commercial butane, commercial propane and *HD5*.

Butane-propane combinations – commonly known as LPG – refer to products composed by a mixture of butanes and/or butylenes with propane and/or propylene; commercial butane is composed mainly by butanes and/or butylenes; commercial propane is integrated mainly by propane and/or propylene; and lastly, *HD5* is a hydrocarbon with more precise specifications than those of commercial propane, with a minimum volume of 90% propane and a maximum volume of 5% propylene. Due to its pureness and low pollutant emission levels, in countries like Australia and the United States *HD5* is the only LPG product authorized for use in vehicles with internal combustion engine.



Since imported fuel characteristics usually vary greatly from LPG produced in Mexico, they are combined to obtain a typical and homogenous blend. Graph 16 shows the composition of the product commercialized in 2007 by country of origin.

Graph 16



LPG imports by composition and country of origin, 2007

Source: Pemex.

Pemex is the sole authorized bulk LPG importer in Mexico and it is responsible for: ensuring LPG supply to meet domestic demand for customers, for absorbing financial impacts caused by reference price volatility, currency fluctuations, international contracts and logistic coordination of domestic supply that create disadvantages in implicit opportunity costs, by selling a product whose real price is higher.

1.4 Supply-demand balance between 1997 and 2007

PGPB has developed a distribution system based on the optimization of transportations costs, considering demand, production, imports and exports, allowing for the establishment of a supply-demand balance that guarantees the availability of the energy source in most Mexican households.

In the last 10 years, demand has exceeded supply, making imports necessary to meet the domestic market's needs.

In 2007, LPG's supply consisted of 73% domestic production and 27% imports. This ratio has been maintained throughout the period between 1997 and 2007, although 2005 was a year when less imports were required: only 23%. Demand in turn increased at a rate of 0.8%, being 2000, 2001 and 2002 the years with the highest demanded volumes.

As mentioned before, PGPB contributed the largest part of domestic supply and registered the greatest growth between 1997 and 2007, with 1.2%. The impact on LPG production caused by PR has decreased at an annual rate of 3.0%. See chart 20 and graph 17.

Chart 20
LPG's Domestic balance, 1997-2007
(thousand barrels per day)

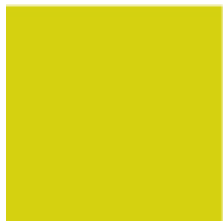
Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr 1997-2007
Origin	287.0	303.3	328.2	349.6	334.4	337.5	332.6	339.6	320.7	318.5	308.9	0.7
Internal supply	213.5	226.1	234.4	228.9	234.6	235.9	247.2	255.0	247.8	241.8	226.0	0.6
Pemex Gas y Petroquímica Básica	176.8	195.9	201.2	203.6	205.5	204.7	212.1	224.9	215.4	215.3	198.9	1.2
Pemex Refinación	36.6	30.1	33.1	25.2	29.0	31.2	34.7	28.9	31.4	26.1	26.8	-3.0
Pemex Petroquímica	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	n.a.
Pemex Exploración Producción	-	-	-	-	-	-	0.5	1.2	1.0	0.3	0.2	n.a.
Import	73.5	77.2	93.8	120.7	99.8	101.6	85.3	84.6	72.9	76.7	82.9	1.2
Destination	287.7	298.5	323.3	342.9	334.7	337.3	332.8	334.6	320.3	313.3	308.0	0.7
Internal demand	282.3	294.2	318.8	337.4	331.6	336.9	332.5	334.3	318.5	311.2	307.0	0.8
Agriculture-Livestock sector	5.4	6.1	6.2	5.5	6.1	6.3	5.7	5.5	6.2	4.2	3.8	-3.3
Automotive transportation sector	7.6	12.8	25.9	33.1	35.4	39.4	40.2	39.8	35.4	28.1	28.9	14.3
Industrial sector ¹	24.7	25.4	28.1	31.1	28.8	29.5	27.5	28.3	28.3	29.8	29.8	1.9
Oil sector	3.6	6.5	6.8	7.1	6.3	4.3	5.0	6.1	4.4	5.2	5.7	4.6
Residential sector	203.8	208.2	211.2	214.2	209.3	209.2	208.2	210.1	200.1	198.1	194.6	-0.5
Services sector	37.2	35.2	40.7	46.3	45.7	48.2	45.8	44.4	44.1	45.8	44.2	1.7
Export	5.4	4.2	4.5	5.5	3.1	0.4	0.3	0.2	1.8	2.1	1.0	-15.3
Inventory variation ²	- 0.7	4.8	4.9	6.7	- 0.3	0.2	- 0.2	5.0	0.4	5.1	0.9	
Note: Propane and butane volumes included in the industrial sector for consumption as feedstock.	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	7.8

n.a. does not apply

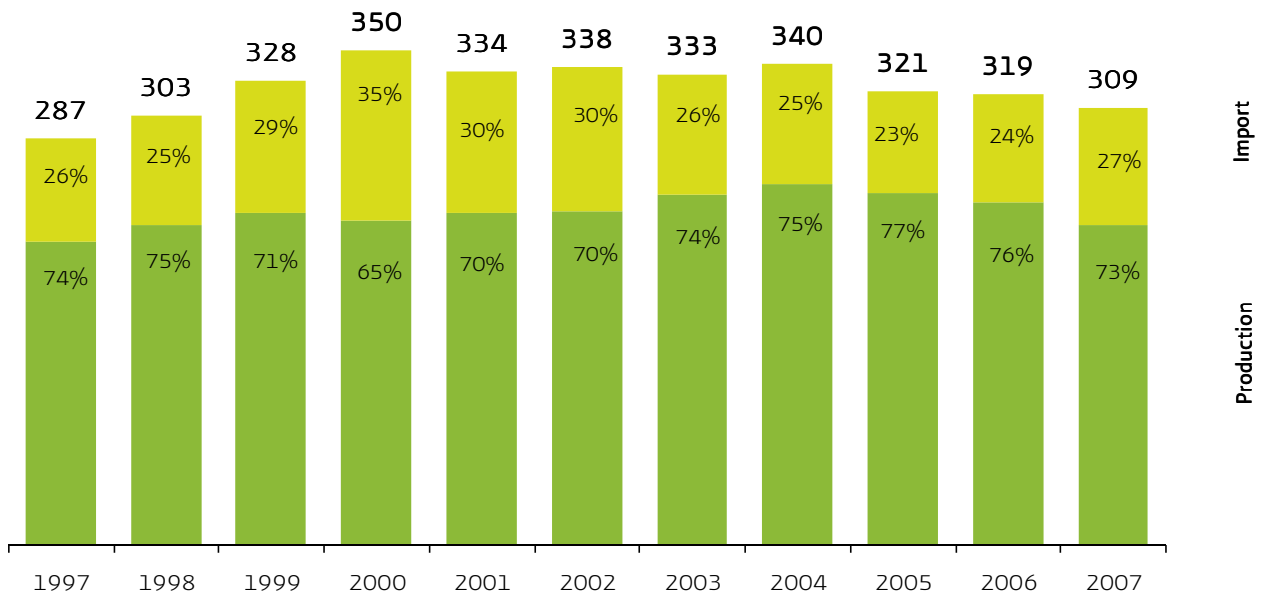
¹ Includes butane, iso-butane and propane sales of the Central region.

² Includes ships in transit, statistical differences and pipelines filling.

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



Graph 17
Mexico's LPG demand* supply structure, 1997-2007
(thousand barrels per day)



*Includes domestic demand, export and stock variations.

Source: Sener, based on data from Pemex and Sener.

LIQUEFIED PETROLEUM DOMESTIC MARKET OUTLOOK, 2008-2017

This chapter displays supply and demand trends for LPG domestic market for the next ten years and the main factors that may influence its evolution. Likewise, it shows the investment flow for this year, highlighting private investments on LPG which will help to invigorate the infrastructure development and broaden the range of supply services on the end-user behalf.

2.1 Demand 2007-2017

LPG domestic demand during 2007-2017 considers an average annual decrease of 0.4%, reaching 294.3 tbd at the end of the term. This behavior is mainly due to a drop in consumption by the automotive transportation sector, 17.7 tbd, displaying an annual decrease of 9%. The estimated demand will be focalized in the states of the Central region (an average of 40%), being the residential sector the largest demander with 66% of share (see chart 21).

Chart 21
LPG* Domestic demand by sector, 2007-2017
(thousand barrels per day)

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Total	307.0	303.4	302.1	300.8	299.3	298.3	297.5	296.7	295.9	295.1	294.3	-0.4
Residential	194.6	199.9	202.1	203.8	202.7	200.9	199.4	198.2	197.1	196.0	194.9	0.0
Services	44.2	43.4	43.4	43.5	43.4	43.3	43.2	42.9	42.5	42.0	41.5	-0.6
Industrial	29.8	28.3	28.9	29.6	30.3	31.1	31.9	32.5	33.1	33.9	34.7	1.5
Motor carrier	28.9	21.4	16.4	12.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	-9.0
Agriculture and livestock	3.8	4.8	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	4.2
Oil	5.7	5.5	6.3	6.4	6.4	6.4	6.4	6.4	6.3	6.2	6.3	1.1

*Includes propane and butane used as raw materials in the industrial sector.

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

The current expectations on LPG consumption changed in regard to those from the Outlook 2007-2016 (see figure 11); though these variations took place mostly within the residential sector, the main factors affecting this estimation according to each sector are as follows:

- Residential and Services Sectors: They display a downward trend in the long-term demand, due to the introduction of solar heaters and a better efficiency provided by the renewal of stoves and conventional boilers. In addition to this, Natural Gas (NG) is having more penetration, and firewood increases its competitiveness as a substitute.
- Automotive Transportation Sector: The scarce range expected from the LPG differential pricing, opposite to substitute fuels, will make that vehicle conversions impact its demand; this, due to its scarce financial advantage and economic convenience.
- Industrial Sector: There are expected variations over the relative prices of substitute fuels in regard to LPG, and also in the trend of the manufactured product – the industrial revenue measure.
- Agriculture and Livestock Sector: Its contribution to the economical growth has been – and it is expected to be – low.

Graph 11
Projections on the LPG domestic demand, 2007-2016 and 2008-2017
(thousand barrels per day)



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

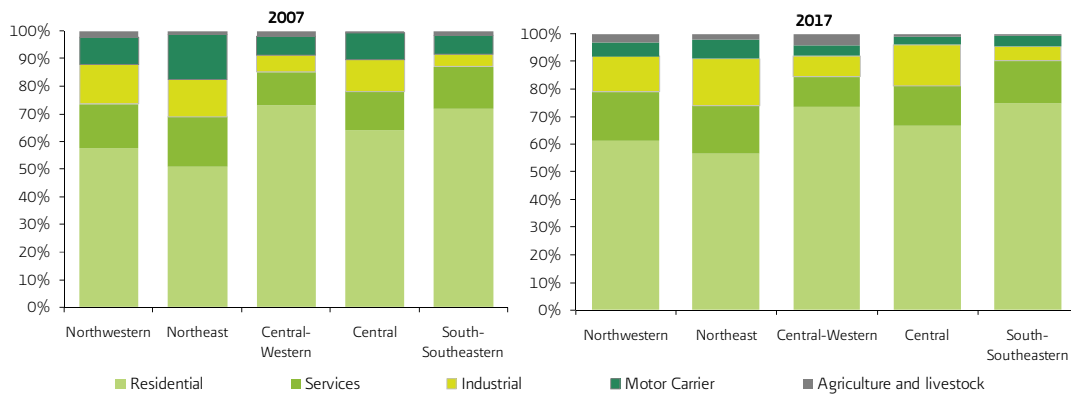
This estimation foresees LPG demand will have a sustained moderate decrease at a domestic level, 4.1% in regard to 2007 and a volume of 12.7 tbd less.

Residential sector will consume 68% of the sectorial's total (not considering oil sector). Nevertheless, during 2007-2017 it is expected that all regions will reduce their consumption; the Northern one will have the largest drop at a regional level (6.3 tbd), and the automotive transportation sector from the Central region, the highest sectorial impact (8.6 tbd).

In spite of domestic demand's decrease, it is expected that the ZMVM (Metropolitan Zone of Mexico's Valley) industrial sector will increase LPG consumption causing thus, that the Central region will grow 27% (3.8 tbd). Within the next ten years, the sectorial configuration of LPG demand will change in each region, as it can be appreciated on graph 12.

The demand's regional distribution will be affected mainly by the dynamism expected from NG in many cities; hence, LPG domestic consumption within the residential sector will be less dynamic, especially in the North. This will not happen in the South-Southeastern region, where LPG is still displacing other energy sources; in contrast, Northeastern and Northeastern will increase their LPG share by the end of the term.

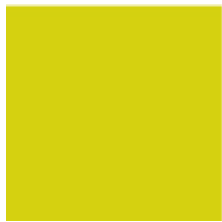
Graph 12
Regional distribution of the LPG domestic demand, 2007 and 2017



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

The Central region will still be the largest consumer, since the states forming the ZMVM will require more than one third of the total consumption – 101.5 tbd - by 2017. This raise is mainly due to a growth in the real-estate market, and to a replacement of products for ones using LPG.

On the other hand, the Central-Eastern region will be second in the domestic demand, with nearly the fourth part of the national consumption by the end of 2007. Likewise, the North will show a similar behavior: 21.9% of share, reaching 63.3 tbd by the end of the term.



It is worthwhile mentioning that in the South-Southeastern region it is expected a zero growth in the domestic market, prevailing a decrease at short and mid-term, and recovering from 2014 on with a similar demand levels as those from 2007; this, mainly due to the stationary consumption of some states within that region, specially Veracruz, one of the main consumers at a regional level.

In general terms, LPG consumption will be tightly linked to housing occupancy, concretely in those states with growing urban needs for the last years. In fact, Distrito Federal and Estado de Mexico trade most of the segments of urban housing, given the commuting and remoteness problems their population has to deal with.

Estado de Mexico will need nearly 20% of the domestic total (55.9 tbd) by 2017, becoming the main consumer. In comparative terms, this consumption is larger than the ones of the Northwestern, Northeastern and South-Southeastern regions, which represents 32%, 31% and 29%, respectively; Mexico City will consume 28.7 tbd in 2017, one tenth of the domestic total and being second in consumption by federal entity.

Chart 22
LPG Domestic sales by region and federal entity, 2007-2017
(thousand barrels per day)

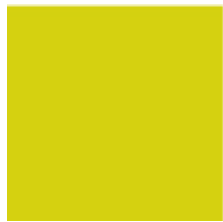
Region / State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
National	301.3	297.8	295.8	294.4	292.9	291.9	291.1	290.3	289.6	288.9	288.0	-0.4
Northwestern	26.1	24.4	24.3	24.3	24.4	24.5	24.7	24.8	24.9	25.0	25.0	-0.4
Baja California	11.3	10.2	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.6	10.6	-0.7
Baja California Sur	1.9	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	-1.0
Sinaloa	6.0	5.5	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.6	5.6	-0.7
Sonora	6.9	7.0	7.0	6.9	6.9	7.0	7.0	7.1	7.1	7.1	7.1	0.4
Northeastern	43.5	43.5	42.2	41.1	40.3	39.7	39.3	39.0	38.5	38.4	38.3	-1.3
Coahuila	8.8	8.5	8.1	7.9	7.8	7.8	7.8	7.8	7.9	7.9	7.9	-1.1
Chihuahua	12.2	12.1	11.4	10.8	10.4	10.2	9.9	9.8	9.6	9.5	9.4	-2.6
Durango	3.5	3.9	3.9	4.0	4.0	4.0	4.0	4.1	4.1	4.1	4.1	1.6
Nuevo León	9.3	10.5	10.4	10.3	10.0	9.8	9.5	9.3	9.1	9.0	9.1	-0.3
Tamaulipas	9.6	8.5	8.3	8.1	8.0	8.0	8.0	7.9	7.9	7.9	7.8	-2.0
Central-Western	69.7	68.7	68.4	68.1	67.8	67.4	67.1	66.9	66.6	66.4	66.1	-0.5
Agascalientes	3.4	3.6	3.5	3.4	3.3	3.3	3.3	3.2	3.2	3.2	3.2	-0.8
Colima	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	-0.1
Guanajuato	13.7	13.4	13.3	13.2	13.1	13.0	12.9	12.8	12.8	12.7	12.7	-0.8
Jalisco	23.5	23.0	22.9	22.8	22.7	22.4	22.2	22.0	21.8	21.6	21.4	-0.9
Michoacán	11.4	11.4	11.5	11.6	11.6	11.7	11.7	11.7	11.7	11.8	11.8	0.3
Nayarit	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	-0.9
Querétaro	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	-0.2
San Luis Potosí	5.5	5.4	5.4	5.3	5.3	5.2	5.1	5.1	5.1	5.1	5.1	-0.9
Zacatecas	4.5	4.6	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.8	4.8	0.6
Central	122.6	122.3	122.0	121.8	121.4	121.0	120.6	120.3	120.0	119.7	119.2	-0.3
Distrito Federal	30.8	30.9	31.1	31.2	30.9	30.5	30.1	29.8	29.4	29.1	28.7	-0.7
Hidalgo	12.2	12.2	11.9	11.6	11.6	11.7	11.8	11.8	11.9	12.0	12.0	-0.2
México	56.7	56.8	56.6	56.5	56.4	56.3	56.3	56.2	56.1	56.1	55.9	-0.1
Morelos	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	0.4
Puebla	16.1	15.4	15.4	15.4	15.4	15.4	15.3	15.3	15.3	15.4	15.4	-0.5
Tlaxcala	4.5	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	0.8
South-Southeastern	39.5	39.0	39.0	39.1	39.1	39.2	39.3	39.4	39.5	39.5	39.5	0.0
Campeche	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	-0.1
Chiapas	5.2	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	0.6
Guerrero	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	0.4
Oaxaca	4.4	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.3	4.3	4.3	-0.2
Quintana Roo	3.0	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	-0.8
Tabasco	3.6	3.4	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	-1.4
Veracruz	15.4	15.3	15.3	15.4	15.4	15.4	15.5	15.5	15.5	15.5	15.5	0.1
Yucatán	3.5	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	0.7

Residential Sector

Within this sector, LPG demand will remain constant; although there are some changing factors marking this behavior at the long term and which are mainly fostered by residential-energy saving, like the introduction of alternative energy schemes – solar panels – and shifts in consumption habits.

Likewise, the regional composition of the demand will not display meaningful changes; the Central region will still require most of the demand, which is intended to be of 79.7 tbd by 2017. Central-Western's will be second, in spite of having the largest regional decrease (-0.4% annual growth), a fourth of the total, reaching 51.2 tbd by the end of the term.

In housing, the significance of fuels' aggregated consumption lays over the election of water heating and cooking systems, whether it is LPG, NG, electric or solar energy. This election is given in accordance to family budget, system cost, fuel price and the current infrastructure.



Through the years, LPG has had many advantages over other fuels, being strongly rooted into Mexican houses due to its adaptability, portability and affordable price. Nowadays, NG penetration has deeply affected LPG consumption, since many urban complexes – through collaboration covenants leading to construction and designing of NG networks – have adopted this fuel decreasing thus LPG growth expectancies in zones where that infrastructure already exists or it will be introduced.

Nonetheless, Mexican homes have meaningful geographic and socioeconomic differences; this, in addition to population growth and urban development will make that LPG market display a strong potential replacement within the next years. Likewise, the search of new niche markets, along with its introduction to areas that are not currently supplied, and the regional economic development will keep housing as one of the main promoters of LPG consumption.

On the other hand, the enhancement of promotional schemes for LPG profiting in boilers and stoves, fosters an energy-saving culture that will make LPG consumption more efficient.

The replacement and complementarily of LPG for conventional fuels – mainly firewood – is an important factor for the future development of its domestic market. Within rural areas, and in spite of the difficulty to transport this fuel, its price, and stoves' and boilers' cost, LPG will remain as a viable option in terms of environmental, economical and social benefits.

There are various projects – based upon developmental research¹¹ - for replacing firewood stoves for LPG's in urban and rural areas; with this, it is expected that LPG will gradually increase its share on homes that still use firewood as a fuel. This replacement will bring, along with environmental benefits, economic and social ones, too. On one hand, it will avoid deforestation and CO₂ emissions due to firewood burnt and reducing hence the possibilities of acquiring respiratory diseases for inhaling smoke; on the other hand, people will use their time more efficiently not having to collect firewood.

The Liquefied Petroleum Gas Regulation (RGLP) broadens LPG distribution by introducing transportable containers which help conveying this fuel under better safety and ergonomic conditions and providing the end user with the weight and dimensions needed to handle it properly and the possibility to buy it at commercial establishments. This will make LPG accessible to rural areas and, in such way, improve their life quality.

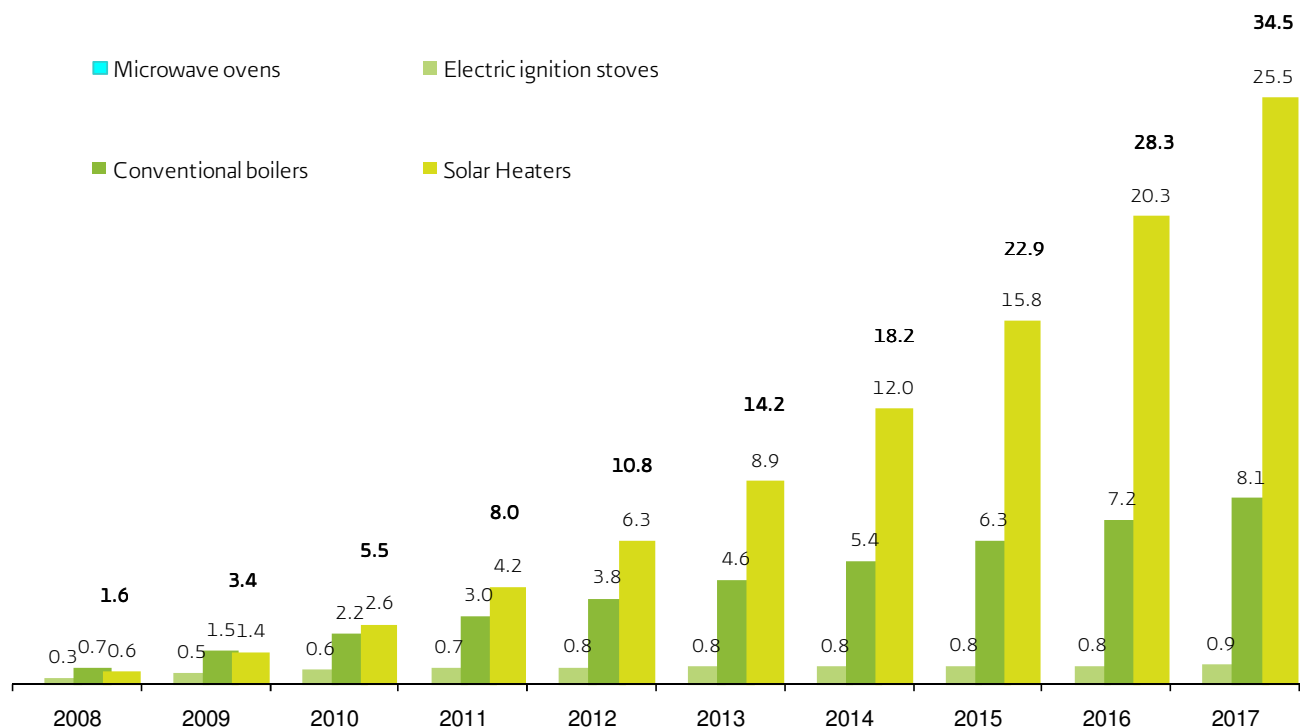
In 2007, the National Commission for the Efficient Use of Energy, along with the German Technical Cooperation Agency (GTZ for its initials in German), and the Solar Energy National Association (ANES)

¹¹ These investigations are being made by private and governmental organisms and study environmental and health implications on using firewood as a fuel.

designed and established the “Program for Promoting Water-Solar Heaters in Mexico” (Procalsol) which seeks to broaden, profit and diversify energy sources in Mexico.

This program encourages solar heating in various sectors – mainly the residential one – pointing out those options that offer more social profit. For that reason, this sector’s LPG estimation, aside of considering this technology, incorporates technical advances on conventional boilers, replacement of pilot-flame stoves for electronic-ignition ones, and displacing LPG for electricity through the use of microwave ovens (see graph 13).

Graph 13
LPG savings in the residential sector by kind of equipment, 2008-2017
(thousand barrels per day)



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

The premises considered for this LPG estimation are:

- Replacing firewood for LPG, mainly in rural areas where the access is difficult.
- Continuum of LPG retail prices, and an average economic growth of 3.5% during 2007-2017.
- An expected growth housing/state of 0.73%.

- Replacing LPG for NG where available; it also considers the area of Cuernavaca.

In contrast, the Northeastern and Central-Western regions will decrease 0.2% and 0.4%, respectively, given to the improvement of technological efficiencies in boilers and kitchen stoves, and a low growth of regional population (see chart 23).

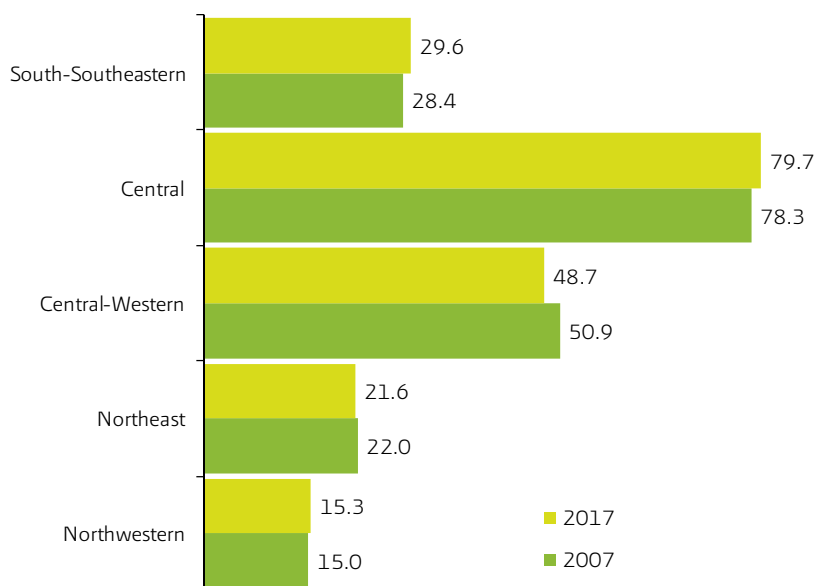
Chart 23
LPG regional emand in the esidental ector, 2007-2017
(thousand barrels per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	194.6	199.9	202.1	203.8	202.7	200.9	199.4	198.2	197.1	196.0	194.9	0.0
Northwestern	15.0	14.7	15.0	15.2	15.3	15.3	15.3	15.3	15.3	15.3	15.3	0.2
Northeast	22.0	25.0	24.8	24.7	24.0	23.4	22.9	22.5	22.0	21.8	21.6	-0.2
Central-Western	50.9	50.1	50.7	51.1	50.9	50.4	50.0	49.7	49.3	49.0	48.7	-0.4
Central	78.3	81.8	82.7	83.4	83.0	82.3	81.8	81.3	80.8	80.3	79.7	0.2
South-Southeastern	28.4	28.3	28.9	29.4	29.5	29.5	29.5	29.6	29.6	29.6	29.6	0.4

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

As it was mentioned above, the Central region will remain as the main consumer of this fuel, followed by the Central-Western which will show a minimum setback in its consumption level. The North-Eastern region – where NG is its main competitor – will display a little reduction by 2017, whilst the Northwestern and South-Southeastern ones will slightly increase their consumption (see Graph 14).

Graph 14
LPG regional demand in the residential sector, 2007 and 2017
(thousand barrels per day)



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

Services Sector

This sector will remain second in LPG consumption; its demand by 2017 will be of 41.5 tbd, decreasing annually 0.6% during the term. The Northeastern region will have the largest growth, 0.5%, and a volume of 4.4 tbd by 2007.

The intensive use of LPG within this sector lays in the specific applications of restaurants, hotels, hospitals, public bathrooms, kitchens, laundries and dry-cleaners¹². LPG savings entail a better management of the profits representing 8 tbd by 2017 in the use of conventional boilers and solar heaters.

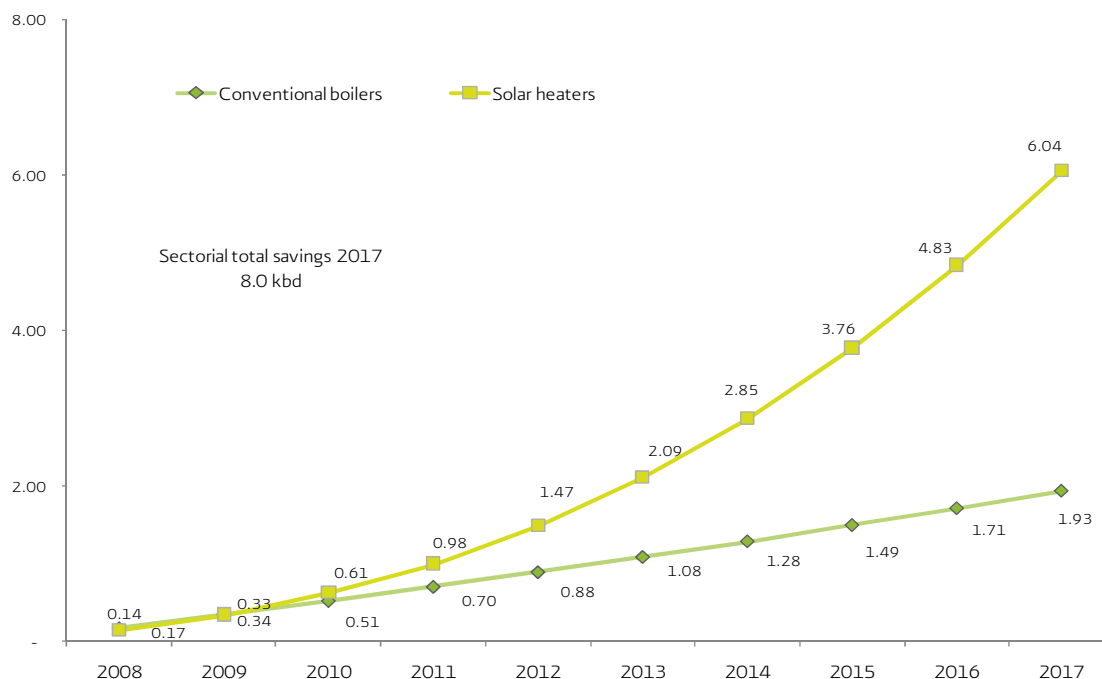
Within this sector there are some businesses which cannot replace non-fossil fuels like firewood or coal (like some restaurants or shops selling spit-roasted chickens), since their commercial offer depends on the savor this fuels give to their food, and LPG cannot replace them.

¹² Since 2006, Mexico City established an environmental regulation to profit solar energy for heating water (NADF-008-AMBT-2005), which represents savings of LPG.



In Graph 15 it can be appreciated that solar boilers will have the largest LPG savings (6 tbd by 2017); the steadiness in replacing conventional gas boilers will contribute with 1.9 tbd. This substitution process will be slow, since conventional equipments have been used for years and their updating is gradual. Besides, solar heater’s development has been very recently introduced to the hydrocarbons’ savings market.

Graph 15
LPG savings in the services sector by kind of equipment, 2008-2017
(thousand barrels per day)



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

For the regional demand it is expected that Northwestern and South-Southeastern regions will display growth rates of 0.5% and 0.1%, each, due to a continuing expectation of NG penetration.

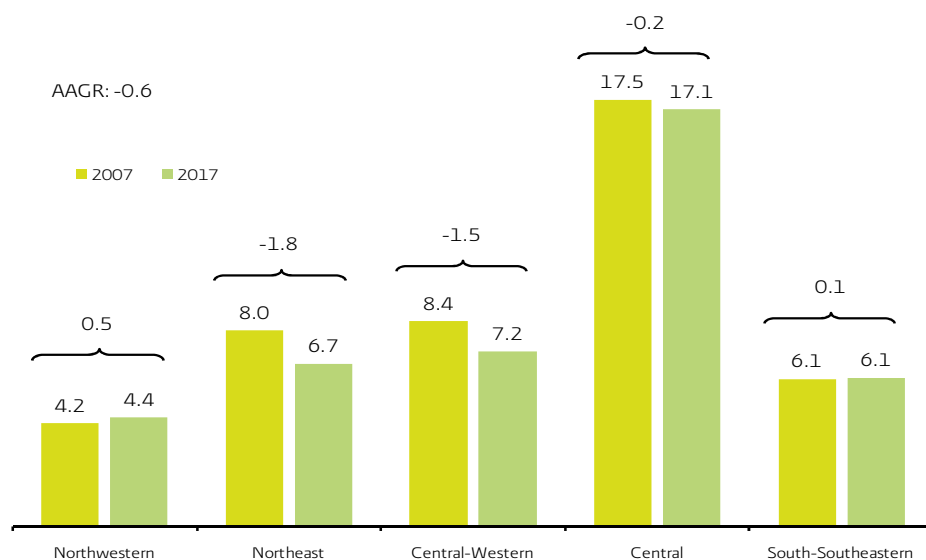
In contrast, Northeastern, Central-Western and Central regions will show decrease rates of -1.8%, -1.5% and -0.2%, respectively. This is due to NG penetration in most of the states of those regions, as well as the improvement of the equipment using this fuel and the introduction of solar heaters (see chart 24 and Graph 16).

Chart 24
LPG regional demand in the services sector, 2007-2017
(thousand barrels per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	44.2	43.4	43.4	43.5	43.4	43.3	43.2	42.9	42.5	42.0	41.5	-0.6
Northwestern	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.4	4.4	0.5
Northeast	8.0	7.6	7.5	7.4	7.3	7.2	7.1	7.0	6.9	6.7	6.7	-1.8
Central-Western	8.4	7.5	7.6	7.6	7.6	7.5	7.5	7.4	7.4	7.3	7.2	-1.5
Central	17.5	18.2	18.2	18.2	18.2	18.1	18.0	17.8	17.7	17.5	17.1	-0.2
South-Southeastern	6.1	5.8	5.9	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	0.1

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

Graph 16
LPG regional demand in the services sector, 2007 and 2017
(thousand barrels per day)



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

Automotive Sector

The estimated demand for automotive transportation sector will be of 113 tbd, 39% less in respect to 2007. For the second consecutive year, there will be a drop in the estimated demand confirming thus the historical trend displayed for more than five years.



Historically, LPG automotive transportation sector has been supported by the large number of conversions from gas vehicles, and a competitive price of LPG in regard to other fuels. This, along with programs for encouraging LPG use (like the Vehicle Program “Day without a Car”, established in 1989) and cap prices, have fostered this fuel’s vehicles marketing and marked a milestone in vehicle development.

In fact, conditions began changing in 2005 when LPG price was positioned 37.4% over gasoline, and 21.8% over diesel. Thus, conversion advantages decreased, and so did its consumption and the financing given to distributors. Likewise, with the gradual introduction of low-sulfur diesel (Pemex Diesel UBA) in 2006, the benefits of diesel expanded and car assemblers incorporated new models using LPG to replace a part of gasoline vehicles.

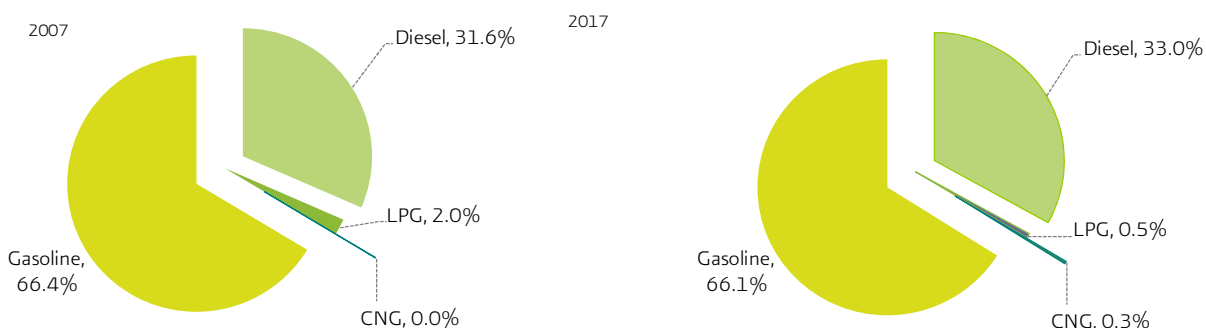
Given the high prices expected for fuels, the price scenario on fuels’ demand for the automotive industry forecasts that LPG price will remain above diesel’s; other fuels’ prices and their associated costs will make that LPG’s expected yields, its intensive use, maintenance and conversion costs will be less profitable.

As for the expected fuels’ yields, LPG vehicles will have average efficiencies below automobiles using other fuels. Though, LPG demand for the automotive industry would increase if diesel prices raise, or if new technologies for LPG are introduced.

For light-utilitarian vehicles – mainly used for passengers’ transportation – LPG price per kilometer will keep economic advantages. In the case of compact and subcompact vehicles, and heavy trucks, their cost/kilometer for NG and diesel will be more attractive.

Thus, LPG share was of 2% in 2007 and it is expected dropping up to 0.5% by 2017. In contrast, diesel and NG will increase their share to 33% and 0.3%, respectively (see Graph 17).

Graph 17
Distribution of uels’ demand for the automotive transportation sector, 2007-2017

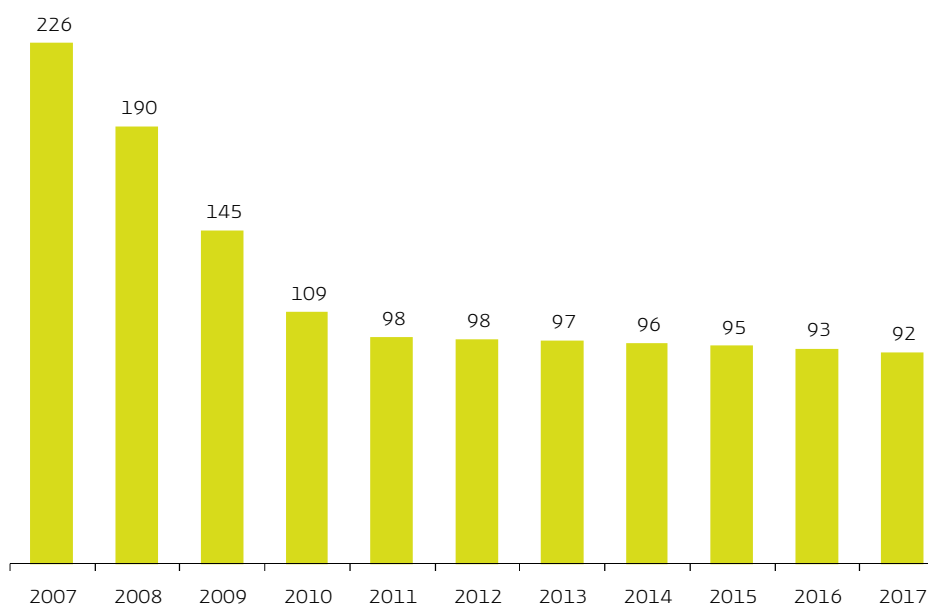


Source: IMP, based on CRE, Pemex, Sener and private companies.

In 2007, there were 226 thousand LPG vehicles circulating; by 2017 there are expected to be just 92 thousand units, an annual decrease of 8%; this renders to a larger penetration of diesel vehicles, and a contraction on LPG's, consequence of the reduction on conversions and obsolete circulating units.

During 2008-2011, it is foreseen that a meaningful amount of LPG vehicles will go out of circulation and be replaced by NG's, or diesel ones. For the term 2012-2017, this reduction will be slower, since the continuance of some vehicles is convenient or its lifespan justifies it (see Graph 18).

Graph 18
Evolution of LPG vehicle fleet, 2007-2017
(thousand vehicles)

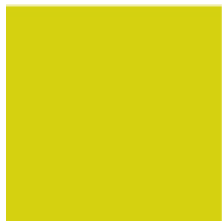


Source: IMP, based on CRE, Pemex, Sener and private companies.

Technological Expectations for Vehicles Running on LPG

Most of the vehicles running on LPG are conversions made to gasoline vehicles¹³; there are some others having a dual motor running on LPG, gasoline, ethanol, NG, etc. In practice, the power, acceleration and cruising speed of LPG vehicles are lower than in gasoline ones, whilst in dual-motor vehicles, their performance is more similar to gasoline's.

¹³ Except for Japan, whose LPG vehicles are OEM (original equipment manufacturer).



For the past years, technological advances have led to LPI engine systems (liquid propane injection), which economize fuel and improve combustion. LPI engines do not vaporize LPG; instead it injects it in the combustion chamber as a liquid.

In LPI engine systems, their computers, as well as every spare part were specially designed to run on LPG, and they have demonstrated to be reliable in terms of power, engine durability and cold start.

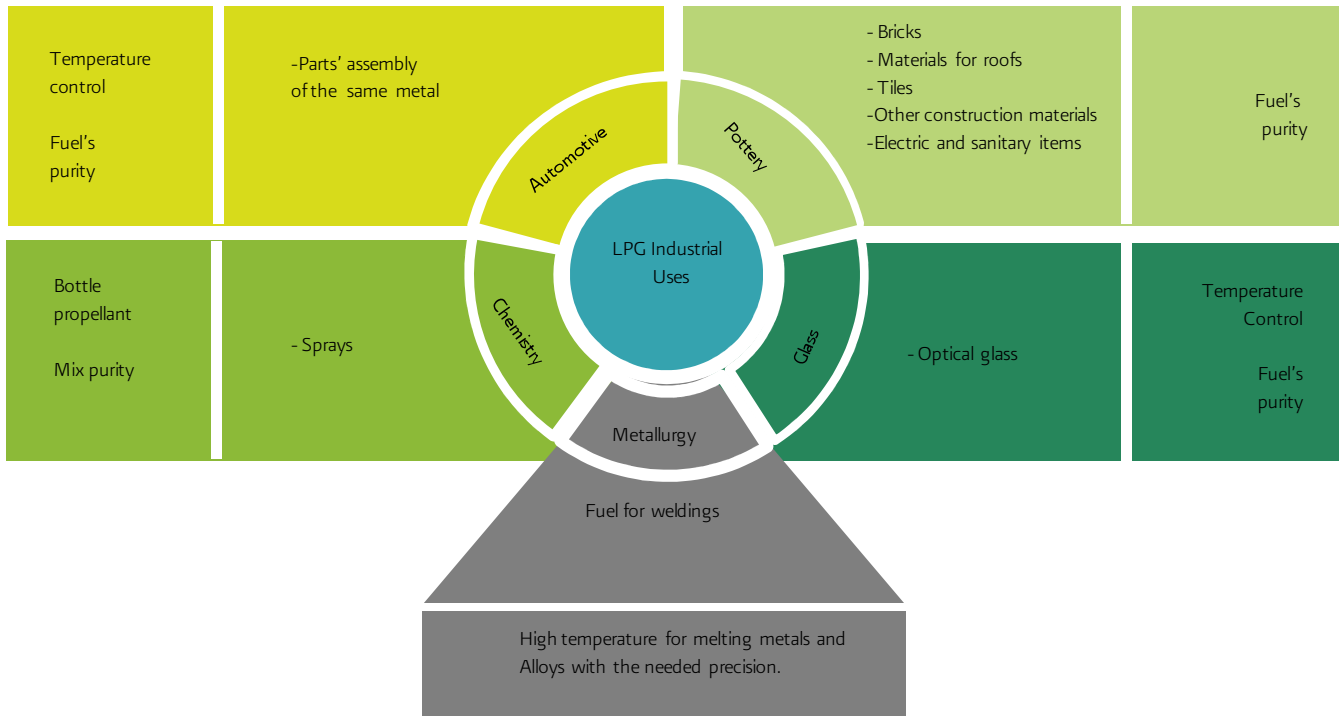
Aside this system, it has been developed another one on propane vapor sequential injection (SVI), with a similar yield. Both systems are being incorporated in the revision and replacement of the current Mexican Official Regulation NOM-005-SEDEG-1999.

Industrial Sector

Energy demand is closely related to industrial economic growth. The sort and measure of the demand respond to specific characteristics for each end use.

In the industrial sector, LPG is frequently used for industrial furnaces, heating processes, pottery, glass manufacture, metal processing, paint dryers, sprays, welds, etc. (see Graph 19) Not to mention it is a pure and clean source of energy that generates heat in a controlled way.

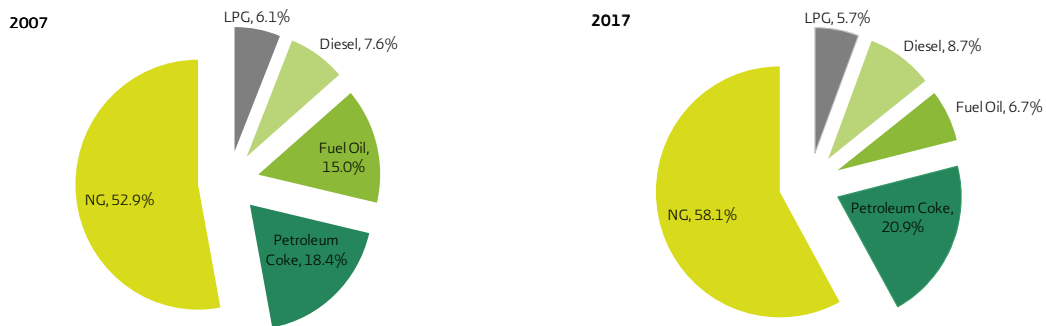
**Graph 19
LPG industrial uses**



Source: IMP.

The forecast on LPG industrial demand considers every fuel used within the sector. In that context, at 2007 LPG share was of 6.1% and by 2017 it is expected to drop to 5.7% (see Graph 20)

**Graph 20
Fuels' demand distribution in the industrial sector, 2007 and 2017**



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

NG will increase its share at an annual rate of 3.1%; petroleum-coke consumption will be 29% of the total amount, having an average growth of 3.4%. Diesel will display the largest AAGR (3.5%) being thus number three in preferences. Fuel oil will still have a negative annual growth (5.8%, average) since it has been replaced by more efficient fuels, in environmental terms.

Chart 25
Fuels' domestic demand in the industrial sector, 2007-2017
(thousand barrels per day of LPG equivalent)

	LPG ¹	Petroleum coke	Diesel	Fuel Oil	Natural Gas ²	Total	% LPG within the total	Growth Rate					
								LPG	Petroleum Coke	Diesel	Fuel Oil	Natural Gas	Total
2007	29.8	90.2	37.1	73.5	259.3	490.0	6.1						
2008	28.3	82.5	44.9	75.2	267.6	498.5	5.7	-5.2	-8.5	2.1.3	2.2	3.2	1.7
2009	28.9	95.3	45.5	70.2	280.4	520.3	5.6	2.2	15.5	1.2	-6.7	4.8	4.4
2010	29.6	98.1	45.9	66.0	292.4	532.0	5.6	2.5	2.9	0.9	-6.0	4.3	2.3
2011	30.3	101.4	46.7	61.3	306.8	546.6	5.6	2.5	3.4	1.7	-7.1	4.9	2.7
2012	31.1	101.7	48.0	57.6	317.0	555.5	5.6	2.6	0.3	2.8	-6.1	3.3	1.6
2013	31.9	104.7	49.1	54.1	323.9	563.7	5.7	2.3	2.9	2.3	-6.2	2.2	1.5
2014	32.5	110.1	49.9	50.2	331.2	573.9	5.7	1.9	5.2	1.6	-7.2	2.2	1.8
2015	33.1	115.4	50.7	46.5	338.0	583.6	5.7	1.9	4.7	1.6	-7.4	2.1	1.7
2016	33.9	120.2	51.5	43.7	344.5	593.8	5.7	2.3	4.2	1.6	-5.9	1.9	1.7
2017	34.7	126.2	52.3	40.5	351.1	604.8	5.7	2.4	5.0	1.5	-7.4	1.9	1.8
AAGR 2007-2017	1.5	3.4	3.5	-5.8	3.1	2.1							
Average 2007-2017	31.3	104.2	47.4	58.1	310.2	551.1	5.7	1.5	3.6	3.7	-5.8	3.1	2.1

¹ Includes butane and propane used as raw materials.

² It does not include PPQ

Source: IMP, based on Banxico, CONAE, CRE, EIA, INEGI, Pemex, Sener and private companies.

The industrial sector's prospected demand for LPG depends mainly on the evolution of the gross domestic product (GDP) of manufacturing and the established price for end users. Based on the latter, it is forecasted that LPG industrial demand by 2017 will be of 34.7 tbd, which means that during the term 2007-2017 will have an expected AAGR of 1.5% (see chart 26 and Graph 21).

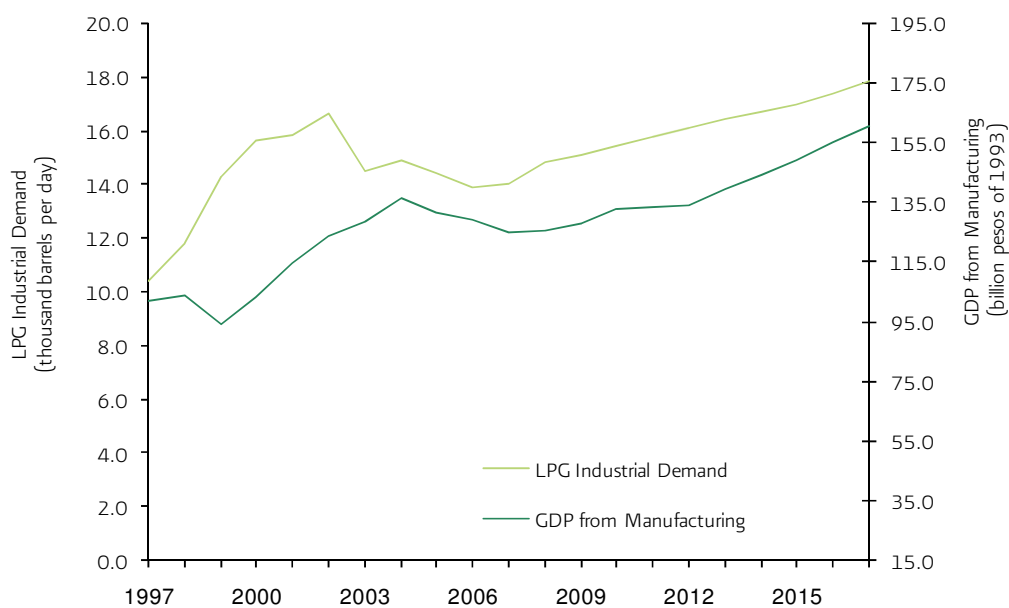
Chart 26
LPG* regional demand in the industrial sector, 2007-2017
(thousand barrels per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	29.8	28.3	28.9	29.6	30.3	31.1	31.9	32.5	33.1	33.9	34.7	1.5
Northwestern	3.7	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.1	3.2	3.3	-1.4
Northeast	5.8	5.1	5.3	5.4	5.6	5.8	5.9	6.1	6.2	6.4	6.5	1.1
Central-Western	4.4	4.1	4.1	4.2	4.4	4.5	4.6	4.7	4.8	4.9	5.0	1.1
Central	14.0	14.8	15.1	15.4	15.7	16.1	16.4	16.7	17.0	17.4	17.8	2.4
South-Southeastern	1.8	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	1.6

*Includes propane and butane used in the industrial sector as raw material.

Source: IMP, based on Banxico, CONAE, Pemex, Sener and private companies.

Graph 21
LPG industrial demand and GDP from manufacturing industry
in the Central Region, 1997-2017



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



Agriculture and Livestock Sector

Within this sector, LPG is the fuel most used in those areas lacking of infrastructure, conveyance and distribution of NG or diesel. Furthermore, due to LPG's versatility, it is used in activities like drying of seeds and orchards, thicket destruction, and heating of greenhouses and warehouses for cattle raise and aviculture.

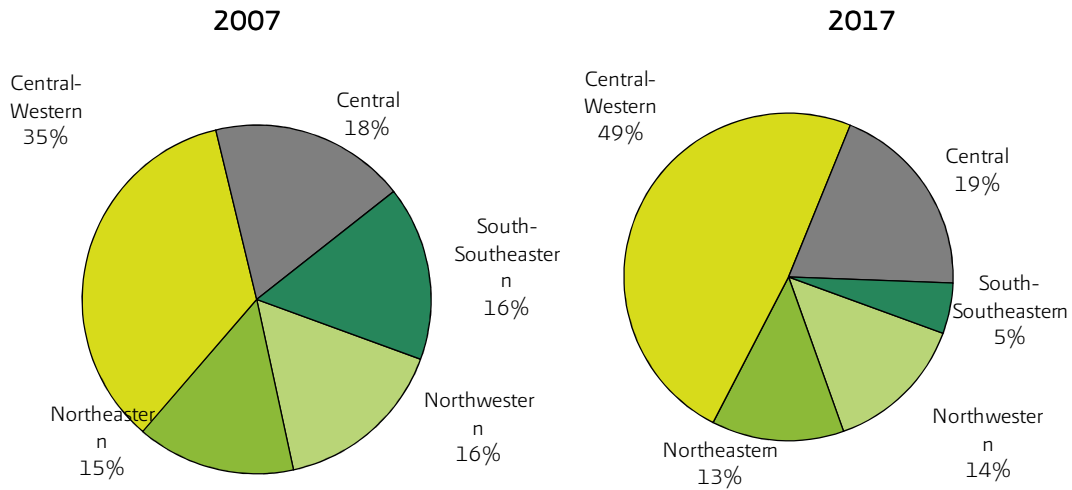
Using LPG has also helped to reduce deforestation, since it replaces the use of biomass as a fuel in some farm equipment and mobile machinery. Hence, LPG demand in this sector will show an annual growth of 4.2% during the term 2007-2017 (see chart 27 and Graph 22),

Chart 27
LPG regional demand in the agriculture and livestock Sector, 2007-2017
(thousand barrels per day)

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	3.8	4.8	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	4.2
Northwestern	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	2.8
North eastern	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	3.0
Central-Western	1.3	2.3	2.4	2.4	2.5	2.6	2.6	2.6	2.7	2.8	2.8	7.7
Central	0.7	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	4.9
South-Southeastern	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-7.4

Source: IMP, based on INEGI, Pemex and Sener.

Graph 22
LPG Regional breakdown in the agriculture and livestock sector, 2007 and 2017



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

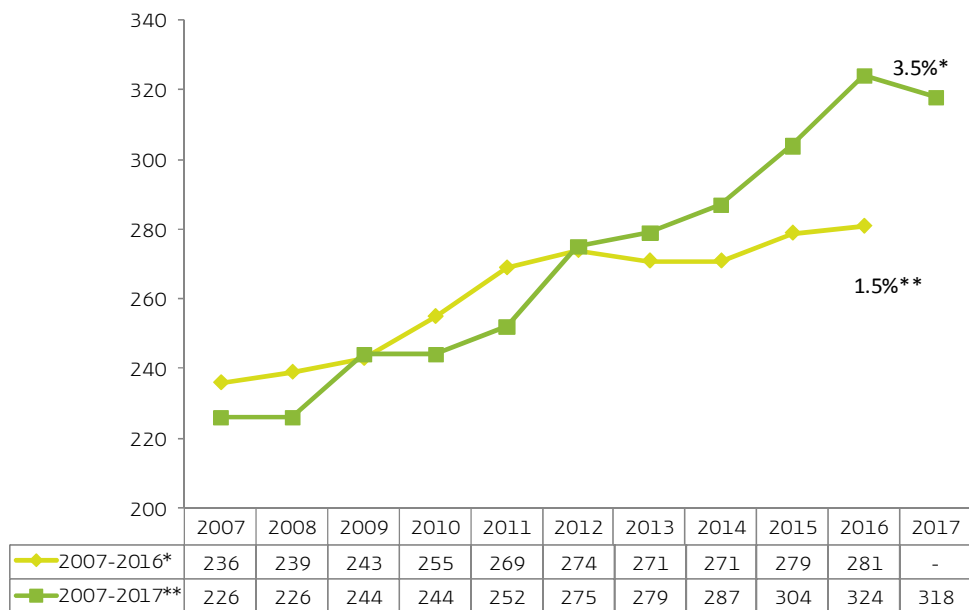
2.2 Supply 2007-2017

By 2017, the supply is expected to increase 92 tbd in regard to 2007, an annual growth of 3.5% that covers much of LPG demand. Even if for Pemex Refining (PR) is expected an AAGR of 7.8%, 82.1% of LPG domestic demand will come from Pemex Gas and Basic Petrochemical (PGPB).

LPG future supply is strongly linked to the volume and kind of gas Pemex Exploration and Production (PEP) gives to PGPB to be processed, given the amount of liquids of sweet-wet gas and sour-wet gas. At the mid and long-term, this supply will have a steady growth of 3.5% (see Graph 23).



Graph 23
LPG production projections, 2006-2016 and 2007-2017



* AAGR 2007-2017

** AAGR 2006-2016.

Source: Pemex.

This new scenario assumes that 2016 will have the largest LPG production coming from PGPB and PR; this, due to the expected evolution of PR production linked to projects of clean fuels, and increases on the refining capacity.

It is expected that by 2017, the domestic supply provided by PGPB will be of 261 tbd, a little more than four fifths from the total and a 2.8% average annual growth. PR production will have a larger growth, 7.8%, mainly from 2014 on, reaching 56.9 tbd at the end of the period (see chart 28).

Chart 28
LPG domestic production by subsidiary, 2007-2017
(thousand barrels per day)

Origin	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Total	225.7	225.0	244.0	244.4	251.7	275.3	279.2	286.9	303.6	324.3	317.9	3.5
PGPB	198.9	197.5	210.7	213.0	219.4	241.4	246.6	245.2	256.8	268.0	261.0	2.8
Refining	26.8	27.5	33.4	31.4	32.4	34.0	32.5	41.7	46.8	56.3	56.9	7.8
Exploration and Production	-	-	-	-	-	-	-	-	-	-	-	N.A.

*It considers a marginal volume produced in 2003.

N.A.: Not applicable

Source: IMP, based on Pemex Gas and Petroquímica Básica

The projects' portfolio of PGPB responds to those objectives displayed in its strategic program, which fosters safety, ecology and the maintenance of productive facilities, increasing thus the economic aggregated value of the company through the expansion of its productive plant and conveyance infrastructure.

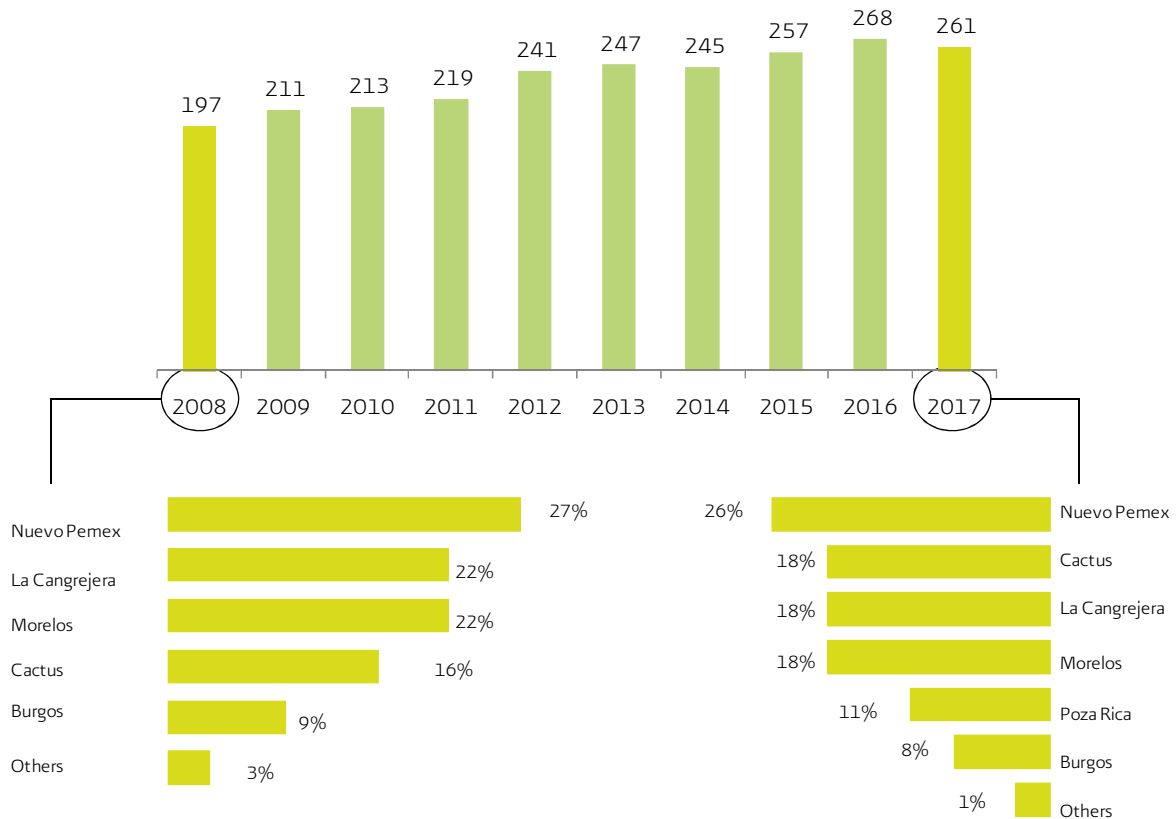
During the past years, the Northeastern region (particularly the area of Reynosa) has aimed to increase its NG domestic supply, becoming a developmental center for this fuel's market in Mexico. For that reason, Pemex, in coordination with its subsidiaries, has assigned a growth strategy called "Proyecto Integral de Burgos", whose main objective is increasing NG supply through the exploitation of 1P reserves fields of non-associated gas (Basin of Burgos) and the disposal of the necessary assets for handling a larger gas volume in the area of Reynosa.

On that purpose, PGPB began the construction of the cryogenic plants 5 and 6 within the Gas Processing Center (CPG) Burgos, expected to be concluded by 2008 and which will allow processing 1,200 MMbd of sweet-wet gas coming from Basin of Burgos. The idea is to process this gas and obtain – as a major final product – LPG and other fuels derived from that gas.

Likewise, PGPB will develop the beltway project Zapoapita in the Central Zone of Veracruz, with a length of 30 km and which starting operation is expected by 2013. This, to increase the capacity and operative flexibility of the current LPG pipelines and reduce risks for those towns located nearby conveyance systems.

At the short and mid-terms CPG Nuevo Pemex will still contributing with more than one fourth of PGPB production, reaching 54.1 tbd in 2008, and 68.6 tbd in 2017; CPG Cactus, La Cangrejera and Morelos will produce the remainder half of PGPB production, 53% of the total by the term's end (see Graph 24).

Graph 24
PGPB production of LPG by gas processing center, 2008-2017
(thousand barrels per day)



Source: Pemex.

On behalf of PR, Tula refinery will control LPG production by 2017 (17%), followed by Minatitlan, Salina Cruz and Salamanca with 12% each (see Graph 25). PR has considered projects to expand its infrastructure having hence a larger production of super-low sulfur fuels in accordance to environmental regulations. These projects will improve production yields and will increase refinery margins; the main ones considered for this scenario are:

- a) Conclude Minatitlan upgrading in 2009¹⁴.
- b) Conclude the resid-conversion project in Salamanca, and the gasoline quality one in the SNR in 2013.

¹⁴ Currently, the upgrading process is delayed and its conclusion may be postponed for 2010. Though, this outlook is based upon the program establishing its conclusion in 2009.

- c) Incorporate a new facility for refining Mayan crude with a capacity of 300 tbd in 2014, and conclude Salina Cruz upgrading and its Project for diesel quality.
- d) Conclude the resid-conversion Project in Tula in 2015.
- e) Add a second refining facility of 300 tbd in 2016.

Graph 25
PR production of LPG and share by refinery, 2008-2017
(thousand barrels per day)



Source: Pemex.



Investment Requirements, 2009-2017

For the term 2009-2017, PGPB plans to invest 46,291 million MXN - at prices of 2008 - in the performance of the company assets; the early provision of its market products; the increase of its processing capacity (in accordance to the expectations on gas and condensates' supply of PEP); adequate conveyance and distribution capacities; and count on having information technologies to support the primary process of the value chain.

From the total resources, 42% (19,350 million MXN) will be destined to strategic projects and 58% (26,941 million MNX) to operative ones. These projects are focused into value creation, performance efficiency, maintenance excellence and the assistance of technological and systems' integration, as well as processes' administration.

PGPB investment resources for LPG industry look forward to keeping the maintenance excellence in distribution terminals, fulfilling the program for the integral maintenance of the intercentral pipelines that convey petrochemicals, and update bumping stations.

Aside from the beltway Zapapoita, two other projects will be constructed in the Southeastern region for conveying C₂₊ and ethane, namely:

- A C₂₊ pipeline with 20" of diameter, and a length of 70 km, running from Cd. Pemex to Nuevo Pemex. It will start operations in 2012.
- An ethane pipeline made of two parts: one with a diameter of 12" and a length of 11 km, running from Cactus to Nuevo Pemex, and its continuance from Nuevo Pemex to Coatzacoalcos, with a diameter of 20" and a length of 130 km. Both will start operations by 2012.

Withal, by 2011 the Terminal of Abasolo will be constructed, which will have a capacity of about 27 tbd. This project requires an investment of 350 million MXN.

Complementary Investments

With the RLPG publishing there will be a vertical integration for gas pipelines conveyors; in CFC's opinion this integration will not have negative effects towards processes of competitiveness and free competition, since it will foster a larger investment in gas-pipelines conveyance systems by reducing cost operation and, eventually, offer better prices to buyers and final users.

It will also foster infrastructure development and will broaden the supply-services range on behalf of concessionaires and final users, protecting competitiveness and free competence.

PGPB investment budget mainly responds to integral maintenance programs, construction of new pipelines, invigorating and giving performance flexibility to the current infrastructure; and to reactivate and update bumping stations. In respect to an increase of performance flexibility for LPG conveyance, the following projects (in which private investors will support the timely supply of LPG) have been taken into account:

1. **LPG transfer from CPG Poza Rica to Mexican Highlands:** Its first stage must be concluded by the end of 2009 and it considers constructing a private terminal for care and handling services in Atotonilco, Hidalgo, with a storage capacity of 50 tbd, and a dispatch one of 25 tbd. This terminal will interconnect with PGPB system through a branch line with a diameter of 10" and a length of 20 km. Its second stage – which will possibly begin operations by 2013 – considers constructing a pipeline of 10" of diameter and a length of 250 km from Poza Rica to Atotonilco, with an average conveyance capacity of 20 tbd, supplying national product to the Terminal of Atotonilco.
2. **Tuxpan II Terminal:** It envisages the construction of a private storage terminal for LPG having semi-cooled spheres with a capacity of 35 tbd, and a capacity for receiving ships of 40 MT. It will start operations the first semester of 2009 and will supply imported product to the terminal of Atotonilco.
3. **Storage and Supply Terminal in La Paz, Jalisco:** Its construction will reduce those conveyance operations using pipelines that run through the urban zone of Guadalajara, and will eventually lead to the closure of the Zapopan Terminal, reducing thus, the risks for its population. Operations will be moved to the new terminal in La Paz, Jalisco, which will have a storage capacity of 80 tbd and will begin operations in 2009.
4. **Pipeline Manzanillo-La Paz, Jalisco:** It considers constructing a pipeline of 12" in diameter and a length of about 328 km, that will interconnect the storage and supplying terminal in La Paz, Jalisco with a private shipping terminal located in Manzanillo, Colima. It is expected to start operations in 2012 and it will assure distribution to the Western region and will back up the creation of infrastructure in that region.

2.3 Supply-Demand Balance, 2007-2017

This balance identifies the opportunities and risks that affect the domestic supply as well as enables those changes which will help fulfilling the objectives of the energy planning.

The LPG prospective balance has two main components: LPG supply, made up by Pemex domestic production and imports; and LPG demand, which includes domestic sales in every end-use sector within our



country, including oil-industry self-consumption and exports. It also incorporates inventory variations, which groups various concepts and allows balancing supply and demand volumes.

LPG domestic supply will cover this fuels demand to a great extent (3.5% vs. -0.4% annual average growth, respectively), having thus, a downward trend on imports (-8.6%); just the ones needed on a logistic basis in Tijuana, Ciudad Juarez, Topoloboampo and Mexicali, are left.

According to the energy domestic balance, estimated for the next ten years (see chart 29), future demand will be as follows: PGPB, 74%; PR projects, 16%; imports, 11% This demand will be destined mainly to residential and services sectors (80% of the sectorial demand). The South-Southeastern region will provide 85% of the national production followed by – at a less extent – by Northeastern region (10%), and Central and Central-Western (5%, both). With regard to consumption, the Central region will have 40%, Central-Western, 22%, and Southeastern, 16%; Northern regions will represent – together – 22%.

For the next seven years, the domestic demand will be covered with national production and imports; nevertheless, from 2015 on, national production will provide the total LPG consumption. The latter will depend on Pemex projects' portfolio and budget restrictions. The estimation of those profiles includes probable reserves' discoveries and a degree of uncertainty in regard to the exact volume of the hydrocarbons to be extracted. Hence, to face the demand requirements adequately, it will be necessary to enhance Mexico's investment opportunities to get the maximum advantage of oil potential and assure thus, this resource for future generations.

Imports will keep a downward trend of 8.6%, mainly due to an expected fall in 2009, which foresees a negative rate of 23% in regard to 2008. In foreign-trade terms, this balance displays a deficit in its trade balance until 2014, having an immediate recovery thanks to 2015 and 2016 exports (65% and 61% respectively, in regard to the previous year). The latter is based upon this fuel's availability, derived from a larger production and a decrease on imports.

Chart 29
LPG domestic balance, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	308.9	301.6	302.6	300.8	299.6	312.9	315.8	322.0	337.5	358.2	351.6	1.3
Domestic Supply	226.0	225.6	244.0	244.4	251.7	275.3	279.2	286.9	303.6	324.3	317.9	3.5
Pemex Gas y Petroquímica Básica	198.9	197.5	210.7	213.0	219.4	241.4	246.6	245.2	256.8	268.0	261.0	2.8
Pemex Refinación	26.8	27.5	33.4	31.4	32.4	34.0	32.5	41.7	46.8	56.3	56.9	7.8
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Exploración Producción	0.2	0.6	-	-	-	-	-	-	-	-	-	N.A.
Imports	82.9	76.0	58.5	56.4	47.9	37.5	36.7	35.1	33.9	33.9	33.8	-8.6
Destiny	308.0	305.4	302.6	300.8	299.6	312.9	315.8	322.0	337.5	358.2	351.6	1.3
Domestic demand	307.0	303.4	302.1	300.8	299.3	298.3	297.5	296.7	295.9	295.1	294.3	-0.4
Agriculture and Livestock Sector	3.8	4.8	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	4.2
Motor-Carrier Sector	28.9	21.4	16.4	12.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	-9.0
Industrial Sector	29.8	28.3	28.9	29.6	30.3	31.1	31.9	32.5	33.1	33.9	34.7	1.5
Oil Sector petrolero	5.7	5.5	6.3	6.4	6.4	6.4	6.4	6.4	6.3	6.2	6.3	1.1
Residential Sector residencial	194.6	199.9	202.1	203.8	202.7	200.9	199.4	198.2	197.1	196.0	194.9	0.0
Services Sector	44.2	43.4	43.4	43.5	43.4	43.3	43.2	42.9	42.5	42.0	41.5	-0.6
Exports	1.0	2.1	0.5	-	0.3	14.6	18.4	25.3	41.7	63.1	57.3	49.6
Inventories variation *	0.9	- 3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Note: The volumen of propane and butane consumed as raw material, is included in the industrial sector.	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.

Chart 30
LPG balance of the Northwestern region, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	26.0	24.4	24.3	24.3	24.4	24.5	24.7	24.8	24.9	25.0	25.0	-0.4
National	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Gas y Petroquímica Básica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Refinación	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Exploración Producción	-	-	-	-	-	-	-	-	-	-	-	-
Imports	17.9	16.9	18.2	17.7	17.0	16.2	16.1	16.0	16.0	15.9	15.9	-1.2
From other regions	8.1	7.5	6.2	6.6	7.4	8.3	8.6	8.7	8.9	9.0	9.1	1.2
Destiny	26.1	24.4	24.3	24.3	24.4	24.5	24.7	24.8	24.9	25.0	25.0	-0.4
Domestic demand	26.1	24.4	24.3	24.3	24.4	24.5	24.7	24.8	24.9	25.0	25.0	-0.4
Agriculture and Livestock Sector	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	2.8
Motor-Carrier Sector	2.5	2.3	1.7	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	-7.2
Industrial Sector	3.7	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.1	3.2	3.3	-1.4
Oil Sector petrolero	-	-	-	-	-	-	-	-	-	-	-	-
Residential Sector residencial	15.0	14.7	15.0	15.2	15.3	15.3	15.3	15.3	15.3	15.3	15.3	0.2
Services Sector	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.4	4.4	0.5
Exports	-	-	-	-	-	-	-	-	-	-	-	-
To other regions	-	-	-	-	-	-	-	-	-	-	-	-
Inventories variation*	- 0.1	-	-	-	-	-	-	-	-	-	-	

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.

Chart 31
LPG balance of the Northeastern region, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	62.7	62.8	57.5	57.8	53.6	45.7	44.0	42.1	40.0	39.7	41.5	-4.1
National	23.3	24.2	30.6	33.9	34.4	31.8	30.9	30.6	29.5	29.3	31.1	2.9
Pemex Gas y Petroquímica Básica	19.6	19.7	23.1	26.4	26.9	24.3	23.4	23.1	22.0	21.8	23.6	1.9
Pemex Refinación	3.7	4.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.2
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Exploración Producción	-	-	-	-	-	-	-	-	-	-	-	-
Imports	39.4	38.6	26.9	23.8	19.2	13.9	13.1	11.6	10.5	10.5	10.4	12.5
From other regions	-	-	-	-	-	-	-	-	-	-	-	0.0
Destiny	62.7	62.8	57.5	57.8	53.6	45.7	44.0	42.1	40.0	39.7	41.5	-4.1
Domestic demand	43.5	43.5	42.2	41.1	40.3	39.7	39.3	39.0	38.5	38.4	38.3	-1.3
Agriculture and Livestock Sector	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	3.0
Motor-Carrier Sector	7.0	5.1	3.9	2.9	2.7	2.7	2.7	2.7	2.7	2.7	2.7	-9.2
Industrial Sector	5.8	5.1	5.3	5.4	5.6	5.8	5.9	6.1	6.2	6.4	6.5	1.1
Oil Sector petrolero	-	-	-	-	-	-	-	-	-	-	-	-
Residential Sector residencial	22.0	25.0	24.8	24.7	24.0	23.4	22.9	22.5	22.0	21.8	21.6	-0.2
Services Sector	8.0	7.6	7.5	7.4	7.3	7.2	7.1	7.0	6.9	6.7	6.7	-1.8
Exports	-	-	-	-	-	-	-	-	-	-	-	0.0
To other regions	19.3	19.3	15.3	16.7	13.4	5.9	4.7	3.2	1.4	1.4	3.2	16.4
Inventories variation*	0.0	-	-	-	-	-	-	-	-	-	-	-

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.

Chart 32
LPG balance of the Central-Western region, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	69.7	68.7	68.4	68.1	67.8	67.4	67.1	66.9	66.6	66.4	66.1	-0.5
National	2.2	2.4	7.0	7.0	7.0	7.0	6.3	6.5	6.5	6.6	6.6	-26.0
Pemex Gas y Petroquímica Básica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Refinación	2.2	2.4	7.0	7.0	7.0	7.0	6.3	6.5	6.5	6.6	6.6	-26.0
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	0.0
Pemex Exploración Producción	-	-	-	-	-	-	-	-	-	-	-	0.0
Imports	11.0	10.0	7.5	7.8	7.5	7.5	7.5	7.5	7.5	7.5	7.5	11.2
From other regions	56.5	56.3	53.9	53.4	53.3	52.9	53.4	52.9	52.6	52.3	52.0	2.3
Destiny	69.7	68.7	68.4	68.1	67.8	67.4	67.1	66.9	66.6	66.4	66.1	-0.5
Domestic demand	69.7	68.7	68.4	68.1	67.8	67.4	67.1	66.9	66.6	66.4	66.1	-0.5
Agriculture and Livestock Sector	1.3	2.3	2.4	2.4	2.5	2.6	2.6	2.6	2.7	2.8	2.8	7.7
Motor-Carrier Sector	4.6	4.7	3.6	2.7	2.5	2.5	2.5	2.5	2.5	2.5	2.5	-6.1
Industrial Sector	4.4	4.1	4.1	4.2	4.4	4.5	4.6	4.7	4.8	4.9	5.0	1.1
Oil Sector petrolero	-	-	-	-	-	-	-	-	-	-	-	-
Residential Sector residencial	50.9	50.1	50.7	51.1	50.9	50.4	50.0	49.7	49.3	49.0	48.7	-0.4
Services Sector	8.4	7.5	7.6	7.6	7.6	7.5	7.5	7.4	7.4	7.3	7.2	-1.5
Exports	-	-	-	-	-	-	-	-	-	-	-	-
To other regions	-	-	-	-	-	-	-	-	-	-	-	-
Inventories variation*	0.0	-	-	-	-	-	-	-	-	-	-	-

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.

Chart 33
LPG balance of the Central Region, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	122.5	122.3	122.0	121.8	121.4	121.0	120.6	120.3	120.0	119.7	119.2	-0.3
National	9.6	9.1	3.9	4.2	5.1	5.2	4.2	4.3	9.4	9.2	9.4	-0.2
Pemex Gas y Petroquímica Básica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Refinación	9.6	9.1	3.9	4.2	5.1	5.2	4.2	4.3	9.4	9.2	9.4	-0.2
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	-
Pemex Exploración Producción	-	-	-	-	-	-	-	-	-	-	-	-
Imports	-	-	-	-	-	-	-	-	-	-	-	0.0
From other regions	112.9	113.2	118.1	117.6	116.3	115.8	116.4	116.0	110.6	110.4	109.8	0.3
Destiny	122.6	122.3	122.0	121.8	121.4	121.0	120.6	120.3	120.0	119.7	119.2	-0.3
Domestic demand	122.6	122.3	122.0	121.8	121.4	121.0	120.6	120.3	120.0	119.7	119.2	-0.3
Agriculture and Livestock Sector	0.7	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	4.9
Motor-Carrier Sector	12.1	6.5	5.0	3.8	3.4	3.4	3.4	3.4	3.4	3.4	3.4	-11.8
Industrial Sector	14.0	14.8	15.1	15.4	15.7	16.1	16.4	16.7	17.0	17.4	17.8	2.4
Oil Sector petrolero	-	-	-	-	-	-	-	-	-	-	-	-
Residential Sector residencial	78.3	81.8	82.7	83.4	83.0	82.3	81.8	81.3	80.8	80.3	79.7	0.2
Services Sector	17.5	18.2	18.2	18.2	18.2	18.1	18.0	17.8	17.7	17.5	17.1	-0.2
Exports	-	-	-	-	-	-	-	-	-	-	-	-
To other regions	-	-	-	-	-	-	-	-	-	-	-	-
Inventories variation*	-0.1	-	-	-	-	-	-	-	-	-	-	-

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.

Chart 34
LPG balance of the South-Southeastern region, 2007-2017
(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR 2007-2017
Origin	205.4	200.5	208.5	206.4	209.4	231.3	237.7	245.6	258.2	279.2	270.8	2.8
National	190.8	190.0	202.5	199.3	205.3	231.3	237.7	245.6	258.2	279.2	270.8	3.6
Pemex Gas y Petroquímica Básica	179.3	177.8	187.5	186.6	192.5	217.1	223.2	222.1	234.8	246.2	237.4	2.8
Pemex Refinación	11.3	11.6	15.0	12.7	12.8	14.2	14.5	23.5	23.4	33.0	33.4	11.5
Pemex Petroquímica	-	-	-	-	-	-	-	-	-	-	-	0.0
Pemex Exploración Producción	0.2	0.6	-	-	-	-	-	-	-	-	-	N. A.
Imports	14.6	10.5	6.0	7.1	4.2	-	-	-	-	-	-	N. A.
From other regions	-	-	-	-	-	-	-	-	-	-	-	0.0
Destiny	204.3	204.4	208.5	206.4	209.4	231.3	237.7	245.6	258.2	279.2	270.8	2.9
Domestic demand	45.2	44.5	45.3	45.4	45.5	45.6	45.7	45.8	45.8	45.8	45.8	0.1
Agriculture and Livestock Sector	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-7.4
Motor-Carrier Sector	2.7	2.8	2.2	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-5.7
Industrial Sector	1.8	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	1.6
Oil Sector petrolero	5.7	5.5	6.3	6.4	6.4	6.4	6.4	6.4	6.3	6.2	6.3	1.1
Residential Sector residencial	28.4	28.3	28.9	29.4	29.5	29.5	29.5	29.6	29.6	29.6	29.6	0.4
Services Sector	6.1	5.8	5.9	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	0.1
Exports	1.0	2.1	0.5	-	0.3	14.6	18.4	25.3	41.7	63.1	57.3	49.6
To other regions	158.1	157.8	162.7	161.0	163.7	171.1	173.6	174.5	170.7	170.4	167.7	0.6
Inventories variation*	1.1	-3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N.A.: Not applicable

* Includes differences, packing and ships en route.

Source: IMP, based on Banxico, CONAGUA, Conapo, Pemex, Sener and private companies.