Oil-products Outlook

2008-2017

Gobierno Federal

SENER

Mexico, 2008

Ministry of Energy

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

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Presentation

The main commitment of the Federal Government on refining matters is to have a modern, competitive and efficient industry able to supply the country's demand of fuels. To this effect, the Energy Reform – recently published – gives a legal frame under which the Refining industry is invigorated and gives Petroleos Mexicanos (Pemex) more capacity of execution and more autonomy for performing new projects.

The current gasoline imports have reached levels which represent a high cost for the country. Four of each ten liters demanded by the country in 2007 were covered with imports; that means that many of the jobs, investments, taxes and other benefits are going to countries other than Mexico. That is to say, we export our crude oil and, later on, we import the fuels we need at a higher price.

On the other hand, the recent worldwide economic crisis has brought hesitation to any intended forecast. In that sense, it is clear that the Reform will bring certainty to investments in the energy sector as well as give the owned-state company (Pemex) the possibility of performing projects which may revert to the current imports situation, allowing it to obtain bigger economical resources within the country. In fact, even when the benefits for Pemex have not been totally quantified, there is confidence that, in having a new legal frame, the amount of projects will grow and thus, the refining industry – and Pemex in general – will be invigorated.

The anticipated growth for oil-derived products demand overpasses by far the national refineries production, even considering the fulfillment of upgrading projects, which main objective is taking the maximum advantage of crude oils, specially the heavy oil which is produced in the country and thus, obtaining the best yields from more added-value products.

To this effect, Presidualent Felipe Calderón, has announced the construction of a new refinery as part of the *Programme for Impelling Growth and Employment*. In the current edition of the *Oil-derived Products Outlook 2008-2017*, it is considered the opening for business of this new refining capacity in the prospected period which, in great measure will cover part of the demand and will bring a new impulse to this industry.

In another direction, on February 1st, 2008, the *Law of Promotion and Development of Bioenergetics* was published; this Law seeks to drive the development of the biofuels industry within our country and thus having a viable and ecologically sustainable alternative other than fossil fuels.

We are facing a historical opportunity for positioning Mexico not only as an oil-eporting country, but one able to develop the oil industry to its highest degree and, hence, give a bigger impulse to the national economy.

Georgina Kessel

Ministry of Energy

Introduction

The Ministry of Energy publishes the *Oil-Derived Products Outlook* annually, to offer trustable, updated information on the evolution of the refining industry and oil-derived products market for the last ten years, as well as an analysis of the expected behavior during the prospected period; this, the latter, to set the basis for the planning and development of this industry within the country.

The document contains two chapters. The first one describes the evolution of this industry at a national level from 1997-2007. It includes changes of infrastructure, capacity by kind of process and crude-oil processing. These changes have led to an increase on the production of gasoline and diesel as well as a larger processing of heavy crude oil. The chapter includes the historical supply and demand within Mexico by oil-derived product, region and sector. It also shows a balance between the historical supply and demand for each oil-derived product and its interregional flow. Furthermore, it includes a section on the biofuels' situation in the country.

Chapter two develops the 2008-2017 outlook, including expected investment in the sector and its impact over the oil-derived products and in the crude-oil processing. It is worthwhile mentioning that the Reform's effects are still being evaluated and hence, the presented scenario was drawn just with the current information. For the matters of demand, it shows each oil-derived product projection by consumption sector and by region, in addition to the balances of the prospected supply and demand. It is important to notice that, given the international financial crisis and the extent of its impact over Mexico, this is a very uncertain subject; thus, the demand scenario is a conservative one. Likewise, this chapter displays the country's potential on biofuels, the considered actions for their opening for business, and the projects for its production.

The Ministry of Energy hopes that the current edition of the *Oil-Derived Products Outlook* fulfills the users' expectations, and thus will become a valuable tool for planning as well as a document displaying the sector's needs.

Executive Summary

At a worldwide level, the oil-derived products demand has kept, for the past decade, a sustainable growth and Mexico has not been alien to this trend. Therein, the present outlook acknowledges the raising on the oil-derived products demand within our country and the need of investing on infrastructure as a security strategy. Furthermore, it acknowledges the worldwide current economic situation as it is reflected in a deceleration on demand raise.

This outlook opens with an analysis of the historical performance and of the expected one of the oil-derived products industry; afterwards, it displays a section on the historical evolution of the refining industry in Mexico and its possible development in the next ten years.

Worldwide Scene

During 2007, the worldwide refining capacity was of 87,913 thousand barrels per day (tbd), which represented a raise of 1,235tbd (1.4%) in relation to 2006. The region of Europe and Eurasia registers the largest capacity worldwide, followed by Pacific Asia, with 24,601tbd, and North America with 20,970tbd. The Middle East has shown a notable raise during the period of study and placed its capacity in 7,525tbd; Central and South America have had a processing capacity of 6,512tbd, while Africa has had a capacity of 3,280tbd.

On the other hand, during 2007 the average worldwide demand was situated on 85,220tbd, that is to say 1.2% over 2006. All the oil-derived products, except for fuel oil, recorded demand increases. Light distillates grew 1.4% related to 2006, middle distillates 1.2%, other oil-derived products 1.8%, while fuel oil dropped 0.7%. Pacific Asia presented the biggest demand volume amongst different regions, followed by North America.

By 2007 the refining margins improved, situating themselves in an average of 13.5 USD/tbd on the North American Coast of the Gulf of Mexico (USGC), 4.99 USD/tbd for refineries in Europe, and 5.3 USD/tbd in the Asian Market. The levels of refinery utilization showed efficiency improvements in respect to 2006, reaching their best ranks and increasing their available exceeding capacity. The fact of having kept such high margins during 2007 helped keeping favorable conditions in the market, thereby, it can be expected an increase in the number of announced projects for this sector. Indeed, there have been announcements of the construction of nine new refineries in Africa, Pacific Asia, Eurasia, Middle East and even in the USA; therefrom, fifteen new refineries may open between 2010 and 2012, which represents a raise of 2,500tbd to the refining capacity. The required investment for the sector towards 2015 is estimated on more than 320,000 mmUSD.

In regard to the alternative for fossil-derived products, the biofuel reporting bigger volumes is ethanol, displaying an average annual growth rate (AAGR) of 9.9% between 1997 and 2007, mainly driven by the economical growth of the USA during that period. This country, along with Brazil, controlled 91.7% of the worldwide production of ethanol in 2007. Thereto, the worldwide production of biodiesel was quadrupled between 2000 and 2005, from 16tbd produced in 200 to more than 64tbd in 2005. It is worthwhile mentioning that this rise comes mainly from Germany, whose production in 2005 reached nearly 40tbd, representing more than 60% of the worldwide production.

National Scene

During the period 1997-2007, the distillation capacity of crude oil, as well as other processes has not had many variations, this means that the national production of oil-derived products has had a limited growth. In fact, except for the refineries of Cadereyta and Madero – which were upgraded during the last decade – production growth of light and middle distillates has been marginal in the rest of the refineries integrating the National Refining System (SNR).

For the last ten years, the incorporation of coking processes in Cadereyta and Madero let these refineries raise their gasoline production 68.7% and 55.9% respectively. On the other hand, in 2007 the domestic demand of oil-derived products was 16.2 thousand barrels of oil equivalent per day (tboed) less than the previous year mainly due to a drop on the crude processing of some refineries. In regard to the production per oil-derived product, we shall mention that the biggest produced volumes were recorded in Tula and Salina Cruz, by reason of having processed the biggest volume of crude mix, with a total production of 443.8tbd in the SNR.

Production of middle distillates (diesel and jet fuel) was 400.3 tbd in 2007. Diesel represented the highest demand; and 0.2 jet fuel barrels were produced per of diesel. Albeit this proportion and the increase on its elaboration, diesel imports covered 14% of its domestic demand, while jet fuel increased its production 10.3 tbd as a result of its efficiency improvement of 0.7%.

Fuel oil production fell from 34.7% to 23.7% between the beginning and the end of the period, reducing its production in 129.3tbd. Petroleum coke, on the other hand, raised its production in 55.6 millions of tons per year (Mty) in regard to 2006, placing itself in 1689.1Mty in 2007.

Between 1997 and 2007 the imports of oil-derived products grew 5.8% on average, which meant an increase of 163.4 tboed. For 2007 about 379.4 tboed were imported, from which 67.7% were gasoline, 13.9% diesel, 13.6% petroleum coke, and 4.8% fuel oil. It is important to consider the fact that gasoline has gradually increased its share between 1997 and 2007, while fuel oil decreased from year 2000 on, due to its being less demanded for generating electricity.

Prospective Scenario

The current edition of the *Oil-Derived Products Outlook* displays a scenario that includes new refining capacity according to the *Programme for Impelling Growth and Employment*; it also considers the benefits of the Energy Reform (recently approved), which will lead to a better performance for this industry.

The raise on fuels demand, along with i insufficient development of infrastructure has saturated the available capacity in the SNR. In order to face this limitation, Pemex Refining (PR) has outlined various strategic projects. Incorporating coking plants in Salamanca and Tula will enlarge the processing of heavy crude oil from 56.3% to 96.4% in 2017 with respect of the first year of the period. Furthermore, these two additional facilities will have a processing capacity for crude of 300 tbd each.

Reaching these capacities, along with the required infrastructure, will lead to a raise of 359.5tbd of middle distillates for the period 2008-2017. In addition, fuels' quality will be substantially improved and will offer ultra-low sulfur gasoline and diesel.

In order to carry out the mentioned projects and be able to reach a higher demand of fuels under the quality specifications for gasoline and diesel established on NOM-086 (Official Mexican Norm), PR needs to invest 513,854 MXN during the next nine years. From the total investment, the new capacities represent 31.5%, and their implementation will add 266.5 tbd of gasoline at the end of the period.

The expectations of the demand growth are conservative; nonetheless, given the raise on fuels demand for auto transport, PR needs to decrease its dependency on imports. The evolution of this supply is supported on the investments scenario, which will lead to a raise of 662.5tbdcoe (thousand barrels of crude oil equivalent per day) during 2007-2017. Gasoline and diesel will keep the major average share of the mentioned period: 37.5% and 33% each. In less proportion will be jet fuel and petroleum coke.

In 2017, PR will increase its fuels production in regard with the beginning of this period. In the case of gasoline, this will rise from 30.1% - the average in 2007 – to 42.4% in 2017, which means the AAGR will be of 7.3%, reaching thus a production of 893.2 tbd in 2017. For diesel, the average output will be of 23.1% for the first year and of 32.1% at the end of the period, with a production of 656.2 tbd. Jet fuel will have an average growth of 4.6% and a production of 103.6tbd. In the case of fuel oil, its intended average output will fall from 19.6% to 5.6% with its consequent reduction of 201.4tbd on its production. Petroleum coke will raise its production to a considerable extent: 11,876tbd in 2017.

Domestic oil-derived product market, 1997-2007

Domestic supply and demand trends of oil-derived products (gasoline, diesel, turbosine, fuel-oil and petroleum coke) have been maintained in 2007, widening the gap between domestic production and supply, and leading to the need for larger import volumes, mainly of light and intermediate distillates (gasoline and diesel).

This chapter presents the historic trends of the country's oil-derived product supply and demand, as well as a market behavior analysis by region and consumption sector. It also includes a section on investments made between 1997 and 2007 and on the country's production dynamics.

1.1 SNR's installed capacity

In the last years, crude oil distillation capacity and other processes have not undergone great changes, resulting in the limited growth of domestic oil-derived product generation. As a matter of fact, except for the Cadereyta and Madero refineries, both of which were upgraded in the last decade, the production increase of light and intermediate distillates in the rest of the refineries within the National Refining System (SNR) has been marginal.

The unbalance between gasoline supply and demand has lead Pemex Refinación (PR) to gradually adapt its production plants to the characteristics of currently available crude oil types, allowing for the increased yield of gasoline and intermediate distillates. Hence, between 1997 and 2007 the company executed several projects aimed at infrastructure development and technology improvement.

In the last 10 years, the incorporation of coking processes in Cadereyta and Madero allowed for gasoline production increase by 68.7% and 55.9%, respectively. As a consequence, these work centers experienced the highest growth rate in gasoline production (see chart 1), and expanded their installed capacity or modernized some of their existing facilities, achieving the incorporation of efficient technology processes, hence greater production yields.

In addition to coking plants, there is also a need for additional infrastructure allowing for the integration of diverse processes to achieve fuel production with specifications that depend on the development of automotive technologies and on environmental policies. In this sense, PR has made investments to expand and modernize productive process infrastructures; however, the available installed capacity has become insufficient to cover the fast pace of gasoline demand.

Chart 1

Gasoline production and growth rates, 1997 and 2007

(thousand barrels per day)

	1997	2007	aagr (%)
SNR	**387.7**	**443.8**	**1.4**
Cadereyta	48.7	82.2	**5.4**
Madero	39.4	61.5	**4.5**
Tula	89.2	100.5	**1.2**
Salamanca	63.0	63.4	**0.1**
Minatitlán	53.0	41.7	**-2.4**
Salina Cruz	94.4	94.5	**0.0**

Source: IMP, based on data from Pemex Refinación.

Due to this fact, and looking at investment results and at the results of the Cadereyta and Madero refineries' upgrading projects where, in addition to the changes in production, it is now possible to process heavier crude oils, we may say that the remaining refineries will also undergo upgrading in the future. Minatitlán is currently being adapted to this infrastructure and technology.

Each work center requires a specific upgrading scheme based mainly on the specifications and volumes of fuel types to be produced, on the characteristics of the crude oil to be processed and on their geographic location. In this context, additional infrastructure will be required to increase fuel production and to enhance fuel quality.

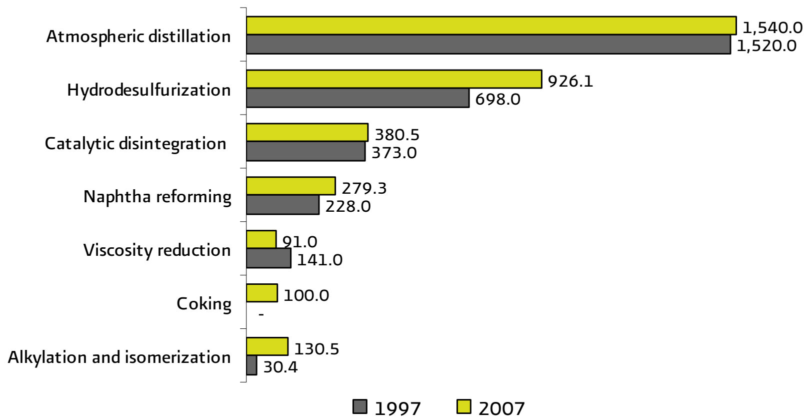
Regarding processing capacities, primary distillation has remained almost static when compared to the development of other secondary processes. Between 1997 and 2007, the increase registered in this process represented 20.0 thousand barrels per day (tbd), reaching 1,540 tbd in 2007. Naphtha reforming has not undergone relevant capacity changes; its growth throughout the period amounted to 51.3 tbd.

Processes aimed at high-octane gasoline production (alkylation and isomerization) registered a capacity increase by 100 tbd (see graphs 1 and 2).

Graph 1

Installed capacity evolution by process type, 1997 and 2007

(thousand barrels per day)

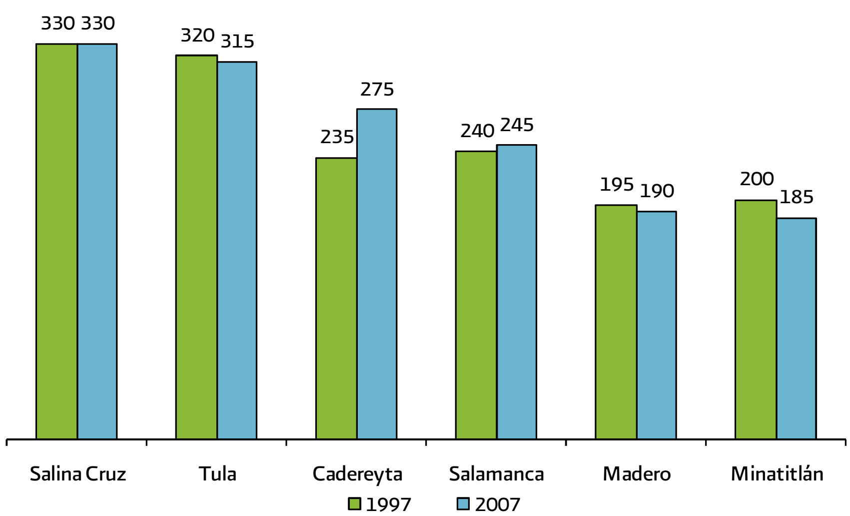


Source: IMP, based on data from Pemex Refinación.

Graph 2

Crude oil processing capacity by refinery, 1997 and 2007

(thousand barrels per day)



Source: IMP, based on data from Pemex Refinación.

Hydrodesulfurization processes experienced the highest degree of expansion in order to comply with the norm on low-sulfur-content fuel production. In this context, the Tula refinery has a strategic role due to its area of influence in the central part of the country, possessing high installed capacity for this process (see chart 2).

In view of the production trends of higher-value fuels and lower fuel-oil production, no higher capacity is required in viscosity-reducing plants. Primary distillation capacity has shown the lowest annual growth rate (0.1%), followed by catalytic disintegration capacity with 0.2%, naphtha reforming capacity by 2.1%, hydrodesulfurization with 2.9%, and a decrease in viscosity reduction capacity by 4.3% (see chart 3).

Chart 2

Installed capacity by refinery and process, 1997-2007

(thousand barrels per day)

	Cadereyta		Madero		Minatitlán		Salamanca		Salina Cruz		Tula		SNR		aagr
Process	**1997**	**2007**	**1997**	**2007**	**1997**	**2007**	**1997**	**2007**	**1997**	**2007**	**1997**	**2007**	**1997**	**2007**	**SNR**
Atmospheric distillation	235	275	195	190	200	185	240	245	330	330	320	315	1,520	1,540	0.1
Catalytic disintegration	70	90	43	60.5	40	30	60	40	80	80	80	80	373	381	0.2
Viscosity reduction	50	-	-	-	-	-	-	-	50	50	41	41	141	91	-4.3
Catalytic reforming	20	46	20	30	48	49	25	39.3	50	50	65	65	228	279	2.1
Alkylation and isomerization	12	23	3.4	22.1	15	15	-	17.4	-	27.7	-	25.2	30	130	15.7
Hydrodesulfurization	86	186.5	58.0	141.7	100	97	96	116.5	161	165	197	219.4	698	926	2.9
Coking	-	50	-	50	-	-	-	-	-	-	-	-	-	100	na
Sulfur (tons/day)	120	600	110	600	80	80	240	240	160	240	320	1,000	1,030	2,760	10.4

na.- does not apply
Source: IMP, based on data from Pemex Refinación.

The evolution of complexity coefficients allows for knowing the relation between secondary process capacities and primary distillation plants, reflecting the efforts aimed at the production of fuel with lower sulfur content.

Chart 3
Complexity coefficients in the National Refining System, 1997-2007

Process	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Catalytic disintegration	0.24	0.24	0.24	0.24	0.24	0.26	0.26	0.24	0.24	0.25	0.25
Naphtha reforming	0.15	0.15	0.15	0.17	0.17	0.20	0.20	0.20	0.20	0.18	0.18
Hydrodesulfurization	0.46	0.49	0.49	0.52	0.54	0.64	0.64	0.64	0.64	0.60	0.60
Viscosity reduction	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.06	0.06

Source: IMP, based on data from Statistical yearbook 2007 and from Pemex Refinación.

1.2 Crude oil processing in SNR

In 2007, the volume of crude oil processed within SNR represented 1,269.8 tbd, 56.9% out of which accounted for light crude oil, 38.0% to heavy crude oil, 3.5% to reconstituted crude oil[1] and 1.5% to superlight crude oil. This volume was lower than in 2006 as a result of maintenance works, adverse climatic conditions that affected the shipping of products, and operation-related aspects that influenced crude oil demand in the Madero and Salina Cruz refineries (see chart 4).

Chart 4

Crude oil process by type in SNR, 1997-2007

(thousand barrels per day)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**1,242.3**	**1,283.0**	**1,228.0**	**1,227.4**	**1,251.9**	**1,245.4**	**1,285.9**	**1,303.4**	**1,284.4**	**1,284.2**	**1,269.8**	0.2
Superlight	21.1	19.5	16.5	1.7	2.8	11.8	6.3	3.5	14.1	19.2	19.5	-0.8
Light	604.8	736.1	773.7	744.9	800.1	818.1	811.3	756.7	728.5	723.0	722.4	1.8
Heavy	451.8	401.8	359.9	379.6	333.1	344.8	424.3	495.1	531.7	499.0	483.0	0.7
Reconstituted[1]	164.6	125.7	77.9	101.2	115.9	70.7	44.0	48.1	10.2	43.1	44.9	-12.2

[1] Maya crude oil free of light products, pentanes, light naphtha from Cangrejera, light naphtha from Cactus, gasoline from Poza Rica, gasoline from Madero.
Source: IMP, based on data from Pemex Refinación.

The Madero, Salamanca and Salina Cruz refineries registered a decrease in crude oil processing when compared to 2006. In the first two cases, the decrease was caused by a lower share of heavy crude oil, and at the Salina Cruz refinery (A. Dovalí Jaime), it was caused by a lower volume of processed light crude oil (see chart 5).

[1] Maya crude oil free of light products, pentanes, light naphtha from Cangrejera, light naphtha from Cactus, gasoline from Poza Rica, gasoline from Madero.

Chart 5

Crude process by refinery, 1997-2007

(thousand barrels per day)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**1,242.3**	**1,283.0**	**1,228.0**	**1,227.4**	**1,251.9**	**1,245.4**	**1,285.9**	**1,303.4**	**1,284.4**	**1,284.2**	**1,269.8**	**0.2**
Cadereyta	176.0	167.3	109.9	125.8	200.4	196.0	209.0	212.8	194.6	207.2	210.2	1.8
Madero	137.5	147.6	149.8	149.3	105.9	108.0	141.2	145.3	141.9	149.3	141.4	0.3
Minatitlán	175.6	180.7	174.0	172.0	177.0	169.6	176.6	167.0	162.6	168.6	170.1	-0.3
Salamanca	194.7	185.2	178.2	186.0	185.7	185.4	185.0	198.6	197.0	196.4	187.6	-0.4
Salina Cruz	281.0	307.4	308.6	298.2	292.8	306.3	306.2	287.9	292.7	290.0	271.5	-0.3
Tula	277.5	294.9	307.5	296.2	290.3	280.1	267.8	291.9	295.6	272.7	288.9	0.4

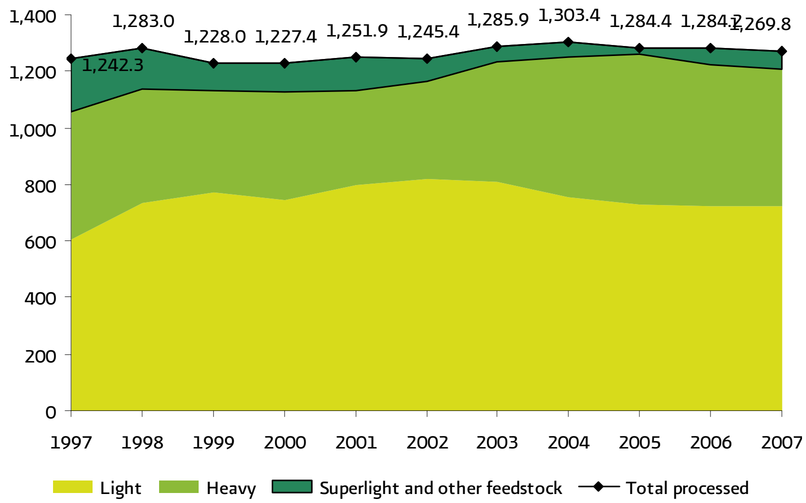
Source: IMP, based on data from Pemex Refinación.

During the 1997-2007 period, light crude oil maintained its high share in SNR; however, as of 2003 the processing levels of this crude oil type decreased, and the processed volume of heavy crude oil increased as a consequence of the upgrading projects (see graph 3).

Graph 3

Light and heavy crude oil process evolution in SNR, 1997-2007

(thousand barrels per day)



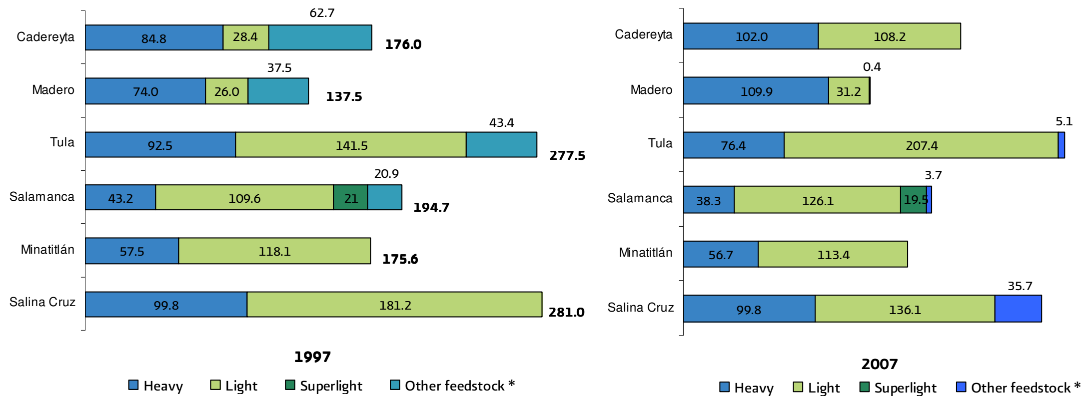
Source: IMP, based on data from Pemex Refinación.

The refinery that processed the largest volume of crude oil in 2007 was Tula; while Madero was the refinery with the largest share of heavy crude oil in the entire system, representing 22.8%., despite receiving the lowest total volume. As to light crude oil, Tula stood out due to the magnitude of supplied volumes: 28.7% of the total (see graph 4).

Graph 4

Crude process by type and by refinery

(thousand barrels per day)



* Includes Maya crude oil free of light products, pentanes, light naphtha from Cangrejera, light naphtha from Cactus, gasoline from Poza Rica and gasoline from Madero.
Source: IMP, based on data from Pemex Refinación.

1.3 Investments in SNR

In 2007 Pemex Refinación made investments equal to 13,847.9 million pesos (mmp), 63.5% of which corresponded to financed investment for the Minatitlán project; the remaining amount (5,052.5 mmp) was channeled to projects such as:

Production and operation maintenance of refineries, pipeline systems and storage terminals;

Energy train [2] in Cadereyta and Madero;

Fight illegal fuel markets;

Fuel quality project; and

Gasoline pool improvement.

Out of the total investment resources (programmed plus financed investment), 66.5% was destined to the reconfiguring project of Minatitlán; 30.8% to the conclusion of different works at the remaining refineries; 0.4% to the

[2] Infrastructures that complement the refineries' facilities to increase production, improve quality and obtain profits for the improvement of the profit and loss statement of the refinery, of Pemex Refinación and of Pemex.

combat of illegal markets; and 2.3% to fuel quality enhancement. The total amount of financed investment was destined to the reconfiguring project of the Minatitlán refinery (see chart 6).

Chart 6

Investment made in strategic projects, 2007
(million pesos)

Investment	Minatitlán	Cadereyta	Madero	Salamanca	Tula	Salina Cruz	Combat of illegal markets	Fuel quality	Gasoline pool improvement
Total required	**9,205.6**	**2,872.2**	**762.5**	**372.1**	**246.3**	**6.5**	**60.5**	**320.5**	**1.8**
Programmed investment	410.2	2,872.2	762.5	372.1	246.3	6.5	60.5	320.5	1.8
Financed investment *	8,795.4								

* Includes 112.9 million dollars of capitalizable interests.
Source: IMP, based on data from Pemex Refinación.

The purpose of investments destined to the Minatitlán refinery is to increase nominal crude oil processing capacities, to enhance fuel quality, reduce fuel-oil production and to grant this work center a more competitive, efficient and profitable position by using larger volumes of Maya crude oil.

On the other hand, the combat of illegal markets considers the acquisition of state-of-the-art equipment and tools to reduce the negative effects of this activity. Diverse actions (pipeline measurements, air surveillance, tank truck tracking, as well as discouraging the sale of tampered products) have been undertaken to reduce illegal fuel extraction activities.

Regarding fuel quality, Pemex Refinación has undertaken different investment projects to comply with environmental norms. The projects include the construction and modernization of plants allowing for the production of fuels with ultra-low sulfur content.

3.4 Production of oil-derived products

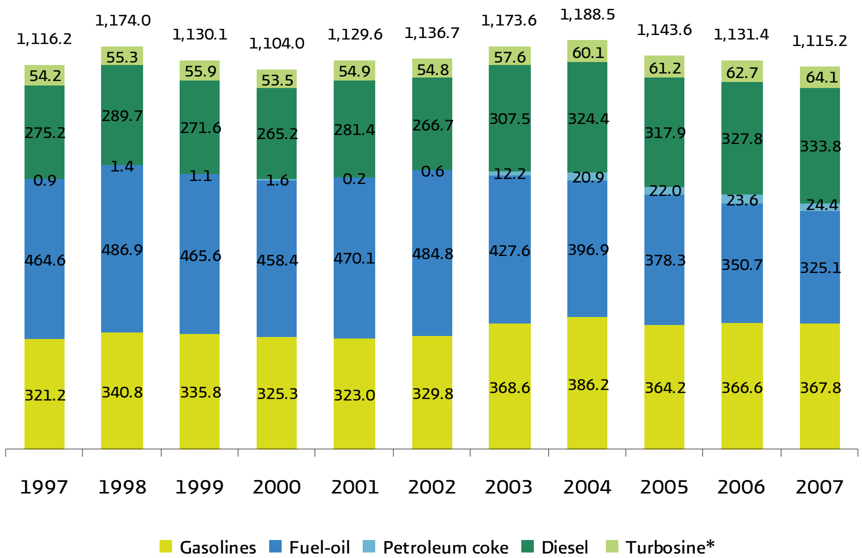
In 2007, domestic oil-derived product supply represented 16.2 tbdoe less than the previous year, due mainly to the decrease in the crude oil processing activities of some refineries, despite the increase of production yields. The production growth rate of oil-derived products3 between 1997 and 2007 was -0.01%, reflecting the fact that production in 2007 was fairly similar to that of 1997 (see graph 5). While domestic supply was 1.0 tbdoe lower between these years, domestic demand increased by 172.1 tbdoe.

[3] Fuel-oil, petroleum coke, diesel, gasoline and turbosine.

Graph 5

Production of oil-derived products in SNR, 1997-2007

(thousand barrels per day of crude oil equivalent)

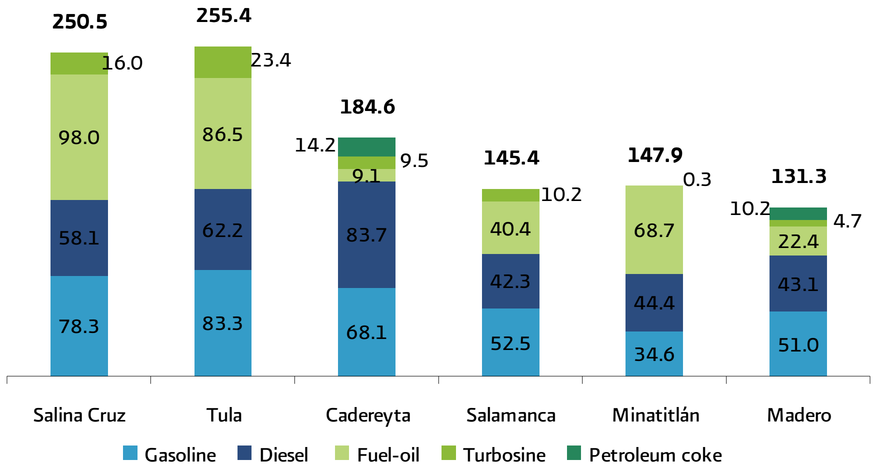


* Does not include jet fuel.
Source: IMP, based on data from Pemex Refinación.

The creation of more complex schemes in SNR through reconfiguring projects has allowed for the gradual modification of fuel production yields. Deep conversion schemes in Cadereyta and Madero achieved -in 2004- the highest production levels in the entire period leading to a lower production of fuel-oil (see graph 6).

Graph 6
Production of oil-derived products by refinery, 2007

(thousand barrels per day of crude oil equivalent)



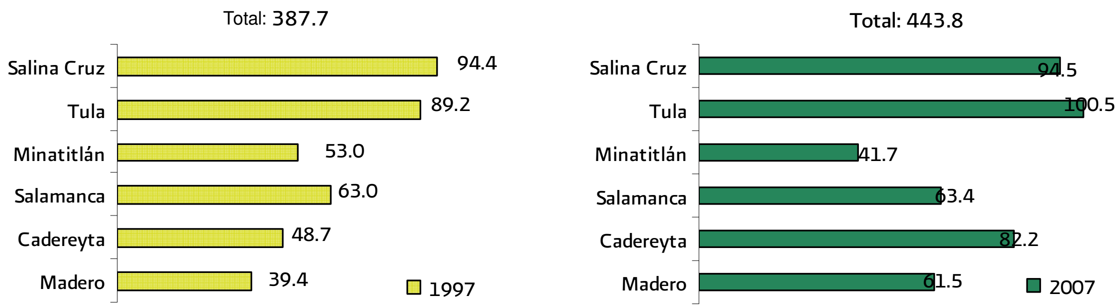
Source: IMP, based on data from Pemex Refinación.

Between 1997 and 2007, gasoline production yields increased from 31.2% to 35.0%, translating into an increase of supply for 56.2 tbd. It is worth mentioning that, even though Madero and Cadereyta obtained the highest yields of gasoline in 2007, the greatest volumes were produced in Tula and Salina Cruz since they processed the highest volume of crude oil blends (see graph 7).

Graph 7

Gasoline production by work center, 1997 and 2007

(thousand barrels per day)



Source: IMP, based on data from Pemex Refinación.

Even so, the production increase registered throughout the historical period was unable to cover domestic demand, since for every barrel of gasoline demanded in 2007, 58.3% was produced in the country while the rest was acquired from abroad. While production increased at an average annual rate of 1.4%, domestic demand grew at a rate of 4.3% during the period. This means that demand increased by 261.4 tbd and gasoline production, by only 56.2 tbd.

Pemex Refinación produces two types of gasoline for the automotive market: Magna and Premium. In 2007, the former represented 93.1% of domestic supply. The evolution of gasoline production by fuel type is presented in chart 7.

Currently, the gasoline type known as Pemex Premium is sold in the country with a sulfur concentration of 30 parts per million (ppm), while Pemex Magna is sold with 300 ppm in metropolitan areas, 15 ppm in the Northern border zone of the country and 500 ppm in the rest of the republic.

Chart 7
Gasoline production by type, 2007

(thousand barrels per day)

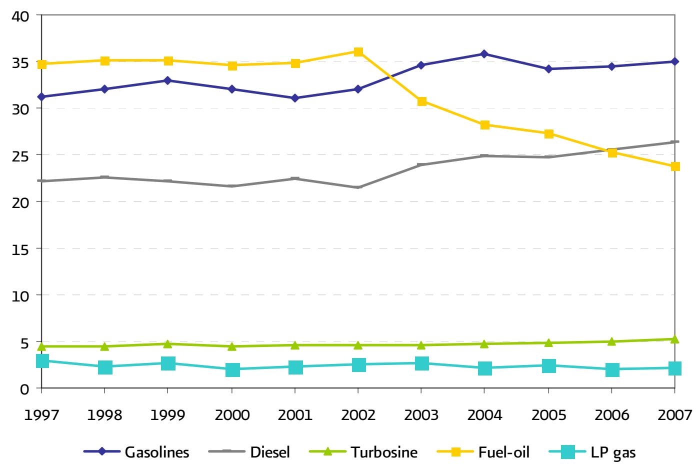
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**387.7**	**411.3**	**405.3**	**392.6**	**389.8**	**398.1**	**444.9**	**466.0**	**439.5**	**442.4**	**443.8**	**1.4**
Base[1]	12.4	48.4	45.9	27.9	22.4	25.9	10.5	3.9	4.8	7.5	4.5	-9.7
Nova	90.4	4.1	0.6	-	-	-	-	-	-	-	-	n.a.
Others[2]	1.3	1.2	1.0	0.8	0.8	0.5	0.3	0.2	0.8	0.6	0.1	-22.5
Pemex Magna	282.5	347.9	346.6	346.0	349.4	349.9	396.5	418.0	395.7	399.3	413.2	3.9
Pemex Premium	1.12	9.7	11.2	17.9	17.3	21.8	37.6	43.8	38.2	35.0	26.1	37.1

[1] Considers liquid gasolines plus transfers from Cangrejera.
[2] Includes gas solvent, naphtha gas and colorless gasoline; does not include jet fuel.
Source: IMP, based on data from Pemex Refinación.

The production yield of fuel-oil decreased from 34.7% to 23.7% between the beginning and end of the period, reducing production by 129.3 tbd. In 2007, the Minatitlán refinery had the greatest yields of fuel-oil and hence the lowest yield of gasoline production. Madero and Cadereyta registered the highest yields in gasoline production in exchange for a lower yield of fuel-oil, resulting in the lowest volumes as a consequence of deep conversion processes (see graph 8 and 9).

Graph 8

Global production yield evolution in SNR, 1997-2007
(percentage units)

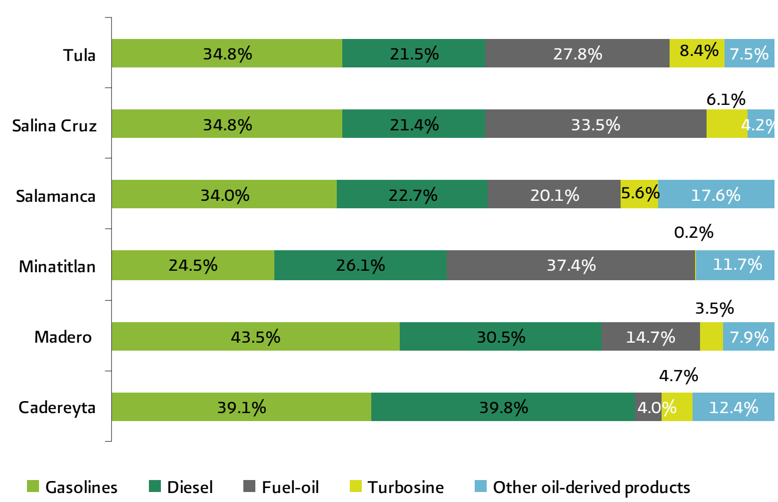


Source: IMP, based on data from Pemex Refinación.

Graph 9

Crude oil yields in the production of oil-derived products, 2007

(percentage units)



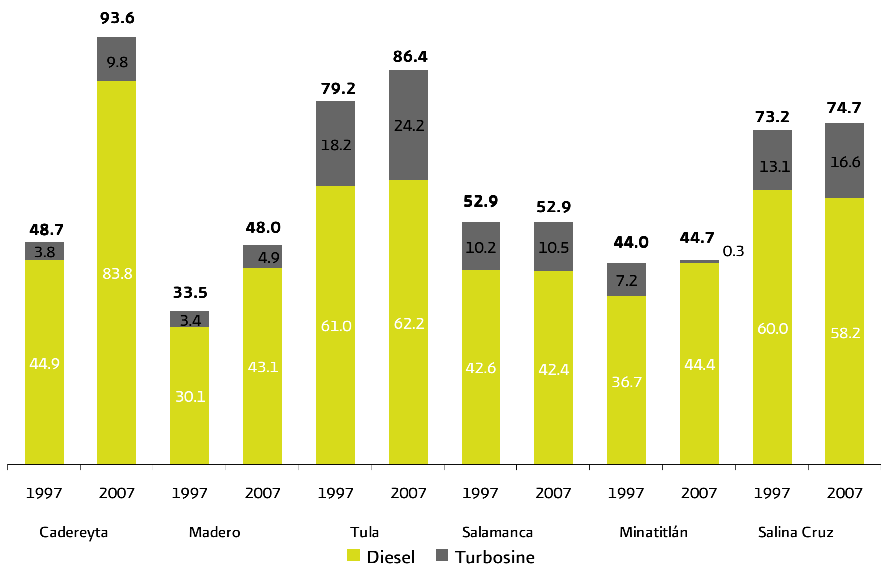
Source: IMP, based on data from Pemex Refinación.

Intermediate distillate (diesel and turbosine) production increased at an annual average rate of 1.9% reaching 400.3 tbd in 2007, having diesel the highest share in domestic supply. In 2007, 0.2 barrels of turbosine were produced for each barrel of diesel. Despite this ratio and production growth, diesel imports represented 14.0% of domestic demand. Turbosine production increased by 10.3 tbd as a result of the 0.7% increase of its yield (see graph 10).

Graph 10

Intermediate distillate production, 1997 and 2007

(thousand barrels per day)

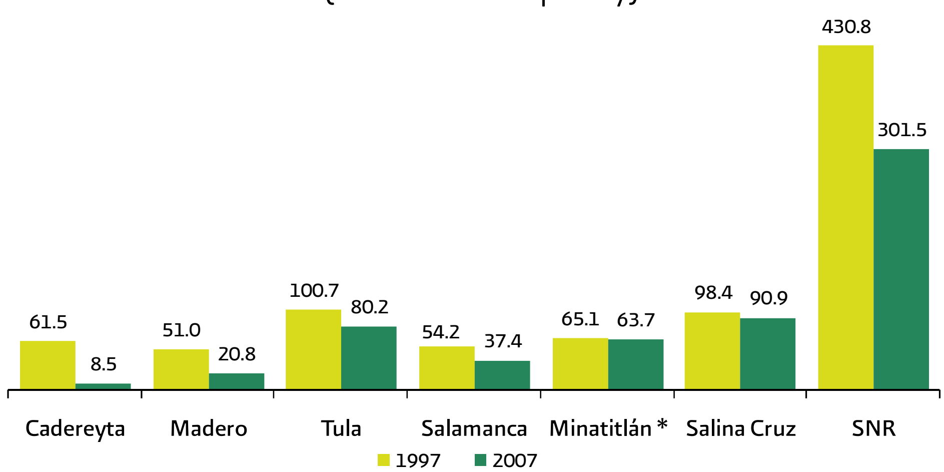


Source: IMP, based on data from Pemex Refinación.

Graph 11

Fuel-oil production by refinery, 1997 and 2007

(thousand barrels per day)



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

1.5 Domestic oil-derived product demand, 1997-2007

1.5.1 Transportation sector

Land transportation

Regional gasoline and diesel demand

During the studied period, the Central region consumed most of the gasoline for transportation purposes, with a share of 28.7% in total domestic consumption in 2007. This elevated demand is explained by the high concentration of gasoline vehicles in the region, and by the high number of trips made by private vehicles. In addition to this, the increase in the number of automobiles and the domination of collective transportation services are factors leading to high degrees of dependence on gasoline.

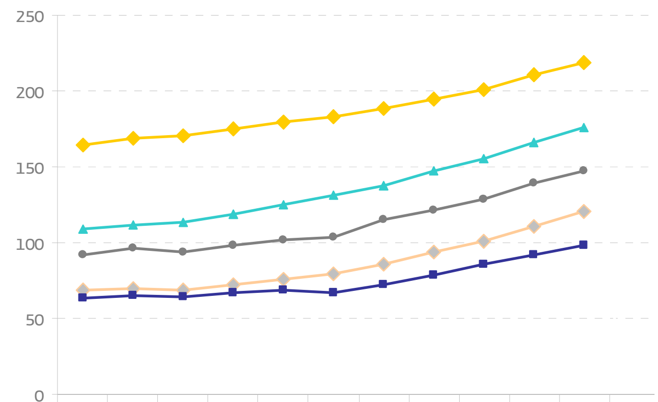
In the metropolitan area alone, almost 22 million trips[4] are made every working day, 14.8 million out of which are made on public and 6.8 million on private means of transportation. As to public transportation, those used most frequently were collective transportation means and cabs; private transportation was dominated by the use of cars.

[4] 2007 origin-destination survey. Ministry of Transportation. (The term "trip" refers to the number of movements made by an undetermined number of persons during one day on some means of transportation. This figure does not correspond to the number of users transported).

Graph 12

Regional gasoline demand in the transportation sector, 1997-2007

(thousand barrels per day)



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
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
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
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
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
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
Total	497.8	511.7	511.0	531.4	550.6	565.3	600.5	636.1	671.5	718.3	760.3	4.3

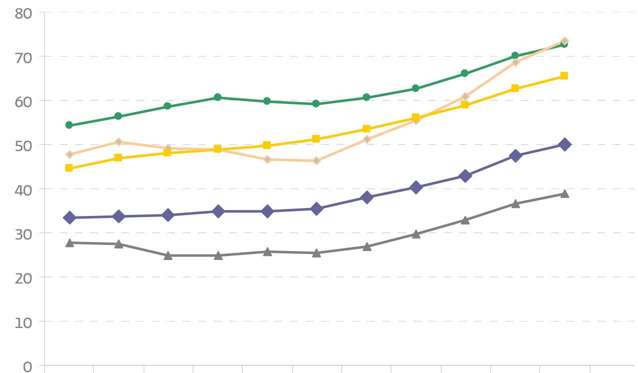
Source: IMP, based on data from Pemex.

The second most important region regarding consumption was the Central-Western region, consuming in 2007 23.1% of the total of gasoline used for transportation purposes. The Northeastern region had the lowest share with 12.9% (see graph 12).

Graph 13

Regional diesel demand in the transportation sector, 1997-2007

(thousand barrels per day)



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Central-Western	54.3	56.4	58.5	60.6	59.7	59.0	60.7	62.5	66.1	69.9	72.6	2.9
Northeastern	47.8	50.5	49.2	48.9	46.5	46.3	51.3	55.3	60.9	68.6	73.3	4.4
Central	44.5	46.9	48.0	48.8	49.6	51.1	53.3	56.1	58.8	62.6	65.5	3.9
South-Southeastern	33.4	33.7	33.9	34.8	34.8	35.4	38.0	40.3	42.8	47.4	49.9	4.1
Northwestern	27.9	27.4	24.8	24.7	25.6	25.5	26.8	29.7	33.0	36.7	38.7	3.3
Total	207.9	214.8	214.5	217.8	216.2	217.3	230.0	243.9	261.6	285.2	300.0	3.7

Source: IMP, based on data from Pemex.

Out of the total vehicle fleet existing in 2007, 94.6% were gasoline vehicles, 4.3% were diesel, and the remaining percentage corresponded to LP gas and to a lesser extent to compressed natural gas (CNG). By category, compact and subcompact vehicles prevailed within the vehicle fleet structure; the highest ratio of vehicles within these categories consumes gasoline.

Between 2002 and 2007, the total vehicle fleet increased by 5.8 million, reaching 20.6 million (see charts 8 and 16).

Chart 8

Vehicle fleet structure, 2002-2007

(million vehicles)

Category	2002	2003	2004	2005	2006	2007	aagr
Total	**14.8**	**16.0**	**17.0**	**18.0**	**19.4**	**20.6**	**6.9**
Compact	3.6	3.9	4.1	4.4	4.7	5.0	6.9
Subcompact	3.8	4.1	4.4	4.4	4.7	5.0	5.6
Luxury and sports	1.1	1.2	1.3	1.4	1.5	1.6	6.8
Light	5.7	6.2	6.6	7.1	7.8	8.3	7.7
Heavy	0.5	0.6	0.6	0.6	0.7	0.7	6.4

Source: IMP, based on data from private companies.

Chart 9

Gasoline vehicle fleet, 2002-2007

(thousand vehicles)

Region	2002	2003	2004	2005	2006	2007	aagr
Northwestern	1,606	1,742	1,852	1,971	2,129	2,286	7.3
Northeastern	2,690	2,917	3,101	3,301	3,564	3,778	7.0
Central-Western	2,901	3,146	3,345	3,560	3,844	4,096	7.1
Central	4,767	5,169	5,497	5,850	6,317	6,525	6.5
South-Southeasterr	1,876	2,035	2,164	2,303	2,486	2,757	8.0
Total	13,840	15,008	15,960	16,984	18,341	19,442	7.0

Source: IMP, based on data from private companies.

Regarding diesel vehicles, in 2007 diesel demand in the transportation industry increased by 36.2% when compared to 2002, as a result of the increase of these vehicle types (309.1 thousand vehicles), representing a vehicle fleet of 885.8 thousand units in 2007. The average annual growth rate of these vehicles was higher than that of gasoline vehicles, reflecting a marked dynamism due to the advantages of these engines.

Due to the high power of diesel engines when compared to gasoline engines, their capacity allows for larger scales both in cargo and passenger transportation at lower costs, granting alternatives with respect to gasoline engines and replacing the vehicle fleet running on LP gas, thereby making the diesel vehicle segment acquire greater relevance.

Chart 10

Diesel vehicle fleet, 2002-2007

(thousand vehicles)

Region	2002	2003	2004	2005	2006	2007	aagr
Northwestern	66.9	72.6	77.2	82.1	98.3	107.9	10.0
Northeastern	112.1	121.5	129.2	137.5	168.1	188.8	11.0
Central-Western	120.9	131.1	139.4	148.3	161.9	172.9	7.4
Central	198.6	215.4	229.0	243.7	269.3	291.9	8.0
South-Southeastern	78.2	84.8	90.2	95.9	113.8	124.2	9.7
Total	**576.7**	**625.3**	**665.0**	**707.7**	**811.4**	**885.8**	**9.0**

Source: IMP, based on data from private companies.

Between 1997 and 2007, car sales increased by 54.5%, while truck sales grew by 80.0%. Despite this growth, a decrease has taken place in the last two years, due mainly to the increased import of second-hand vehicles during the last three years; the rest of the period was characterized by the noticeable increase in the acquisition of new units (see graph 14).

The same period registered 4,438.2 thousand legally imported vehicles, representing 71.3% of the total of imported vehicles (legal, illegal and regularized). In this sense, legal car imports grew at an average annual rate of 19.0%[5].

Legally imported vehicles that predominated in 2006 were light cargo and private passenger vehicles (compact and subcompact). In this context, heavy cargo vehicles (diesel) had a lower share (below 1.0%) this year.

On the other hand, the coming into effect of the automotive decree in 2005[6] has caused a considerable increase in vehicle imports in the last three years, exceeding the 2005 figures by 48.1% in 2006, representing 1,220,000 vehicles; domestic sales represented 1,099,555 units, meaning that the increase observed in vehicle import has generated greater gasoline demand.

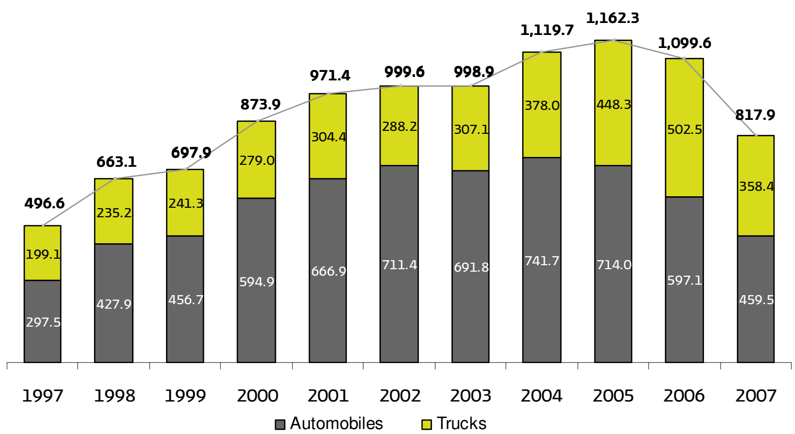
The incorporation of new vehicles and the elimination of outdated units generate a vehicle fleet with increased average efficiency; nonetheless, the import of backward technologies in outdated vehicles acquired from abroad diminish the benefits of an evolving fleet.

[5] Source: IMP, based on data from private companies.
[6] Decree establishing the conditions for the definitive import of second-hand motor vehicles. DOF 22/08/2005.

Graph 14

Vehicle sales evolution, 1997-2007

(thousand units)



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

Service stations

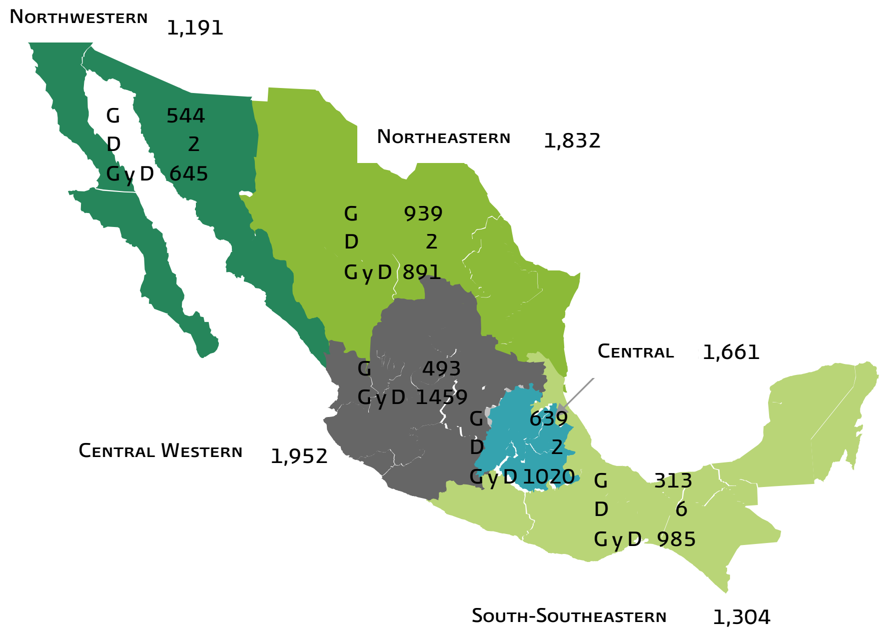
The retail sale of gasoline and diesel offered by PR takes place through service stations. By 2007, 7,940 stations are registered into the Pemex Franchise system, with Mexican investors as owners. These franchises seek to offer more efficient services to their customers, creating a larger network for automotive fuel sales.

Out of the total of service stations, 2,928 distribute only gasoline; 5,000 sell gasoline and diesel; and 12 sell exclusively diesel (see figure 2 and chart 11).

Figure 2

Regional distribution of service stations, 2007

(number of stations)



G: gasoline stations
D: diesel stations
G and D: gasoline and diesel stations

Source: IMP, based on data from Pemex Refinación.

Chart 11

Vehicle fleet and fuel demand distribution, 2007

(percentage units)

	Vehicle fleet		Fuel demand	
	Gasoline	Diesel	Gasoline	Diesel
Northwestern	11.8%	12.2%	12.9%	14.3%
Northeastern	19.4%	21.3%	19.4%	24.0%
Central-Western	21.1%	19.5%	23.1%	24.2%
Central	33.6%	33.0%	28.7%	20.3%
South-Southeastern	14.2%	14.0%	15.8%	17.3%

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

Air transportation

Broadly speaking, aviation operations in Mexico grew at an annual average rate of 3.2% between 1997 and 2007. During 2007, operations increased by 203 thousand when compared to the previous year; out of these, 168 thousand are related to regular commercial airlines, that is, operations with established routes and schedules; 21 thousand corresponded to air taxis (non-regular commercial operations) and 17 thousand corresponded to general aviation (private, official, military and general aircrafts with foreign number plates). Cargo operations have decreased by almost 3 thousand operations (see chart 12).

Chart 12

Operations by aviation type, 1997-2007

(thousand operations)

Type	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**1,380.3**	**1,420.0**	**1,460.7**	**1,470.9**	**1,465.7**	**1,457.0**	**1,458.8**	**1,526.2**	**1,569.2**	**1,696.6**	**1,899.4**	**3.2**
Regular commercial[1]	846.4	892.2	914.8	934.0	946.2	933.2	922.1	961.7	975.6	1,064.5	1,232.1	3.8
Charter[2]	51.4	59.7	62.5	75.8	36.9	32.1	34.7	33.8	31.4	30.7	31.2	-4.9
Non-regular commercial[3]	189.8	181.3	183.4	160.8	161.4	169.0	181.2	204.8	215.2	224.5	245.3	2.6
General aviation[4]	292.8	286.8	300.1	300.3	302.1	303.8	302.6	301.3	310.8	336.0	352.9	1.9
Cargo	n.d.	n.d.	n.d.	n.d.	19.0	18.8	18.3	24.7	36.1	40.9	37.9	n.a.

[1] Refers to aircrafts of airlines with established routes and schedules.
[2] Refers to commercial aircrafts with non-concession routes and/or routes that are off itinerary, with sporadic operation.
[3] Refers to air taxis.
[4] Refers to private, official, military and general aircrafts with foreign number plate.
n.d. = not available.
n.a. = does not apply.
Source: IMP, based on data from ASA.

Passenger air transportation has increased in a relevant manner due to factors such as time or service prices in comparison with land transportation. Between 2006 and 2007, the number of passengers increased by 11.2 million. Out of the 86.5 million passengers transported in 2007, 57.5 million traveled on national aircrafts and 29.0 million, on international. From the total of passengers transported, 94.3% traveled on airlines with established routes and schedules[7].

[7] Aeropuertos y Servicios Auxiliares, Sistema Aeroportuario Mexicano, 2007.

Another factor contributing to the increase of air passenger numbers is the operation of new routes and the creation of low-cost airlines in Cuernavaca, Tuxtla Gutiérrez, Ciudad del Carmen, Loreto and Nogales, among others.

During 2007, the busiest airports with the highest movement of passengers were Mexico City with 25.8 million passengers in 378,161 operations; Cancún with 11.4 million passengers in 114,067 operations; Guadalajara with 7.3 million passengers in 164,244 operations; Monterrey with 6.6 million passengers in 116,826 operations; and Tijuana with 4.7 million passengers in 65,460 operations[8].

Chart 13

Passengers transported by aviation operation type, 1997-2007

(million passengers)

Type	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**50.0**	**54.4**	**58.3**	**59.4**	**59.2**	**57.5**	**61.4**	**66.4**	**69.4**	**75.3**	**86.5**	**5.6**
Regular commercial[1]	44.9	49.0	52.4	53.0	53.5	52.6	55.9	60.9	64.4	70.4	81.6	6.1
Charter[2]	4.4	4.7	5.4	5.9	4.8	4.0	4.5	4.4	3.9	3.7	3.6	-1.9
Non-regular commercial[3]	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	1.6
General aviation[4]	n.d.	n.d.	n.d.	n.d.	0.4	0.4	0.4	0.5	0.5	0.5	0.5	n.a.

[1] Refers to aircrafts of airlines with established routes and schedules.
[2] Refers to commercial aircrafts with non-concession routes and/or routes that are off itinerary, with sporadic operation.
[3] Refers to air taxis.
[4] Refers to private, official, military and general aircrafts with foreign number plate.
n.d. = not available.
n.a. = does not apply.
Source: IMP, based on data from ASA.

By the end of 2007, the number of registered aircrafts was 7,572[9], 5,561 out of which were for private service, 1,646 for commercial service (including airlines and air taxis) and 365 for official purposes (State service), representing an increase of 158 aircrafts for private service, 157 for commercial service and 41 for official service, when compared to those registered in 2006. In addition, there is a registry of 1,340 airfields[10] and 85 airports[11] (27 national and 58 international).

[8] ASA, Sistema Aeroportuario Mexicano, 2007.
[9] Aircrafts registered in the Mexican Aeronautical Registry; does not include foreign aircrafts (leased).
[10] Defined area of land or water proper for taking off, landing, water landing or for the movement of aircrafts, with minimum facilities or services to guarantee operation safety.
[11] Airport: civil airfield for public services with adequate facilities and services for receiving and dispatching aircrafts.

On the other hand, the public sales price of turbosine increased by 98 cents per liter during 2007 compared to the previous year, reaching 7.28 $/lt[12], mainly due to the oil price increase that had an important impact on the operative expenses of airlines.

Turbosine demand has grown at an average annual rate of 3.7% between 1997 and 2007. The Central, South-Southeastern and Central-Western regions remained the most dynamic regions as a result of the expansion and decentralization of airports and the conditioning of alternative airports.

During 2007, the Mexico City airport demanded around 22.8 tbd, Cancún 10.1 tbd, Guadalajara 6.1 tbd, Monterrey 3.9 tbd and Tijuana 3.8 tbd [13], being these the most relevant airports.

Chart 14

Domestic turbosine demand by region, 1997- 2007

(thousand barrels per day)

Regional turbosine	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	tmca
Total	**47.2**	**52.4**	**55.3**	**55.5**	**55.3**	**53.3**	**54.2**	**57.8**	**58.7**	**61.2**	**67.9**	**3.7**
Northwestern	6.6	6.9	7.5	7.4	7.6	7.3	7.2	7.2	7.4	7.5	7.6	1.4
Northeastern	3.5	3.6	3.5	3.3	3.9	3.6	4.7	4.5	4.3	4.7	9.5	10.6
Central-Western	9.5	10.5	11.3	11.6	11.4	10.7	10.3	11.2	12.3	13.1	10.6	1.1
Central	17.4	21.2	21.3	21.1	20.7	20.8	19.8	21.2	21.6	22.5	23.5	3.1
South-Southeastern	10.2	10.2	11.7	12.0	11.7	10.8	12.2	13.6	13.1	13.5	16.7	5.0

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

Sea transportation

In terms of volume, the sea transportation of merchandise is more common worldwide, since it allows for the transportation of larger volumes to greater distances. In Mexico, ports handling the largest volume of goods are Lázaro Cárdenas, Michoacán; Manzanillo, Colima and Salina Cruz, Oaxaca, on the Pacific coast, while the busiest ports in the Gulf of Mexico are Cayo Arcas, Campeche; Pajaritos, Veracruz and Dos Bocas, Tabasco.

Diesel demand for sea transportation increased at an annual average rate of 1.5% between 1997 and 2007. The moderate growth is due mainly to the merging of maritime companies to abate costs through strategies such as route redistribution, cargo consolidation, service globalization and the decrease of international maritime traffic.

[12] Oil indicators, Pemex.
[13] Figures based on data from Sistema Aeroportuario Mexicano, ASA.

Chart 15

Diesel demand in different transportation types, 1997-2007

(thousand barrels per day)

Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**232.3**	**243.3**	**244.9**	**249.6**	**244.6**	**241.6**	**254.8**	**269.0**	**288.1**	**312.7**	**329.1**	**3.5**
Automotive transporta	207.9	214.8	214.5	217.8	216.2	217.3	230.0	243.9	261.6	285.2	300.0	3.7
Railway	11.9	11.0	10.4	10.9	10.2	10.6	10.7	11.5	11.8	12.7	14.5	2.0
Maritime transportatio	12.6	17.5	20.0	21.0	18.2	13.6	14.1	13.5	14.7	14.8	14.6	1.5

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

Regional oil-derived product consumption in the transportation sector

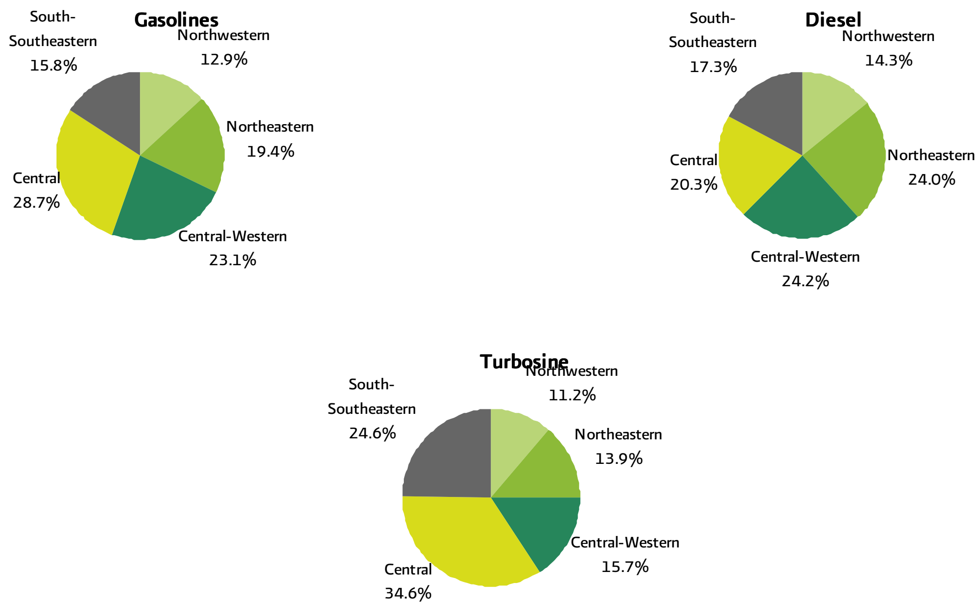
In 2007, the gasoline vehicle fleet and the number of operations at the Mexico City International Airport generated an important increase of gasoline and turbosine demand in the Central region.

On the other hand, the Central-Western region is the main diesel and fuel-oil consumer due to its heavy industrial activities.

Graph 15

Regional participation in the sale of oil-derived products to the transportation sector, 2007

(percentage structure)



Source: IMP, with data from ASA, Pemex and Sener.

1.5.2 Electricity sector

Public electricity sector

Fuel-oil, after natural gas, remains one of the main fuels used in the electricity sector. Its consumption during the period 1997-2007 was reduced by an annual average rate of 5.1%. As of 2000, its growing tendency was reversed, and as of 2004 natural gas demand exceeded the demand of this oil-derived product as a consequence of a policy based on the use of cleaner-burning fuel types.

Fuel-oil demand reduction indicates that the technological changes taking place in some processes have favored the use of coal and natural gas as substitute energies. In this sense, fuel-oil demand in the public electricity sector decreased by 3.8 thousand barrels per day of crude oil equivalent (tbdoe) in 2007, as did diesel demand, which decreased by 3.6 tbdoe, while natural gas demand increased by 42.3 tbdoe, fostered by the growing demand of Independent Energy Producers that employ natural gas in their combined cycle plants, and by favorable price behavior.

The following plants increased their fuel-oil demand during 2007: San Carlos (BCS), Mazatlán II (Sin.), Manzanillo I and II (Col.), Villa de Reyes (SLP) and Salina Cruz (Oax.). All of which use conventional thermal technology, with the exception of San Carlos that uses internal combustion technology. The remaining plants decreased their fuel-oil consumption when compared to 2006.

Chart 16

Fossil fuel demand in the public electricity sector, 1997-2007
(thousand barrels of crude oil equivalent per day)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Total	**544.5**	**606.6**	**604.2**	**666.1**	**700.2**	**707.3**	**713.4**	**682.5**	**713.4**	**706.4**	**740.9**	**3.1**
Comisión Federal de Electricidad	540.3	600.0	597.4	655.5	678.0	627.5	599.0	522.5	549.8	497.3	493.8	-0.9
Luz y Fuerza del Centro	4.2	6.6	6.8	5.9	6.6	6.0	5.7	4.9	5.0	5.2	9.5	8.5
Independent Power Production	0.0	0.0	0.0	4.7	15.6	73.8	108.7	155.0	158.6	203.9	237.7	n.a.
Coal	**76.6**	**80.8**	**81.9**	**82.5**	**98.6**	**105.3**	**120.0**	**99.2**	**129.0**	**127.1**	**126.8**	**5.2**
Comisión Federal de Electricidad	76.6	80.8	81.9	82.5	98.6	105.3	120.0	99.2	129.0	127.1	126.8	5.2
Fuel-oil	**368.7**	**407.2**	**393.7**	**420.1**	**407.3**	**357.2**	**302.6**	**276.4**	**288.5**	**221.3**	**217.5**	**-5.1**
Comisión Federal de Electricidad	368.7	407.2	393.7	420.1	407.3	357.2	302.6	276.4	288.5	221.3	217.5	-5.1
Diesel	**5.9**	**8.6**	**7.8**	**11.3**	**8.3**	**6.8**	**16.3**	**6.7**	**6.0**	**6.9**	**3.2**	**-5.9**
Comisión Federal de Electricidad	5.9	8.6	7.8	11.2	8.1	6.3	15.5	6.5	5.7	6.8	2.9	-6.8
Luz y Fuerza del Centro	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
Independent Power Production	0.0	0.0	0.0	0.1	0.2	0.5	0.8	0.2	0.3	0.0	0.3	n.a.
Natural gas	**93.4**	**110.0**	**120.8**	**152.2**	**186.2**	**238.0**	**274.4**	**300.2**	**289.9**	**351.1**	**393.5**	**15.5**
Comisión Federal de Electricidad	89.2	103.4	113.9	141.8	164.1	158.7	160.9	140.5	126.6	142.1	146.6	5.1
Luz y Fuerza del Centro	4.2	6.6	6.8	5.9	6.6	6.0	5.7	4.9	5.0	5.2	9.5	8.5
Independent Power Production	0.0	0.0	0.0	4.5	15.4	73.3	107.9	154.8	158.4	203.9	237.4	n.a.

n.a.= does not apply.
Source: IMP, based on data from CFE, Pemex and private companies.

Private electricity sector

During the studied period, the private electricity sector started to boom due to the increase of companies generating their own energy by using natural gas, fuel-oil, petroleum coke, diesel and coal.

Fuel demand in the private electricity sector has grown at an annual average rate of 5.3% between 1997 and 2007. However, the share of fuel-oil in total fuel demand has decreased, while petroleum coke, natural gas and diesel demand has increased. After 2003 and 2004, when four large plants - two natural gas and two petroleum coke – have been incorporated into the system, only smaller natural gas and diesel equipment have been integrated, thus no relevant changes have been registered in the last years.

Some industrial branches using fuel-oil for electricity self-generation in their processes are: sugar, food, mining, paper, oil, chemistry, iron steel, textile and tourism.

On the other hand, electric power production for export was based on natural gas demand, through three plants located in the state of Baja California close to the US border, with a natural gas import demand of 21.0 tbdoe in 2007.

Chart 17

Fuel demand in the private electricity sector, 1997-2007
(thousand barrels of crude oil equivalent per day)

Sector	Product	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Electricity self-generation	**Total**	**35.6**	**36.5**	**38.4**	**40.4**	**30.3**	**33.7**	**49.9**	**63.4**	**63.0**	**57.9**	**59.7**	**5.3**
	Fuel-oil	15.3	16.0	17.8	20.2	15.9	11.7	11.4	13.2	11.8	9.2	9.0	-5.1
	Petroleum coke	-	-	-	-	-	-	3.6	12.0	12.9	14.8	14.7	n.a.
	Coal	-	-	-	-	-	-	-	-	0.1	0.2	0.4	n.a.
	Diesel	0.4	0.4	0.6	0.4	0.6	0.9	1.7	0.4	0.9	0.9	1.3	12.5
	Natural gas	19.9	20.0	20.1	19.8	13.8	21.0	33.2	37.7	37.4	32.8	34.3	5.6
Electricity export	**Natural gas**	**-**	**-**	**-**	**-**	**-**	**-**	**9.0**	**15.4**	**20.2**	**23.4**	**21.0**	**n.a.**

n.a.= does not apply.
Source: IMP, based on data from CFE, CRE, Pemex and private companies.

1.5.3 Industrial sector

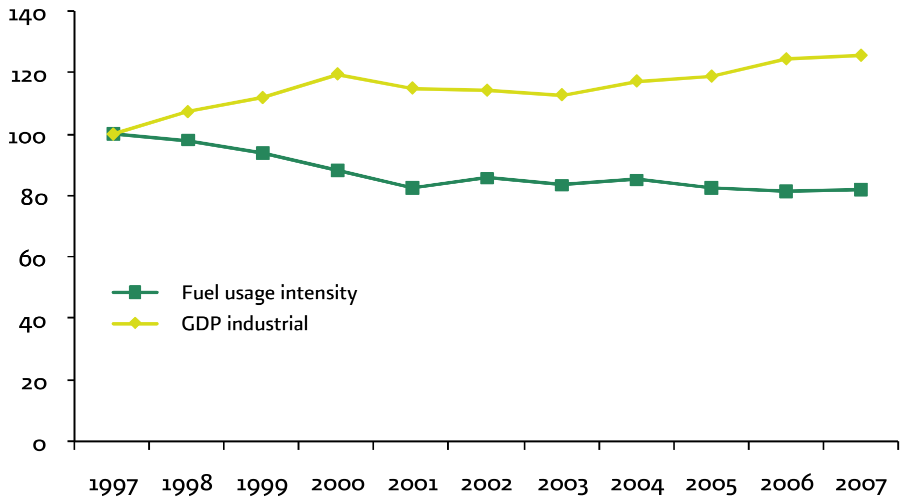
Evolution of fuel usage intensity in the industrial sector

A way of identifying technological changes in the industrial sector, thus changes in technology efficiency, is to look at the evolution of fuel usage intensity, that is, the energy consumed[14] per monetary unit produced. In this sense, as of 2001, fuel usage intensity has remained stable, being its growth proportional to the growth of industrial GDP.

[14] Considering fuel-oil, petroleum coke, diesel, LP gas and natural gas.

Graph 16

Fuel usage intensity in the industrial sector and industrial GDP growth, 1997-2007
(indexes 1997=100)



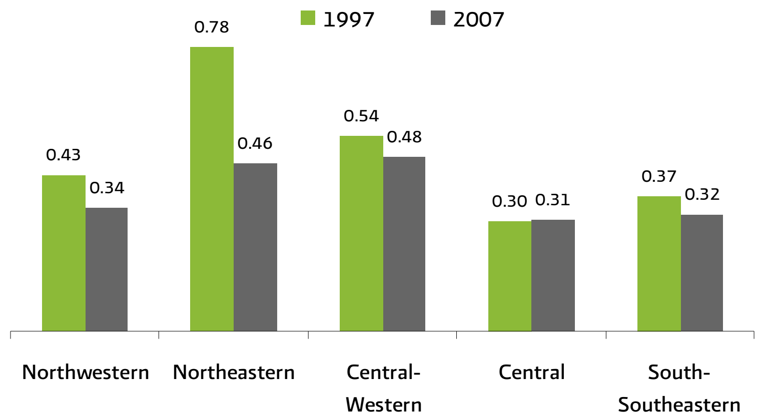
Source: IMP based on data from CRE, INEGI, Pemex, Sener and private companies.

The most relevant regions with high industrial GDP levels are the Central, Northeastern and Central-Western regions. Nonetheless, the most dynamic regions have been the Northeastern and Central-Western regions, showing average annual growth rates of 3.6% and 3.4%, respectively.

Graph 17

Regional fuel usage intensity in the industrial sector, 1997 and 2007

(Giga-calories per thousand pesos of product at 1993 prices)



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

Fuel consumption

The behavior of the national industry represents an important factor in fuel demand and therefore in the behavior of oil-derived product consumption. In this sense, oil-derived products with the largest impact on demand are: fuel-oil, petroleum coke and, to a lesser degree, diesel. Another factor that influences oil-derived product demand is environmental regulation[15].

Industrial activities still show an interest for fuel-oil and natural gas; however, technological development in some industrial branches such cement, glass and iron steel allows for a shift towards petroleum coke. The use of diesel is more limited since it is employed in specific activities such as the pumping of liquids through internal combustion engines. Therefore, diesel demand in the industrial sector is not easy to substitute; this is reflected in an annual average growth rate of 0.4 % during the 1997-2007 period.

Fuel-oil demand is mainly concentrated in the iron steel, mining, cement, glass, beer and paper industries; diesel demand is concentrated in the construction, mining, chemistry, bottled water and rubber industries, among others. It is important to mention that Mexico has cementing plants that work with state-of-the-art technology, allowing for the use of four different types of energy source, including fuel-oil, petroleum coke, alternative fuel types and natural gas.

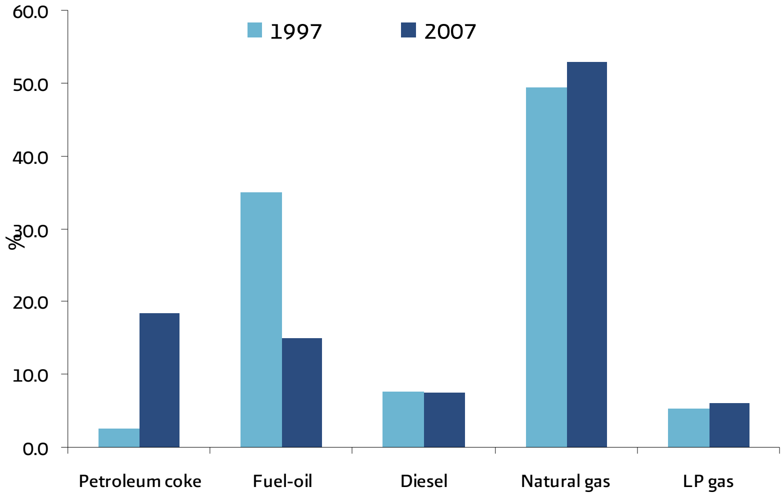
In comparative terms, fuel demand in the industrial sector[16] shows relevant changes in consumption percentages. Fuel-oil and coke demand, that in 1997 accounted fo 35.1% and 2.6% of the total of fuels used in the sector, modified their share in 2007 reaching 15.0% in the case of fuel-oil and 18.4% in the case of coke, with respect to the total (see graph 18).

[15] Official Norm 086 on air quality, Semarnat.

[16] Considering petroleum coke, fuel-oil, diesel, natural gas and LP gas.

Graph 18

Fuel share in the industrial sector's demand, 1997 and 2007
(percentage structure)

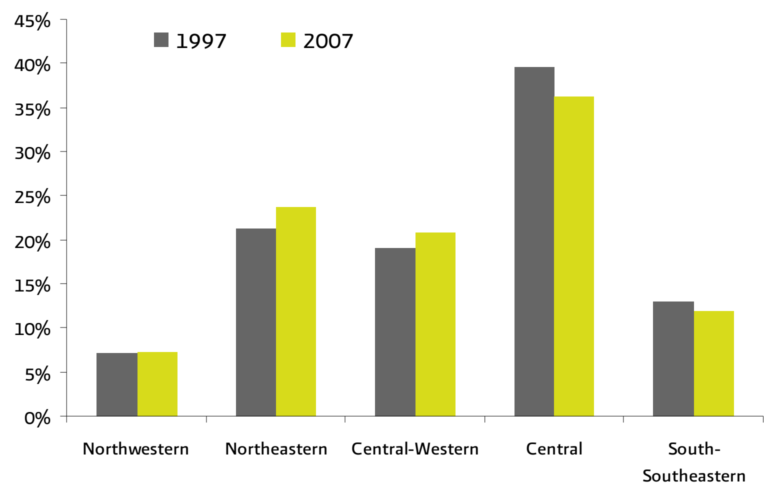


Source: IMP, based on data from CRE, INEGI, Pemex, Sener and private companies.

The industrial sector's regional growth is one of the most important factors that determine fuel demand. In this sense, the Central region is the most relevant due to its economic contribution to the industrial sector, followed by the Northeastern and Central-Western regions. Nonetheless, when comparing shares between 1997 and 2007, it is clear that industrial development in the two latter has become crucial.

Graph 19

Regional share in industrial Gross Domestic Product, 1997 vs 2007
(percentage structure)

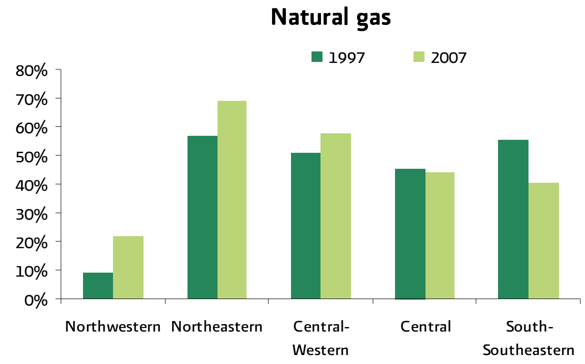


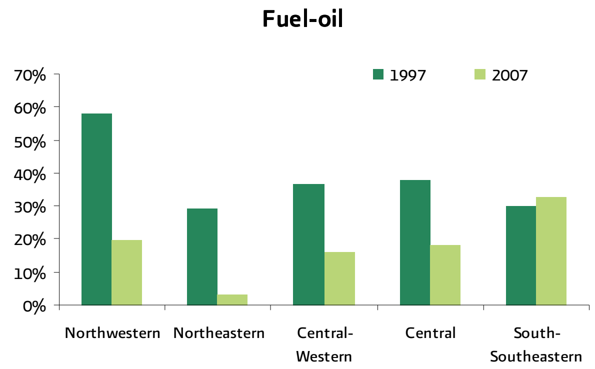
Source: IMP, based on data from INEGI.

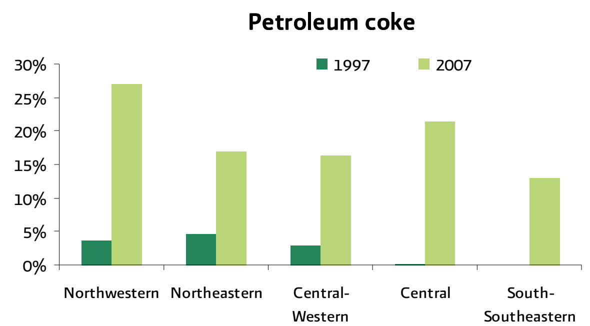
In 2007, regional demand was characterized by using natural gas as the main industrial fuel in most regions, followed by coke and fuel-oil, with the exception of the Northeastern region that uses mainly fuel-oil (see graph 20).

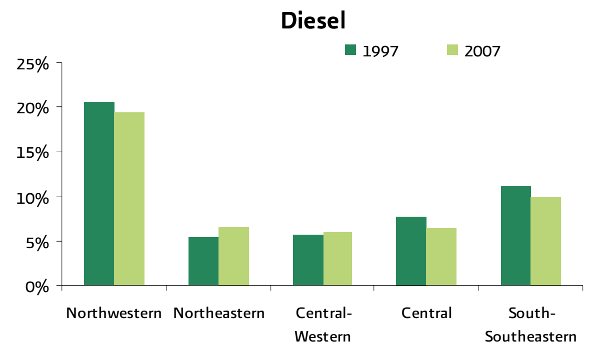
Graph 20

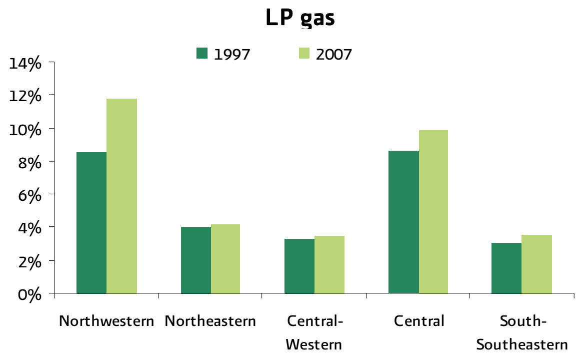
Regional share in industrial fuel demand, 1997 and 2007
(percentage structure)











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

1.6 Foreign trade, 1997-2007

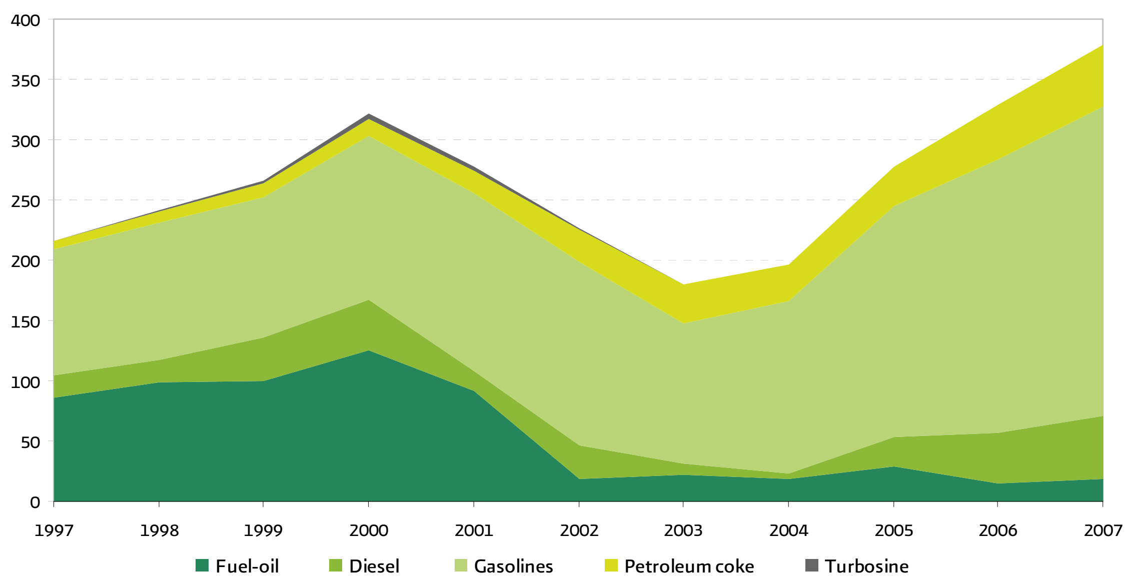
Oil-derived product imports[17] grew by an annual average rate of 5.8% between 1997 and 2007, which equals to an increase of 163.4 tbdoe. In 2007, around 379.4 tbdoe have been imported, 67.7% out of which corresponded to gasoline, 13.9% to diesel, 13.6% to petroleum coke and 4.8% to fuel-oil. A key aspect to be considered is that gasoline types gradually increased their share between 1997 and 2007, while fuel-oil shares started decreasing as of 2000, as a consequence of a lower demand by CFE.

It is worth mentioning that the conclusion of upgrading projects and the start of operations of the Madero y Cadereyta coking plants largely increased the production of gasoline and the yields of intermediate currents (diesel), temporarily decreasing imports as of 2003 (see graph 21).

Graph 21

Oil-derived product imports, 1997-2007

(thousand barrels of crude oil equivalent per day)



Source: IMP, based on data from Pemex Refinación.

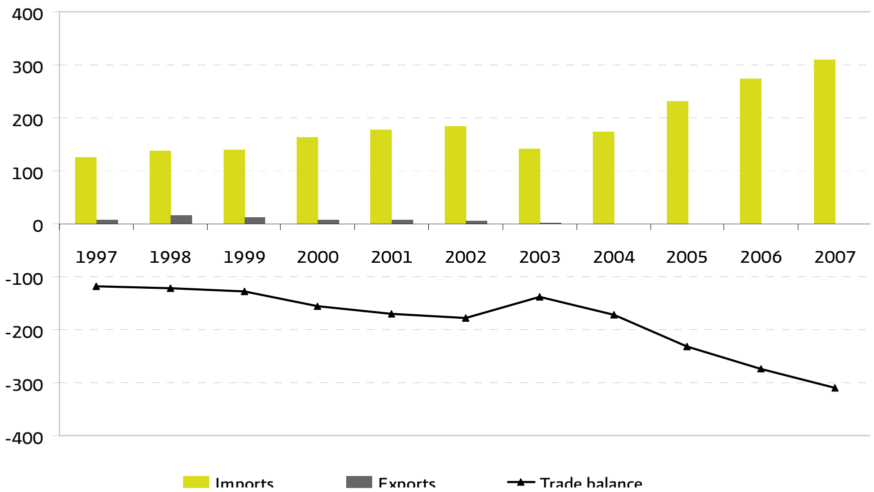
During 2007, 62.4% of imported gasoline types corresponded to regular, 33.7% to Premium, 3.8% to methyl tertiary-butyl ether (MTBE) and the rest to Premium UBA.

[17] Considering fuel-oil, petroleum coke, diesel, gasoline and turbosine.

Graph 22

Gasoline import and export, 1997-2007

(thousand barrels per day)



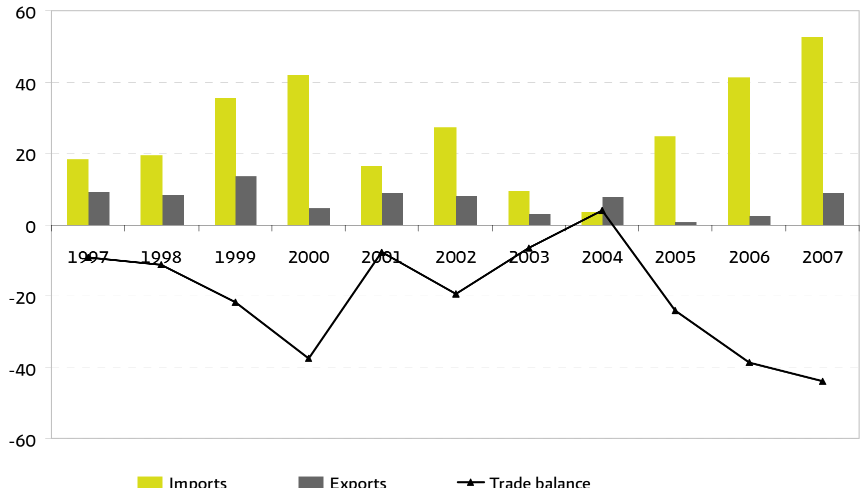
Source: IMP, based on data from Pemex Refinación.

On the other hand, diesel imports maintained an annual average growth rate of 11.2% between 1997 and 2007. Import volumes registered by the end of 2007 represented 52.7 tbd. Diesel trade balance during 2007 had a deficit with a volume of 43.9 tbd, resulting from 52.7 tbd of imports and 8.8 tbd of exports (see graph 23).

Graph 23

Diesel imports and exports, 1997-2007

(thousand barrels per day)



Source: IMP, based on data from Pemex Refinación.

In 2007, there were no imports of turbosine, while 3.4 tbd were exported.

In the case of fuel-oil, trade balance during 2007 was positive with 16.6 tbd, due to the import of 17.0 tbd, entering the country mainly through the ports of Manzanillo and Tuxpan and on the Cd. Juárez border; 33.6 tbd were primarily exported through the ports of Pajaritos, Salina Cruz and Madero.

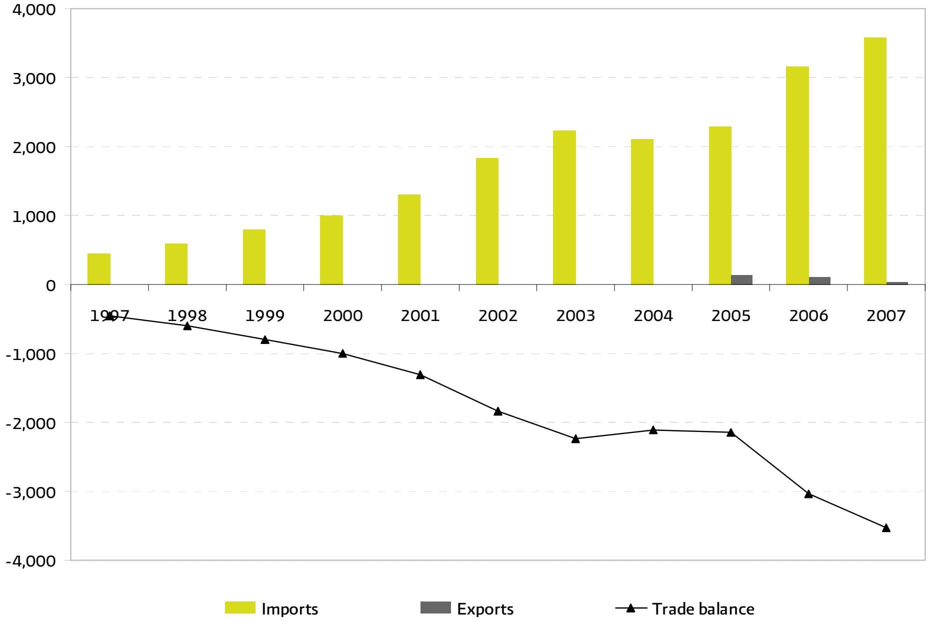
Petroleum coke imports have shown an annual average growth rate of 23.1%, due to its increased use as energy source in the industrial sector, mainly in the cement, chemical and basic metal industries. In addition, important part of these imports is destined to electricity self-generation. During 2007, around 3,578.2 thousand tons (Mt) of petroleum coke have been imported.

The branches with the highest consumption of petroleum coke are: cement industry with 3,472.3 Mt; chemical industry with 401.9 Mt; basic metal industry with 191.3 Mt; machinery and electric appliances with 50.2 Mt; and electricity self-generation with 1,018.1 Mt.

Graph 24

Petroleum coke imports and exports, 1997-2007

(thousand tons)



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

1.7 Domestic oil-derived product balance, 1997-2007

Chart 18

Domestic gasoline balance, 1997-2007
(thousand barrels per day)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**514.2**	**548.8**	**545.6**	**556.4**	**567.9**	**582.3**	**585.9**	**639.7**	**671.2**	**716.2**	**753.7**	**3.9**
Production	387.7	411.3	405.3	392.6	389.8	398.1	444.9	466.0	439.5	442.4	443.8	1.4
Cadereyta	48.7	49.7	41.0	34.7	64.0	74.6	84.8	81.1	73.2	81.9	82.2	5.4
Madero	39.4	40.0	42.0	39.7	23.0	22.3	52.8	53.7	57.3	60.9	61.5	4.5
Tula	89.2	95.9	102.2	106.0	102.2	94.8	91.7	111.8	103.8	94.4	100.5	1.2
Salamanca	63.0	56.2	59.1	55.5	55.0	60.5	64.1	65.5	63.6	66.3	63.4	0.1
Minatitlán	53.0	64.0	59.4	55.3	55.9	55.1	50.6	57.2	45.5	42.0	41.7	-2.4
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	94.4	105.4	101.6	101.4	89.8	90.9	100.8	96.8	96.0	96.9	94.5	0.0
Import[1]	126.6	137.5	140.3	163.9	178.1	184.2	141.1	173.7	231.8	273.8	309.8	9.4
Destination	**507.9**	**529.4**	**524.0**	**541.2**	**560.0**	**573.1**	**603.5**	**637.7**	**672.7**	**719.1**	**761.3**	**4.1**
Domestic demand	499.5	513.3	512.5	532.7	551.7	566.3	601.2	636.8	672.1	718.9	761.0	4.3
Transportation sector	497.8	511.7	511.0	531.4	550.6	565.3	600.5	636.1	671.5	718.3	760.3	4.3
Oil sector	1.7	1.6	1.5	1.2	1.1	1.0	0.7	0.7	0.7	0.7	0.7	-9.2
Export	8.3	16.1	11.5	8.5	8.3	6.8	2.3	0.9	0.6	0.2	0.4	-26.8
Inventory variation	**6.4**	**19.4**	**21.6**	**15.3**	**7.9**	**9.2**	**-17.6**	**2.0**	**-1.4**	**-3.0**	**-7.7**	**n.a.**

[1] Including in-bond industry for the historical period.

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

Chart 19

Domestic diesel balance, 1997-2007
(thousand barrels per day)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**293.7**	**309.4**	**307.3**	**307.4**	**298.2**	**294.2**	**317.1**	**328.3**	**343.0**	**369.4**	**386.8**	**2.8**
Production	275.4	290.0	271.9	265.4	281.6	266.9	307.8	324.7	318.2	328.1	334.0	1.9
Cadereyta	44.9	47.4	27.9	30.8	59.0	59.7	70.5	76.1	69.1	75.2	83.8	6.4
Madero	30.1	30.1	37.6	35.5	26.0	18.7	35.3	37.7	42.9	45.9	43.1	3.6
Tula	61.0	62.1	62.5	60.4	58.8	51.3	56.5	65.1	59.0	56.7	62.2	0.2
Salamanca	42.6	41.6	39.5	40.7	37.6	41.1	36.0	41.4	42.1	44.5	42.4	-0.1
Minatitlán	36.7	36.4	38.8	38.1	36.9	37.3	41.9	40.2	39.2	42.2	44.4	1.9
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	60.0	72.3	65.5	59.9	63.4	58.7	67.7	64.1	65.9	63.7	58.2	-0.3
Import[1]	18.3	19.4	35.4	42.0	16.6	27.3	9.3	3.7	24.8	41.3	52.7	11.2
Destination	**284.4**	**296.6**	**299.8**	**300.3**	**297.3**	**290.4**	**310.1**	**326.2**	**337.4**	**362.4**	**384.3**	**3.1**
Domestic demand	275.2	288.5	286.2	295.9	288.3	282.4	307.1	318.5	336.5	359.8	375.5	3.2
Industrial sector [2]	23.9	23.8	21.4	23.4	22.3	21.4	21.9	26.6	25.1	24.4	24.8	0.4
Oil sector	12.7	12.3	11.5	11.2	12.5	11.7	12.4	15.9	16.4	15.0	17.1	3.1
Transportation sector	232.3	243.3	244.9	249.6	244.6	241.6	254.8	269.0	288.1	312.7	329.1	3.5
Electricity sector	6.3	9.0	8.4	11.7	8.9	7.7	18.0	7.1	6.9	7.8	4.5	-3.4
Public electricity production (CFE and LyFC)	5.9	8.6	7.8	11.2	8.1	6.3	15.5	6.5	5.7	6.8	2.9	-6.8
Private electricity production	0.4	0.4	0.6	0.6	0.7	1.4	2.5	0.7	1.1	1.0	1.6	15.0
Independendent power producers	-	-	-	0.1	0.2	0.5	0.8	0.2	0.3	0.0	0.3	n.a.
Electricity self-generation	0.4	0.4	0.6	0.4	0.6	0.9	1.7	0.4	0.9	0.9	1.3	12.5
Export	9.2	8.2	13.6	4.4	8.9	8.0	2.9	7.7	0.8	2.5	8.8	-0.4
Inventory variation	**9.3**	**12.7**	**7.6**	**7.1**	**1.0**	**3.8**	**7.1**	**2.1**	**5.6**	**7.0**	**2.5**	**-12.5**

[1] Including in-bond industry for the historical period.

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

Chart 20

Domestic fuel-oil balance, 1997-2007
(thousand barrels per day)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**510.9**	**542.6**	**524.8**	**541.5**	**521.1**	**467.2**	**416.7**	**385.8**	**377.2**	**339.5**	**318.5**	**-4.6**
Production	430.8	451.5	431.7	425.0	435.9	449.6	396.5	368.0	350.8	325.2	301.5	-3.5
Cadereyta	61.5	60.4	38.5	50.3	65.7	56.5	44.2	25.3	21.2	19.6	8.5	-18.0
Madero	51.0	46.5	41.3	40.1	33.0	39.6	29.2	33.3	19.5	24.6	20.8	-8.6
Tula	100.7	106.0	103.0	94.0	92.1	90.8	79.3	77.7	86.9	77.5	80.2	-2.2
Salamanca	54.2	53.7	49.2	54.1	54.6	48.2	49.2	54.9	48.4	42.0	37.4	-3.6
Minatitlán*	65.1	68.6	75.5	69.6	75.1	79.7	84.5	75.4	75.5	66.6	63.7	-0.2
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	98.4	116.3	124.3	116.9	115.4	134.8	110.2	101.5	99.2	95.0	90.9	-0.8
Import	80.1	91.1	93.1	116.5	85.2	17.6	20.2	17.7	26.4	14.3	17.0	-14.4
Destination	**508.9**	**543.1**	**518.9**	**534.1**	**516.4**	**469.6**	**418.4**	**380.0**	**383.9**	**336.9**	**327.3**	**-4.3**
Domestic demand	508.8	541.8	518.0	534.1	512.6	444.7	397.0	377.3	383.1	301.3	293.8	-5.3
Transportation sector	2.0	2.9	3.4	2.9	2.1	1.8	1.6	1.4	1.5	1.2	1.2	-4.9
Electricity sector	356.0	392.5	381.5	408.3	392.4	342.1	291.1	268.5	278.4	213.7	210.0	-5.1
Public electricity production	341.8	377.6	365.1	389.5	377.6	331.2	280.6	256.2	267.5	205.2	201.7	-5.1
Electricity self-generation	14.2	14.9	16.5	18.7	14.8	10.9	10.6	12.2	10.9	8.5	8.4	-5.1
Industrial sector	101.4	100.2	90.1	83.6	80.5	62.2	61.9	62.6	60.7	48.8	45.6	-7.7
Oil sector	49.4	46.2	42.9	39.4	37.6	38.6	42.4	44.9	42.4	37.6	36.9	-2.9
Export	0.0	1.3	0.9	0.1	3.9	24.9	21.4	2.6	0.8	35.6	33.6	96.5
Inventory variation	**2.1**	**- 0.5**	**5.9**	**7.4**	**4.6**	**- 2.4**	**- 1.7**	**5.8**	**- 6.6**	**2.6**	**- 8.9**	**n.a.**

*Includes transfer of Maya crude oil free of light products from La Cangrejera to fuel-oil.

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

Chart 21

Domestic turbosine balance, 1997-2007
(thousand barrels per day)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**56.0**	**59.1**	**60.5**	**59.5**	**59.8**	**58.3**	**59.6**	**62.1**	**63.3**	**64.9**	**66.30**	**1.7**
Production	56.0	57.1	57.8	55.3	56.7	56.7	59.6	62.1	63.3	64.8	66.3	1.7
Cadereyta	3.8	1.1	0.6	-	3.3	3.9	4.6	5.1	4.5	4.8	9.8	9.9
Madero	3.4	3.7	2.7	2.9	0.7	0.4	4.4	6.7	7.0	7.2	4.9	3.8
Tula	18.2	22.0	22.4	21.3	21.6	21.1	20.7	21.8	22.5	22.9	24.2	2.9
Salamanca	10.2	11.1	11.6	11.9	11.8	11.1	10.5	11.2	12.2	13.3	10.5	0.3
Minatitlán	7.2	7.1	5.9	3.6	4.3	3.1	3.2	2.5	2.8	1.2	0.3	-26.8
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	13.1	12.1	14.5	15.6	15.0	17.1	16.2	14.9	14.4	15.3	16.6	2.3
Import2	-	2.0	2.7	4.1	3.1	1.6	-	-	-	0.1	-	n.a.
Destination	**51.6**	**55.4**	**57.7**	**59.2**	**57.8**	**59.7**	**61.8**	**64.6**	**65.6**	**67.5**	**71.3**	**3.3**
Domestic demand	47.2	52.5	55.3	55.5	55.3	53.3	54.2	57.8	58.7	61.2	67.9	3.7
Transportation sector	47.2	52.4	55.3	55.5	55.3	53.3	54.2	57.8	58.7	61.2	67.9	3.7
Oil sector	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	-	-	n.a.
Export	4.4	3.0	2.3	3.6	2.5	6.3	7.6	6.8	6.9	6.3	3.4	-2.5
Inventory variations	**4.4**	**3.7**	**2.8**	**0.3**	**2.0**	**- 1.4**	**- 2.3**	**- 2.4**	**- 2.3**	**- 2.5**	**- 5.0**	**n.a.**

[1] Including jet fuel.
[2] Including in-bond industry for the historical period.
Source: IMP, based on data from Pemex and Sener.

Chart 22

Domestic petroleum coke balance, 1997-2007
(thousand tons per year)

Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**513.0**	**697.2**	**875.2**	**1,114.7**	**1,319.7**	**1,876.8**	**3,089.4**	**3,563.5**	**3,820.1**	**4,795.4**	**5,267.4**	**26.2**
Production	65.4	95.2	79.5	110.2	14.9	39.1	848.5	1,452.9	1,523.0	1,632.5	1,689.1	38.4
Cadereyta	-	-	-	-	-	-	397.8	813.3	754.1	811.8	984.8	n.a.
Madero	65.4	95.2	79.5	110.2	14.9	39.1	450.6	639.5	768.9	820.7	704.3	26.8
Tula	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salamanca	-	-	-	-	-	-	-	-	-	-	-	n.a.
Minatitlán	-	-	-	-	-	-	-	-	-	-	-	n.a.
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	-	-	-	-	-	-	-	-	-	-	-	n.a.
Import*	447.6	602.0	795.6	1,004.5	1,304.9	1,837.7	2,240.9	2,110.6	2,297.1	3,162.9	3,578.2	23.1
Destination	**528.8**	**656.5**	**853.1**	**1,101.5**	**1,327.1**	**1,904.4**	**2,201.7**	**3,551.0**	**3,770.1**	**4,740.6**	**5,227.4**	**25.7**
Domestic demand	528.8	656.5	853.1	1,101.5	1,327.1	1,904.2	2,201.4	3,551.0	3,623.2	4,623.1	5,183.9	25.6
Electricity sector	-	-	-	-	-	-	250.5	831.8	894.6	1,024.2	1,018.1	n.a.
Public electricity production	-	-	-	-	-	-	-	-	-	-	-	n.a.
Electricity self-generation	-	-	-	-	-	-	250.5	831.8	894.6	1,024.2	1,018.1	n.a.
Industrial sector	528.8	656.5	853.1	1,101.5	1,327.1	1,904.2	1,950.9	2,719.1	2,728.7	3,598.9	4,165.8	22.9
Hydraulic cement	253.5	368.4	507.5	669.5	1,091.2	1,589.7	1,567.7	2,405.7	2,285.0	2,998.5	3,472.3	29.9
Basic metal industry	121.1	137.7	157.6	223.2	85.2	127.2	183.0	168.3	116.4	189.5	191.3	4.7
Chemistry, rubber and plastics	60.7	64.3	78.5	81.2	71.2	95.6	105.3	46.9	195.2	310.8	401.9	20.8
Machinery and electric appliances	55.1	41.2	36.6	42.7	38.1	55.4	63.5	19.2	62.5	67.0	50.2	-0.9
Glass	-	-	-	-	-	-	-	36.9	21.2	14.8	4.2	n.a.
Rest of the industry	38.4	44.9	72.9	84.9	41.3	36.4	31.5	42.1	48.3	18.3	45.8	1.8
Export	-	-	-	-	-	0.1	0.3	-	146.9	117.5	43.5	n.a.
Inventory variation	**-15.8**	**40.8**	**22.0**	**13.2**	**-7.3**	**-27.5**	**887.7**	**12.5**	**50.0**	**54.8**	**40.0**	**n.a.**

*Includes Pemex and private companies.
Source: IMP, based on data from private companies, Pemex, SE and Sener.

Chart 23

Domestic oil-derived product balance, 1997-2007
(thousand barrels of crude oil equivalent per day)

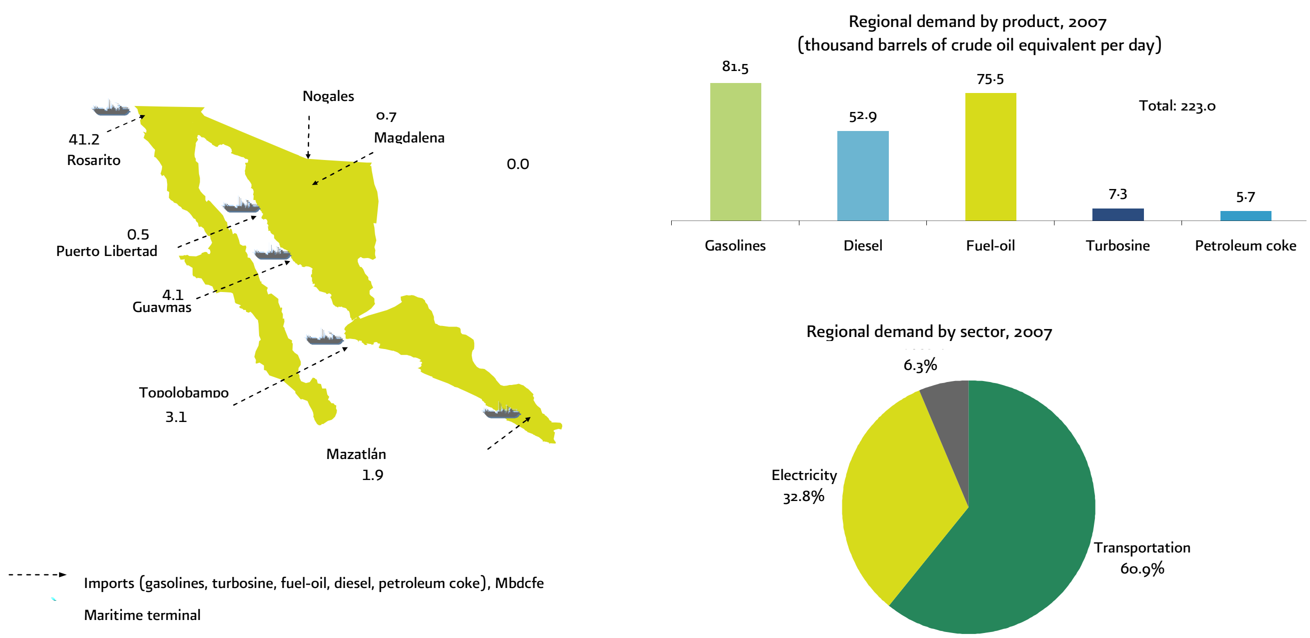
Concept	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	aagr
Origin	**1,332.2**	**1,416.3**	**1,396.3**	**1,425.8**	**1,407.4**	**1,363.8**	**1,353.9**	**1,385.5**	**1,422.1**	**1,460.7**	**1,494.5**	**1.2**
Production	1,116.2	1,174.0	1,130.1	1,104.0	1,129.6	1,136.7	1,173.6	1,188.5	1,143.6	1,131.4	115.2	0.0
Cadereyta	155.2	154.8	103.9	113.8	186.0	186.1	198.5	187.2	167.8	180.5	184.6	1.8
Madero	121.9	118.4	120.7	116.0	81.4	80.8	121.2	133.7	129.3	141.7	131.3	0.7
Tula	261.1	277.1	279.9	270.1	263.7	248.1	238.0	262.4	260.5	240.6	255.4	-0.2
Salamanca	163.1	156.8	152.7	156.6	153.4	153.9	152.3	165.8	158.7	157.5	145.4	-1.1
Minatitlán	157.8	170.3	175.1	162.5	168.2	171.9	178.0	171.3	161.0	149.9	147.9	-0.7
New capacity	-	-	-	-	-	-	-	-	-	-	-	n.a.
Salina Cruz	257.0	296.7	297.7	285.0	276.7	295.9	285.6	268.2	266.3	261.2	250.5	-0.3
Import	216.0	242.2	266.3	321.8	277.9	227.0	180.3	197.1	278.5	329.3	379.4	5.8
Destination	**1,311.3**	**1,384.0**	**1,361.4**	**1,397.6**	**1,393.1**	**1,356.6**	**1,352.7**	**1,377.7**	**1,426.3**	**1,455.0**	**1,512.2**	**1.4**
Domestic demand	1,291.0	1,358.1	1,335.1	1,382.5	1,370.7	1,310.0	1,317.4	1,359.8	1,415.3	1,406.1	1,463.0	1.3
Transportation sector	692.5	721.0	725.4	746.5	756.4	763.2	806.3	853.1	902.7	968.1	1,025.8	4.0
Electricity sector	390.3	432.3	419.9	452.0	432.1	376.7	335.6	308.7	320.0	253.0	245.7	-4.5
Public electricity production	374.6	415.9	401.5	431.3	415.4	363.5	318.1	282.8	294.2	228.1	220.4	-5.2
Private electricity production	15.7	16.5	18.3	20.7	16.7	13.2	17.5	25.8	25.8	24.9	25.3	4.9
Independent power producers	-	-	-	0.1	0.2	0.5	0.8	0.2	0.3	0.0	0.3	n.a.
Electricity self-generation	15.7	16.5	18.3	20.6	16.5	12.7	16.7	25.6	25.5	24.9	25.0	4.8
Industrial sector	140.8	141.4	130.8	129.3	128.3	115.9	116.8	133.2	129.9	128.9	134.1	-0.5
Oil sector	67.4	63.5	59.0	54.7	54.0	54.2	58.7	64.8	62.7	56.0	57.5	-1.6
Export	20.4	25.9	26.3	15.1	22.4	46.6	35.3	17.8	11.0	48.9	49.2	9.2
Inventory variation	**20.9**	**32.3**	**34.9**	**28.2**	**14.4**	**7.1**	**1.2**	**7.9**	**-4.2**	**5.7**	**-17.7**	**n.a.**

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

1.8 Figures on regional oil-derived product demand, 2007

Figure 3

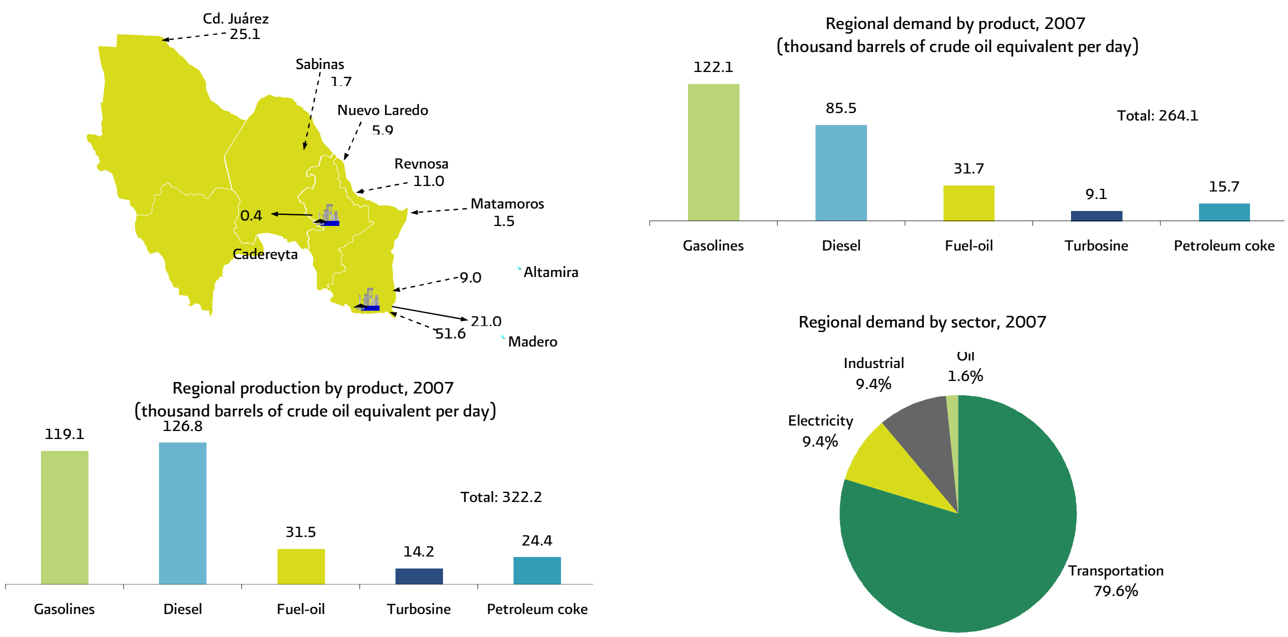
Northwestern Region, oil-derived product flow, 2007



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

Figure 4

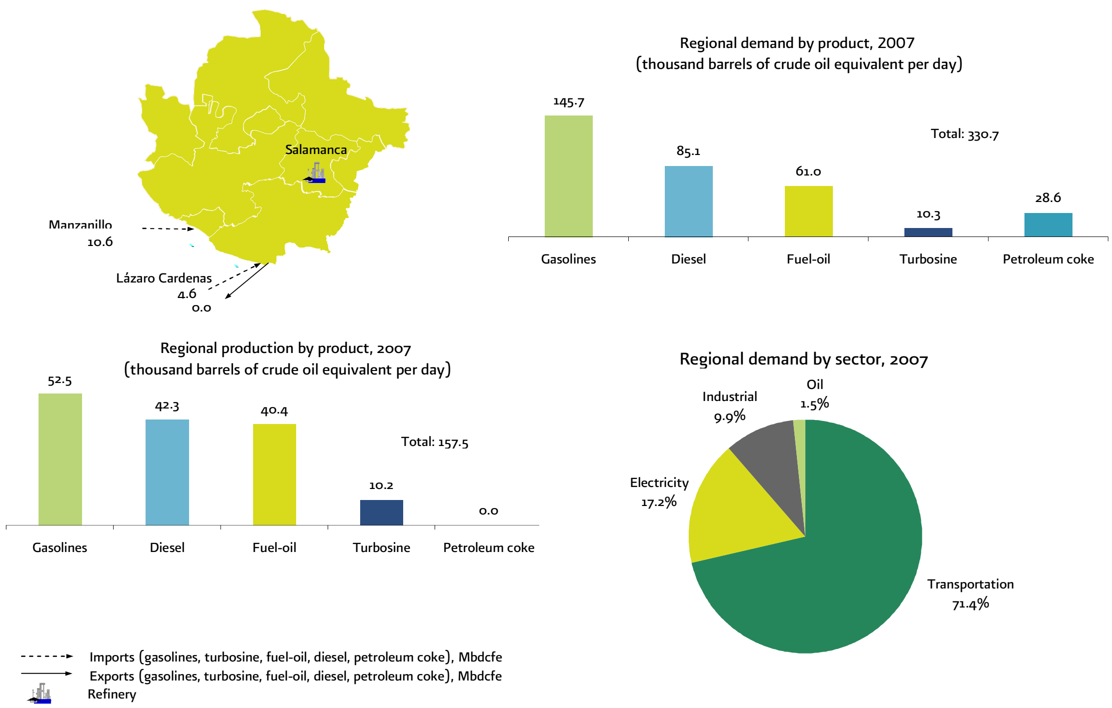
Northeastern Region, oil-derived product flow, 2007



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

Figure 5

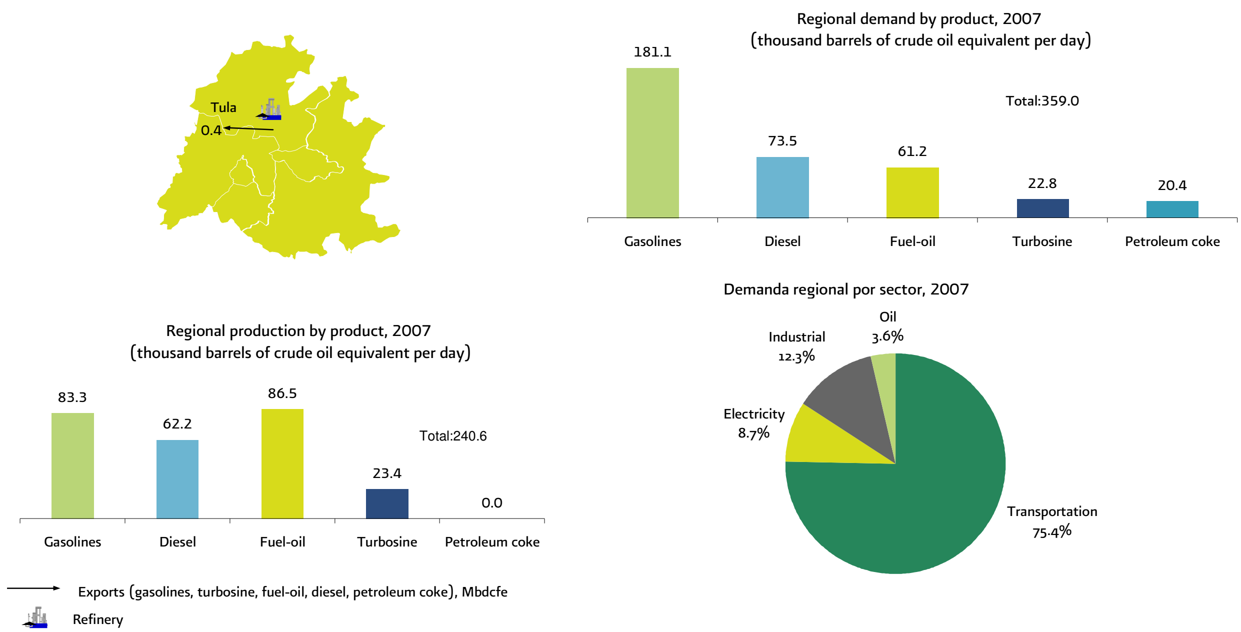
Central-Western Region, oil-derived product flow, 2007



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

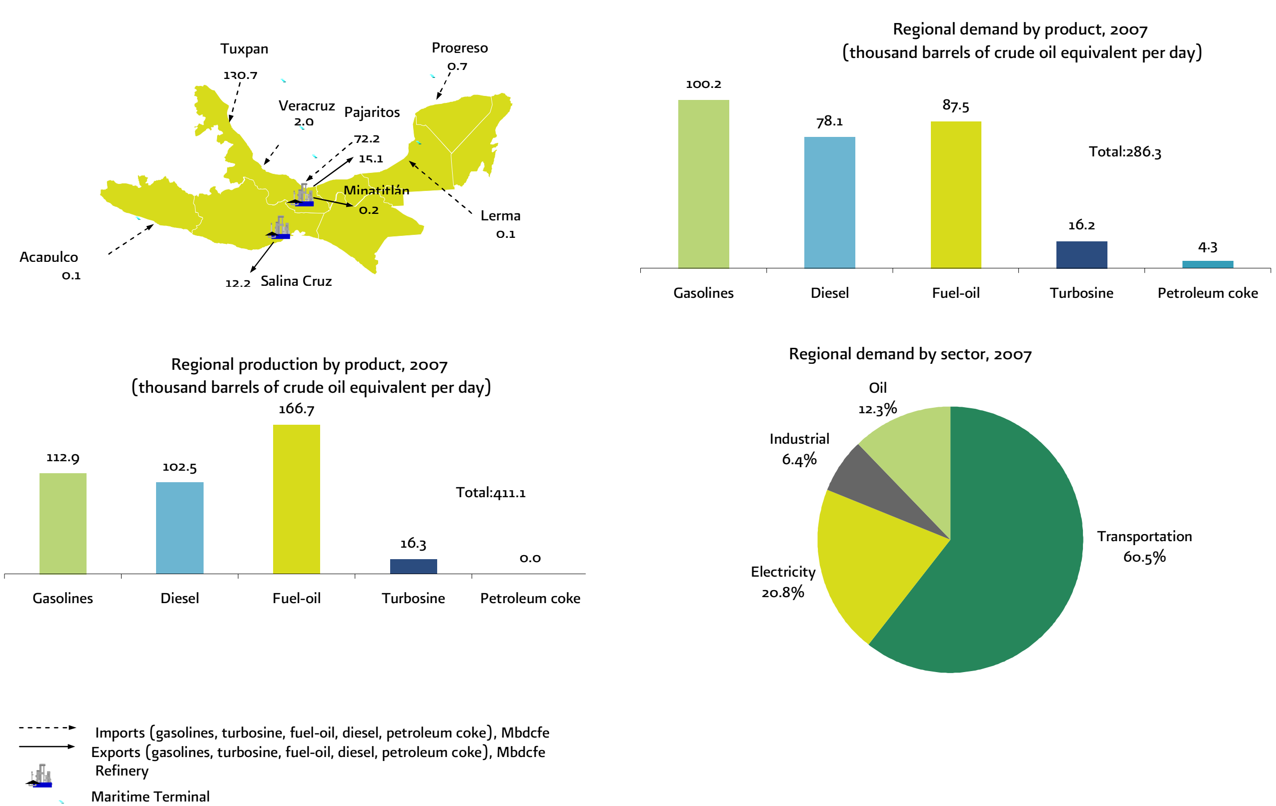
Figure 6

Central Region, oil-derived product flow, 2007



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

Figure 7
South-Southeastern Region, oil-derived product flow, 2007



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

1.9 Biofuels

Historically, biofuel production in Mexico has been taking place on a rather small scale and, unlike other countries around the world with considerable production of these fuel types, until 2007 Mexico did not have any land exclusively destined to biofuel-based energy production. Nonetheless, the country has substantial potential for its development.

Ethanol

Mexico has a low degree of food-producing self-sufficiency due to the characteristics of its agricultural production. In this sense, given the country's tropical features, crops with high development potential for energy-producing purposes must be those that provide excellent yields. The first places are taken by sugar cane, sugar beet and yucca as raw materials of great priority for ethanol production. Wheat and sorghum crops may also be considered in zones with specific soil quality or climate-related issues that manifest themselves in low productivity and wasted resources.

In Mexico, little over 750 thousand hectares of sugar cane are grown in 15 states of the Republic, with the exclusive purpose of sugar production. From this surface, approximately 35% has irrigation system and the rest is rainfed crop in tropical areas.

Expected yields in liters of ethanol per ton of sugar cane, in each technology category considered in the study, would be:

Sugar cane juice (guarapo).- (14.5% of fermentable sugar in stems); 80 liters of ethanol per ton of sugar cane.

Whole sugar cane (juice plus bagasse) with an expected yield of 138 liters of ethanol per ton of whole sugar cane.

Regarding cereals, although Mexico has a deficit of foodstuff for human consumption, there are crops that may be used as raw material for ethanol production provided that specific conditions are secured (for instance the transportation of wheat in Mexicali B.C, located far away from consumption centers, must be subsidized). In the Cortés Sea region, more specifically in Sinaloa, the country's first maize producer state that employs state-of-the-art irrigation technology in the Culiacán and Fuerte Valleys, large portion of the production must be sent to the country's central part, implying high transportation costs. Due to this fact, this place (central-northern part of Sinaloa) could produce ethanol using maize as raw material, with an expected yield of 400 liters of ethanol per ton.

As to wheat, productivity has been maintained or has increased only slightly in the last decade, having the Mexicali and Yaqui Valleys the highest yields in the Cortés Sea region, with 6.0 and 5.7 tons per hectare, respectively. The feasibility of producing ethanol from wheat is being analyzed in this zone due to logistic reasons. One hectare of whole wheat (harvested wheat plus chaff) in the Mexicali Valley would produce 4,678 liters of ethanol.

Sugar beet was grown in the Mexicali Valley, B.C., as well as in the Yaqui and Fuerte Valleys with good results; production has even been assessed on marginal lands (salinity and sodium content), irrigated with district sewage waters flowing to the sea. In these extreme conditions, the crop produced 40 tons of beet per hectare, and a process to rescue these lands was undertaken. The yield of ethanol per ton of sugar beet is 98 liters.

With regard to grain sorghum, in the San Fernando Tamaulipas zone, in the Pacific North Region, approximately 230 thousand hectares per year have been sown in the last decade; they were rainfed winter crops (December-January) benefiting from the rainfalls of this season. Sorghum production reaches a little more than 2 tons per hectare with average rainfall and no fertilizers, using improved seed. Sorghum yield may even reach 400 liters of ethanol per processed ton.

During 2004, 1,336 hectares of yucca were grown in Mexico, mostly rainfed, in the Peninsular Region, mainly in Tabasco. Yucca responds sensitively to prolonged floods, thus considering soil drain as the restricting factor of production, there are approximately 75,000 hectares with great production potential; most of them are located in Distrito de Desarrollo Rural (DDR) 151 de Cárdenas, Municipality of Huimanguillo, in Tabasco state. Production is feasible provided that balanced fertilizing practices are implemented. In addition, if lands are properly drained, approximately 200 thousand medium-potential hectares will be available in DDR 150 and 151. Potential yields are estimated at 20 to 30 tons per hectare, with a starch content of up to 35%, obtaining up to 4,630 liters of ethanol per hectare.

Sweet sorghum was grown in the central and southern part of Sinaloa and Coahuila, as well as in the regions of Laguna and Bajío, offering excellent yields with irrigation systems. Rainfed crops are grown in Sinaloa, Chihuahua, Guerrero, Michoacán and Jalisco. Sweet sorghum is produced mainly for self-consumption on farms that raise cattle for milk. The conditions to grow sweet sorghum on rainfed lands are also given in the central-eastern part of Tamaulipas, where grain sorghum is produced on large surfaces. There may be up to five harvests per year both on lands with irrigation system and on rainfed lands, offering an accrued yield of up to 100 tons per hectare on irrigated lands and 60 tons per hectare on rainfed lands. Up to 30 tons of dry material per hectare are obtained (13,000 liters of ethanol; 130 liters per ton of sorghum) benefiting from the 13 tons of sugar from their juices and the 10 tons of sugar from their stems and leafs.

The Ministry of Energy, in a joint effort with GTZ[18], studied the possibility and convenience of the following crops as raw materials for the production of ethanol to be used as fuel:

Chart 24

Potential crops for ethanol production

Crop	Region	Water usage technology
Sugar cane	Bajo Papaloapan, Huastecas, Balsas	Rainfed and irrigation
Grain corn	Cortés Sea	Irrigation
Grain wheat and chaff	Cortés Sea	Irrigation
Grain sorghum	North Gulf	Rainfed
Sugar beet	Cortés Sea	Irrigation
Tropical beet	Bajo Papaloapan and Peninsular	Rainfed
Yucca	Bajo Papaloapan and Peninsular	Rainfed
Sweet sorghum		Rainfed

Source: Sener, GTZ.

The crop selection criteria referred to above were: availability of mature technology, costs, investment needs, required surface, net energy index, emission and mitigation of greenhouse gas effect. Sugar cane has been selected as the most promising crop, and it may be complemented with other crops in the medium and long terms.

[18] Deutsche Gesellschaft für Technische Zusammenarbeit (Cooperación Técnica Alemana).

Biodiesel

Biodiesel production at commercial scale may be feasible in Mexico in the medium term, as long as integrated action is undertaken to include technical, economic and environmental aspects, and if agreement is reached with the agrarian y agro-industrial sectors, in addition to an effort aimed at technological research and development.

In the case of biodiesel, the first crops selected due to its efficiency and productivity in humid and sub-humid tropical zones, as well as in view of the considerable surface available in our country that today is not necessarily cultivated land, is African oil palm (Elaeis guineensis jacq). The second place is taken by Jatropha Curcas L. or Barbados nut, selected due to its capacity of adapting well to adverse soil and climate conditions, to its rusticity and soil-improving capacity. Other potential crops are soybean (Glicina max), rapeseed, safflower and sunflower.

According to the National Institute for Research in Forestry, Agriculture and Fisheries (INIFAP), there are around 2.5 million hectares of land with great potential for African oil palm growing, located in Chiapas, Campeche, Guerrero, Michoacán, Oaxaca, Quintana Roo, Tabasco and Veracruz states. In 2004, 36,374 hectares of this crop were grown in Chiapas, Veracruz, Campeche and Tabasco, 30,603 out of which were rainfed; yields in Chiapas have been outstanding with a little more than 18 tons of fresh fruit bunches per hectare (a practical comparison shows that in Costa Rica, with new varieties and production technology, 38 to 40 tons per hectare per year of fresh fruit bunches are harvested, translating into 9.8 tons of oil, producing 12,302 liters of biodiesel per hectare).

Mexico has no experience growing Jatropha. It is known that the plant starts producing as of the first year, though yields are only moderate, and increases this yield during the first five years to become stable with time; its useful life can reach up to 50 years. In the already stabilized phase, its yield per hectare is estimated at 5 tons of dry seed, 1.8 to 2 tons of which are oil seeds and 3.255 tons are protein-rich oil cake (57%). In the Peninsular Region, concretely in the northeastern part of Yucatán, the so-called "Henequen-growing" areas have characteristics that seem adequate for this crop type.

Soybean growing activities have significantly decreased in Mexico; it has almost disappeared from lands with irrigation technology and is only produced on rainfed lands, mainly in the south of Tamaulipas state where, in 2004, 54,000 hectares were grown. That year, domestic production reached 133 thousand tons on 89 thousand harvested hectares, 80 thousand of which were rainfed and 9 thousand 600 were irrigated lands, in Tamaulipas as well. In 2004, in Chiapas (Soconusco) and San Luis Potosí rainfed crops were grown on 11 and 12 thousand hectares, respectively. The average domestic yield was of 1,500 kilograms per hectare. Three and a half million tons of bean were imported during 2004-2005, and another six million tons are expected to be imported for the 2015-2016 cycle.

In Mexico, 1,228 hectares of rapeseed were harvested in the two cycles in 2004; of these, 837 were grown on rainfed lands (secano or dry land) and 371 on irrigated lands. Its mean yield was as follows: on irrigated land, 2,126 kilograms per hectare, and on rainfed land, 1,537 kilograms per hectare. Producer states were: Tamaulipas, Jalisco, Tlaxcala Guanajuato and Mexico.

With regard to the yield of this crop for biodiesel production, rapeseed contains between 380 and 400 kilograms of oil and between 180 and 200 kilograms of protein per ton. When processed with the pressing method, not with solvents, 369 kilograms of crude oil and approximately 500 kilograms of cake or paste are obtained with 200 kilograms of protein. The 369 kilograms of oil, when estherized with ethanol, would yield 387 kilograms of biodiesel, that is, approximately 460 liters.

In 2004, 212,000 hectares of safflower were harvested in Mexico, 122,686 of which were on irrigated lands, mainly in Sonora (105,000 hectares), with a yield of 1,400 kilograms per hectare. From one ton of safflower seeds approximately 272 kilograms of oil and 728 kilograms of cake are produced, containing 126 kilograms of protein, that is, 17.3%. When estherized with ethanol the 272 kilograms of oil would yield approximately 285 kilograms of biodiesel, that is, 339 liters.

In México, in the same year, 90 hectares of sunflowers were harvested, with a yield of 2.58 tons of seed per hectare. From this surface, 70 hectares were irrigated lands, located mainly in Chihuahua. Sunflower seed, on a dry basis weight, is composed by 42% of oil, 16% of protein and 40% of fiber. From one ton of seed, by the pressing method, 387 kilograms of oil and 613 kilograms of cake are obtained, with 160 kilograms of protein, that is, 26%. When estherized with ethanol the 387 kilograms of oil would yield approximately 405 kilograms of biodiesel, that is, 482 liters.

Evolution of the Oil-Derived Products Domestic Supply and Demand, 2008-2017

According to the *Programme for Impelling Growth and Employment*[19], and taking into account the benefits from the recently approved Energy Reform – which will lead to a bigger capacity of execution to the industry in the next years-, PR intends to create more infrastructure; this will lead to a larger production of ultra-low sulfur content, according to the environmental normative. The projects already considered will be able to ameliorate production outputs and increase refining margins.

The oil-derived products supply takes into consideration a scenario of financed and programmable investments that will reinforce infrastructure in the value chain of PR; nevertheless, being the effects for strengthening Pemex after the Energy Reform are still on valuation, the development of other future projects has not been yet discarded. The main strategic projects already considered are:

Finishing Minatitlán upgrading in 2009;

Concluding the residual conversion project in Salamanca and of gasoline quality of the SNR in 2013;

Incorporation of a new refining capacity for Mayan crude of 300tbd, concluding Salina Cruz upgrading and the diesel quality project in 2014;

To end up the project of residual conversion in Tula in 2015; and,

Set on stream the new refining capacity of 300 tbd in 2016.

The fulfillment of the hereinbefore mentioned projects during the prospected period will lead to:

Increase the processing of heavy crude;

Raise the average outputs in the production of gasoline and middle distillates;

Reduce domestic supply of fuel oil;

Incorporate coking facilities into all the SNR; and,

Produce ultra low sulfur fuels.

[19] This programme was presented on October 8, 2008 in an address for the Nation given by the President Lic. Felipe Calderón Hinojosa.

2.1 Development of the SNR and Its Impact on the Production of Oil-Derived Products, 2008-2017.

2.1.1 Development of Processing Facilities in the SNR

The raise on fuels demand, along with the insufficient infrastructure development, has caused a saturation of the available capacity in the SNR. In order to face these limitations, PR sets up various strategic projects of meaningful transcendence for the required budget dimension and technological advances they represent.

The development of new capacity and the generating of a larger infrastructure will reduce the current limitations of this industry.

Chart 25

Increase of Installed Capacity on Refining Processes, 2008-2017

(thousand barrels per day)

Processing Utilities	Cadereyta	Madero	Tula	Salamanca	Minatitlán	New Facilities	Salina Cruz	**Total**
Atmospheric Distillation	-	-	-	-	150.0	600.0	-	**750.0**
Catalytic Cracking	-	-	25.0	20.0	42.0	220.0	25.0	**332.0**
Catalytic Reforming	-	-	35.0	5.0	-	130.0	11.0	**181.0**
Alkylation and Isomerization	-	-	10.3	8.0	27.0	78.0	35.0	**158.3**
Hydrodesulfuration	77.5	90.0	158.5	218.0	151.4	554.0	245.0	**1,494.4**
Coking	-	-	80.0	50.0	56.0	250.0	65.0	**501.0**

Production Capacity

Source: IMP, based on information from Pemex Refinación.

The capacity's increase on atmospheric distillation and the improvement of operative performance will lead to a raise of 842.4tbd in processing heavy crude during the period 2008-2017.

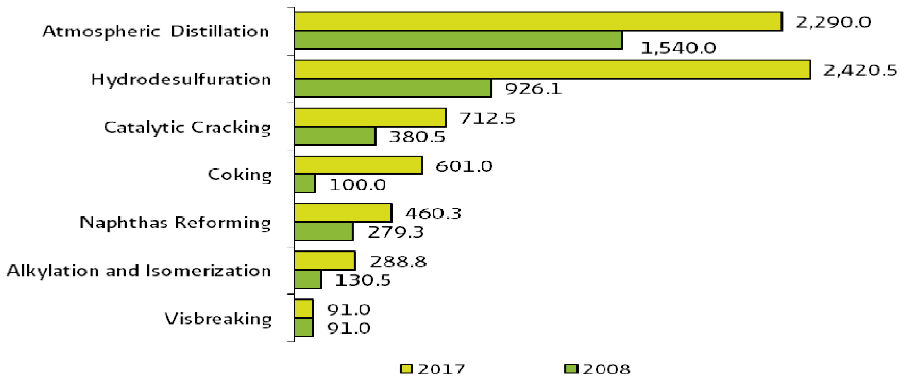
Changes in the environmental regulation will require producing ultra-low sulfur fuels and necessary and significant investments in order to have a larger capacity in hydrodesulfuration facilities. In this context, the new capacity will mean 22.9% of the total installed capacity of the SNR in 2017.

The intended evolution of the installed processing capacity by type is displayed on Figure 8. By reaching this capacity, as well as having the needed infrastructure, will lead to an increase on domestic supply of fuels (452.4 tbd), and of 359.5 tbd on middle distillates during the period 2008-2017. In addition, fuels quality will be substantially improved offering ultra-low sulfur gasoline and diesel.

Figure 8

Installed Capacity in the SNR by Processing Type, 2008 y 2017

(thousand barrels per day)



Source: IMP based on Pemex information.

Minatitlán upgrading will lead to an important increase on its crude-processing capacity (see table 33), raising it 81.1% in the next year: a raise from 185 tbd to 335 tbd.

For Salina Cruz, the oil-processing capacity will not be increased with its upgrading (see table 32), but it will give this refinery a scheme of deep conversion that will lead to a raise of the heavy-crude processing of 37.1%.

Chart 26

Installed capacity by Refining Processes, 2017 (thousand barrels per day)

Process	Cadereyta	Madero	Tula	Salamanca	Minatitlán	New Facilities	Salina Cruz	SNR
Atmospheric Distillation	275.0	190.0	315.0	245.0	335.0	600.0	330.0	2,290.0
Catalytic Cracking	90.0	60.5	105.0	60.0	72.0	220.0	105.0	712.5
Visbreaking			41.0				50.0	91.0
Catalytic Upgrading	46.0	30.0	100.0	44.3	49.0	130.0	61.0	460.3
Alklylation and Isomerization	23.0	22.1	35.5	25.4	42.0	78.0	62.7	288.8
Hydrodesulfuration	264.0	231.7	377.9	334.5	248.4	554.0	410.0	2,420.5
Coking	50.0	50.0	80.0	50.0	56.0	250.0	65.0	601.0
Sulfur (ton/day)	600.0	600.0	1,000.0	240.0	80.0		240.0	2,760.0

* Production Capacity.
Source: IMP, based on PR information.

The incorporation of coking facilities in Salamanca and Tula will enlarge the heavy-crude processing from 56.3% to 96.4% in 2017 contrasted to the beginning year of the period. Furthermore, the two additional capacities already examined will have a crude-processing capacity of 300tbd, each (see table 33); consequently, at the end of the period, both will contribute to a gasoline production of 266.6tbd, a volume equivalent to 30% of the domestic production.

2.1.2 Crude Processing in the SNR

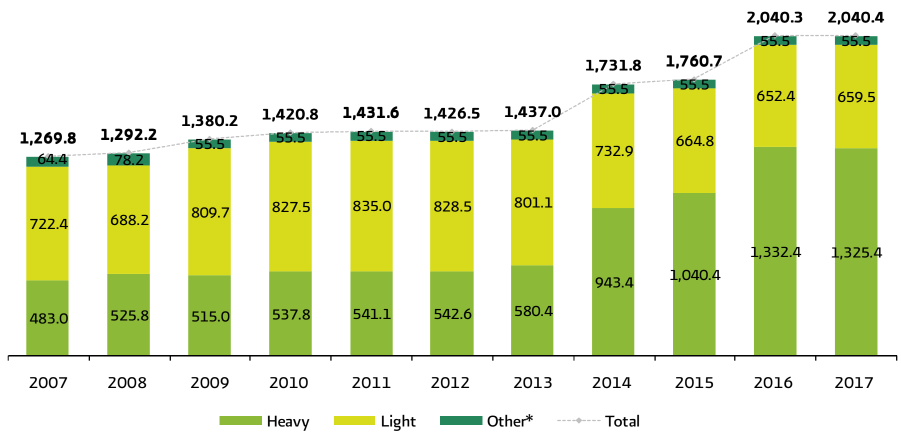
The total crude processing in the SNR for the period 2007-2017 will display an average annual growth of 4.9%. The intended trends in the current scenario show there will be an important change in the composition of the provided mix due to a raise of 842.4tbd on the heavy-crude processing in the SNR, while the light crude will drop in 62.9tbd. The expected average growth rates are of 10.6% and –0.9% each (see figures 9 and 10).

For light crude, the expectations show a downward trend, remaining as the most-demanded crude until 2013, with a share of 55.7%, and of 32.3% in 2017, which means a bigger proportion of heavy crude in the mix (see figure 2).

Figure 9

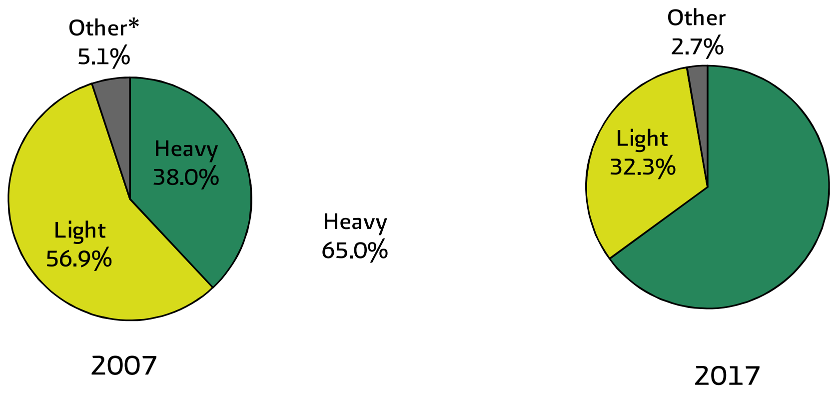
Processed Crude by Kind, 2007-2017

(thousand barrels per day)



* Considers crude free of light and extra-light crude.
Source: IMP, based on PR information.

Figure 10
Processed Crude by Kind in the SNR, 2007 and 2017
(percentage structure)



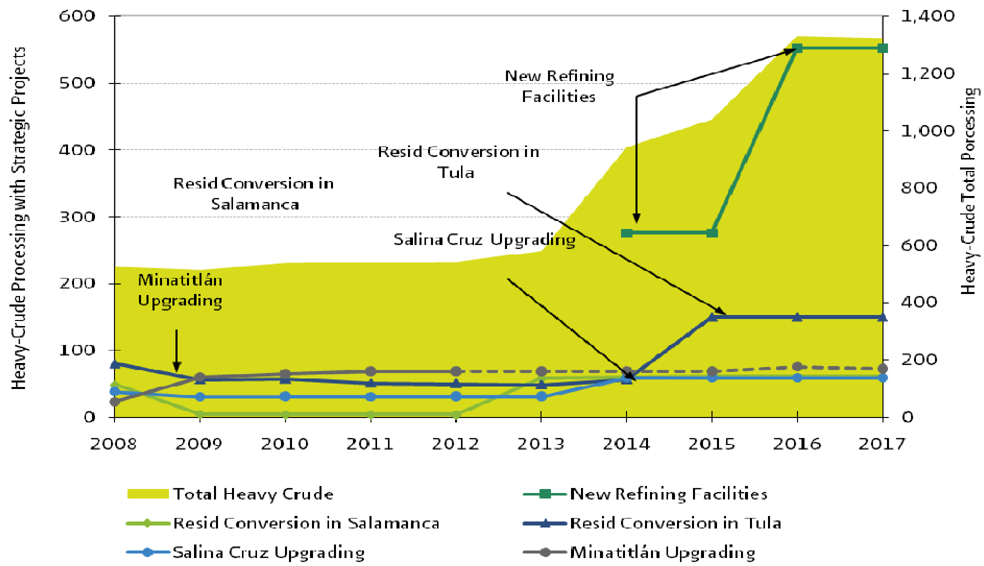
* Extra-light crude and extra-light crude

Source: IMP, based on PR information.

Minatitlán and Salina Cruz upgrading; residual conversions in Salamanca and Tula; and the new capacities will give larger volumes of heavy crude in the SNR (see figure 4).

Figure 11

Impact of the Strategic Projects on the Heavy-Crude Processing, 2008-2017 (thousand barrels per day)

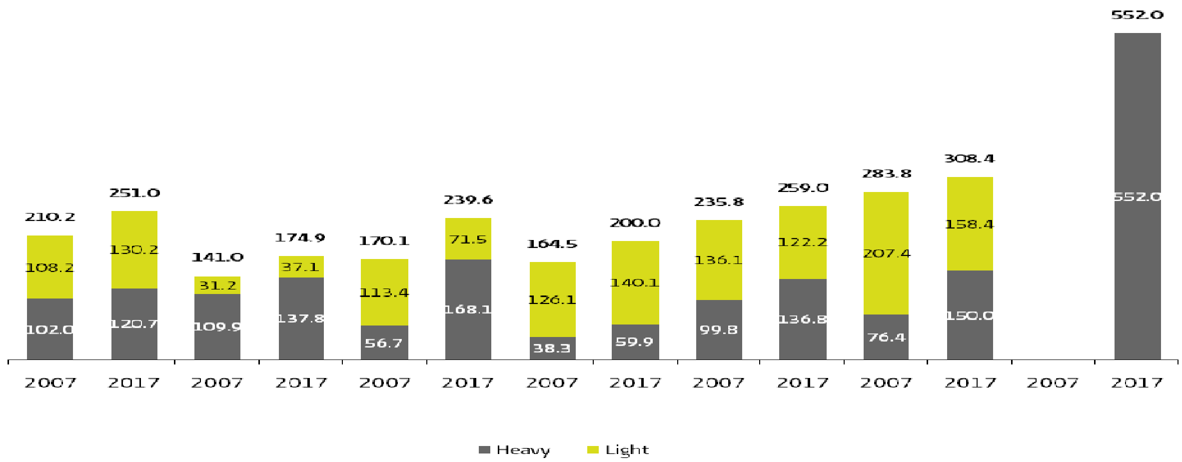


Source: IMP, based on PR information.

At the end of the prospected period, Minatitlán refinery will reckon a raise of 196.8% on its receiving of heavy crude; Salina Cruz' of 37.1%; Salamanca and Tula of 56.3% and 96.4% each; Cadereyta of 18.4%; and Madero, 25.4% (see figure 12).

Figure 12

Crude Processing by Kind* and by Refinery, 2007 and 2017 (thousand barrels per day)



* It neither includes non-sticky, super low, nor "other feedstocks" (amorphous gasoline, isomerate, octane-based gasoline, pentanes, Cangrejera upgraded, pyrolisis gasoline, Minatitlán isobutane).
Source: IMP, based on PR information.

Strategies on Crude Refining

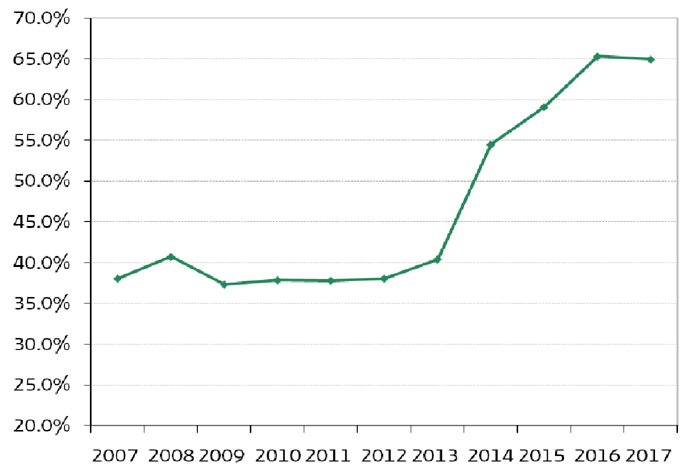
Based on the "Programme for Increasing the Operative Efficiency in Petroleos Mexicanos and its Subsidiary Organisms", PR has established various actions focused on increasing productivity per each processed-oil barrel, improving fuels' quality and having a better efficiency of conveyance, mobility, storage and distribution of oil-derived products.

Transforming the productive structure will improve the quality of the fuels obtained from Mayan. Besides, the new refining facilities will have a leading role in the high-quality oil production, by processing only this kind of crude (see figure 13).

Figure 13

Share of Heavy Crude in the Total-Processed Mix in the SNR, 2007-2017

(percentage)



Source: IMP, based on PR information.

Investments in the National Refining System

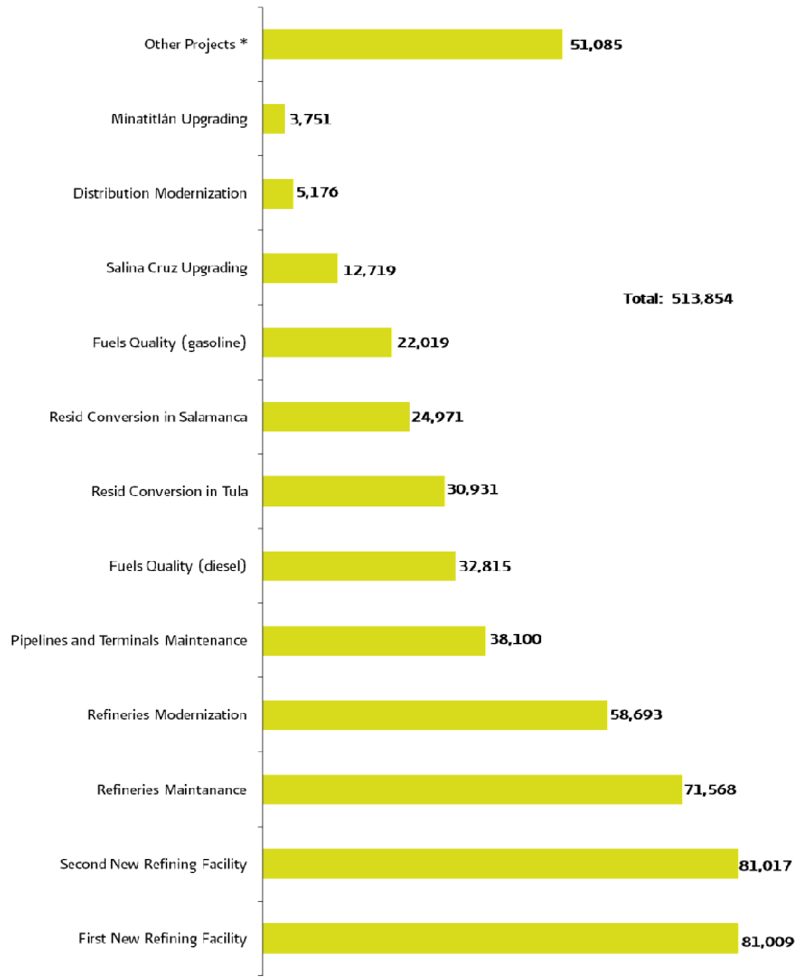
To fulfill the hereinbefore mentioned projects and reach a bigger fuel supply under the quality specifications for gasoline and diesel, established in the NOM-086, PR requires an investment of 513, 853 million MXN (see figure 14).

From the total investment required, new capacities represent 31.5%, and their execution will bring 266.6tbd of gasoline at the end of the period. The projects for enhancing fuels quality (diesel and gasoline) will represent 10.7%. In this context, the refining industry should carry out numerous investments in processing facilities for improving gasoline quality. The residual conversion in Tula and Salamanca represent 6% and 4.9% of the total investment, while the upgrading of Minatitlán and Salina Cruz will need 0.7% and 2.5% each.

Figure 14

Investment Requirements in Projects of the SNR, 2009-2017

(million pesos)



*Includes the associated sources for the financed investment projects.
Source: IMP, based on PR information.

2.1.3 National Production of Oil-Derived Products

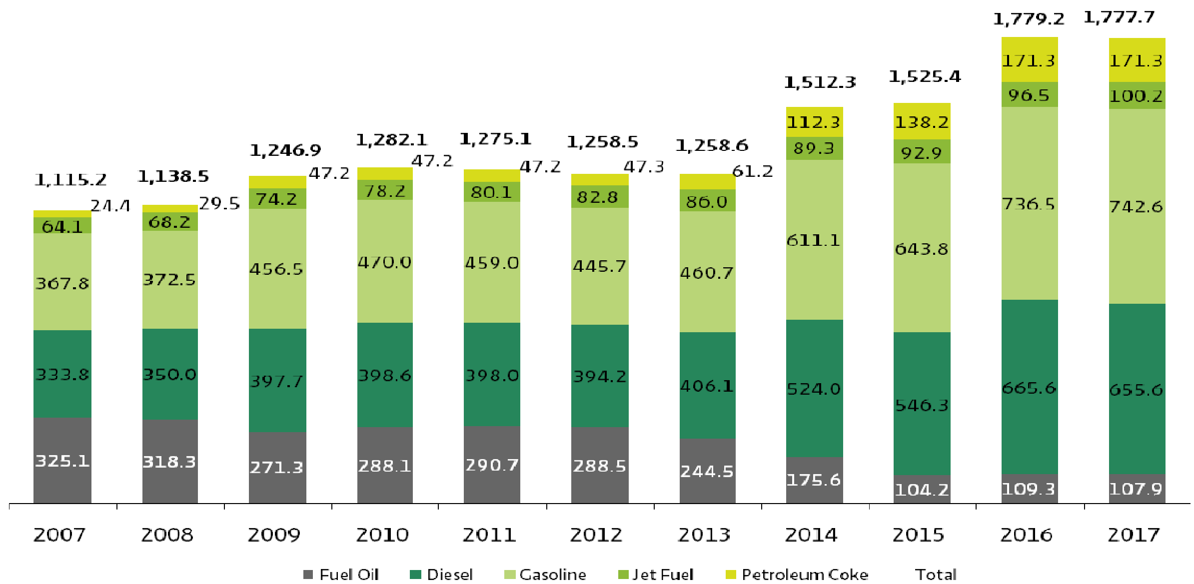
Due to the increasing demand of fuels for motor carrier, PR needs to reach a better balance between the domestic supply and demand of fuels. This supply's evolution is supported by the investment scenario, which will lead to a rise of 662tbdoe during 2007-2017. This means the production of oil-derived products will grow at AAGR of 4.8%.

Gasoline and diesel will keep the major average controlling interest in the production for the mentioned period, 37.5% and 33% each; in a lesser proportion will be jet fuel and petroleum coke (see figures 16 and 17).

Figure 16

SNR Oil-Derived Products Production, 2007-2017

(thousand barrels of crude oil equivalent per day)

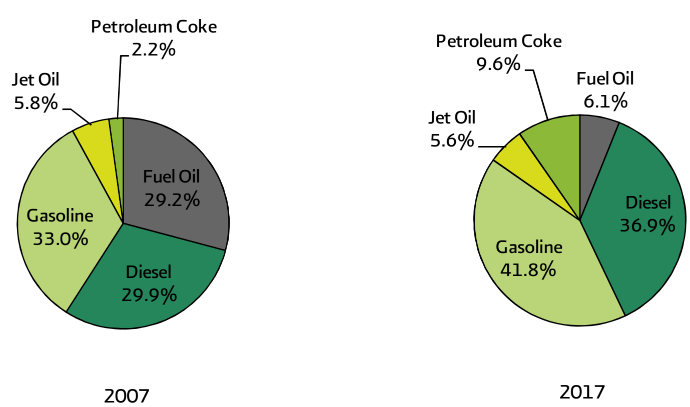


Source: IMP, based on PR information.

Figure 17

Oil-Derived Products Share in the National Production, 2007 and 2017

(Percentage structure)



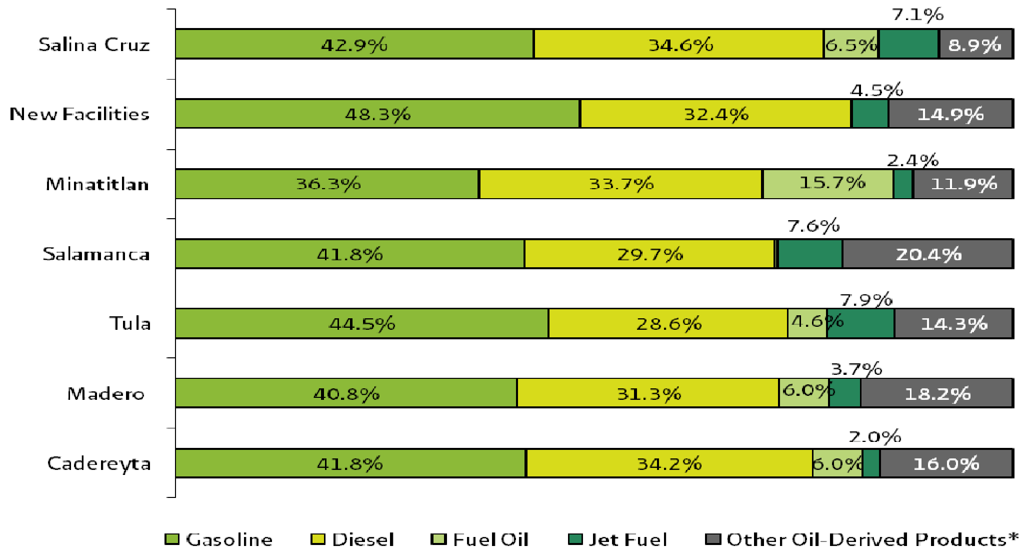
Source: IMP, based on PR information.

In 2017, PR will be able to increase the production yields of fuels in relation to the beginning of the period. For gasoline, these will have an average grow from 30.1% to 42.4% in 2017, which means this fuels manufacture will have an AAGR of 7.3%.

Figure 18

Refineries Yields by Product, 2017

(percentage structure)



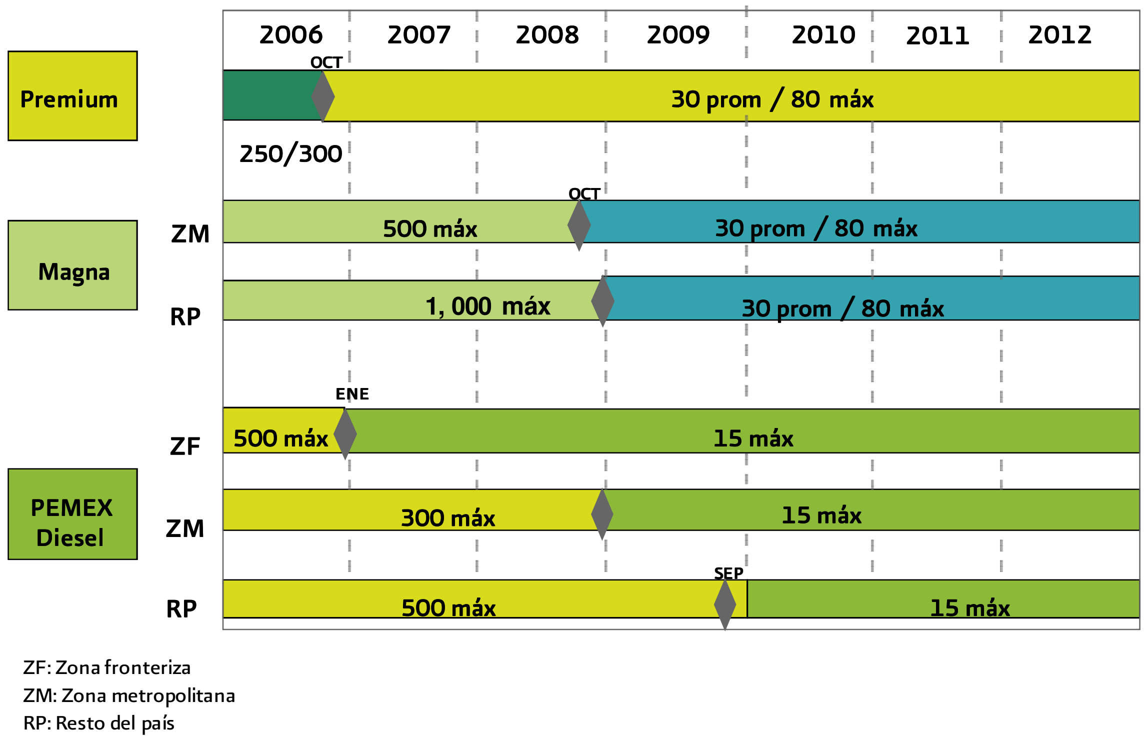
* Includes petroleum coke, asphalts, lubricants, paraffin and other products.
Source: IMP, based on PR information.

Manufacturing super-low sulfur products will reduce – or even eliminate – pollutants and will also be an essential requirement for introducing new vehicle technology. Thereof, the significance of making the necessary investments for reducing sulfur in gasoline and diesel; in such way, the refining industry will be able to provide the automotive industry fuels allowing the entrance of motor carrier vehicles with new technology (see diagram 1).

Diagram 1

Sulfur Specifications for Gasoline and Diesel, NOM 086

(parts per million)



♦ This date was set up by the NOM-086 in the DOF (Federal Official Journal) on January 30, 2006.
Source: IMP, based on PR information.

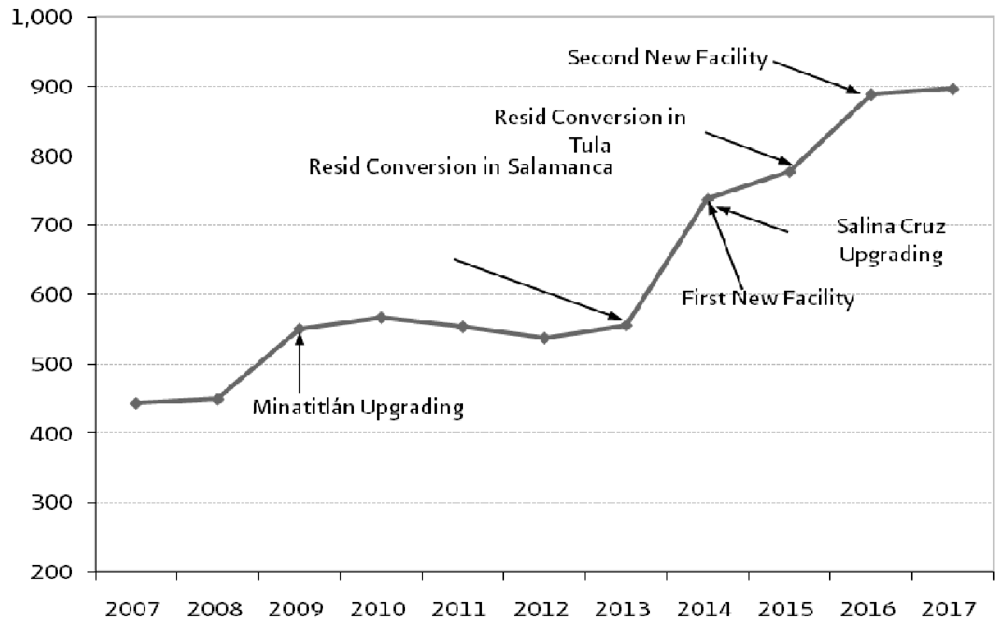
Gasoline production will raise to 452.4 tbd reaching, at the end of the period, 896.2 tbd; the domestic supply will double in 2017, in regard to 2007.

At the end of the period, Minatitlán's upgrading will let it contribute with 11.5% of that oil-derived products demand, while Salina Cruz's will be of 14.6%. The residual conversion of Salamanca and Tula will cause an additional shift on their production of 18.7tbd and 36.9tbd. The new capacities will simultaneously contribute with 29.7% of the domestic supply. The impact these projects will have on gasoline manufacture is shown in figure 19.

Figure 19

Impact of the Strategic Projects on Gasoline Production, 2007-2017

(thousand barrels per day)



Source: IMP, based on information from PR.

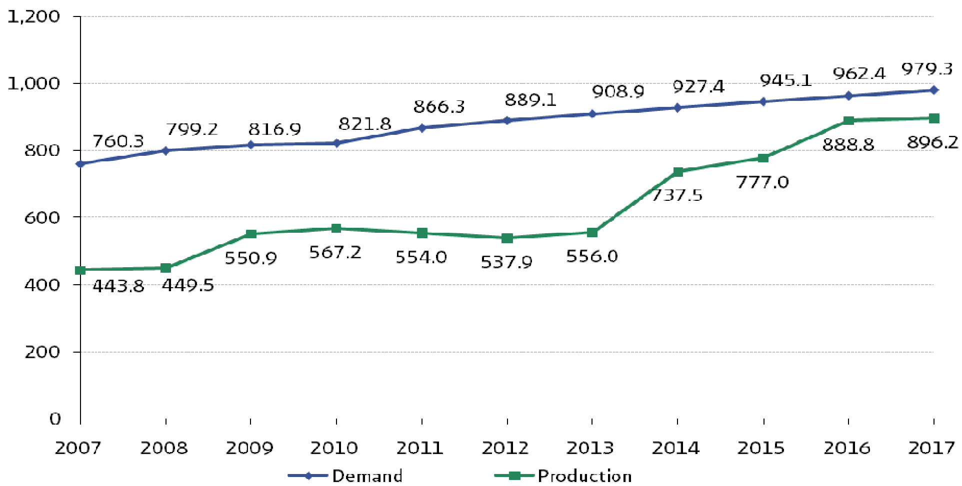
With the upgrading projects for all SNR and the incorporation of the new capacity, the imports' volume will drop considerably. Whilst in 2007 the difference among domestic demand and supply was of 314.5tbd, it is estimated that for 2017, it will be of 81tbd (see figure 20). Hereupon, even when the expected growth of the refinery capacity is insufficient for closing the intended balance for the next nine years, the imports of these oil-derived products will drop as to be – in 2016 and 2017 – the lowest ones registered in the historical period as well as in the outlook.

The capacity increases, foreseen in a wider landscape from the outlook period of this analysis, will need a similar capacity to refineries with larger dimensions in the SNR, also having more efficient schemes of deep conversion than the existing ones and, thus, the income-yield capacity of national refineries will be increased.

Figure 20

Evolution of the Supply and Domestic Sales of Gasoline1, 2007-2017

(thousand barrels per day)



[1]. It does not consider Pemex self consumptions..

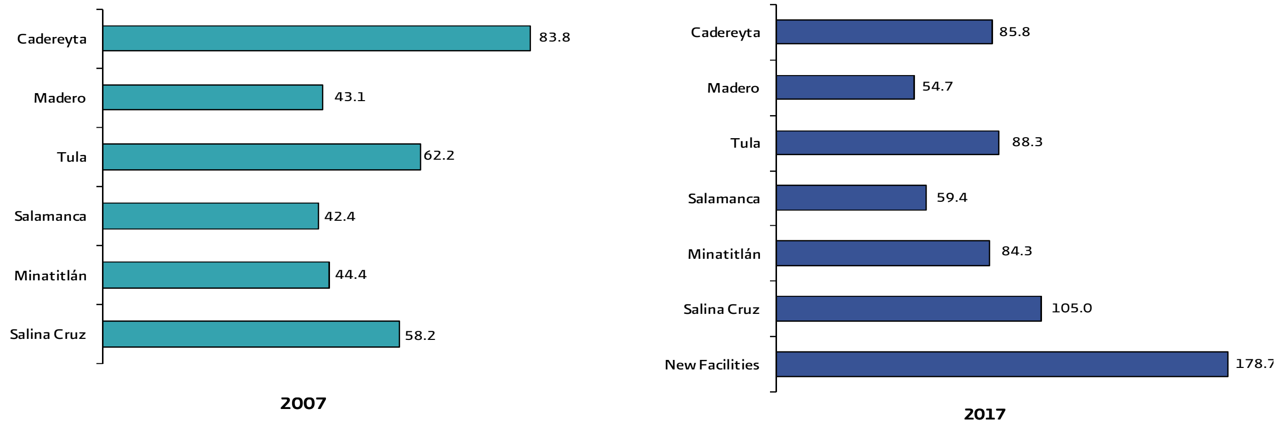
Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex Refinación, Sener and private companies.

Middle distillates will have an AAGR of 6.6%, so at the end of the period will they will be placed in 759.8tbd, that is, 359.4tbd more than those produced during 2007. The distillates higher yields will be mainly focused towards diesel, which will have a raise of 322.2tbd. The new refining facilities will share 27.2% of the domestic supply, whilst new refining facilities will share 27.2% of the domestic supply; Minatitlán and Salina Cruz will share 12.8% and 16% each (see figure 21).

Figure 21

Diesel Manufacture by Work Center, 2007-2017

(thousand barrels per day)



Source: IMP, base on information from Pemex Refinación.

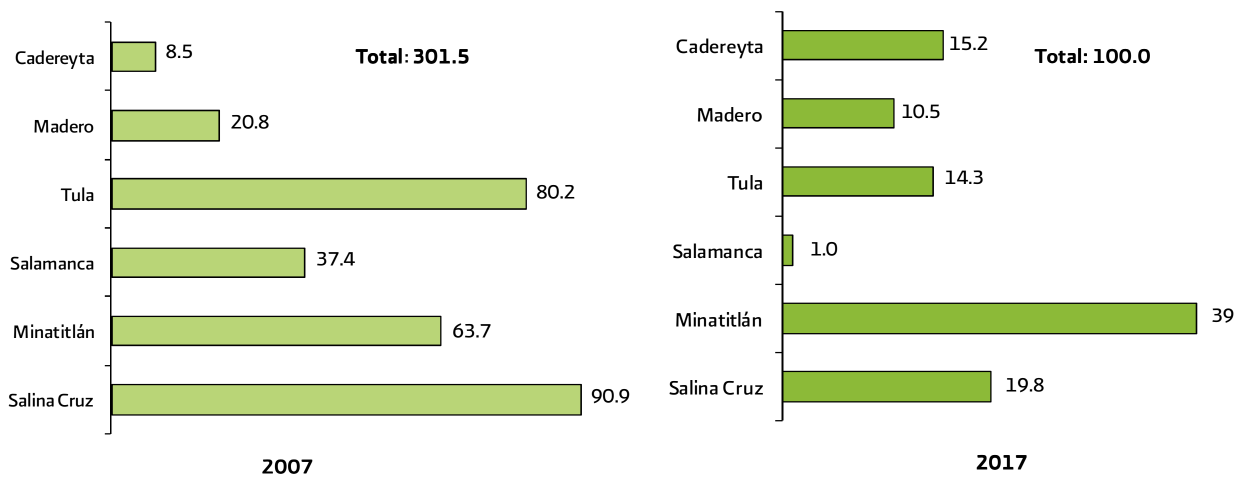
In 2017, the jet-fuel production will exceed in 37.3tbd its period's beginning (AAGR 4.6%). Tula refinery will remain as the one with the largest manufacture of this fuel, contributing to the domestic supply with 23.6% in 2017. The new facilities will share 23.8%, Minatitlán and Salina Cruz 5.8% and 21% each. During the analyzed period, the production of this fuel will increase from 66.3tbd to 103.6tbd.

Fuel-oil production will have a drop of 201.4tbd. Salina Cruz and Tula refineries will have a significant contraction in this fuel's manufacture, reducing its supply in 137tbd during this period. On the other hand, Minatitlán and Salina Cruz will be the refineries with the largest share on the domestic production in 2017 with 39.2% and 19.8% each. The new facilities will focus in the manufacture of gasoline, middle distillates and petroleum coke (see figure 22).

Figure22

Manufacture of Fuel Oil by Work Center, 2007 y 2017

(thousand barrels per day)



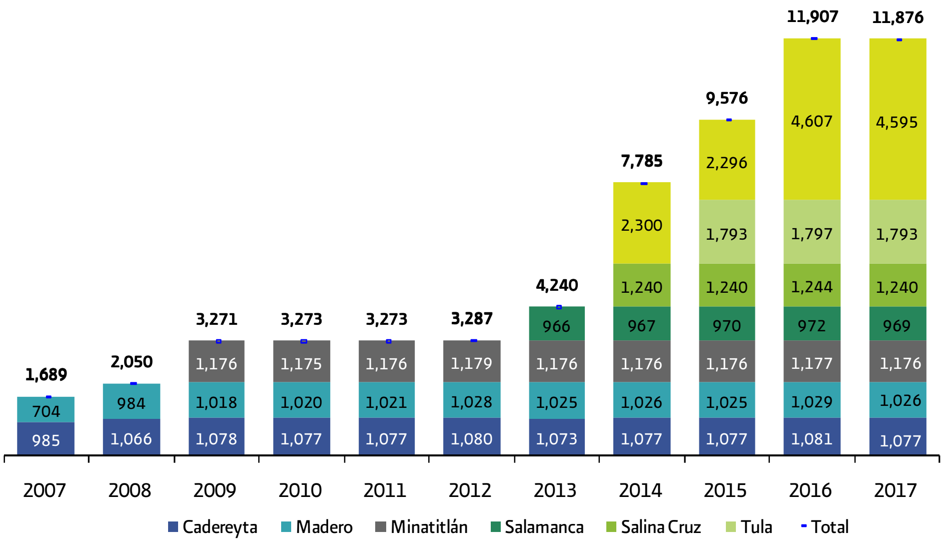
Source: IMP, based on information from Pemex Refinación.

As it has been indicated, the petroleum coke will show a pace of annual growth of 21.5%, equivalent to 10,186.9 thousand tones (kt). This increase is conferred to the integration of deep conversion processing in all the SNR and hence a larger processing of Maya crude. At the end of the period, the new capacities and Tula refinery will be the major producers of this energetic; their contribution to the domestic supply will be of 38.7% and 15.1% each (see figure 23).

Figure 23

Manufacture of Petroleum Coke by work center, 2007-2017

(thousand tons)



Source: IMP, base on information from PEMEX Refinación.

2.2 Domestic Demand of Oil-Derived Products, 2008-2017

This section shows the supply projections for each oil-derived product by consumption sector and region detail. It is worthwhile mentioning that, given the worldwide financial crisis and its impact extent within the country, this is an uncertain subject and thus, the demand scenario is conservative.

2.2.1 Transportation Sector

During the period 2007-2017, it is estimated that the vehicle fleet will grow at a rate of 5.3%, that is, an increase of 14 million of automobiles. At the end of the period, the vehicle-fleet structure will be mainly of gasoline motor carriers (92.5%) and diesel vehicles (4.5%), while LPG and CNG vehicles will just have a marginal contribution (see chart 27).

Chart 27

Vehicle Fleet by Kind of Fuel, 2007-2017
(thousand vehicles)

Fuel	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	**20,557.1**	**21,999.5**	**22,829.1**	**24,013.3**	**25,290.8**	**26,716.4**	**28,154.5**	**29,636.3**	**31,191.0**	**32,831.2**	**34,539.2**	5.3
Gasoline	19,442.1	20,869.9	21,704.0	22,866.2	24,091.9	25,446.8	26,815.5	28,225.8	29,705.1	31,265.0	32,887.5	5.4
Diesel	885.8	936.0	976.1	1,033.2	1,095.1	1,165.9	1,235.1	1,306.4	1,381.3	1,460.7	1,544.3	5.7
LPG	226.0	189.8	144.9	109.3	98.5	97.7	96.9	95.9	94.7	93.4	92.0	-8.6
NGC	3.1	3.7	4.1	4.6	5.3	6.1	7.0	8.3	9.9	12.1	15.4	17.2

Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

The gasoline vehicle fleet will show a raise of 13.4 million of units, while the expected raise for diesel vehicles will be of 0.66 million[20]. The vehicle-fleet estimate in the projection of gasoline and diesel demand includes the impact of the NAFTA's clause – that has just went into effect -, which allows the import of ten-year-old light and heavy vehicles (January 1st, 2009), thus enlarging the vehicle fleet.

Chart 28

Fuels Demand in Transportation Sector, 2007-2017
(thousand barrels per day)

Fuel	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Magna Gasoline	658.9	708.2	711.6	715.9	754.7	775.0	792.3	808.4	823.9	838.9	853.7	2.6
Premium Gasoline	101.4	91.0	105.2	105.9	111.6	114.1	116.6	119.0	121.3	123.5	125.7	2.2
Gasoline Total	**760.3**	**799.2**	**816.9**	**821.8**	**866.3**	**889.1**	**908.9**	**927.4**	**945.1**	**962.4**	**979.3**	2.6
Diesel	300.0	320.5	313.3	316.3	334.9	345.9	355.7	365.1	374.2	383.3	392.4	2.7
LPG	28.9	21.4	16.4	12.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3	-9.0
NG (MMpcd)	1.9	2.7	2.9	3.1	3.6	4.0	4.4	4.9	5.6	6.5	7.7	15.3

Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

For 2017 it is expected that Magna gasoline will represent an average of 82.2% of the total demand of gasoline, whilst Premium's will cover the rest (see chart 28). It is estimated that gasoline demand will grow at minor pace than vehicle fleet, since fuel will grow at an annual rate of 2.6% and vehicles at 5.4% in 2007-2017.

[20] In NGC motor carriers there will be an increase of approximately 12.2 thousand vehicles. For LPG, a decrease of the fleet is expected due to the preference diminish towards this fuel usage (its prices have raised systematically, thus discouraging the change of motor fuel tanks that were previously converted and are now reaching their life term. It is not expected the renewal of these systems or their migration to gasoline units).

Vehicles Efficiency

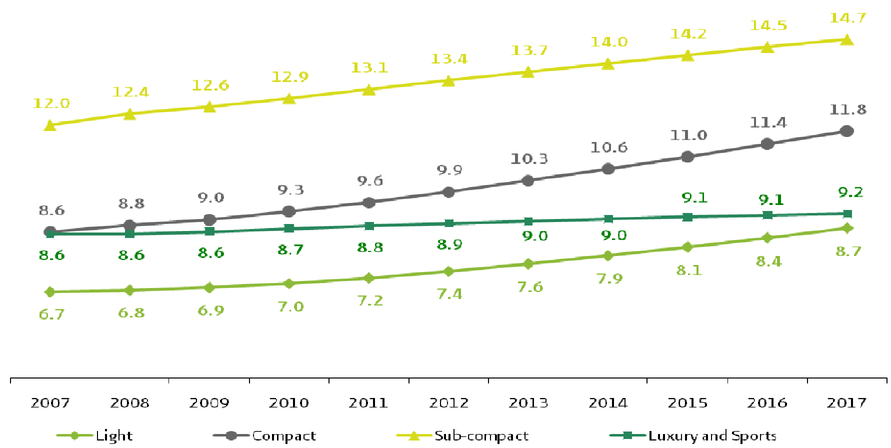
The improvement of the vehicle-fleet efficiency is a gradual process that may be fulfilled with the incorporation of new technologies that reduce energy losses and thus, will help on achieving a better use of fuels. Furthermore, the withdrawal of those units at the end of their lifetime has significantly helped to improve its efficiency.

The evolution of the estimated efficiencies by kind of gasoline shows that light vehicles will keep the highest ranking during the prospected period; by its end, there will be an increase related with efficiency of 2 km/l (see figure 24).

Luxury and sports vehicles are not expected to have a substantial increase on their efficiencies, whilst compact ones – from 2011 on – are expected to have a gradual increase that might approximately reach 11.8km/l in 2017.

Subcompact vehicles will still be the ones with better efficiency (for gasoline vehicles); whilst in 2008 compact's efficiency will be approximately of 8.8km/l; subcompacts' overpass the latter's efficiency in approximately 3.6km/l (reaching 12.4km/l), and expecting to reach 14.7km/l in 2017.

Figure 24
Average Efficiency of New Gasoline Vehicles by Category, 2007-2017
(kilometers per liter)



Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

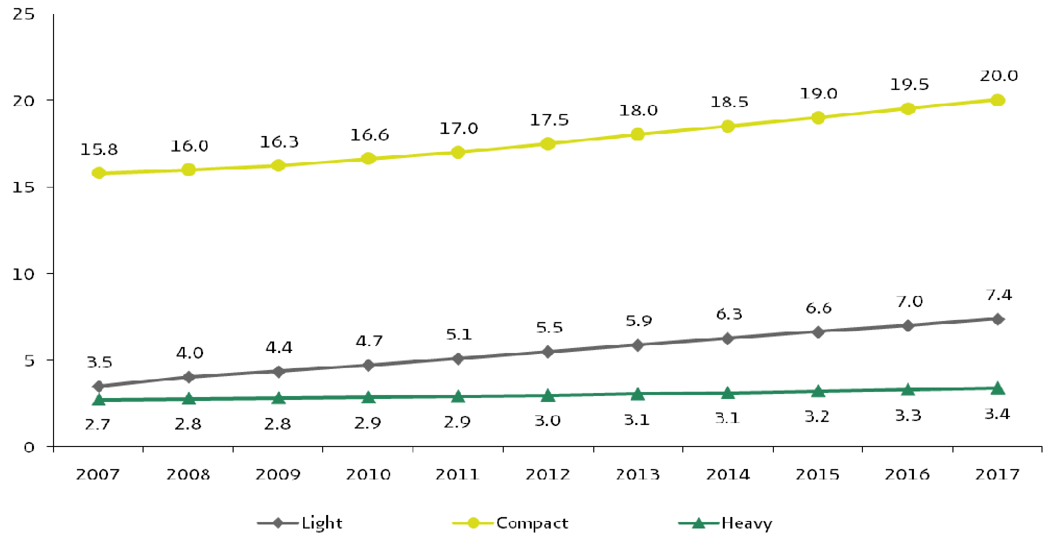
Diesel motors are characterized by a high compression ratio in which power is controlled through the amount of injected fuel (mix quality), which becomes an advantage over gasoline vehicles[21]; hence, the main allure of diesel motors is on its fuel saving.

In general terms, compact-diesel automobiles display greater efficiencies in regard to other vehicles such as light or heavy ones. Nonetheless, the higher raises for the prospected period will be those of compact vehicles which expect an increase up to 4.2km/l at the end of 2017, reaching an average consumption of its fleet of 7.2km/l.

For heavy vehicles, these will show the lowest raises on efficiency in regard to those of diesel's, since nowadays, most of the existing fleet overpasses its useful lifetime. In addition to this, it is not expected any important replacement at middle term due to the slow process of its fleet renewal (see figure 25).

[21] The main differences amongst gasoline and diesel motors are: whilst gasoline motors let in a mixture of gas and air, compresses it and turns it on through an electric spark, diesel motors just let in air, compress it and, afterwards, inject the fuel into the compressed air, being thus the latter's heat which produces the spontaneous combustion that makes diesel motors more efficient than gasoline's, for diesel compression can be higher and, thus, it generates more power. In addition, the bigger energetic density of diesel –in contrast to gasoline's-, and the improved efficiency of diesel motors allow running larger distances at a lower cost.

Figure 25
Average Efficiencies of Diesel-Vehicle Fleet by Category, 2007-2017
(Kilometers per liter of gasoline equivalent)



Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

Gasoline will still be the most demanded fuel for the next ten years, even if there has been an earnest interest of some vehicle assemblers on marketing diesel automobiles. The observed competitiveness on diesel prices, as well as these motor carrier's advantages on their mechanical efficiency contrasted to gasoline motors, may cause an increase of their vehicle fleet, thus increasing diesel consumption.

For maritime transportation, it is estimated that by the year end of 2007, diesel demand was of 14.6tbd which represents the conveyance of 298.5 million of tons of load and 12.7 million passengers.

It is fitting to say that in 2007 loading terminals in Nuevo León, Veracruz and Jalisco went on stream, so, currently, there are 64 loading terminals throughout the country[22.] The Multimodal Project of Punta Colonet in Baja California – which includes an overseas port, a container's terminal and a railroad connection with USA border, is also considered.

This terminal is part of the Specialized Container's Terminal (TEC) of Lázaro Cárdenas Port, which – after concluding the three projected stages – handles a capacity of 2 million TEUS (units equivalent to 20ft long containers) per year and will have direct railway connections to USA border via Laredo, allowing thus international transits.

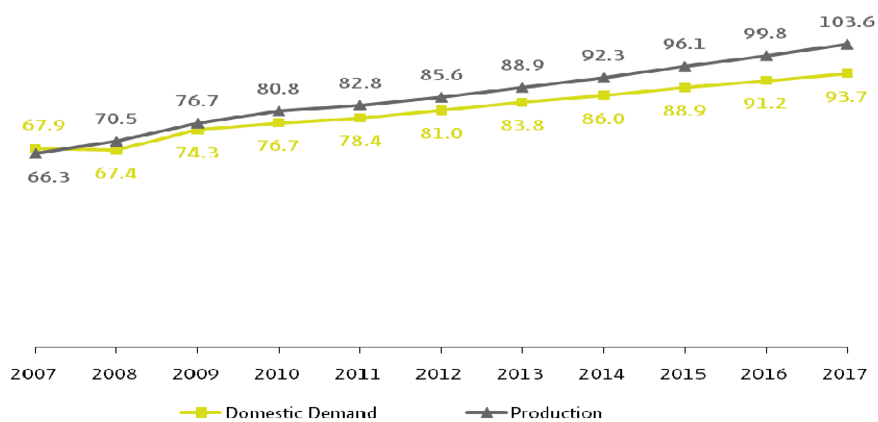
For the hereinbefore said, the diesel total demand in the transport sector will rise from 329.1tbd in 2007 to 428.6tbd in 2017 (2.7% AAGR), mainly encouraging the demand on motor carriers for load and passengers conveyance. The most

[22] Ministry of Communications and Transportation (SCT). *Labor's Report.*

important regions for diesel demand in transportation sector, ordered by their extent will be Central-West and Northeast regions which will demand 103.4tbd and 102.9tbd each at the end of the prospected period.

For the air transport it is foreseen that jet-fuel demand will reach 93.7tbd in 2018, due to the increases on airport operations in load and passengers transportation (see figure 26).

Figure 26
Demand and Production of Jet Fuel, 2007-2017
(thousand barrels per day)



Source: IMP, based on information from ASA, BANXICO, INEGI, Pemex Refinación, SCT and Sener.

One of the main factors having a bearing on the demand's growth expectancy is fulfilling the Metropolitan Airport Project which will take care of the increasing demand of these services. That project includes Terminal 2 of the International Mexico City Airport (AICM), currently at service, the development of airports nearby Mexico City's Metropolitan Zone, such as Puebla's, Toluca's, Querétaro's and Cuernavaca's, as well as the decentralization of the AICM towards the airports of Guadalajara, Monterrey and Cancún under the concept of traffic-distribution centers, or order to avoid passengers moving through Mexico City.

Furthermore, it is expected a raising of air-cargo transport capacity during the studied period, which will be on stream with the enlargement project of Puebla's International Airport "Hermanos Serdán", looking forward on promoting air cargo for Puebla and Tlaxcala. Likewise, this will improve logistics at Central Mexico; in addition the SCT has agreed, along with branch authorities in Honduras, El Salvador and Guatemala, to promote the development of regular and non-regular air services to the "Mayan World" region, this for encouraging tourism and transportation there.

Based on the above, jet fuel demand is in the Central region will represent 36.6% of the domestic demand, followed by South-Southeast with 21.6% (see chart 29).

Chart 29
Jet-Fuel Regional Demand, 2007-2017
(thousand barrels per day)

Regional	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	**67.9**	**67.4**	**74.3**	**76.7**	**78.4**	**81.0**	**83.8**	**86.0**	**88.9**	**91.2**	**93.7**	**3.3**
Northwest	7.6	9.3	10.2	10.6	10.9	11.3	11.7	12.1	12.5	12.9	13.3	5.8
Northeast	9.5	5.5	6.1	6.3	6.4	6.6	6.9	7.0	7.3	7.5	7.7	-2.1
Central-West	10.6	13.0	14.4	14.9	15.2	15.7	16.3	16.7	17.3	17.8	18.2	5.5
Central	23.5	25.1	27.7	28.5	29.1	30.0	30.9	31.7	32.6	33.4	34.3	3.8
South-Southeast	16.7	14.4	15.9	16.4	16.8	17.4	18.0	18.5	19.1	19.7	20.2	1.9

Source: IMP, based on information from ASA, BANXICO, INEGI, Pemex, SCT and Sener.

2.2.2 Electric Sector

Public Electric Sector

Fuels demand on the electric public sector will have a pace of annual growth of 1.9% for the next ten years, mainly encouraged by the demand of NG for generating electricity, as part of the independent production of energy.

From year 2008 up to year 2013m fuel-oil demand will show substantial changes with a downward trend, and its consumption will have a drop of 74.7tbdoep during this period, due to the low efficiency of applied technology (conventional thermoelectric) is not compensated with the fuels' low cost. Besides, the environmental impact caused by the combustion of this energetic will contribute to its consumption drop.

The generating of electric energy based on combined-cycle technology promotes the use of cleaner fuels as natural gas. In this sense, fuels demand for generating electrical energy in the public sector will be mainly based upon natural-gas consumption which will be of 632.8tbdoe, which represents 70.6% of fuels' total demand within the sector (see chart 30).

Chart 30
Fuels Demand in the Electric Public Sector, 2007-2017
(thousand barrels of oil equivalent per day)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Total	**740.9**	**687.3**	**724.9**	**738.4**	**735.2**	**765.2**	**769.8**	**803.4**	**846.2**	**871.5**	**904.1**	**1.9**
Federal Power Comission (CFE)	493.8	418.2	420.8	428.9	424.4	448.8	444.1	454.0	465.4	452.4	457.9	-0.9
Light and Power Company (LFC)	9.5	7.5	5.0	5.0	4.0	2.4	2.4	2.4	2.4	2.4	8.3	-1.3
Independent power production	237.7	261.6	299.0	304.6	306.8	314.0	323.3	347.0	378.4	416.7	437.9	6.3
Coal	**126.8**	**92.3**	**134.1**	**140.5**	**145.0**	**151.0**	**155.1**	**155.8**	**155.1**	**154.4**	**162.5**	**2.5**
CFE	126.8	92.3	134.1	140.5	145.0	151.0	155.1	155.8	155.1	154.4	162.5	2.5
Petroleum coke	**-**	**-**	**-**	**-**	**-**	**6.1**	**8.4**	**8.4**	**8.4**	**8.4**	**8.4**	**N/a**
CFE	-	-	-	-	-	6.09	8.37	8.37	8.37	8.37	8.37	**N/a**
Independent power production	-	-	-	-	-	-	-	-	-	-	-	**N/a**
Fuel oil	**217.5**	**173.6**	**159.3**	**148.1**	**129.6**	**123.9**	**98.9**	**106.5**	**117.2**	**104.3**	**98.5**	**-7.6**
CFE	217.5	173.6	159.3	148.1	129.6	123.9	98.9	106.5	117.2	104.3	98.5	-7.6
Diesel	**3.2**	**4.1**	**1.9**	**2.7**	**2.1**	**2.5**	**1.8**	**1.6**	**1.5**	**1.3**	**1.9**	**-4.9**
CFE	2.91	4.11	1.92	2.66	2.05	2.52	1.82	1.62	1.50	1.29	1.92	-4.0
LFC	-	-	-	-	-	-	-	-	-	-	-	**N/a**
Independent power production	0.30	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-29.4
Natural Gas	**393.5**	**417.3**	**429.6**	**447.1**	**458.6**	**481.6**	**505.6**	**531.0**	**564.1**	**603.1**	**632.8**	**4.9**
CFE	146.6	148.2	125.5	137.6	147.8	165.2	179.9	181.7	183.3	184.0	186.7	2.4
LFC	9.5	7.5	5.0	5.0	4.0	2.4	2.4	2.4	2.4	2.4	8.3	-1.3
Independent power production	237.4	261.6	299.0	304.6	306.8	314.0	323.3	347.0	378.4	416.7	437.9	6.3

N/A: Not applicable
Source: IMP, based on information from CFE, Sener, Pemex and private companies.

Private Electric Sector

The private electric sector is supported on the use of natural gas for generating energy; the consumption of this fuel will show an average demand of 67.6% of the total fuels in this sector during the prospected period; diesel will have a light rise, while coal will increase significantly in self generation (see chart 31).

Chart 31

Fuels Demand in the Private Electric Sector, 2007-2017
(thousand barrels of oil equivalent per day)

Sector	Product	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Electricity Self-generation	**Total**	**59.9**	**71.6**	**72.7**	**72.7**	**72.7**	**72.7**	**85.8**	**85.8**	**85.8**	**85.7**	**85.8**	**3.7**
	Fuel oil	9.0	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	0.1
	Petroleum coke	14.7	14.6	14.7	14.7	14.7	14.6	14.7	14.7	14.7	14.6	14.7	0.0
	Coal	0.6	0.8	0.8	0.8	0.8	0.8	13.8	13.8	13.8	13.7	13.8	13.0
	Diesel	1.3	1.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.5
	Natural Gas	34.3	45.4	46.3	46.3	46.4	46.4	46.4	46.4	46.4	46.4	46.4	3.0
Electricity Export	**Natural Gas**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**21.0**	**0.0**

N/A: Not applicable
Source: IMP, based on CFE, CRE, Pemex and private companies.

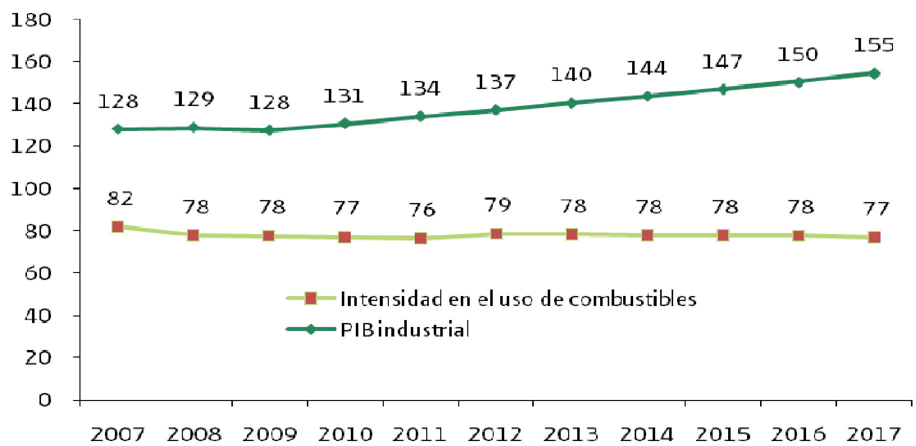
2.2.3 Industrial Sector

An important index on fuels demand for the industrial sector is its use of intensity[23], that is, the amount of energy consumed per each currency unit produced. A technological advance will show a higher efficiency in the productive processes and thus, less fuel's use per currency unit produced. It is estimated that intensity on the use of fuels will decrease an annual average of 0.6% between 2007 and 2017.

[23] Fuel oil, petroleum coke, diesel, LPG and NG are considered.

Figure 27

Fuels' Use Intensity in the Industrial Sector, 2007-2017 (Indexes, 1997=100)

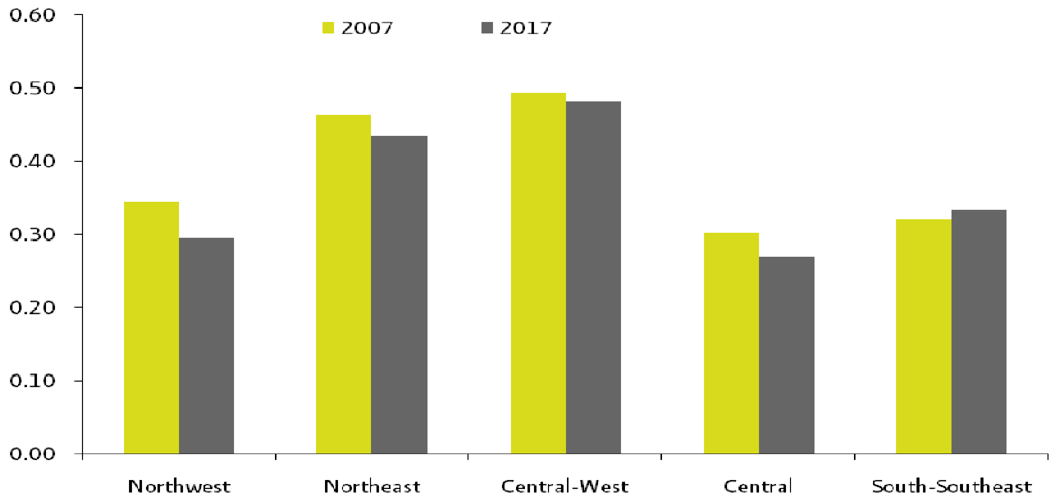


Source: IMP, based on information from, BANXICO, CFE, CRE, EIA, INEGI, Pemex, SE, Sener and private companies.

It is expected that the Northwest region will show significant technological advances in the prospected period, since the intensity of consumed fuels will be reduced an average of 1.5% in currency terms during this period. On the other hand, the industrial GDP growth for this region is expected to be of 2.5% annual average.

Figure 28

Regional Intensity of Fuel's Use in the Industrial Sector, 2007-2017 (gigacalories per thousand pesos of product at 1993 prices)



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

Nowadays – and for the past years, natural gas has had a greater demand in the industrial sector in comparison with other fuels, due to its combustion characteristics, maintenance cost and heating power, followed by petroleum coke and fuel oil.

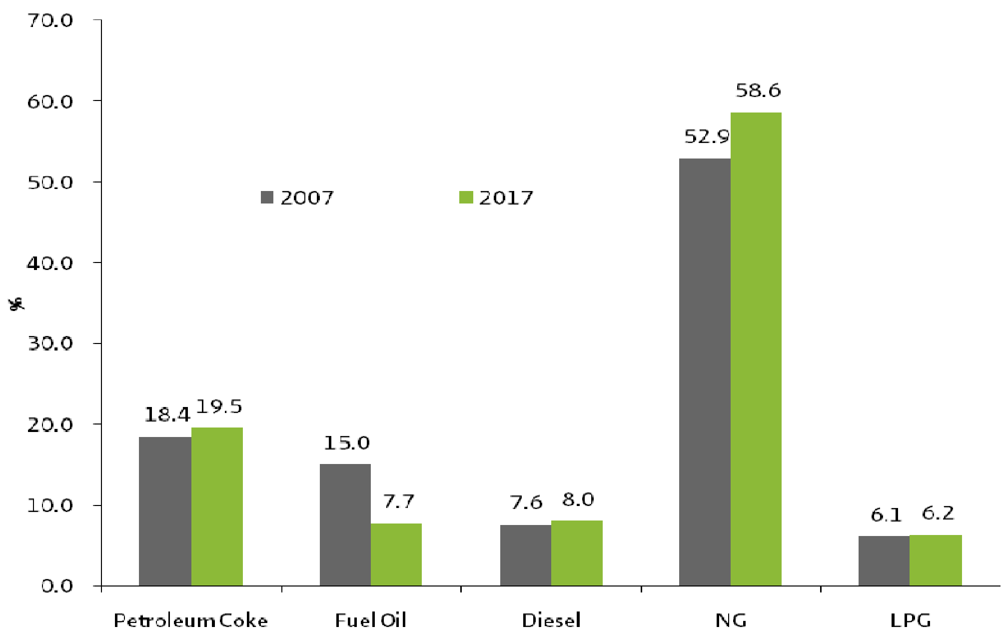
In the future, technological changes within the industrial sector will affect fuels demand. By instance, hydraulic cement will use petroleum coke instead of natural gas and fuel oil. Business branches as food, beverages and tobacco will substitute fuel oil for natural gas in their boilers, due to pollution issues. Thus, fuels price, as well as their normative requirements has pointed out a process of energetic substitution wherein fuel oil will be displaced for more viable options which, furthermore, are more adaptable to the current technologies.

In comparison, fuels demand in the industrial sector[24] will have important changes in the percentage structure of its consumption. Thus, fuel-oil demand will drop from 15% in 2007 to 7.7% in 2017 (in regard of all the used fuels in the sector), while NG will grow from 52.9% to 58.6% during the same years (see figure 29).

[24] Petroleum coke, fuel oil, diesel, NG and LPG are considered.

Figure 29

Fuels Share in the Industrial-Sector Demand, 2007 and 2017
(percentage structure)



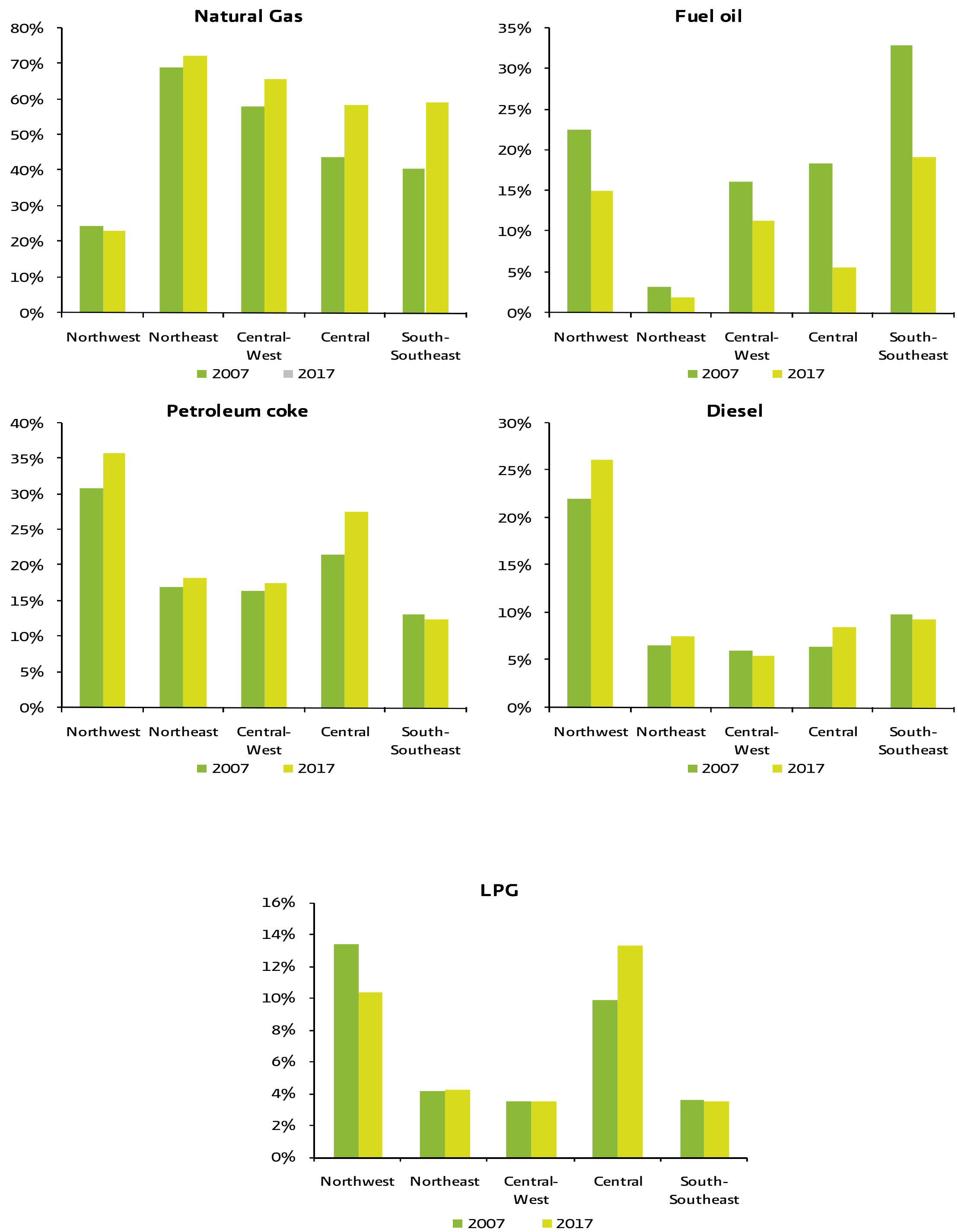
Source: IMP, based on information from BANXICO, CFE, CRE, EIA, INEGI, Pemex, SE, Sener and private companies.

The regional growth of the industrial sector is one of the most important factors for determining fuels demand. In this sense, the Central region is the most important one for its economic contribution to the industrial sector, followed by the Northeast and Central-West ones. During 2007 the regional demand was distinguished for using NG as its main fuel for all regions, followed by petroleum coke and fuel oil. In the South-Southeast region, petroleum coke will remarkably substitute fuel oil, due to technological factors (see figure 30). On the other hand, diesel demand on the industrial sector will grow at 1.8% AAGR between 2007 and 2017.

Using diesel in the industrial sector is associated with the working of internal combustion motors on pumping systems and firefighting for generating electric energy or in motor-carrier units within industrial facilities as lift trucks, amongst others.

Figure 30

Share of Industrial Fuels on the Regional Demand (percentage structure)



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

In regard to petroleum-coke demand, this fuel is mainly used for producing cement, chemical products and basic metals. It is foreseen it will keep the same relative importance by branch group.

Chart 32
Petroleum-Coke Demand in the Industrial Sector by Branch Group, 2007-2017
(thousand tons)

Branch Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Cement	3,472.3	3,471.4	3,370.1	3,474.9	3,585.2	3,682.9	3,777.8	3,879.3	3,973.8	4,072.6	4,195.2	1.9
Basic Metals	191.3	192.4	186.8	194.1	201.7	209.6	216.3	223.3	230.5	238.5	248.8	2.7
Chemistry	401.9	400.6	397.7	403.2	408.7	414.3	420.0	425.7	431.5	438.0	444.3	1.0
Metal, electric and transport products	50.2	53.0	52.8	55.6	58.9	62.1	64.9	67.9	71.0	74.0	78.3	4.5
Glass	4.2	4.2	4.1	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	1.4
Rest	45.8	46.9	48.0	49.4	50.9	52.4	54.0	55.6	57.2	59.0	60.7	2.9
Total	**4,165.8**	**4,168.5**	**4,059.4**	**4,181.4**	**4,309.6**	**4,425.5**	**4,537.4**	**4,656.3**	**4,768.7**	**4,886.8**	**5,032.2**	1.9

Source: IMP, based on information from BANXICO, INEGI, SE, Sener and private companies.

During 2007 petroleum-coke demand in the cement branch was of 3,472Kt, and it is expected to be of 4,195 thousand tons in 2017, with higher consumptions in the states of Hidalgo, San Luis Potosí and Sonora (see chart 33).

Chart 33

Petroleum-Coke state consumption for Cement Industry, 2007-2017 (thousand tons)

Federal Entities	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Aguascalientes		25	25	25	26	27	27	28	28	29	30	N/a
Baja California	63	63	62	63	64	65	65	66	67	68	69	0.8
Coahuila	170	169	165	169	173	177	181	185	189	193	197	1.5
Colima	147	146	142	146	151	156	160	165	169	174	179	2.0
Guerrero	17	17	16	17	17	18	18	19	19	20	20	1.7
Hidalgo	623	618	597	618	640	660	679	700	719	739	764	2.1
Jalisco	293	291	283	291	299	307	314	321	328	335	344	1.6
México	241	240	233	240	247	253	259	266	272	278	286	1.7
Morelos	197	196	190	196	202	207	212	218	223	228	234	1.7
Nuevo León	286	284	275	284	294	302	310	319	327	336	346	1.9
Oaxaca	28	28	27	28	29	30	31	32	32	33	34	2.0
Puebla	350	347	335	347	359	371	381	393	403	415	428	2.1
San Luis Potosí	472	469	460	470	480	489	498	507	515	524	535	1.3
Sonora	333	329	313	329	347	363	379	396	412	429	450	3.1
Tabasco	62	61	60	61	63	64	65	66	68	69	70	1.3
Tamaulipas		0	0	0	0	0	0	0	0	0	0	
Veracruz	97	97	96	97	98	100	101	102	103	104	105	0.7
Yucatán	93	92	91	92	94	95	97	98	100	101	103	1.0
Total	**3,472**	**3,471**	**3,370**	**3,475**	**3,585**	**3,683**	**3,778**	**3,879**	**3,974**	**4,073**	**4,195**	1.9

Source: IMP, based on information from BANXICO, INEGI, SE, Sener and private companies.

Fuel-oil demand will be mostly concentrated in sugar-cane industry, chemical, cement, cellulose and paper, and basic metal ones amongst others. In 2007, fuel-oil demand was of 45.6tbd and it is expected it will drop to 19.2tbd in the next ten years. The most important changes will happen in the cement industry, for its technology allows the use of petroleum coke instead of NG or fuel oil.

Chart 34
Fuel-Oil Demand for the Industrial Sector by Branch Group, 2007-2017
(thousand barrels per day)

Branch Group	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Food, beverage and tobacco	0.7	0.5	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	-4.8
Sugar	7.1	7.0	7.0	6.9	6.9	6.8	6.7	6.7	6.6	6.6	6.5	-0.8
Cellulose and paper	5.6	4.1	4.2	3.5	3.3	3.3	3.6	3.6	3.6	3.5	3.4	-4.8
Cement	8.8	5.9	3.5	2.9	2.8	2.7	2.4	2.5	2.6	2.6	2.6	-11.4
Beer and malt	3.4	2.5	2.6	2.2	2.0	2.0	2.2	2.2	2.2	2.2	2.1	-4.8
Basic Metals	4.6	3.3	3.5	2.9	2.7	2.7	2.9	2.9	2.9	2.9	2.8	-4.8
Mining	2.8	2.1	2.2	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.7	-4.8
Chemistry	6.1	4.4	4.7	3.9	3.6	3.6	3.9	3.9	3.9	3.9	3.8	-4.8
Rest	4.8	3.5	3.6	3.0	2.8	2.8	3.1	3.1	3.0	3.0	2.9	-4.8
Glass	1.7	1.7	1.7	1.7	1.7	0.8	-	-	-	-	-	-100.0
Total	**45.6**	**35.0**	**33.4**	**29.2**	**27.8**	**26.7**	**27.2**	**27.2**	**27.2**	**26.9**	**26.4**	-5.3

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

2.2.4 Oil Sector

Oil-derived products demand in the oil sector is mainly focused to the consumption of fuel oil, diesel and gasoline. Such demand is supported by the following assumptions:

Drop of the energy consumption by produced unit, led by savings on burning-gas associated and the rise of energetic efficiency in its operations;

Project for gasoline quality in 2013 and for diesel's in 2017;

Upgrading projects for the refineries of Minatitlán in 2009 and Salina Cruz in 2014;

Residual conversion in Salamanca from 2013 on and in Tula from 2015 on; and

New refining capacity (300 tbd of Mayan crude) for 2014 and 2016.

According to the preceding information, it is intended that fuel-oil demand in this sector will be the most important one amongst oil-derived products; thus, the average demand will be of 48.1tbd will be used as fuel in refining processes.

For diesel demand, PEP will use – at average – 96.5% from the total in the oil sector, followed by PPQ (Petrochemicals), PGPB (Gas and Basic Petrochemicals) and Corporate. Within the sector, diesel is mainly used as a fuel for firefighting systems, pumping and in terrestrial and maritime transport.

Gasoline demand in the oil sector is focused in operating terrestrial transport; hence, the average demand between 2007 and 2017 will be of 1.2tbd, from which 71% will be used by PEP, 12.4% by PGPB, 11.5% by Corporate and 5.1% by PPQ (see figure 31).

Figure 31

Domestic Demand for Oil-Derived Products in the Oil Sector, 2007-2017 (thousand barrels per day)

Source: IMP, based on information from Pemex.

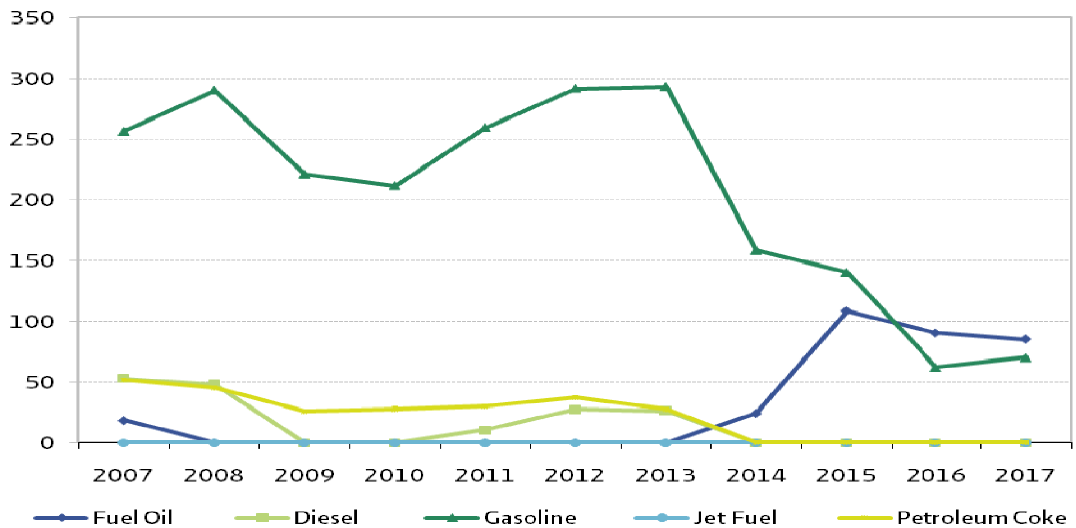
2.3 Foreign Trade of Oil-Derived Products, 2007-2017

During 2007, 309.8tbd were imported (40.7% of the domestic demand), and it is expected that by the end of the prospected period it will drop to 8.6%, due to the new capacity which is considered from 2014 on (see figure 32).

Nonetheless, it is estimated that in the period 2007-2017, gasoline still be the oil-derived product with the biggest imports volume. Thus, it is foreseen that by the end of 2017 gasoline imports will be of 69.9tbdoe, which represents 45% of the total import of oil-derived products during that year.

Figure 32

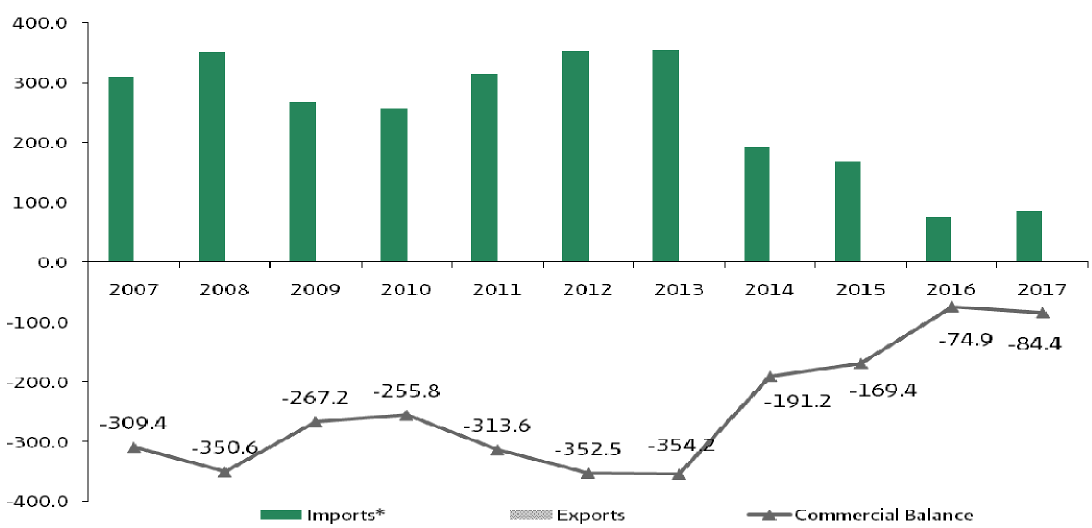
Oil-Derived Products Imports, 2007-2017
(thousand barrels of crude oil equivalent per day)



Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, BANXICO, CFE, CRE, EIA, EPA, INEGI, Pemex, Sener and private companies.

Figure 33

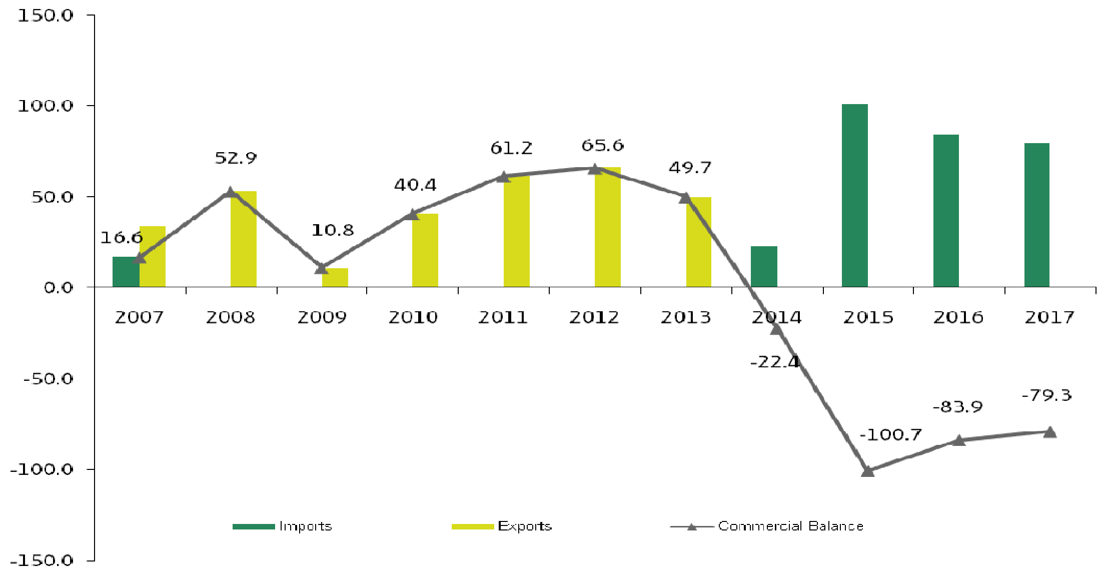
Gasoline's Foreign Trade, 2007-2017
(thousand barrels per day)



* Includes maquila.
Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

For 2014 the commercial balance of fuel oil will have a deficit of 22.4tbd as a result policies on producing oil-derived products with a higher aggregated value, as gasoline. Thus, Salina Cruz refinery will supply less fuel oil from 2017 on, due to the upgrading tasks, wherefrom it will be necessary to import it from that year on (see figure 34)

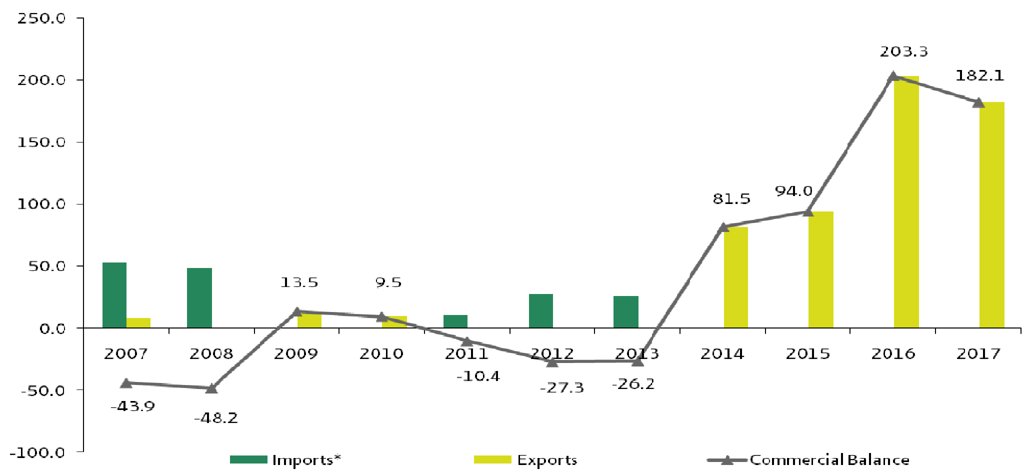
Figure 34
Fuel-Oil Foreign Trade, 2007-2017
(thousand barrels per day)



Source: IMP, based on information from BANXICO, CFE, CRE, EIA, IEA, INEGI, Pemex, SE, Sener and private companies.

In the case of diesel, it is expected that the upgrading of Minatitlán will raise its production during 2009 and 2010; from then on and until 2013, the demand will increase significantly for the transport sector. Afterwards, from 2014 until the end of the prospected period, the production of Salina Cruz refinery and new capacity will raise; hence, during those years – mainly from 2014 on -, diesel could be exported.

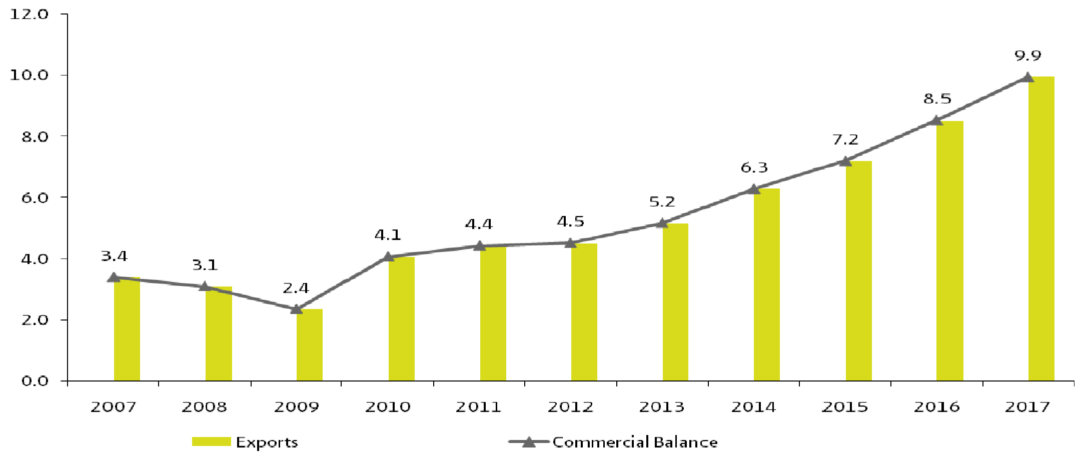
Figure 35
Diesel Foreign Trade, 2007-2017
(thousand barrels per day)



* Includes maquila.
Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, BANXICO, CFE, CRE, EIA, EPA, INEGI, Pemex, Sener and private companies.

Foreign trade on jet fuel shows that during 2007, 3.4tbd were exported, and it is foreseen that by the end of the prospected period this amount will reach 9.9tbd. In this sense, domestic production will be able to totally cover the demand in the future (see figure 36).

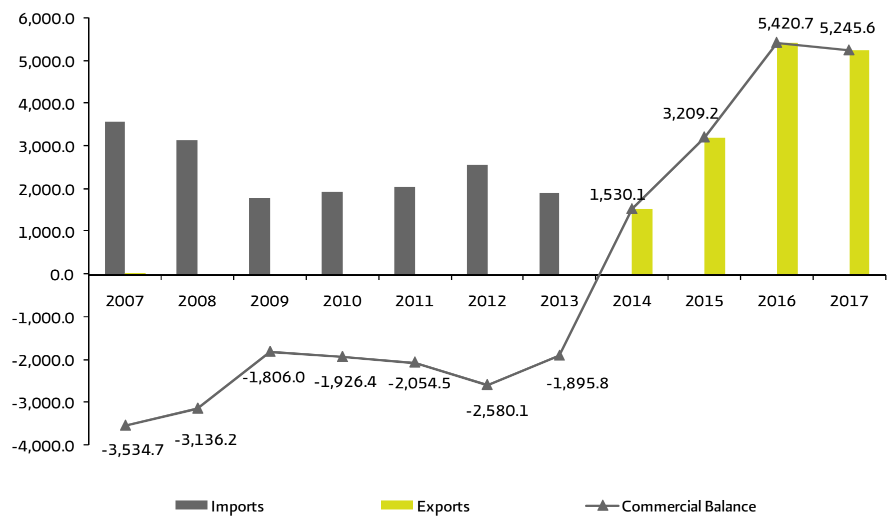
Figure 36
Jet-Fuel Foreign Trade, 2007-2017
(thousand barrels per day)



Source: IMP, based on information from ASA, BANXICO, INEGI, Pemex, SCT and Sener.

Petroleum-coke demand on producing hydraulic cement will have a significant influence over the foreign trade of that fuel; it is estimated there will be a deficit balance in the balance of trade registering hence meaningful imports until 2013. From 2014 on, the balance of trade will turn into an export position, by reason of concluding Salina Cruz upgrading, as well as the residual conversion in Tula and its new capacity from 2015 on.

Figure 37
Petroleum-Coke Foreign Trade, 2007-2017
(thousand tons)



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

2.4 Domestic Balance of Oil-Derived Products, 2007-2017

Chart 35

Fuel-Oil Domestic Balance, 2007-2017

(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Origin	**318.5**	**295.2**	**251.6**	**267.2**	**269.5**	**267.5**	**226.7**	**185.2**	**197.4**	**185.3**	**179.3**	**-5.6**
Production	301.5	295.2	251.6	267.2	269.5	267.5	226.7	162.8	96.6	101.3	100.0	-10.4
Cadereyta	8.5	9.6	9.2	16.4	16.1	16.5	12.6	15.0	15.2	15.4	15.2	6.0
Madero	20.8	7.7	15.5	15.5	15.5	15.5	15.5	15.5	10.2	9.6	10.5	-6.6
Tula	80.2	77.9	73.8	75.8	73.7	73.3	72.8	75.3	14.4	14.2	14.3	-15.8
Salamanca	37.4	39.0	37.0	37.0	37.0	37.0	1.0	1.0	1.0	1.0	1.0	-30.4
Minatitlán*	63.7	62.5	27.1	31.6	36.7	36.4	36.1	36.1	35.9	41.4	39.2	-4.7
Nueva capacidad		-	-	-	-	-	-	-	-	-	-	N/a
Salina Cruz	90.9	98.6	89.0	90.8	90.5	88.9	88.8	20.0	20.0	19.8	19.8	-14.2
Import	17.0	-	-	-	-	-	-	22.4	100.7	83.9	79.3	16.6
Destiny	**327.3**	**295.2**	**251.6**	**267.2**	**269.5**	**267.5**	**226.7**	**185.2**	**197.4**	**185.3**	**179.3**	**-5.8**
Demanda interna	293.8	242.3	240.8	226.7	208.4	201.9	177.0	185.2	197.4	185.3	179.3	-4.8
Transportation sector	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0
Electric Sector	210.0	169.4	156.2	145.8	128.6	123.4	100.1	107.3	117.2	105.2	99.8	-7.2
Public electricity generation	201.7	161.0	147.7	137.3	120.1	114.9	91.7	98.8	108.7	96.7	91.3	-7.6
Electricity self-generation	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	0.1
Industrial Sector	45.6	35.0	33.4	29.2	27.8	26.7	27.2	27.2	27.2	26.9	26.4	-5.3
Oil Sector	36.9	36.6	49.9	50.6	50.7	50.5	48.5	49.5	51.8	51.9	51.8	3.5
Export	33.6	52.9	10.8	40.4	61.2	65.6	49.7	-	-	-	-	-100.0
Inventory variation*	**- 8.9**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	

N/a: Not applicable

* Includes transfers from crude free of light from de La Cangrejera to fuel oil.

Source: IMP, based on information from BANXICO, CFE, CRE, EIA, IEA, INEGI, Pemex, SE, Sener and private companies.

Chart 36

Petroleum-Coke Domestic Balance, 2007-2017

(thousand tons)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Origin	**5,267.4**	**5,186.6**	**5,077.5**	**5,199.5**	**5,327.6**	**5,867.0**	**6,135.5**	**7,784.7**	**9,576.1**	**11,907.4**	**11,876.0**	**8.5**
Production	1,689.1	2,050.4	3,271.5	3,273.1	3,273.2	3,286.9	4,239.7	7,784.7	9,576.1	11,907.4	11,876.0	21.5
Cadereyta	984.8	1,066.2	1,077.8	1,077.4	1,077.0	1,080.5	1,073.1	1,076.6	1,076.6	1,080.9	1,076.6	0.9
Madero	704.3	984.2	1,017.7	1,020.4	1,020.6	1,027.7	1,024.8	1,025.5	1,025.2	1,028.7	1,026.5	3.8
Tula	-	-	-	-	-	-	-	-	1,792.5	1,797.4	1,792.5	N/a
Salamanca	-	-	-	-	-	-	966.3	967.3	969.8	972.1	969.5	N/a
Minatitlán	-	-	1,175.9	1,175.2	1,175.5	1,178.7	1,175.5	1,175.5	1,175.5	1,177.3	1,175.8	N/a
Nueva capacidad	-	-	-	-	-	-	-	2,299.7	2,296.3	4,607.5	4,595.0	N/a
Salina Cruz	-	-	-	-	-	-	-	1,240.1	1,240.1	1,243.5	1,240.1	N/a
Import	3,578.2	3,136.2	1,806.0	1,926.4	2,054.5	2,580.1	1,895.8	-	-	-	-	-100.0
Destiny	**5,227.4**	**5,186.6**	**5,077.5**	**5,199.5**	**5,327.6**	**5,867.0**	**6,135.5**	**7,784.7**	**9,576.1**	**11,907.4**	**11,876.0**	**8.6**
Domestic demand	5,183.9	5,186.6	5,077.5	5,199.5	5,327.6	5,867.0	6,135.5	6,254.6	6,366.9	6,486.7	6,630.4	2.5
Electric sector	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,441.5	1,598.1	1,598.3	1,598.2	1,599.8	1,598.2	4.6
Public electricity generation	-	-	-	-	-	423.4	580.0	580.2	580.1	581.8	580.1	N/a
Electricity self-generation	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	1,018.1	0.0
Industrial sector	4,165.8	4,168.5	4,059.4	4,181.4	4,309.6	4,425.5	4,537.4	4,656.3	4,768.7	4,886.8	5,032.2	1.9
Hydraulic cement	3,472.3	3,471.4	3,370.1	3,474.9	3,585.2	3,682.9	3,777.8	3,879.3	3,973.8	4,072.6	4,195.2	1.9
Basic metals industry	191.3	192.4	186.8	194.1	201.7	209.6	216.3	223.3	230.5	238.5	248.8	2.7
Chemistre, rubber and plastics	401.9	400.6	397.7	403.2	408.7	414.3	420.0	425.7	431.5	438.0	444.3	1.0
Machinery and eletric appliances	50.2	53.0	52.8	55.6	58.9	62.1	64.9	67.9	71.0	74.0	78.3	4.5
Glass	4.2	4.2	4.1	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	1.4
Rest of the industry	45.8	46.9	48.0	49.4	50.9	52.4	54.0	55.6	57.2	59.0	60.7	2.9
Export	43.5	-	-	-	-	-	-	1,530.1	3,209.2	5,420.7	5,245.6	61.5
Inventory variations*	**40.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	

N/a: Not applicable

* Includes Pemex y private companies.

Source: IMP, based on informtion from CRE, INEGI, Pemex, SE, Sener and private companies.

Chart 37

Diesel Domestic Balance, 2007-2017

(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Origin	**386.8**	**398.5**	**398.0**	**398.9**	**408.8**	**421.8**	**432.7**	**524.5**	**546.7**	**666.2**	**656.2**	**5.4**
Production	334.0	350.3	398.0	398.9	398.3	394.5	406.5	524.5	546.7	666.2	656.2	7.0
Cadereyta	83.8	84.6	81.6	85.8	86.8	84.9	84.8	83.1	85.0	85.0	85.8	0.2
Madero	43.1	50.3	43.5	39.1	43.3	42.4	40.6	43.2	54.9	51.5	54.7	2.4
Tula	62.2	58.1	65.3	61.9	61.3	59.9	58.9	55.6	88.3	89.4	88.3	3.6
Salamanca	42.4	50.1	45.2	48.1	46.7	47.9	62.9	60.8	58.2	60.0	59.4	3.4
Minatitlán	44.4	41.1	84.8	85.0	86.3	85.7	85.1	85.1	84.2	83.4	84.3	6.6
Nueva capacidad	-	-	-	-	-	-	-	95.5	76.7	191.1	178.7	N/a
Salina Cruz	58.2	66.1	77.5	79.0	74.0	73.7	74.2	101.2	99.5	105.8	105.0	6.1
Import *	52.7	48.2	-	-	10.4	27.3	26.2	-	-	-	-	-100.0
Destiny	**384.3**	**398.5**	**398.0**	**398.9**	**408.8**	**421.8**	**432.7**	**524.5**	**546.7**	**666.2**	**656.2**	**5.5**
Domestic demand	375.5	398.5	384.5	389.4	408.8	421.8	432.7	443.0	452.7	462.9	474.1	2.4
Industrial sector	24.8	25.7	25.6	26.0	26.4	26.9	27.5	28.1	28.6	29.1	29.7	1.8
Oil sector	17.1	16.6	11.6	11.8	12.0	12.4	12.8	12.6	12.1	12.1	12.1	-3.4
Transport sector[1]	329.1	350.6	343.6	347.2	366.5	378.2	388.8	398.9	408.8	418.6	428.6	2.7
Electric sector	4.5	5.7	3.7	4.5	3.8	4.3	3.6	3.4	3.3	3.1	3.7	-1.9
Public electricity generation (LFC and CFE)	2.9	4.1	1.9	2.7	2.1	2.5	1.8	1.6	1.5	1.3	1.9	-4.0
Private electricity generation	1.6	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.3
Independent electricity producers	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-29.4
Electricity self-generation	1.3	1.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.5
Export	8.8	-	13.5	9.5	-	-	-	81.5	94.0	203.3	182.1	35.4
Inventory variations	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	

1. Includes motor carrier, maritime and railway transport.

N/A: Not applicable

* Includes maquila.

Source: IMP, based on information from AIE, AMDA, AMIA, ANPACT, BANXICO, CFE, CRE, EIA, EPA, INEGI, Pemex, Sener and private companies.

Chart 38

Gasoline Domestic Balance, 2007-2017

(thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Origin	**753.7**	**800.2**	**818.1**	**823.0**	**867.6**	**890.4**	**910.2**	**928.7**	**946.4**	**963.7**	**980.6**	**2.7**
Production	443.8	449.5	550.9	567.2	554.0	537.9	556.0	737.5	777.0	888.8	896.2	7.3
Cadereyta	82.2	79.3	93.4	105.0	105.2	104.9	104.7	105.0	105.0	104.7	105.0	2.5
Madero	61.5	65.3	69.3	68.9	71.3	70.6	67.6	70.5	71.5	71.7	71.4	1.5
Tula	100.5	98.7	102.2	104.8	104.4	104.0	101.1	100.1	137.1	136.3	137.4	3.2
Salamanca	63.4	64.9	59.9	59.9	59.9	59.9	85.0	86.5	86.1	82.3	82.1	2.6
Minatitlán	41.7	47.0	133.0	133.7	118.6	104.2	103.5	103.5	103.3	103.1	103.4	9.5
New capacity	-	-	-	-	-	-	-	135.6	136.5	260.2	266.6	n.a.
Salina Cruz	94.5	94.2	93.1	94.9	94.6	94.3	94.3	136.3	137.5	130.5	130.4	3.3
Import *	309.8	350.6	267.2	255.8	313.6	352.5	354.2	191.2	169.4	74.9	84.4	-12.2
Destiny	**761.3**	**800.2**	**818.1**	**823.0**	**867.6**	**890.4**	**910.2**	**928.7**	**946.4**	**963.7**	**980.6**	**2.6**
Domestic demand	761.0	800.2	818.1	823.0	867.6	890.4	910.2	928.7	946.4	963.7	980.6	2.6
Transport sector	760.3	799.2	816.9	821.8	866.3	889.1	908.9	927.4	945.1	962.4	979.3	2.6
Oil sector	0.7	1.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	6.7
Export	0.4	-	-	-	-	-	-	-	-	-	-	-100.0
Inventory variations	**-7.7**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	

N/a: Not applicable.

* Includes maquila.

Source: IMP, basef on information from AIE, AMDA, AMIA, ANPACT, CRE, INEGI, EPA, Pemex, Sener and private companies.

Chart 39

Jet-Fuel Domestic Balance 2007-2017 (thousand barrels per day)

Concept	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	AAGR
Origin	**66.3**	**70.5**	**76.7**	**80.8**	**82.8**	**85.6**	**88.9**	**92.3**	**96.1**	**99.8**	**103.6**	**4.6**
Production	66.3	70.5	76.7	80.8	82.8	85.6	88.9	92.3	96.1	99.8	103.6	4.6
Cadereyta	9.8	8.1	6.9	6.1	5.1	6.9	7.5	7.6	5.0	5.0	5.0	-6.5
Madero	4.9	7.2	6.5	10.2	6.5	7.4	9.4	6.5	6.5	10.3	6.5	2.9
Tula	24.2	22.8	25.3	30.8	31.6	32.6	33.9	35.7	24.4	24.4	24.4	0.1
Salamanca	10.5	11.9	13.8	11.0	12.4	11.2	11.2	11.1	12.1	14.7	15.3	3.8
Minatitlán	0.3	1.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	34.1
Nueva capacidad	-	-	-	-	-	-	-	6.1	22.0	18.4	24.7	n.a.
Salina Cruz	16.6	18.9	18.1	16.7	21.2	21.4	20.9	19.4	20.1	20.9	21.7	2.7
Import	-	-	-	-	-	-	-	-	-	-	-	N/a
Destiny	**71.3**	**70.5**	**76.7**	**80.8**	**82.8**	**85.6**	**88.9**	**92.3**	**96.1**	**99.8**	**103.6**	**3.8**
Domestic demand	67.9	67.4	74.3	76.7	78.4	81.0	83.8	86.0	88.9	91.2	93.7	3.3
Transport sector	67.9	67.4	74.3	76.7	78.4	81.0	83.8	86.0	88.9	91.2	93.7	3.3
Export	3.4	3.1	2.4	4.1	4.4	4.5	5.2	6.3	7.2	8.5	9.9	11.3
Inventory variations	**-5.0**	-	-	-	-	-	-	-	-	-	-	

N/a: Not applicable.
Source: IMP, based on information from ASA, BANXICO, INEGI, Pemex, SCT and Sener.

2.4.1 Bioenergetics Potential in Mexico

In Mexico, biodiesel-production levels are of small scale (3.7 million liters per year); currently, there is only a producing facility in Cadereyta, Nuevo León, with a storage capacity of 60m3.

In the state of Oaxaca, the University of Vasconcelos has a pilot plant – for research purposes – for elaborating biodiesel from waste vegetable oil (WVO) used for a bus owned by the university; in Michoacán, it is intended to elaborate biodiesel from castor-oil plant (*ricinus communis*), however, this fuel would apparently be more expensive that hydrocarbons.

Likewise, a food-producing company is studying to produce biodiesel from their waste oil, in order to use it in its delivery units; on the other hand, some universities have made studies on biodiesel production, but their results have not been known yet.

It is expected that by 2010, there will be significant advances in the use of ethanol in Guadalajara; the "Pilot Plan for Using Ethanol" in Jalisco, considers in its first stage using a mix of 10% ethanol and 90% gasoline for a vehicle fleet of the state government; in a second stage, it will be used in urban transportation; for the third – and last – stage, this fuel will be of public consumption. In such way, Jalisco can be considered a pioneer entity in the usage of this fuel.

Some organizations think that Mexico is a viable option for using biofuels, since these reduce green-house-effect gases and, thus, contribute to the economical welfare of the region and the country's too. Diversifying the energetic supply through the use of renewable energies requires a meaningful effort in their production as well as using sustainability criteria.

As a conclusion, there are a few existing projects on biofuels in Mexico, and just of a low scale; thus, they just cover self-consumption needs. Nonetheless, the new Law of Promotion and Development of Bioenergetics might make this market more attractive.

If every gasoline in Mexico had a 10% mix of ethanol, there would be a reduction on gasoline and MTBE (methyl and tert-butyl ether) imports, and thus, there would be a saving in the balance of payments, while the selling of Certified Emission Reductions (CERS), through projects from the Clean Development Mechanism (CDM) will also be of significant help.

In regard to biodiesel, the main challenges for introducing it in Mexico are in the agricultural sector. In this sense, stimulus for a more dynamic rural economy should include the following aspects:

Support low-scale oilcrops;

Deeper knowledge of oilcrops like Jatropha; this knowledge should be given to rural population through educational programs;

Make up specialized partnerships which will create a cooperating interaction through the unified use of the machinery;

Promote access to economic financing and technical assistance;

Create special programs for biodiesel and its production at a prime rate; and,

Promote the merging of oilseeds and seed processing/vegetable oil refining/biodiesel production in order to create a stronger withholding of the aggregated value on rural areas;

2.4.2 Bioenergetics' Projects within the Country

Hereafter, projects on the use and production of bioenergetics within the country are displayed; this, based on data from the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (Sagarpa).

Map 1

Location of Biofuels-Production Projects

Source: Sagarpa and Sener.