

Mexico's Oil Industry 2019–2025: National Sovereignty and Energy Self-sufficiency Without Development?

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ABSTRACT

This paper aims to put into perspective the insufficiency of the rescue strategy for Mexico's oil industry during the 2019–2025 period, which covers the administration of Andrés Manuel López Obrador (AMLO) and impacts the first months of the subsequent administration. The paper's hypothesis is that the energy policy actions applied to the oil industry responded to a confused understanding of national sovereignty and energy self-sufficiency in an environment where it is difficult to determine whether there was even a legitimate concern about the country's future development and the role that oil could play in it, given the importance it had in the industrialization process (import substitution industrialization and manufacturing exports-led growth). To clarify this, the text evaluates, through the method of comparative statistical analysis, the degree of compliance of the seven main hydrocarbon-related tasks self-imposed by the AMLO administration. Based on official figures, it shows that, as of April 2025, none of the tasks had been completed, except for that referred to the reversion of the energy reform and those determined by inertial factors or financial and human resources to which the government had broad access. In this environment, after a six-and-a-half-year wait and a great deal of committed resources, the situation of the oil industry, far from improving, worsened.

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I. INTRODUCTION

Between late July and early August 2025, Mexicans were informed by the Ministry of Finance and Public Credit (SHCP) of the execution of an offering of pre-capitalized notes (P-Caps) guaranteed by the federal government. This to ensure that *Petróleos Mexicanos* (PEMEX), the oil company recently reabsorbed by the State (previously classified as a State Productive Enterprise – EPE), would have sufficient liquidity to meet part of its financial obligations for that year. This resulted in the issuance of US\$12 billion in bonds at an annual yield of 5.5%, half of what PEMEX would have paid, which five years earlier had lost its investment-grade status from two of the three major credit rating agencies. They would be used to acquire principal, bond, and interest-bearing securities from the United States Treasury to optimize the maturity profile of PEMEX's debt and reduce its liabilities and financial costs. Upon maturity, on August 17, 2030, these securities must be covered by the company; otherwise, they will become public debt.

This negotiation was a reminder of PEMEX's precarious financial situation, with its external debt profile showing maturities of over US\$21 billion throughout 2025 and a higher amount in 2026, in addition to its debt to suppliers, which amounted to more than US\$20 billion in July 2025. These suppliers increasingly exerted pressure on the State, even ceasing exploration, production, and maintenance work in support of the state-owned oil company. This partly could explain the reduction in hydrocarbon production during the second half of 2024 and the first half of 2025.

How the state-owned oil company could have ended up in such a dire situation is something we all wonder, since the AMLO administration's proposal was exactly the opposite: transition from the 2013–2014 energy reform to the 2019–2025 counter-reform; Substantial increase in hydrocarbon exploration and production; Self-sufficiency in refined products and fertilizers; Taking into account citizens' opinions, including fracking, contracts, and daylight saving time; Prioritizing refined product production over crude oil exports; Constant fuel prices and combating fuel theft; and Financial rehabilitation of PEMEX. The hypothesis is that the strategy failed and that more than just fidelity to the principles of national sovereignty and energy self-sufficiency is required;

that is, the oil industry must be redirected to increase hydrocarbon exploration and production, as well as the utilization rate of installed refinery capacity, in addition to increasing the company's productivity and competitiveness, either through the measures proposed by AMLO or those that are required.

The analysis is carried out as follows: The first section presents a summary of the reorientation of development policy since AMLO's administration, taking into account the range of economic policy elements implemented during his administration. Section 2 observes the process of transition from the 2013–2014 energy reform to the 2019–2025 counter-reform. Section 3 analyzes each one of the seven tasks of AMLO's hydrocarbon policy. Section 4 presents the results and discussion. Finally, the conclusions are presented.

II. THE REORIENTATION OF DEVELOPMENT POLICY IN 2019

The political group that assumed power in Mexico in December 2018, led by a charismatic man with a humanist bent, AMLO, founder and leader of the recently formed National Regeneration Movement (MORENA), championed political, economic, and social proposals that proved highly convincing to voters. Among them was a sentiment that appealed to nationalism and contrasted with the highly market-oriented liberal policies under which the country had been administered since December 1982. Its implementation would be carried out through a series of reforms and counter-reforms imposed thanks to MORENA's supremacy in both chambers of Congress. In the political sphere, public administration would be reorganized, and the judiciary, public security, electoral processes, and forms of popular representation would be reformed. In the economic sphere, various areas would be reconsidered, focusing efforts on energy, telecommunications, regional development, competition, and foreign relations. In the social sphere, new reforms would be implemented in the areas of wages, attention to poverty and marginalized groups, labor-management relations, working conditions, the pension system, education, and public health.

Over the 35 years between 1983 and 2018, Mexico underwent a path of profound transformations that sought to lay the foundations to provide the economy with the elements that

would allow it to resume the high growth rates experienced during the so-called Mexican Miracle (Hansen, 1974). The possibility of achieving this was stimulated by the development experience of Southeast Asian countries since the 1960s (Stiglitz, 1996; Yosuf and Stiglitz, 2001). Unfortunately, the model suffered from a structural flaw that no one inside or outside the country could overlook: the neglect of traditionally disadvantaged social groups. That is to say, even in an environment of high economic growth, and assuming that this would stabilize poverty levels, the market would still be unable to halt the rise of inequality. This dichotomy has been addressed by various scholars in economic and social development based on cross-section analysis, among others, and was corroborated in far-reaching research studies such as that of Piketty (2013).

The approach of the government inaugurated by AMLO was appropriate in terms of correcting the distortions generated by his predecessors, whom he described as technocrats and neoliberals. He addressed this through an unprecedented push for minimum wages, a regional reorientation of development toward the southeast and center regions of the country, and a readjustment of poverty alleviation programs. In this area, coverage increased for unemployed youth, students, the elderly, rural residents, coastal residents, single mothers, and people with disabilities. These social programs were implemented by displacing the targeted poverty alleviation system that had been in place since 1992 (the Solidarity and successor programs), based on a methodology primarily designed by an international organization, the World Bank (Gutierrez-Rodriguez, 2025).

The package's coverage was so widespread that in the medium term, it sought to protect 30 million of the country's 38.5 million families by granting each of them at least one social program. However, it was clear that the amount in pesos would not guarantee the eradication of poverty, either individually or as a family. On the contrary, it would undermine average labor productivity (OECD, 2025a), and stipends would be prioritized over options for further education and an increase in the labor market participation rate, one of the lowest internationally (OECD, 2025b). Similarly, as multiple observers warned, there would not be sufficient public resources —particularly from a solid tax base— to finance such expenditures without neglecting areas such as health, education, science

and technology.

To achieve the aforementioned change of course, the Executive had to face the dilemma posed 45 years earlier by Hansen (1974) of addressing social commitments stemming from the Revolution that were growing rapidly due to demographic growth, or financing public policies to boost economic development. Given MORENA's founding ideology, which was more economically oriented toward the short term than the long term, the party leadership opted for the former, for which it had the unconditional support of Congress. This led the Executive Branch from the outset to neglect not only the completion of ongoing public works and the maintenance of infrastructure but also the construction of new infrastructure.

III. FROM THE 2013–2014 ENERGY REFORM TO THE 2019–2025 COUNTER-REFORM

Regarding hydrocarbons, the government that assumed power at the federal level in December 2018 (and repeated as a political group, led by MORENA, in October 2024) outlined seven major tasks in various forums, statements, and interviews, before and after taking office, and not only in official energy planning documents. The first task was strategic and medium-term, consisting of restoring the vertical integration of the then-EPE, PEMEX, so that it could regain the status it had held prior to the 2013–2014 energy reform, based on considerations of national sovereignty and energy self-sufficiency. This was complemented by the idea of avoiding redundancy of functions between PEMEX and its subsidiaries, which, following the 2013–2014 energy reform, were also defined as EPE, with their own legal personality and assets, although subject to the management, direction, and coordination of the PEMEX corporation.

The second task, within the framework of six defined for the short and medium term (2019–2024), was to accelerate hydrocarbon exploration and exploitation work in order to increase crude oil production from 1.73 Million Barrels Daily (MBD) and natural gas production from 4,881 Billion Cubic Feet of gas Daily (BCFGD), recorded in December 2018 (PEMEX, 2025), to 2.9 MBD and 5,500 BCFGD, respectively, no later than 2024. The production of more hydrocarbons would be carried out facing unprecedented restrictions imposed by the federal government itself, starting with the fact that exploration work would be limited

from that moment on to land and shallow waters. This did not imply ignoring the current exploration and exploitation contracts won by private enterprise, which would be respected as long as they complied with the legal framework.

Third, the goal of achieving self-sufficiency in refined products was proposed, given that fuel imports accounted for nearly 80% of total demand in 2018. Rhetorically, this would be achieved by modernizing the six PEMEX-owned refineries in the country, which would also entail equipping the Salina Cruz and Tula refineries with coking plants to produce more gasoline and diesel and less fuel-oil. A new refinery would also be built in Dos Bocas, Tabasco, officially named Olmeca, as large as the last one built in the country in 1979 (Salina Cruz, Oaxaca) and the one owned by PEMEX in Deer Park, Texas, both with a processing capacity of 340,000 barrels per day (BPD). Likewise, self-sufficiency in fertilizers would be achieved by putting into operation various ammonia plants that had been idle for about 20 years in Cosoleacaque, Allende, and Poza Rica, Veracruz, as well as in Lázaro Cárdenas, Michoacán.

Fourth, community rights would be respected above the objectives of exploration, exploitation, and transformation of energy resources; time zone management would be reviewed; the use of hydraulic fracturing (fracking) techniques would be eliminated; and the bidding process for hydrocarbon exploration and production areas would not be resumed until a careful review of the contracts awarded during the previous three and a half years, including the possibility of penalizing any noncompliance. Additionally, the participation of private companies in electricity generation would be limited to 46%.

Fifth, domestic production of refined products would be given priority over crude oil exports, with exports falling to zero before the end of the 2019–2024 six-year term, coinciding with the full operation of the Dos Bocas refinery, and the modernization of the other six refineries. As previously stated, Tula and Salina Cruz would be equipped with coking plants.

Sixth, fuel prices, particularly gasoline and diesel, would be kept constant in real terms, and pipeline smuggling, known as huachicol, would be aggressively combated, as it was pointed out as the most serious problem of losing resources, with no enough mention of corruption.

IV. DEGREE OF GOALS ACHIEVEMENT

4.1 Legal reversal of the 2013–2014 energy reform

The strategic objective of reversing the energy reform involved returning PEMEX and the Federal Electricity Commission (CFE) to their status as vertically integrated public companies with a high degree of monopoly; that is, they would regain the almost absolute responsibility they had held for managing the oil and electricity industries. This was carried out through a process that began in December 2018 when AMLO took office and was consolidated in March 2025, five months after the inauguration of President Sheinbaum's administration (2024–2030). The exercise consisted of a series of legal and administrative actions that required the support of Congress and were made possible thanks to the absolute majorities that both governments enjoyed in both the Chamber of Deputies and the Senate, based on the votes obtained in the general elections by their political party, MORENA, and its allies, the Labor Party (PT), the now-defunct Social Movement Party (PES), and the Green Ecologist Party of Mexico (PVEM). Particularly significant was the effort to return constitutional articles 25, 27, and 28 to their near-original state between October 31 and December 20, 2024. Additionally, two autonomous bodies, the Energy Regulatory Commission (CRE) and the National Hydrocarbons Commission (CNH), were dissolved. Their regulatory functions were absorbed by the Ministry of Energy (SENER), which subsequently transferred them to a newly created body under its supervision, the National Energy Commission (CNE). This effectively ended a state regulatory model that had been in place for almost 35 years.

The secondary legislation derived from the previous constitutional changes was implemented through a decree published in the Official Gazette of the Federation on March 18, 2025, issuing eight laws: the Law of the State-Owned Enterprise, Federal Electricity Commission; the Law of the State-Owned Enterprise, Petróleos Mexicanos; the Electricity Sector Law (LESE); the Hydrocarbons Sector Law (LESH); the Energy Planning and Transition Law; the Biofuels Law; the Geothermal Energy Law; and the Law of the National Energy Commission. Additionally, various provisions contained in the Law of the Mexican Petroleum Fund for Stabilization and Development and in the Organic Law of the Federal Public Administration were amended.

The practical results of the aforementioned adjustments, and even a series of actions prior to them, could be predicted in December 2018, with the suspension of the bidding process for onshore and offshore hydrocarbon blocks, leaving the institutional distribution of probable (P2) and possible (P3) hydrocarbon reserves as they were until then: 83% under PEMEX's control and the remainder controlled by many private, national, and foreign companies. Although it was stated that the process would resume once the contracts were reviewed, this did not happen. On the contrary, faced with legal uncertainty, as well as the lack of success of some exploratory exercises, several private companies that had won exploration and production contracts, either alone or in consortiums, chose to forgo them. By 2023, 38 blocks tendered to private companies, equivalent to one-third of the total (111 at the time), had been fully or partially returned to SENER. As a result, PEMEX's share of P2 and P3 reserves increased to 85%, and its total crude oil and condensate production rose from 90% at the end of 2021 to 95% in 2024 (Gutiérrez-Rodríguez, 2022; PEMEX, 2025). This means that, at least in hydrocarbon production, when we talk about PEMEX, we are talking about practically an entire industry.

One case that was on the verge of becoming a repossession and even an international conflict was the Zama mega-field, discovered in July 2017 in shallow waters of the Gulf of Mexico, at a depth of approximately 500 meters, by the winning consortium of Block 7 in bidding round 1.1, led by the US company Talos Energy. Initial calculations established that it would enter operation in 2025, reaching a maximum production of 180 thousand barrels per day (TBD) of high-quality light crude and 2,388 MCFGD, with a start-up expenditure of just over US\$9 billion: US\$4,541 million earmarked for investment and US\$4,544 million for operating gas. Given that the megafield borders an allocation made by SENER to PEMEX, the EPE entered into a dispute with Talos over its control from the beginning of AMLO's administration. In July 2021, SENER awarded PEMEX the operation of the project, prompting Talos to express its intention to ask the US-Mexico-Canada Agreement (USMCA) to arbitrate the case, although it later withdrew. In March 2022, the unification of the megafield was completed, and Talos retained a 17.35% stake. Once this was negotiated, and with PEMEX as the operating company, both presented the Zama development plan to the CNH in March 2023, which

was approved the following June and constitutes PEMEX's main project, along with the Trion field, located in deep waters of the northern portion of the Gulf of Mexico (2,500 meters), with Woodside Energy then as the operator, with a 49.6% stake, while PEMEX Exploration and Production (PEP) owns the remaining 50.4%. This is changing as in August 2025 PEMEX in alliance with Grupo Carso decided to take over the project and become the operators, facing possible litigation.

A similar action was taken in the wholesale electricity market (MEM). On one hand, in 2019, the bidding process in such a market was postponed. On the other hand, the incorporation of wind and solar photovoltaic energy from generating companies that had won bids and even from those units that, not dedicated to generation but to other activities, had surpluses (self-supply companies) was limited, arguing that they destabilized the system. As a corollary, the Electricity Industry Law was amended to limit the overall participation of private companies in generation to a maximum of 46%, leaving the remaining 54% to CFE. Within this framework, the Spanish company Iberdrola announced, in the second half of July 2025, that for reasons related to Mexico's legal and fiscal stability, it would sell its 15 renewable energy plants, valued at \$4.7 billion, and would leave Mexico after 16 years of presence. This came after, just in 2023, it had consolidated the sale of 55% of its assets to the Mexico Infrastructure Partner (MIP) fund, with participation from the Mexican government, for US\$6 billion, selling 13 combined-cycle power plants with a capacity of 8,534 megawatts. These plants were taken over by the National Infrastructure Fund (FONDIN) as the majority shareholder and vehicle to refinance the transaction, which government circles described as "a new nationalization of the electricity market", since with it, the CFE consolidated its majority control over it. However, in the end, the transfer was made to the Cox Group, also from Spain.

In March 2025, two steps were taken simultaneously to eliminate redundancies. Firstly, four out of the seven PEMEX subsidiaries were consolidated: PEMEX Drilling and Services (PPS), PEMEX Cogeneration and Services (PCS), PEMEX Fertilizers (PF), and PEMEX Ethylene (PE). Secondly, three EPE were transformed into Subsidiary Productive Enterprises (EPS): PEP, PEMEX Industrial Transformation (TRI), and PEMEX Logistics (LOG). The main difference between EPE and EPS is that

the latter are subsidiaries created in accordance with the laws applicable to each of the jurisdictions in which they were incorporated. Additionally, the dissolution of CFE's 10 subsidiary companies was decided: CFE Transmission, CFE Distribution, CFE Basic Supply, and CFE Generation I, II, III, IV, V, and VI, as well as CFE Telecommunications and Internet for All, which would be replaced by administrative units. Consequently, the generation, transmission, distribution, electricity supply, and marketing activities in the wholesale electricity market were transferred to CFE's Corporate Operations Directorate, while telecommunications and internet activities were transferred to the Corporate Commercial Business Directorate. The National Energy Control Center (CENACE) remains a decentralized body, independent of CFE.

4.2 Substantial increase in hydrocarbon exploration and production

In implementing the second task to accelerate hydrocarbon exploration and exploitation to boost daily crude oil and gas production, the results were contrary to projections. Proven reserves and hydrocarbon production decreased instead of increasing, and exploration activity also declined. Proven reserves decreased from 13 to 8.4 billion barrels of oil equivalent (BBOE) between 2015 and 2024 (CNH, 2025); oil production decreased 38% and gas 27.3% (PEMEX, 2025). Although some gas wells were discovered, oil remained the primary focus. By 2024, the reserves/production ratio stood at just 8.7 years. To achieve growth, new reserves need to be discovered at a faster rate than extraction, posing a challenge despite the declining domestic demand for refined products and controlled exports, as discussed later.

Another notable fact about reserves in 2024 was their relative concentration in the southeastern region, both offshore (55% of the total) and onshore (16.4). The rest was: Veracruz, 10.9%; Deep Gulf of Mexico, 5.8%; Land Tampico-Misantla, 0.7%, and the rest of the territory, 11.2% (CNH, 2025). This, on the one hand, reflects the limited progress made in exploring and developing new wells and fields, particularly on land. On the other hand, the government's self-imposed straitjacket, which resulted in very little progress in deepwater exploration in the Gulf of Mexico, with reserves reaching just 5.8% of the total, and in fields susceptible to fracking (north-northeast of the country).

Furthermore, the number of wells drilled and completed by PEMEX declined systematically starting in 2015. Between that year (610 wells) and 2024 (276), the reduction was 46%; between 2018 (328 wells) and 2024, it was 16%; and if the figures observed between January and April 2025 (44) are annualized (132), the drop compared to 2024 would be 33% (CNH, 2025 and SENER, 2025). In fact, the first strategy outlined by the administration that assumed control of PEMEX at the end of 2024 was to recover the remaining hydrocarbons in existing wells using both secondary and tertiary (improved) techniques, as well as drilling to greater depths. This evidently has several problems: it guarantees short extraction horizons, since it increases the well recovery rate by an average of 15%, but it also increases production costs by up to 30% and has harmful effects on the environment due to the components that must be injected into the well, specifically carbon dioxide (CO₂), the greenhouse gas with the greatest presence in Mexico's environment.

As a result, crude oil production experienced a sharp decline between December 2015 and April 2025, dropping from 2,275,000 BPD in the first period to 1,359,518 BPD in the second (a cumulative reduction of 40%). The decline was offset by the entry into operation of two wells producing condensates or natural gas liquids: Quesqui, located in Tabasco, and Ixachi, located in Veracruz, whose production was added to crude oil production under the direction of PEMEX. Consequently, liquid hydrocarbon production decreased from the figure indicated in December 2015, when both concepts were not consolidated, to 1,627,346 barrels per day in April 2025, implying a cumulative reduction of 28.5% (PEMEX, 2025).

Bear in mind that gas condensate fields have the following characteristics: the hydrocarbon mixture is composed of more than 60% methane gas, as in dry and wet gas fields, while the amount of heavy hydrocarbons is considerably higher. Condensates are byproducts of hydrocarbon drilling that can be found in liquid or gaseous form, depending on the pressure and temperature at the time of release. Although they are used as raw materials for the manufacture of fuels, i.e. they are primarily gasoline known as natural gasoline, they are essential in the manufacture of certain plastics and effective in stabilizing heavier crude oil, giving it desirable properties before it is sent to refineries. Condensates must be stabilized before use or

transportation. This is not only due to their explosive nature but also because they contain impurities such as CO₂ and hydrogen sulfide (H₂S), which can corrode the interior of pipelines, pipes, and tanks.

4.3 Self-sufficiency in refined products and fertilizers

Along with the decline in crude oil production, fewer and fewer petroleum products were processed, despite the original idea being to prioritize the industrialization of the raw material rather than seeking to place it on the international market (exporting orange juice, not whole oranges, as it used to be said). On one hand, oil production decreased from 2.275 TBD in December 2015 to 1.729 TBD in December 2018, and further to 1.627 TBD in April 2025. On the other hand, refined oil production decreased from 1.267 TBD to 740.6 TBD, and then to 331.9 TBD over the same period. Thus, refined oil production relative to crude oil production, which includes condensates in the previous figures, particularly from March 2020 (1.5% of total liquid hydrocarbons production) to April 2025 (16%), fell from 55.7% in December 2015 to 42.8% in the same month in 2018, and to only 20.4% in April 2025 (PEMEX, 2025).

Self-sufficiency in gasoline and diesel remained elusive, although the international energy transition process began to take effect and Mexico benefited from it, thanks to the penetration of more efficient vehicles into the domestic market. First, the vehicle fleet included more compact vehicles; then, hybrids were added, and more slowly, electric vehicles. Thus, while PEMEX's domestic sales of gasoline and diesel decreased from 1.2 MBD in December 2015 to 1.04 MBD in the same month of 2018 and to 1.0 MBD in April 2025, its gasoline and diesel imports fell from 572.4 TBD in the first month to 360.7 TBD in the last, after having reached record levels in December 2018 (833.6 TBD). With this, PEMEX's dependence on imported gasoline and diesel fell from 47.2% in December 2015 to 35.9% in April 2025, after having reached a peak of 79.8% in December 2018 (PEMEX, 2025). As will be seen later, imports by private parties, which depend on a permit granted by SENER (Procedure SENER-09-002 Permit for the import of petroleum products), as well as fiscal huachicol (practically smuggling), distort the figures.

Unfortunately, Mexico's heavy crude oil production (Maya, 22 degree-API) is so high in relation to total production (50.5%), and five of the six original refineries are so poorly adapted that the increasing gasoline production leads to the generation of what has become an undesirable byproduct due to its high pollution levels: fuel oil, with a high sulfur content. Although gasoline production did indeed increase in April 2025 (344.3 TBD) compared to December 2018 (207.1 TBD), thanks to the Dos Bocas refinery entering into operation at 35% of its installed capacity, fuel oil production also increased (even without Dos Bocas, in December 2015 gasoline production amounted to 381.4 TBD) (PEMEX, 2025). Meanwhile, the ratio of this byproduct to gasoline remained at the level it had in 2015 (62%), when fuel oil could still be exported, and the remainder could be used both as fuel for ships on the high seas and as a raw material for the generation of electricity in many thermoelectric plants, without having to face today's ecological restrictions, by virtue of international agreements.

Looking more closely at this point, national production of refined products (gasoline, diesel, liquefied gas, kerosene, and fuel oil) decreased from 1,123,703 BD in December 2015 to 929,522 BD in April 2025, despite the addition of 84,080 BD from the Dos Bocas refinery. Although final figures for this refinery are being withheld, it would ultimately cost the treasury US\$21 billion. The largest share of processing in April 2025 corresponded to Tula, with 22.4% of national production, followed by Salina Cruz, with 20.3%, and Cadereyta, with 14.8%. If Salamanca (14.3%) and Ciudad Madero (11.4%) are added to these three, the cumulative share reaches 83.2%. The remaining two are Dos Bocas (9.1%) and Minatitlán (7.7%), as shown in Table 1

| Refinery | Dec. 2015 | Particip (5) | Dec. 2018 | Particip (%) | Apr-25 | Particip (%) | Quality of oils used relation in 2025* |
|-----------------|------------------|---------------------|------------------|---------------------|----------------|---------------------|---|
| Cadereyta | 187,244 | 16.7 | 113,105 | 22.1 | 137,725 | 14.8 | Heavy and light equal proportion |
| Cd. Madero | 118,674 | 10.6 | - | 0 | 106,251 | 11.4 | Heavy |
| Minatitlán | 139,672 | 12.4 | - | 0 | 72,063 | 7.7 | Heavy |
| Salamanca | 151,164 | 13.4 | 74,674 | 14.6 | 133,148 | 14.3 | Light+superlight/heavy y= 4 to 1 |
| Salina Cruz | 260,792 | 23.2 | 150,540 | 29.5 | 188,412 | 20.3 | Light/heavy= 2.5 a 1 |
| Tula | 266,158 | 23.7 | 172,285 | 33.8 | 207,843 | 22.4 | Light+superlight/heavy y= 4 a 1 |
| Dos Bocas | - | 0 | - | 0 | 84,080 | 9.1 | Heavy |
| TOTAL | 1,123,703 | 100 | 510,604 | 100 | 929,522 | 100 | |

*Maya (heavy, 22 degree-API); Zapoteco (light, 29.0–29.5 degree-API); Istmo (light, 32 degree-API); Olmeca (superlight, 39 degree-API).

Source: PEMEX (2025)

To comply with environmental regulations, the crude oil mix that each refinery can handle varies greatly. On the one hand, thanks to its on-site coking plant, Dos Bocas processes almost entirely heavy crude. Something similar happens, albeit for different reasons, with the refineries in Ciudad Madero and Minatitlán, although their share of production is very low. This is also the case with the Cadereyta refinery, which faces regional disputes over the greenhouse gases it generates. Due in part to this situation and in part to their high production costs, the first two stopped producing for many months and even years during 2014–2016. The case of Cadereyta is very pressing from a social perspective, due to its proximity to the municipality of Monterrey and its metropolitan area. The ratio of light crude to superlight crude to heavy crude processed by Salamanca and Tula is 4 to 1. Finally, Salina Cruz has a ratio of 2.5 to 1. Of course, when its coking plant and the Tula plant are operational, both will be able to consume levels of heavy crude close to Dos Bocas, which is consistent with the structure of crude oil extracted in Mexico: 50.5% heavy, 23.1% light, and 26.4% super-light and condensates (PEMEX, 2025).

In the case of natural gas, the situation in terms of dependence is dramatic, as imports of this

energy source, almost entirely from the US, have increased steadily since the beginning of the century. Already in 2015, PEMEX's production met only 59.1% of national consumption, a ratio that did fall to 16.3% in the first quarter of 2025, if fiscal huachicol is not considered.

Given its impact on the oil trade balance and the current account of the balance of payments, the country's self-sufficiency in fertilizers was also proposed. This required PEMEX to produce more ammonia, the raw material for urea, the most widely used and least expensive nitrogen fertilizer sold in the country, although it must be acknowledged that it is highly polluting to both the soil and groundwater. Despite problems with equipment corrosion due to disuse for two decades, leading to the presumption of unaffordability, Pro-Agro's sixth plant, formerly Agronitrogenados, was rehabilitated between 2022 and 2024 at the Cosoleacaque Petrochemical Complex in Minatitlán, Veracruz. It is part of a group of four plants that would be restored to meet national demand, self-sufficiency and the constitutional mandate to provide free fertilizers to small agricultural producers, without intermediaries (Article 27, reformed in December 2024). All this based on the Fertilizers for Well-being program, initiated during AMLO's

administration and reinforced by the following one. The planned investment involves US\$375 million and includes, in addition to the four ammonia plants, two urea plants, the rehabilitation of the Lazaro Cardenas plant, and a phosphate rock mine in Baja California Sur.

In practice, production increased by 2.5% between 2015 and 2018, and by 14% between 2018 and 2025, according to preliminary figures, primarily driven by the Cosoleacaque works. Private companies contributed nearly 20% of the 2.15 million tons recorded. Domestic consumption, on the other hand, was much higher. Despite the increase in production, the level of dependence decreased only slightly between 2015 and 2024, from 41.8% to 37.4%. On average, for every ton produced in Mexico, almost two are imported (PEMEX, 2025).

If ammonia production increased as projected starting in 2024, one might wonder what PEMEX did with it. Official statistics suggest that a large portion was exported (traditionally, the two main petrochemical products exported by this company have been ethylene and ammonia). In fact, a 10.7-fold increase in exports of ammonia was registered between 2018 (US\$1.77 million) and 2024 (US\$18.9 million). Compared to the first four months of 2025, almost US\$3.4 million was exported, which when annualized would be US\$10.2 million, a figure lower than that of 2024 but almost six times higher than that of 2018 (PEMEX, 2025).

4.4 Taking into account citizens' opinions, including fracking, contracts, and daylight saving time

Public opinion played an important role in several momentous decisions during AMLO's administration, starting with the cancellation of the Texcoco airport. In this regard, it was established that hydrocarbon exploration and exploitation facilities, as well as those related to energy transmission, generation, and distribution, would not be decided unilaterally, nor would they disregard communities' acquired rights to land and other resources. Similarly, it was argued that citizens were unhappy with handing over portions of the national territory and its maritime border to foreigners (mainly related to license contracts, which were equivalent to concessions) for exploitation and hydrocarbon extraction.

Dissenting voices were also heard regarding the installation of towers for wind power generation and the diversion of irrigation water for consumption by thermoelectric plants (as in the case of Huexca, in Yecapixtla, Morelos, whose production remains unreported due to several pending injunctions). In particular, it was argued that the energy sector could not be placed above the interests of these communities, and that the compensations referred to in the 2013–2014 energy reform failed to take into account their historical achievements, such as agrarian reform, or their ancestral roots.

Regarding the reported review of the 111 hydrocarbon exploration and exploitation contracts granted to 33 private international and national oil companies between 2015 and 2018, it was decided that they would be respected since no irregularities were found. These agreements involved companies as large as Exxon Mobil, Chevron, Shell, BP, Total, Equinor, COOC, Statoil, Repsol, ENI, Petrobras and Lukoil, authorized to explore and exploit resources in plays as sensitive as the deep waters of the Gulf of Mexico. In the case of the north–northeast onshore region, considered an extension of the Eagle Ford formation in Texas, principally the Sabinas Basin and partly the Burgos Basin, including the states of Coahuila, Nuevo Leon, Tamaulipas and a considerable portion of Veracruz, with great potential for both shale oil and shale gas, the use of fracking techniques was restricted.

As a result of the 2024–2025 modifications to articles 25, 27 and 28 of the Constitution, it was announced in July 2025 that 11 Mixed Development Allocation titles would be put into operation between PEMEX, which remained unexploited or underexploited its most recent allocations, and national and international private companies. With this, so it was said, the country's oil industry would inject a little more than US\$8 billion into exploration and production, and PEMEX would partner with companies such as Carso Energy (Mexico), which would invest US\$5 billion in the Ixachi field mentioned above to boost its gas and crude oil production; Woodside Energy (Australia), BP (Great Britain), and Sinopec (China). The reasons given for reorienting the industry in this way were no different from those given by the previous government regarding the service provision, utility sharing, production sharing, and even licensing contracts during 2014–2018: access to private financing without committing public resources,

optimizing investment in exploration and production; improving PEMEX's operational efficiency; accelerating the exploitation of new fields without assuming all the risks; and opening the industry to cutting-edge technology (Gutiérrez-Rodríguez, 2017). Thus, according to the Hydrocarbon Sector Law (DOF, 2025), pre-existing contract modalities were not eliminated, although the State's constitutional right over them and the subsidiary role of private companies were clarified.

In October 2022, a decree issued on January 4, 1996, was reversed. Daylight saving time was established from the first Sunday in April to the last Sunday in October each year, which consisted of setting the clocks forward one hour in the three time zones that cross the national territory. Subsequently, but not simultaneously, the municipalities along the border with the USA and the states of Quintana Roo and Sonora were exempted. The idea stemmed from the need to take advantage of the year's period of greatest sunshine to save an amount of energy equivalent to the annual consumption of the state of Colima and, as an externality associated with globalization, to better synchronize the country's timetables with those of the world's financial and commercial markets, particularly the United States.

In the same vein, arguments were invoked regarding the health problems affecting people, particularly emotional and cardiac issues, due to the implementation of daylight saving time (DST) in 1996, which will be eliminated starting in 2023. All of these actions, perhaps justified for a considerable portion of the population, since they appealed to national sovereignty, among other things, were not justified for energy self-sufficiency, per capita GDP growth, and economic development. Perhaps for this reason, the latter two aspirations, as ingredients of collective well-being, were not accepted in planning documents or official discourse. The idea of happiness was, however.

4.5 Priority of refined products elaboration over crude oil exports

During his campaign, and particularly upon taking office as President of the Republic, AMLO made several remarks regarding the refining industry, which were reflected in the National Refining Plan: i) A new refinery would be built in Dos Bocas, Paraiso, Tabasco, with a processing capacity of 340,000 BPD of crude oil, presumably with a 22-degree API, i.e. Maya, and a cost of US\$8 billion.

It will begin operations in 2022. ii) The six existing refineries would be modernized with an investment of US\$1,300 billion. lii) With this, by 2022, the crude oil processing capacity of the seven refineries would increase from 1,523,000 BD to 1,863,000 BD, which would produce approximately 781,000 BD of gasoline and 560,000 BD of diesel, more than enough to supply the domestic market and export surpluses. iv) Added to this was the decision, made public in multiple forums and documents, to prioritize refining over crude oil exports.

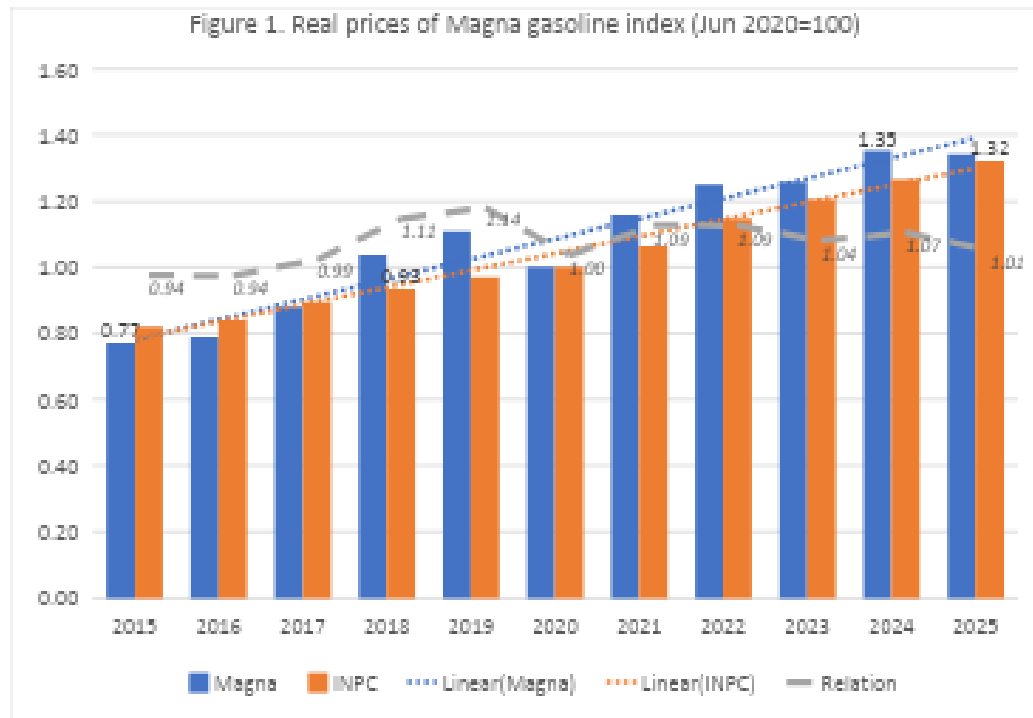
Refined oil production did not increase between December 2015 and April 2025; on the contrary, it decreased from 1.3 MBD in the first month to 332 TBD in the second. Crude oil exports were not eliminated either, as they increased from US\$71.3 million in the first month to US\$386.1 million in the second. However, there was something positive: PEMEX's trade deficit fell from US\$1.183 billion in December 2015 to US\$803.8 million in April 2025, which implies that the amount of imported refined products also decreased (PEMEX, 2025). This improvement is in line with the improved performance of the vehicle fleet and the savings effect generated by the rise in the price of fuels and electricity since 2017. Additionally, the impact of private fuel importers who have permits is significant, with most of them supplying their gas stations (38% of the more than 12,000 in the country are not PEMEX franchises). It is worth noting that some may engage in illegal activities, as will be discussed later. As a result of these factors, the value ratio of PEMEX's refined products imports to crude oil exports was reduced from 17.7 in December 2015 to 3.1 in April 2025.

4.6 Constant fuel prices and the fight against fuel theft

The best way to verify whether the principle of keeping fuel prices constant in real terms was respected is to take the most representative gasoline, Magna, and compare its evolution with the National Consumer Price Index (INPC). To do this, an 11-year series is compiled, from 2015 to 2025, taking June 2020 as the base month (1.00), when the world and the country were in the midst of the COVID-19 pandemic. For consistency, the data for each year correspond to the same month. Based on this analysis, Figure 1 shows that in 2018 and 2019, the years following the liberalization of fuel prices (2017) contemplated in the 2014-2015 energy reform, the price of Magna increased 4 percentage points faster in 2018 and 11 points faster in 2019

than the INPC. The trend continued in 2021, when the difference between the Magna price index and the INPC was 6%, and peaked in 2024, the year of

the country's general elections, at 7%, as shown by the dashed line in the graph. The trend lines for both variables show the widening of the differential.



Sources: PEMEX (2017); CRE (2024); INEGI (2025a), and PROFECO (2025)

Regarding fuel theft, official figures showed a decrease from an average of 94.7 TBD in the illicit fuel market during the 2013-2018 administration (Table 2) to just 6,000 BD in the first few days of 2019. They saw these activities as the only corruption problem of PEMEX and its relation with society, its service providers, and other groups. With the elimination of 90 TBD stolen from these products, it was proposed that

a savings base would be created to finance social programs and even maintain real fuel prices. However, on one hand, the problem rapidly worsened and took on new forms; on the other hand, the costs involved in combating it, perhaps due to failed planning, proved excessive. So, the supposed savings never materialized, and public finances became overwhelmed.

| Year | Produce | Imports | Exports | NAC* | Sales | Imp/CNA | Theft** | Theft/N AC |
|------|---------|---------|---------|------|-------|---------|---------|------------|
| 2013 | 1251 | 523 | 178 | 1596 | 1502 | 32.8 | 94 | 5.9 |
| 2014 | 1180 | 556 | 196 | 1540 | 1428 | 36.1 | 112 | 7.3 |
| 2015 | 1093 | 635 | 192 | 1536 | 1427 | 41.3 | 109 | 7.1 |
| 2016 | 960 | 750 | 179 | 1531 | 1467 | 49 | 64 | 4.2 |
| 2017 | 771 | 893 | 151 | 1513 | 1409 | 59 | 104 | 6.9 |

| | | | | | | | | |
|-------------|-------|-------|-------|------|--------|------|------|-----|
| 2018Jan-Nov | 629 | 916 | 135 | 1410 | 1325 | 65 | 85 | 6 |
| Average | 980.7 | 712.2 | 171.8 | 1521 | 1426.3 | 47.2 | 94.7 | 6.2 |

* National Apparent Consumption (NAC) = Production + Imports – Exports.

** Theft = NAC – Sales. The calculation implies that the internal market supply (NAC) is larger than the reported sales.

Source: Gutierrez-Rodriguez (2019)

To address the issue of punctures in the pipelines, particularly the one running from the port of Tuxpan, Veracruz, to Tula, Hidalgo, and from there to Azcapotzalco, Mexico City, an urgent acquisition of 571 tanker trucks with the capacity to transport 116.8 thousand barrels of crude oil was ordered without bidding, citing national security concerns. The total reported expenditure for this acquisition was US\$85,393,097, resulting in an average price per tanker truck of US\$149,550 (Gutierrez-Rodriguez, 2019). The administration and management of these tankers were entrusted to the Ministry of National Defense (SEDENA).

Five years later, the PEMEX General Directorate disclosed that by the beginning of 2019, 637 tanker trucks had been incorporated, with plans to acquire 1,800 more by 2023, bringing the total number to 2,437 units (Romero Oropeza, 2024). This represents a 4.3-fold increase from the initial number in 2019, indicating the obsolescence of the fleet previous to 2019 of tanker trucks. With the investment calculated at the established price per unit, the total expenditure amounted to S\$364,453,350, permanently, permanently expanding the transportation capacity to nearly half a million barrels of oil at any moment.

Despite the extraordinary effort to transport hydrocarbons by land, with the consequent costs of road wear and tear and the danger and inconvenience to the rest of those who use them, in addition to the parallel involvement of the army in the guard of the pipelines, which by definition would be underutilized, the number of illegal punctures remained at very high levels. After peaking in 2018 with 14,956 punctures, it declined over the next two years (13,053 in 2019 and 9,132 in 2020). From that point on, they rose again, reaching 12,005 in 2023, as if the strategy to combat huachicol had been abandoned (Barnes de Castro, 2025a). Of course, this trend is not paralleled by the 95% impressive reduction reported in the number of barrels diverted to the illicit market

between the peak on December 2, 2018, and January 12, 2019, when it was assured that the problem of pipeline leaks had been solved.

Alongside the persistence of illegal tapping, another long-standing problem worsened. It exploded in the year of the pandemic due to the federal government's assistance to private companies importing fuel and grew again in 2024. This illicit activity was revealed through intelligence work during the first nine months of the new administration (October 2024–June 2015), during which 69,376,918 liters of fuel, equivalent to 1,520 barrels, were seized. These barrels were brought into the country mainly by sea and rail. The figure exceeded the amount seized during the entire previous administration, 46,102,343 liters. However, this seizure represents only a fraction of the total theft and has no parallel with smuggling, which could have reached 30% of the country's gasoline and diesel imports in both 2024 and the first half of 2025. Diesel, whose market price is higher than gasoline, predominates in these illicit activities, while in the US gasoline is more expensive.

According to the US Embassy in Mexico, the cartels send "legalized" crude oil via road and rail tanks or even pipelines from Mexico to Texas. They place it in US refineries for processing and then reintroduce it into Mexico through customs as fuel using falsified documents and front companies. Upon reintroduction, they cross the border without paying the customs duties they would be required to pay because they are disguised with tariff fractions corresponding to automotive oils, lubricants, or alcohols. It should be added that they are generally sold at retail in an unregulated manner (without traceability) at gas stations and even unregulated retail outlets, and they do not pay the Special Tax on Production and Services (IEPS): which is originally paid by the producers and importers and then translated to final consumers. If we take into account that the IEPS represents 25% of the market price of fuels and assume that this is

the only tax evaded, the fiscal damage would have been 140 billion pesos in 2024 (approximately US\$7 billion). However, the total damage inflicted on the Tax Administration System (SAT) and PEMEX should include leaks, theft from operating centers, clandestine refining in home plants, and other types of leaks.

4.7 PEMEX's financial recovery

It can hardly be argued that the worsening of PEMEX's financial problems between 2018 and 2024 was the result of poor management of its trade balance or the high level of taxes and duties it directly contributed to the federation. On one hand, the trade balance resulting from its crude oil exports and imports of petroleum products, natural gas, and petrochemicals, transitioned from a deficit of US\$-3.384 billion in 2018 to a surplus of US\$435 million dollars in 2024. This was the result of a faster reduction in imports compared to exports (-22.6% vs. -12.7%, respectively), which corroborates that during this period, Mexico began an interesting process of energy transition in the transportation sector, although not necessarily in the electricity generation sector, where the share of natural gas (combined cycle plants), primarily imported, continued to grow. This is intended to address the declining gas-to-oil ratio in Mexican Wells, the virtual depletion of important dry gas reserves such as the Sabinas basin in the northern region of the country; and the commitment not to resort to fracking to develop shale gas fields in the north-northeast region.

On the other hand, PEMEX contributes resources directly to the Mexican State in the form of oil revenues. These revenues gave rise to the Mexican Petroleum Fund for Stabilization and Development (FMP), created with the 2013-2014 energy reform. They mainly include the Shared Utility Right (DUC), royalties linked to hydrocarbon exploration and exploitation, state marketer sales, the contractual quota for the exploration phase, and certain royalties (BANXICO, 2025). The calculation of the DUC, which has been by far the most significant contribution to the FMP, is based on the market price multiplied by the barrels of crude oil extracted, from which various costs, expenses, and investments are deducted to establish the amount in pesos to which the royalty rate should be applied. In order to provide PEMEX with sufficient resources to invest in new fields, the Federal Executive ordered the DUC to decline rapidly in recent years: between 2015 and 2018, it

was 65%; between 2019 and 2020, it fell to 54%; between 2021 and 2023, it was reduced to 40%, and in 2024, it fell to 30%. This reduction of more than half over the six-year term entailed a loss of revenue of 484 billion pesos (México Evalua, 2025), approximately US\$24.2 billion. Starting in 2025, a further adjustment to the system was implemented, as the DUC was substituted with the Oil Right for Well-being, set at 30% for oil and 11.63% for non-associated gas.

In addition to the aforementioned reductions, the SHCP waived PEMEX's deferral of the DUC payment at various times. Additionally, in February 2024, it waived payments corresponding to the last quarter of 2023 and the first month of 2025, and in August 2024, it exempted PEMEX from paying the accumulated balance corresponding to May, June, and July of the previous year. These tax waivers amounted to 506 billion pesos (Mexico Evalua, 2025), some US\$25.3 billion. Furthermore, the SHCP made contributions to PEMEX's capital totaling 1,019,172 million pesos, some US\$51 billion.

At the same time, PEMEX reported accumulated losses of 1.8 trillion pesos (US\$90 billion), generated not only by the ineffectiveness of TRI and the inability of PEP to balance them with its positive balances, but also because in 2024 PEP itself reported net losses of 37,108.8 million pesos (Mexico Evalua, 2025; Barnes de Castro, 2025b), equivalent to US\$1,855 million. Likewise, according to its financial statements, PEMEX had accumulated a debt of 4.2 trillion pesos at the end of 2024 (US\$210 billion), with the most notable increase in the share of short-term debt, which went from 1.3% of the total in 2018 to 28.8% in 2024. This of course implies enormous financial pressure, not only for the company but also for the federal government, which, having returned its status as a public company, considers them as its own and has also made financial contributions in recent years to help cover their service: at least 92 billion pesos (México Evalua, 2025), equivalent to US\$4,600 billion.

Adding the federal government's total support to PEMEX, the total amounts reach 2.1 trillion pesos for the 2019-2024 period (US\$105 billion), an average of 350 billion pesos (US\$17.5 billion) each year, equivalent to 1.3% of the Gross Domestic Product (GDP), a figure similar to the expenditures linked to the Welfare social programs inaugurated during the AMLO's administration.

This creates the risk that the loss of PEMEX's investment grade, determined by Fitch Ratings and Moody's in April 2020, while Standard and Poor's placed it on a negative perspective, could eventually affect the federal government itself. In other words, while before the 2013–2014 energy reform, PEMEX financially supported the federal government thanks to its international credibility and low debt costs, its credit problems since 2020 have caused the relationship to reverse. Thus, from being an asset to the government until 2018, it progressively became a liability, not only due to the high financial cost of its debt, but also to its excess staff (some 129,500 people), combined with a rapid decline in its production, which positions it as the sizable oil company (it is one of the 20 largest in the world in terms of revenue) with the lowest product per person employed: Each worker produced 9,280 kilowatt-hours of oil equivalent in 2023, which placed the country in 32nd position worldwide. In Latin America, it fell below Guyana, Brazil, Argentina, Ecuador, and Venezuela (Our World in Data, 2025). Given that the company's book value at the end of 2024 was 2.86 trillion pesos, well below the 4.2 trillion debt previously presented, it was objectively bankrupt (Mexico Evalua, 2025). Besides, its documented external debt in dollars alone reached US\$96.418 billion at the end of 2024 and US\$101.065 billion in the first quarter of 2025. Although this latter level was US\$12.162 billion lower than the peak reached in 2020, this is due to the application of an excessively high exchange rate in 2020, owing to the crisis generated by the Covid-19 pandemic.

V. RESULTS AND DISCUSSION

The results of the oil industry's planning exercise implemented during the campaign and the first months of AMLO's administration, which were framed by the ideals of national sovereignty and energy self-sufficiency, seeking to address social demands rather than market dictates, yielded poor results. From a macroeconomic perspective, the economy grew by an average of 0.8% annually, which meant that per capita GDP declined during the six-year term (annual population growth is 1.1% per year, if immigration is not considered). Similarly, inflation was the highest during those years of the 21st century, with an annual average of 5.17%. Meanwhile, formal job creation reached 2,022,877 posts, half of those created during the previous six-year term and a lower figure than the previous two six-year terms, despite the fact that in those

years more than 6 million people entered the labor market, implying that two-thirds of them went to informality.

Extensive resources amounting to a yearly average of more than 1.5% of GDP (and continuing to grow) were devoted to social transfers, ensuring that at least one program reached 80% of all families, 30 out of 38.5 million families in the country. Similar amounts were assigned to strengthen PEMEX operations and finances, and at least 1% to infrastructure that is yielding between 15% to 25% of what they should (exact figures are reserved by the State and it has not been informed when they will be disclosed): Dos Bocas refinery, the Tren Maya, the Transisthmian Train, the Mexico-Toluca Train, and the Felipe Angeles Airport, which absorbs the expenditures for the cancellation of the Texcoco Airport. In conjunction, all those expenditures add up to 4% of annual GDP. As a consequence, the Public Sector Borrowing Requirements (PSBR), equivalent to public debt, almost tripled from 2.1% of GDP in 2018 to 5.7% in 2024 (SHCP, 2025).

Meanwhile, all methods of measuring poverty (income, labor, extreme, multidimensional) decreased significantly during the six-year period (INEGI, 2025b). This occurred regardless of the quality of employment, health, public education services, and everyday infrastructure usage (streets, roads, ports, telecommunications, airports, etc.). As Hansen (1974) predicted, providing resources to people through social policy to fulfill the promises of the Mexican Revolution finally became more important than providing quality services and assisting the country in addressing its investment needs for development.

Even historical programs such as targeting the most needed people to address poverty and the National Employment Service, which provided stipends for unemployed people in some regions and supported worker qualification and requalification to increase productivity, were dismissed. Many reforms in strategic sectors were reversed, as well as in the political, judicial, and electoral spheres. Summing up, concerns about day-to-day issues became more important than concerns for the future, and planning ceased to be a significant component of government policy.

Regarding the seven core tasks of the oil policy outlined, only the first, the legal reversal of the 2013–2014 energy reform, whose outcome was

predictable given the overwhelming majority of MORENA and its allied parties in Congress, and the fourth, the consideration of citizens' opinions, including fracking, contracts, and daylight saving time, were fully accomplished. The success of this clearly depended on the government's popularity. We now move on to the five tasks that were not met.

Although an increase in hydrocarbon exploration and production was desired and circumstances demanded, the steps taken seemed designed to achieve the opposite. In this regard, the number of exploration and development wells decreased; the bidding process for blocks was paused; disputes arose with some private companies over the delimitation of the resources that were due to them vis-a-vis PEMEX; no work was done on exploration and exploitation in the deep waters of the Gulf of Mexico, despite the discovery of the Trion field in 2012, and the use of fracking was banned, without which the recovery of shale oil and gas from the north-northeast region of the country, as an extension of the Eagle Ford formation in southern Texas, seems difficult. Additionally, gas condensates were classified as liquid hydrocarbons to cushion the fall in domestic crude oil production, which, like natural gas production, fell in early 2025 to levels not seen since the 1970s. The Quesqui field, discovered in 2019 in Tabasco, and the Ixachi field, discovered in 2017 in Veracruz, played a key role in this. These fields came online during AMLO's administration, contributing 25% to liquid hydrocarbon production and 40% to gas production.

Although the strategy followed to achieve self-sufficiency in refined products and fertilizers made some progress, it also absorbed far more resources than budgeted, without meeting expectations. The three main instruments to achieve this were the construction of a new refinery, the recovery of the productive capacity of the six operating refineries, and the restart of several ammonia production plants to ensure sufficient nitrogen fertilizers. The Dos Bocas refinery, which was expected to enter full operation first in 2022 and then it was postponed to 2024, at a total cost of US\$8 billion, only began refining oil at 25% of its capacity in April 2025, at a cumulative cost of \$21 billion. The refurbishment of the six existing refineries, particularly to accommodate more crude produced in the country, Maya, was not possible because the coking plants at the Tula and

Salina Cruz refineries were not completed. Thus, the fuel oil/gasoline production ratio remained at nearly two-thirds, at a time when fuel oil is viewed as an undesirable byproduct of refining, given its high sulfur content and other harmful substances. Its use for maritime transport was eliminated in accordance with the International Maritime Organization. Likewise, the CFE has begun a process of reducing its use for electricity generation.

Regarding fertilizers, the rehabilitation of the public agro-industry enterprise Pro-Agro, in the Cosoleacaque Petrochemical Complex, was not enough to achieve self-sufficiency. At least three other ammonia plants, two urea plants, the Lázaro Cárdenas plant, and a phosphate rock mine in Baja California Sur must be rehabilitated. Furthermore, while on one hand the objective of self-sufficiency was established and the obligation of the federal government to provide fertilizers free of charge, without intermediaries, to small agricultural producers was included in Article 27 of the Constitution, on the other hand at the end of the six-year term, ammonia exports had to be increased, given the impossibility of producing all the fertilizers internally.

Public opinion played a very important role in several momentous decisions during AMLO's administration, starting with the cancellation of the Texcoco airport. Similarly, it was argued that citizens were unhappy with handing over portions of the national territory and its maritime border to foreigners (mainly related to license contracts, which were equivalent to concessions) for the exploitation and extraction of hydrocarbons. On this basis, not only were the tenders awarded by SENER to these companies during the previous administration reviewed, but the entire bidding process was also suspended from December 2018 onwards. Similarly, the communities' position regarding the installation of facilities for hydrocarbon exploration and exploitation, including fracking, was taken into account. Dissenting voices were also heard regarding the installation of towers for wind power generation and the diversion of irrigation water for consumption by thermoelectric plants (as in the case of Huexca, in Yecapixtla, Morelos, whose production remains unreported due to several pending injunctions). In particular, it was argued that the energy sector could not be placed above the interests of these communities, and that the compensations referred to in the 2013-2014 energy reform failed to take into account their

historical achievements, such as agrarian reform, or their ancestral roots. In the same vein, arguments were invoked regarding the health problems affecting people, particularly emotional and cardiac issues, due to the implementation of daylight saving time (DST) in 1996, which will be eliminated starting in 2023.

All of these actions, perhaps justified for a considerable portion of the population, since they appealed to national sovereignty, among other things, were not justified for energy self-sufficiency, per capita GDP growth, and economic development. Perhaps for this reason, the latter two aspirations, as ingredients of collective well-being, were not accepted in planning documents or official discourse. The idea of happiness was, however.

The priority given to refined fuel production over crude oil exports never materialized. On one hand, the increase in refined fuel production was not consolidated, as Dos Bocas did not begin operations in the planned year, nor were the six existing refineries modernized. Thus, the increase in gasoline production was not felt until 2025. On the other hand, the lower crude oil exports occurred not as a deliberate policy, but because domestic hydrocarbon production showed a steady decline over the seven years reported. What was observed was an improvement in PEMEX's trade balance, which at the end of the period showed positive figures, although this was due to the fact that many fuel imports were made by private companies (gas stations with brands other than PEMEX represent 38% of the total), and to the start of a savings process in the transportation sector thanks to new technology vehicles. Despite these economic and social objectives, the real prices of fuel and fuel theft in its various forms grew year after year, with only a few exceptions. In concrete terms, the price of Magna gasoline increased faster than inflation, with the exception of 2020, the year of the COVID-19 pandemic, when the international price of crude oil slowed, and therefore the price of imported gasoline. Furthermore, the government did not fully implement the IEPS for gasoline and diesel, as it did starting in 2024, when spending on flagship projects, social programs, and support for PEMEX approached 4% of GDP.

Regarding the fight against fuel theft, whose resources were supposed to finance social programs, not only did the theft continue after a reduction during the first two years of the six-year

term, but other forms of theft, such as fiscal huachicol, were also discovered. This involves tax evasion through the symbolic payment of customs duties on gasoline, and especially diesel, which is more expensive in the domestic market than diesel, by declaring the product with a substantially lower tariff rate, generally automotive oils, lubricants, or alcohols. Furthermore, they would not be subject to the IEPS. For this reason alone, the government would have lost 140 billion pesos in revenue in 2024. Added to this figure are punctures of gasoline, diesel and gas pipelines; theft from operating centers, mostly refineries; clandestine refining in home plants, and different forms of corruption inside PEMEX and in collusion with certain authorities, contractors and organizations linked to the company.

Far from improving, PEMEX's financial situation worsened during his six-year term, as evidenced by the fact that it lost the investment grade it had enjoyed with the credit rating agencies Fitch Ratings and Moody's. Having ceased to be an EPE and transformed into a public company, many of its problems were automatically passed on to the federal government, which provided ongoing support: it granted exemptions and tax and fee reductions (particularly the DUC), paid part of its debt service, made contributions to its assets, etc. The sum of these expenditures during the six-year term amounted to 2.1 trillion pesos, which, when averaged over the year, represented 1.3% of GDP. Likewise, its debt balance continued to grow; short-term debt now represented nearly a third of the total; maturities were shortened and concentrated in 2025 and 2026; The company's external debt remained close to US\$100 billion, and it was unable to honor payments to its suppliers and associated companies, which caused their support for hydrocarbon extraction to decrease. Given that the company's total value at the end of 2024 was 2.86 trillion pesos, well below its 4.2 trillion pesos debt, from an accounting perspective, it was bankrupt, and from being an asset to the government, it became a liability.

VI. CONCLUSIONS

Since the 21st century, PEMEX has been excessively resistant to change. First, its production has fallen from the peak of 3.383 MBD and 4,570 MCFGD in October 2004 to 1.627 MBD and 4,500 MCFGD in April 2025. Second, its reserves have fallen from 18,895 BBCE in 2004 to 8,383 BBOE in

2024. But since in the same years the number of employed people fell from 137,700 to 129,000, the output per person employed fell from 24.6 barrels per day in the first year to 12.6 barrels in the second. Besides, proven reserves decreased from 13 to 8.4 billion barrels of oil equivalent (BBOE) between 2015 and 2024, and although some gas wells were discovered, oil remained the primary focus. By 2024, the reserves/production ratio stood at just 8.7 years.

It is therefore not surprising that the company's external debt increased from US\$31.5 billion at the end of 2004 to US\$97.632 billion by the end of 2024. With the company's service providers, the accumulated debt was over US\$21 billion by the latter period. The government supported the enterprise with different kinds of transfers: operating capital, financial capital, tax reductions, tax deferrals, and others, amounting to 1.3% of GNP per year.

Although the 2013–2014 energy reform faced obstacles, primarily social, due to the significant role that the progressive government of Lazaro Cardenas (1934–1940) granted to the oil and electricity industries when the former was nationalized in 1938 and the latter created in 1937, it was recognized at least since 2005 that times had changed. Without improving PEMEX's operational efficiency, accelerating the exploitation of new fields while assuming only partial risks, and opening the industry to cutting-edge technology, the state enterprise could not guarantee enough hydrocarbons and a promising future for the development of Mexico.

The experiment of the energy reform lasted only four years, from 2015 to 2018, during which many private oil companies, both national and international, acquired the right to explore and exploit 111 land and sea areas through bidding, most of them in consortiums, including PEMEX. As support for the process declined from 2019 onwards, both reserves and production decreased, and the State efforts were concentrated on oil refining, which after significant expenditures yielded some results by the end of the six-year term. For these reasons, in general the oil industry, of which PEMEX represents 95% in terms of production, is in a worse situation in 2025 than in 2018.

The new administration has changed the name of the contracts through which private companies collaborate with PEMEX. They are now

called mixed contracts, and the production-sharing, profit-sharing, and licensing contracts, which were the most important during the 2015–2018 administration, have in the short run been omitted. In the new arrangements, PEMEX must be the operator and own at least 40% of the project. Several large private companies, both national and international, have expressed interest in exploring and exploiting areas such as the deepwater Gulf of Mexico, the Burgos Basin, and inland hydrocarbon deposits. However, there is likely to be much negotiation ahead before they decide and be allowed to resume operations.

To achieve growth in the industry, new reserves need to be discovered and developed at a faster rate than extraction, which poses a challenge despite the declining domestic demand for refined products and controlled exports. In this sense, the oil industry, 95% in PEMEX's hands, must be redirected to increase hydrocarbon exploration and production, as well as the utilization rate of installed refinery capacity. Similarly, PEMEX needs to increase its productivity and competitiveness, concentrate on the most important aspects, and reduce its financial pressures with banks, service providers, and the government. Can investors and PEMEX trust energy planning direction to make long-term decisions and achieve these challenges?

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