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Mexico

Biofuels Annual

Biofuels Interest in Mexico Growing

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Report Highlights:
After outlining the basic policy framework related to biofuels last year (see GAIN report of June 15, 2009), Mexico continues to search for an adequate strategy to become a player in the global biofuel production field. Because of the sensitive nature of both fossil fuels and agricultural production, the Mexican government is cautious and is taking its time to run pilot tests, adjust related regulation and work with the private sector before fully embarking on producing biofuels at commercial levels. This report updates information on the latest actions taken by public and private organizations, brings fuel-related statistics up to date and provides an outlook for biofuels in Mexico. For additional information and references, please review our previous Biofuels Annual Reports, available at: http://gain.fas.usda.gov/Pages/Default.aspx

Post:
Mexico City

Executive Summary:

Mexico is still defining the legal framework that will regulate biofuel production, following a national interagency strategy. On the policy side, the Government of Mexico (GOM) defined a couple of regulations related to biofuel production, distribution and commercialization while, on the government-run program side, various government agencies identified in the Biofuels Law are defining and setting in place the different actions outlined by the Inter-Agency Biofuel Strategy. As far as ethanol and biodiesel production, the GOM's pilot project to introduce ethanol in the gasoline mix of the three largest metropolitan areas should stimulate the first commercially-oriented ethanol projects, some of which are sugar mills that will redefine their production process while others are brand new ethanol plants specifically built for ethanol production. Sugar cane, sugar beets, castor oil plants, jatropha and oil palm seem to be the inputs with the highest potential to be used in biofuel production in Mexico. With regards to second- and third-generation biofuel production, only two projects, still in the planning phase, have been announced in Mexico. Statistical information on fossil fuel production and consumption is also updated for the last 12 months.

Policy and Programs:

1.1. Government Biofuel Policies

- Since the publication of the Biofuels Promotion and Development Law (Spanish: *Ley de Promoción y Desarrollo de los Bioenergéticos,* or LPDB), which is the backbone of Mexican biofuel public policy, the GOM has worked the past year in defining what can be called "second-tier" regulations – a set of standards, agreements, rules and criteria defined by the different government agencies involved in the Inter-Agency Biofuel Strategy (Spanish: *Estrategia Intersecretarial de los Bioenergéticos*). The following summarizes the policy-related actions take by the GOM in the last 12 months.
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- **1.1.1 Rules of the Biofuels Promotion and Development Law**
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- They are regulations that do not go through Congress and are enforced by the Executive Branch in order to implement the general objectives and policies defined in the referenced Laws by assigning more specific actions or responsibilities to members of the Cabinet. In the case of the RLPDB, the President confers responsibilities to the Secretariat of Energy (SENER), the Secretariat of Agriculture, Livestock, Rural Development, Fishery and Food (SAGARPA) and the Secretariat of Environment and Natural Resources (SEMARNAT).
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- The RLPDB supports the GOM's position of requiring that all biofuel projects comply with the three columns of the Biofuel Strategy: protect food safety/sovereignty, maintain environmental sustainability and promote energy diversification. Additionally, all projects and potential government support programs related to production, storage, transportation, distribution, commercialization and final use of biofuels shall be presented to the Inter-Agency Biofuel Development Commission (Spanish: *Comisión Intersecretarial para el Desarrollo de los Bioenergéticos*) for its final review and approval.
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- This new regulation also seeks to promote collaborative agreements between Federal, State and Municipal agencies in order to promote biofuels in specific regions, in accordance to the specific needs/opportunities generated in different areas of the country. The Biofuel Commission will oversee such agreements and will also supervise the calendar for review of related Mexican Official Standards (*Normas Oficiales Mexicanas*, or NOMs). One clear example of this is the fuel quality NOM review, NOM-086-SEMARNAT-SENER-SCFI-2005 – Fossil Fuel Specifications, which would define the

mixture of ethanol allowed or required in commercial gasolines.

- In another section, the RLPDB details the different permits that the GOM agencies will be in charge of defining and implementing. SAGARPA will be responsible of assigning, when the conditions defined in the Law are met, permissions to use corn as a biofuel input. In this case, SAGARPA must coordinate with the Ministry of the Economy, in April and again in October, to define whether there is any surplus in the domestic corn production. If there were a surplus, SAGARPA would receive and review requests from producers planning to use corn as a biofuel input. It is worth mentioning that this does not apply for imported corn. Companies interested in producing biofuel from imported corn need only to notify SAGARPA of their intention to do so and the GOM will only verify that the corn used for biofuels is indeed imported.

- Besides the aforementioned requests regarding corn, producers intending to use other crops for biofuel production are required to provide a crop notification (Spanish: *Aviso de Siembra*) to SAGARPA so that it may keep track of other crops used as inputs and prevent deforestation. At present, SAGARPA is still waiting to publish the formats for requesting permission to use surplus or imported corn as a biofuel input and also the documentation related to the crop notification.

- Meanwhile, SENER will be responsible for granting permissions for biofuel production, storage, transport and/or distribution via pipelines (see next section).

- **1.1.2 Criteria for Obtaining a Permit to Produce, Store, Transport and Commercialize Ethanol and Biodiesel**

- On November 13, 2009, SENER published the Agreement Outlining the Criteria for Granting Permits to Produce, Store, Transport and Commercialize Biofuels, specifically Ethanol and Biodiesel (Spanish: *Acuerdo por el que se emiten los Lineamientos para el otorgamiento de permisos para la Producción, Almacenamiento, el Transporte y la Comercialización de Bioenergéticos del tipo Etanol Anhidro y Biodiesel*). In the Agreement, SENER defines: the formats that will be used; the paperwork that must be attached (including a detailed description of the facilities, equipment and processes that will be used, an environmental impact study, all safety and security measures and emergency plans, insurance and a list of intended biofuels to be produced, detailing the inputs to be used or stored); and the procedure for private companies or individuals that intend to produce, store, transport or commercialize ethanol or biodiesel to be awarded a permit by SENER.

- The agreement includes an annex with a materials guide, the information that must be included in the facilities outlays, the commonly used symbols for handling ethanol and biodiesel, and the applicable NOMs for which the interested parties should get a third-party certification. Interestingly, the Agreement also defines a simplified process for small producers (those with an output of less than 500 liters daily) or storage facilities (those with a storage capacity of less than 1,000 liters), with the objective of promoting small and medium enterprises, reducing paperwork and eliminating time-consuming requirements.

- All the aforementioned information, including the Biofuels Law and the Rules of the Law have been published by SENER in a downloadable document that includes all the applicable regulations for biofuel production, storage, transport and commercialization,

entitled Legal Framework for Biofuels (Spanish: *Marco Jurídico de los Bioenergéticos*).

- On December 15, 2009, SENER announced that the first 15 authorizations were granted to individuals and companies interested in participating in the bid for the first stage of ethanol usage as a fuel additive in gasolines distributed in the metropolitan area of Guadalajara, Mexico's second largest city (see section 1.2.2. for further details on this project).

- **1.2. Government Biofuel Programs**

- The first is the Sustainable Biofuel Input Production and Scientific & Technological Development Program (Spanish: *Programa de Producción Sustentable de Insumos para Bioenergéticos y de Desarrollo Científico y Tecnológico, or* PROINBIOS), which seeks to develop and produce the inputs used in biofuel production as well as coordinate the related research and investigation projects. The second one – the Biofuel Introduction Program (Spanish: *Programa de Introducción de Bioenergéticos*) – will cover the actual commercial introduction of biofuels in the transportation sector.

- An early version of both programs was presented last year, but several indirect circumstances such as the economic downturn, the violence generated by the drug cartels and this year's gubernatorial elections have affected the GOM priorities, forcing SAGARPA and SENER to make adjustments. The following section summarizes the actions and modifications that took place since last year's report on both programs.

- **1.2.1. SAGARPA's Biofuel Input Production Program**

- The program's main objective continues to be the promotion of crop production and commercialization of sustainable biofuel inputs, thereby increasing the competitiveness and profitability of the rural sector through the use of scientific and technological development. In order to achieve this, SAGARPA defined five strategies to work on:

I. Develop an information system, based on SAGARPA's website, which includes: the related legal framework for biofuel production; a crop database with geographical references; a price monitoring system; environmental, social and economic terms of reference; and information on available support programs for producers.

II. Promote research, development and technology transfer by preparing reference materials for biofuel production, evaluating and procuring genetic material for biofuel crops, setting up test plots and laboratories and promoting second- and third-generation biofuel technologies.

III. Encourage producers to associate in agro-industrial partnerships in order to have a competitive, organized biofuel production industry. This includes the distribution of reference materials explaining not only the advantages and market opportunities of biofuel crops, but also the benefits of rural associations.

IV. Generate market certainty by supporting private investments, providing a "business-friendly" regulatory framework, fostering small and medium enterprises, establishing coordination and linking mechanisms among industry members, and seeking international cooperation.

V. Promote biofuel input production by establishing financing instruments, providing technical assistance, modernizing production infrastructure, developing test projects and using other support programs already in place, such as: water and soil use efficiency,

agricultural health, safety and quality, and seed improvement programs. This strategy also considers the possibility of developing NOMs related to biofuel production.

From these strategies, SAGARPA has derived its current three priorities:

I. Establishing the integrated information system to meet the needs of biofuel producers with regard to market information, industrial processes related to biofuel production and environmental impact.

II. Develop research material on the crops that can initially be used as inputs for biofuel production in Mexico. Research will focus on the following crops: jatropha (*Jatropha curcas*), castor oil plant (*Ricinus communis*), sweet sorghum (*Sorghum saccharum*), sugar beet (*Beta vulgaris*) and sugar cane (*Saccharum officinarum*). The final deliverables of this research will include: technical guides, economic feasibility and competitiveness analyses and environmental sustainability reports for each crop.

III. Providing assistance to producers interested in "shifting" to biofuel crops by giving them preference for accessing SAGARPA support programs already in place, such as seed production, technical supervision, irrigation and infrastructure mechanization, and finance and administration advice.

In accordance with the Biofuel Strategy, which seeks to have ethanol mixed with commercial gasoline in the three largest cities in Mexico by 2012, the Input Production Program's goal is to promote sufficient biomass production to produce the ethanol required to supply the average 6 percent fuel oxygenate currently used in gasolines in Mexico.

Because the Biofuel Introduction Program (see next section) assumes that the first stage for ethanol application in gasoline will commence in 2011 (only in Guadalajara) and the second stage begin in 2012 (adding Mexico City and Monterrey), SAGARPA is looking to produce enough biomass to produce 176 million liters of ethanol for 2011 and 810 million liters of ethanol for 2012 (see Table 1). Still, no decision has been made on the crop(s) that will be used for input and no information is available regarding any production area currently considered as a biofuel input source.

Table 1 – Biofuel Input Production Goals 2011-2012.

City	Ethanol needs (million liters per year)		Required crops (hectares)		Biomass required (million MT per year)	
	2011	2012	2011	2012	2011	2012
Guadalajara	176	184	23,467	24,533	2.35	2.45
Monterrey	-	133	-	17,733	-	1.77
Mexico City	-	493	-	65,733	-	6.57
Total	176	880	23,467	108,000	2.35	10.80

Source: SAGARPA, with information from PEMEX and using sugar cane as input.

However, SAGARPA, through its National Agriculture, Livestock and Forestry Research Institute (Spanish: *Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias*, or INIFAP), has elaborated its Biofuel Crop Productive Potential estimates (Spanish: *Potenciales Productivos de Bioenergéticos*) where interactive maps show the areas where the aforementioned biofuel crops plus oil palm (*Elaeis guineensis*) have the potential to be introduced in order to yield the required biomass for ethanol and biodiesel production.

Table 2 – Biofuel Crop Potential Estimates

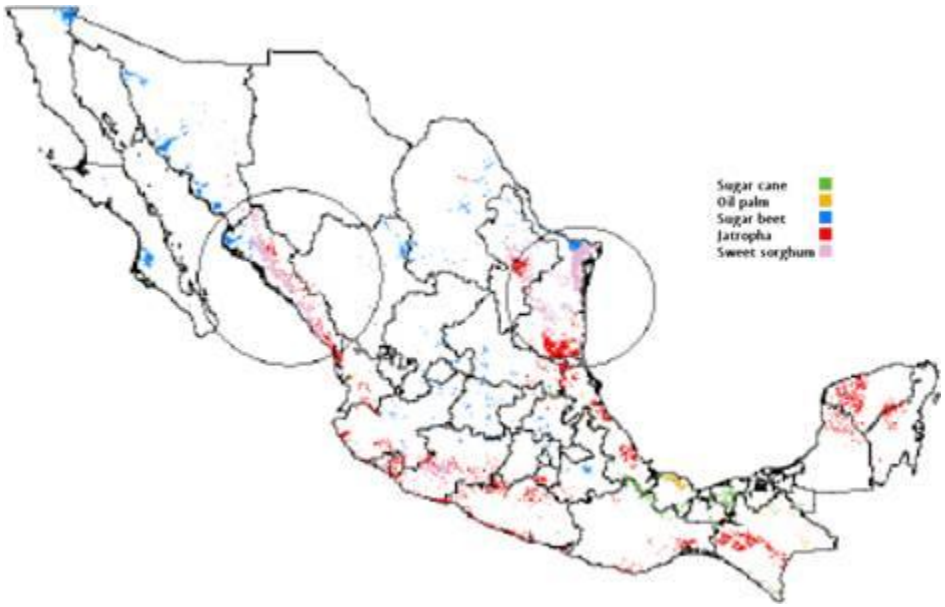
Crop	Current crops (hectares)	High-yield crop potential (hectares)	Average-yield crop potential (hectares)	States with more potential crop surface
Sugar cane	680,000	459,719	4,312,506	Tabasco, Veracruz, Oaxaca & Chiapas
Sugar beet	-	2,007,622	1,724,717	Sonora, Tamaulipas, Coahuila & Sinaloa
Sweet sorghum	-	2,171,939	2,199,709	Tamaulipas, Sinaloa, Nuevo Leon & Michoacan
Castor oil plant	-	3,959,682	6,345,210	Jalisco, Zacatecas, Tamaulipas & Sinaloa
Jatropha	28,000	2,619,916	3,468,428	Sinaloa, Tamaulipas, Guerrero & Chiapas
Oil palm	27,500	242,492	292,750	Veracruz, Chiapas, Puebla & Oaxaca

Source: INIFAP.

Although not considered a biofuel crop by INIFAP, potential rapeseed (*Brassica napus*) acreage is also reported in INIFAP's website and several biofuel organizations have emphasized the potential that rapeseed has for biodiesel production.

It is clear that a large percentage of the potential biofuel crop acreage is concentrated in traditional agricultural states like Sinaloa and Tamaulipas. Other states with high biofuel potential are Veracruz, Chiapas, Yucatan and Jalisco. Several projects have been announced in the last two years in these states; still, not one is yet ready to fully commercialize the inputs or the ethanol or biodiesel to the Mexican market.

Map 1 – Potential acreage for biofuel crops



Source: INIFAP.

1.2.2. SENER's Biofuel Introduction Program

The objective of this Program is to guarantee the conditions that will foster biofuel production and consumption, by incorporating biofuels in the gasoline and diesel mix already commercialized in Mexico. SENER has also defined five strategies where it will concentrate its efforts to achieve this goal:

I. Facilitate information and knowledge exchange, using an internet-based database of biofuel feasibility studies, information on the latest trends of biofuel production and statistics related to production, storage, transportation and commercialization of ethanol and biodiesel. It also considers promoting demonstrative tests for third-generation biofuel production.

II. Support research. Special emphasis will be placed on actions related to analyzing the commercial feasibility of different fuel mixes, security measures for handling biofuels in private facilities, adjustments required in the current fuel distribution infrastructure in order to handle ethanol and biodiesel, research documents on the effect biofuels have on car and truck engines, and the environmental and energy balance impact the introduction of ethanol and biodiesel will have.

III. Encourage multidisciplinary cooperation, by organizing activities where experts from different fields (energy, agriculture, forestry, biotechnology, trade, chemical industry, environmental, finance) can exchange ideas and information on biofuel-related issues. This strategy includes seminars, national and regional workshops, and the integration of private and public representatives in the Biofuel Consultative Committee

IV. Generate market certainty by defining the complementary regulation required for biofuel production, storage, transportation and commercialization; promoting private investments; encouraging small and medium enterprises; defining quality requirements for biofuels; implementing a voluntary "recognition" for companies that use biofuels in their productive processes; establishing international cooperation agreements (including the North American Partnership for Prosperity Alliance); incorporating biofuels in the commercial fuel mix; and generating transparent price, volume and quality monitoring procedures.

V. Promote biofuel implementation. This will require the creation of a new base gasoline; review the current infrastructure and make the necessary adjustments to allow the inclusion of ethanol and biodiesel; create the new infrastructure for biofuel reception, handling, mixing and loading; guarantee the timely supply of biofuels in accordance to technical requirements; and the implementation of a system that allows biofuels to be price competitive.

So far SENER reports that its research activities are carried out with assistance from the Mexican Oil Institute (Spanish: *Instituto Mexicano del Petroleo*, or IMP). For ethanol, SENER and the IMP carried out the pilot test described in last year's report, where 2.53 million liters of gasoline with 6 percent ethanol derived from sugar cane was distributed in four gas stations in Monterrey. Meanwhile, the IMP is currently testing the use of biodiesel to facilitate the lubricity of ultra-low sulfur (UBA) diesel; additional research is being carried out on the different mixes and their commercial feasibilities. The IMP also created a specialized research group on biofuels, which began working on biofuels derived from cellulosic material.

Regarding goals, the Program defines the following scenario for the introduction of ethanol and biodiesel in the current commercial fuel mix:

Table 3 – Biofuel Introduction goals 2012

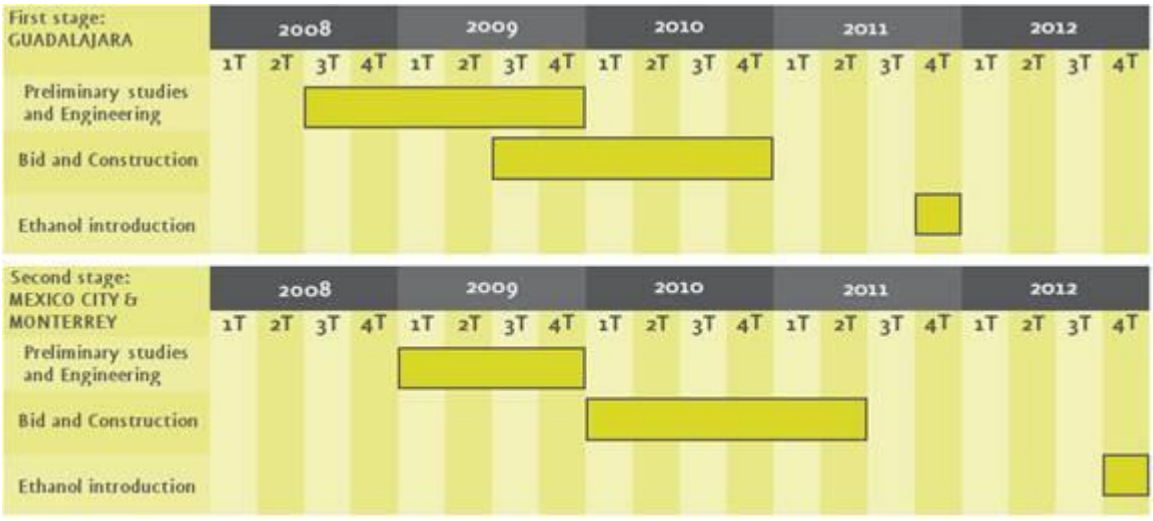
	Biofuel production (thousand barrels daily)	Approximate cost (million USD)	Goal date
Guadalajara	3.20	16.5	3rd trimester of 2011
Monterrey	2.30	10.0	3rd trimester of 2012
Mexico City	8.50	40.8	3rd trimester of 2012
TOTAL ETHANOL	14.00	67.3	-
TOTAL BIODIESEL	0.42	n.a.	n.a.

Source: SENER.

The GOM's Biofuel Introduction Program has defined the two stages for the actual introduction of ethanol in the current fuel mix commercialized in Mexico. According to the Program, the first cities where ethanol will be used as an oxygenant in the current gasolines (Magna and Premium) are Guadalajara in 2011 and Mexico City and Monterrey in 2012 (cities which account for one quarter of the total gasoline demand in Mexico).

In order to meet the average 6 percent of oxygenant volume (currently MTBE), SENER projects that Guadalajara will require 3,000 barrels daily of ethanol (equal to 176 million liters per year) in 2011. Including Monterrey and Mexico City in 2012 will raise that requirement an additional 10,800 barrels daily, which accounts for 626 million liters per year.

The Program defines the following timetables for the first and second stages of the biofuel introduction project:

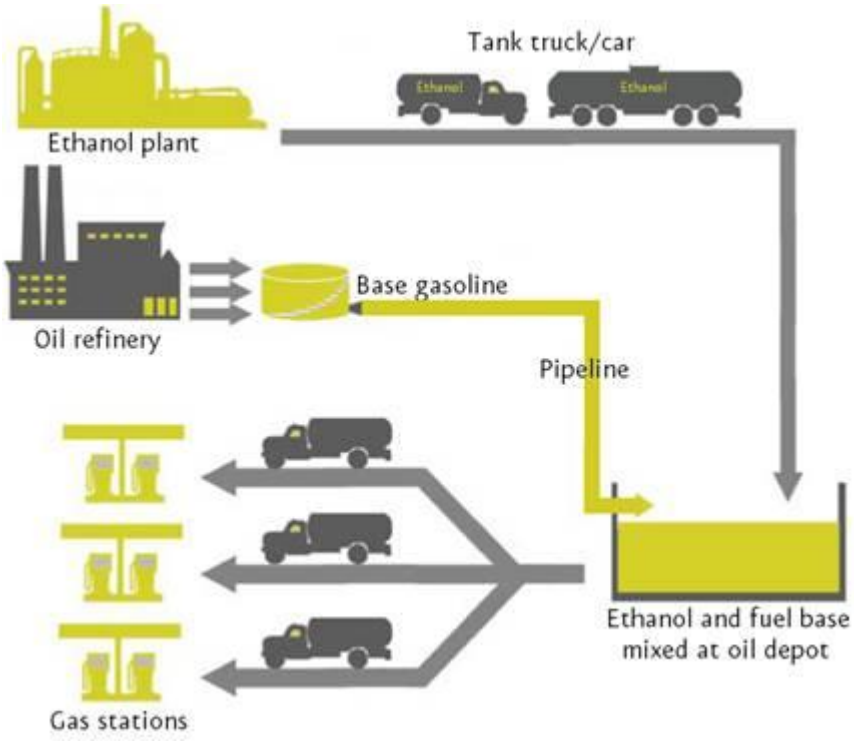


Source: SENER

On October 1, 2009, the state-run oil company PEMEX (*Petroleos Mexicanos*), launched the bid for companies interested in supplying PEMEX with ethanol for five years, with an average of 150

million liters per year. The contract value is estimated in almost US$ 520 million. Several companies complained about the $8.20 pesos (approximately US$ 0.63) per liter price limit and several additional requirements and PEMEX was forced to postpone the bid several times. Finally, on March 7 of this year, Destiladora del Valle won the bid. However, PEMEX cancelled the assignment two weeks later claiming that the company had not met its contractual obligations. According to E-Mision Foundation, a new bid will be announced next July, with some of the adjustments required by the interested companies.

Comprehensive information on the bid, including technical references and documents, is available in Spanish on the GOM's Electronic System for Procurement website. The scheme of ethanol supply is outlined in the following diagram:



So far, several companies have been named by the press as the ones that have participated in the bid process, but no further information is available on their production capacity, the inputs they plan to use or even the location of their projects. Bioenergeticos Mexicanos, Destiladora del Noroeste, Alcoholera de Zapopan, Czarnikow Sugar, Destiladora del Valle, Abengoa Mexico, Biotecnologia en Combustibles, Quimica Apollo, Bioenergia Agroindustrial and Destilmex are some of the companies named in press reports. Some of them are sugar cane mills, which already produce ethanol as a sub-product of sugar production, but they have emphasized that it is not feasible for them to commercialize the ethanol as a fuel oxygenant unless the price limit is above the US$ 1.00 per liter.

Regarding biodiesel, the Biofuel Introduction Program only considers using biodiesel in a mix of less than 1 percent, with UBA diesel, for lubricity. No information is available on whether SENER will promote the use of any other biodiesel mix like B5, B15 or higher. The only goal defined by the Program is to have 1.8 million barrels daily of biodiesel by 2014, in order to mix it with the available stock of UBA diesel.

Bioethanol and Biodiesel:

2.1. Production

2.1.1. Ethanol

As previously reported, Mexico already produces ethanol, but not for fuel purposes. The current ethyl alcohol produced as a sub-product of sugar cane milling is used only to produce alcoholic beverages and by the pharmaceutical industry.

2.1.2. Biodiesel

Biodiesel production levels in Mexico continue to be low and it is often produced by research centers and universities and not intended for commercial purposes. So far, only Grupo Energeticos, located in Cadereyta, Nuevo Leon, is commercializing biodiesel for mixing with regular diesel.

2.2 Consumption

2.2.1. Fossil Fuels in Mexico

As explained in previous reports, Mexico is the sixth-largest oil producer in the world and PEMEX is the third largest oil-producing company in the world. However, the country exports most of its crude oil and, conversely, imports a large volume of gasoline, diesel, and fuel additives, mostly from the United States.

Table 4 – Volume of imports of refined products, in thousand barrels daily

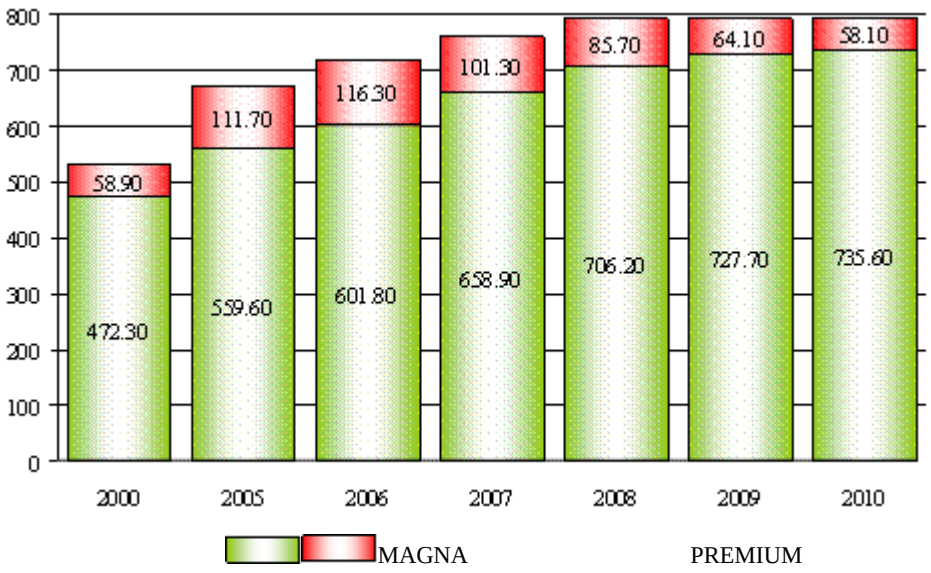
	2005	2006	2007	2008	2009	2010 (Jan-Apr)
Gasoline [1]	169.8	204.7	308.1	340.5	329.6	349.5
Diesel	21.4	40.5	52.7	68.0	47.7	75.4
Fuel Oil	26.4	14.3	17.0	32.9	39.2	2.6
Others	43.2	33.7	34.0	22.4	22.8	54.6
Total	260.8	293.3	411.7	463.8	439.3	482.0

Source: PEMEX Monthly Petroleum Statistics, April 2010

Regarding the sale of domestic fuels, PEMEX reported that gasoline and diesel sales in 2009 showed a reduction due to the economic downturn. In the case of gasoline, consumers actually "shifted" from the Premium gasoline to the cheaper Magna gasoline, because of price differential. Hence, while overall gasoline purchases decreased by less than 0.5 percent, Premium gasoline sales went down 28 percent, while Magna sales actually increased by 3 percent. With regards to diesel sales, PEMEX reported a 5.7 percent reduction in comparison to 2008.

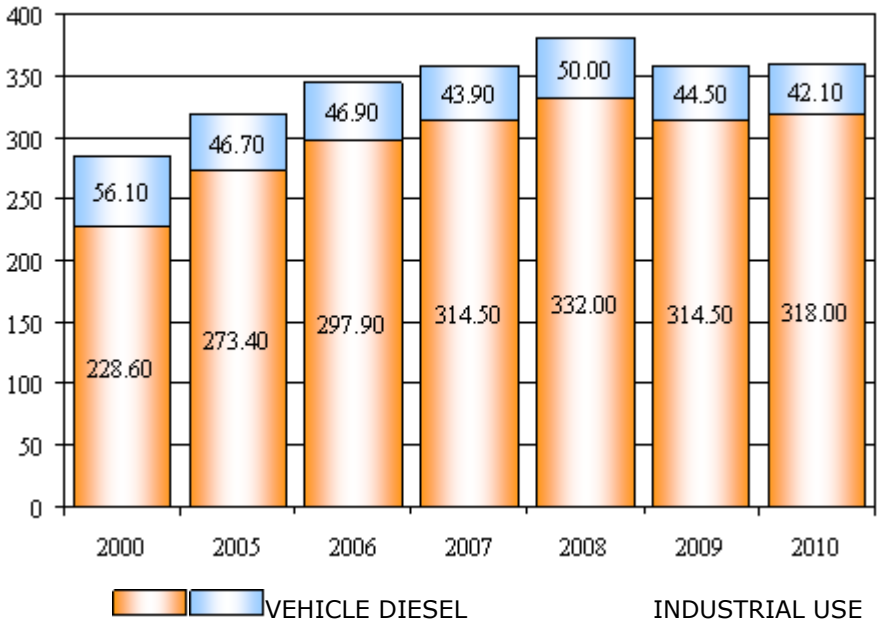
The sales volumes for PEMEX's two brands of petroleum-based gasoline (Magna and Premium) and the two types of diesel (Vehicle or Industrial) are shown in the following tables:

Table 5 – Gasoline sales volume, in thousand barrels daily



Source: PEMEX's Monthly Petroleum Statistics and Statistical Yearbooks.

Table 6 – Diesel sales volume, in thousand barrels daily



Source: PEMEX Monthly Petroleum Statistics and Statistical Yearbooks.

2.3. Trade

Mexico's Customs Administration (*Aduana Mexico*) has made no changes in tariff classification of ethanol. It still considers it ethyl alcohol and does not make a distinction between its use as fuel or a fuel-production input and other uses like medicine and alcoholic beverages, and

continues to use the following tariff codes:

ndenatured ethyl alcohol of an alcoholic strength by volume of 80% vol. or higher
2207.20.01 Ethyl alcohol and other spirits, denatured, of any strength
ndenatured ethyl alcohol of an alcoholic strength by volume of less than 80% vol.

Thus, the import requirements for all three tariff codes remain the same as last year.

[1] Includes gasoline and MTBE

Advanced Biofuels:

So far only two advanced biofuel projects have been announced in Mexico, with very little information available on the full potential and the actual time when these projects will be operational. The first one, the Seawater Foundation project in Bahia de Kino, Sonora, is headed by U.S.-based Global Seawater Inc. (GSI) and intends to use halophytic plants and trees near shrimp and fish farms to produce biofuels. Interestingly, Fernando Canales, a former Mexican Secretary of Energy, is co-chair of GSI.

Meanwhile, the BioFields project in Puerto Libertad, also in the state of Sonora, is a 22,000 hectare, algae-based ethanol project developed in coordination with Dow Chemical Co. and Algenol Biofuels. The project is located next to a thermo-electrical facility in order to produce ethanol using hybrid blue-green algae, sunlight, CO_2 capture from the thermo-electrical plant, non-agricultural land and salt water. So far BioFields has acquired the land and is working on the bio-refinery design, obtaining and maintaining the necessary regulatory approvals to begin construction and define a method to capture the CO_2 emissions.

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