Quest Journals
Journal of Research in Humanities and Social Science
Volume 12 ~ Issue 12 (2024) pp: 17-22
ISSN(Online):2321-9467
www.questjournals.org

Research Paper

Energy Policy of the Government of México

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ABSTRACT
The 2019-2024 National Development Plan (PND) embodies the objective of rescuing the energy sector by supporting PetróleosMexicanos (PEMEX) and the Federal Electricity Commission, which carry out strategic activities so that they can act as promoters of development. competitiveness, economic growth and employment.
The energy policy of the 4t is embodied in the sectoral energy program 2020-2024 in which the rectory of the state in the energy sector is manifested based on the Political Constitution of the United Mexican States (CPEUM) in order to carry out end the provisions of the National Development Plan, precepts of the head of the federal executive as well as obligations of the Mexican state derived from international treaties and agreements.
The energy policies of the current administration of the Mexican state are embodied in the 2020-2024 energy sector program aligned with the 2019-2024 National Development Plan, in observance of articles 25, 26, 27 and 28 of the Political Constitution of United Mexican States, in accordance with the powers granted to SENER by the Planning Law and the Organic Law of the Federal Public Administration and other applicable legal regulations. Mandatory compliance for sectoral regulatory bodies, sectoral institutions, EPE and research centers grouped in SENER in the exercise of their functions. The main objective of the program is the rescue and promotion of the energy sector; specifically productive state companies, decentralized agencies and research institutes, in order to achieve self-sufficiency and energy security. Within the same scope, the transition towards renewable energies of the current national energy matrix is established

***R**eceived 27 Nov., 2024; **R**evised 03 Dec., 2024; **A**ccepted 05 Dec., 2024 © The author(s) 2024.*
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I. FUNDAMENTALS

The 2019-2024 National Development Plan (PND) embodies the objective of rescuing the energy sector by supporting PetróleosMexicanos (PEMEX) and the Federal Electricity Commission, which carry out strategic activities so that they can act as promoters of development. competitiveness, economic growth and employment.

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From the outset, article 25 of the Constitution indicates that the state is responsible for national development in order to strengthen the sovereignty of the nation when planning and conducting the economic activity of the country, according to the general interest of priority areas in order to generate conditions that increase economic growth and employment. Anticipating that the federal government maintains the property of productive state companies (EPE), with respect to which it will establish the adequate policies of personnel administration in order to guarantee its effective operation, transparency and accountability of the same.

In the same article 27 of the Constitution, it establishes the inalienable and imprescriptible domain of the nation of all natural resources such as solid mineral fuels and hydrocarbons, of which their exploitation and use will be made through concessions granted by the federal government, with the exception of strategic areas. . Likewise, the federal government can reserve and suppress them, carry out exploration and exploitation activities through allocations and contracts.

Article 28 of the Constitution establishes that the activities of the state of planning and control of the national electrical system as well as distribution and transmission of electrical energy are strategic activities that do not constitute a monopoly; applying equally to the exploration and exploitation of hydrocarbons, radioactive minerals and their use in the production of nuclear fuels and generation of nuclear energy.

In accordance with the aforementioned foundations, the 2020-2024 energy sector program is the governing instrument for planning the energy sector, where priority objectives and strategies are integrated that, through specific actions, will be implemented by the Ministry of Energy (SENER) as leader of the sector. , coordinating with EPEs, decentralized administrative bodies, parastatal entities and regulatory bodies.

Article 26 of the CPEUM, section A, establishes the organizational bases of the democratic planning system for national development through a National Development Plan in order to conduct the programs of the Federal Public Administration, among which are the sectoral programs. governing activities of each administrative sector, including estimates of resources and decisions on instruments and those responsible for their execution.

In turn, article 16 section III of the Planning Law grants SENER the power to prepare the sectoral program, taking into account the needs of each entity in the sector, autonomous constitutional bodies and governments of the federal entities, and may even derive of social actions and native indigenous communities.

The international agreements and treaties to which Mexico is a party and which are therefore integrated into the country's energy policy principles are the United Nations Framework Convention on Climate Change, the Kyoto Protocol, the Paris Agreement, the 2030 Agenda for Sustainable Development and the Intergovernmental Panel on Climate Change, and is therefore considered in the sectoral program.

On the other hand, the federal laws involved in the planning of activities in the energy field to be considered are the Organic Law of the Federal Public Administration, the Planning Law, the Hydrocarbon Law, the Hydrocarbon Revenue Law, the PetroleosMexicanos Law, and the Electric Industry Law. , Federal Electricity Commission Law, Electricity Industry Law, Energy Transition Law (LTE), Geothermal Energy Law, Regulatory Law of Article 27 of the Constitution on Nuclear Matters, General Climate Change Law (LGCC). Law for the Promotion and Development of Bioenergetics, due to the fact that they expose the powers of SENER related to the elaboration of the sectoral program.

The aforementioned sectoral program is the governing planning instrument to direct the institutional programs of parastatal entities in the sector and align the strategy for the promotion and transition of the Use of Technology and Cleaner Fuels, the Special Program for Energy Transition, the National Program for the Sustainable use of energy, based on the LTE, the National Electric System Development program, the Indicative Program for the Installation and Retirement of Power Plants, the Expansion and Modernization Program of the National Transmission Network and General Networks of Distribution of the Wholesale Electricity Market, the Smart Electric Networks Program, the National Standardization Program of the National Commission for Nuclear Safety and Safeguards, the Energy Efficiency Program of the federal Public Administration of the National Commission for the Efficient Use of Energy (Conuee), National Refining Plan on, National Plan for the Production of Hydrocarbons and the Business Plan of Pemex and CFE.

SENER is the body in charge of publishing, executing and monitoring the sector programme.

The resources for the execution of the program in relation to objectives, strategies, specific actions, coordination, operation, monitoring and reporting thereof are charged to the corresponding allocations of executors of the program during its term.

CURRENT STATE OF THE ENERGY SECTOR

According to the National Hydrocarbons Commission (CNH, s/f) In 2019, the downward trend in hydrocarbon production that had been for crude oil since 2004 and for natural gas since 2009 was reversed, by achieving an inflection with a positive trend of 5.7 and 9% respectively (cited by SENER, 2020).

In the same vay, with the rehabilitation program of the 6 refineries, stoppages were reduced by 67%, going from 48 to 16 in them.

Sistrangas is made up of the national gas pipeline system with the Tamaulipas gas pipeline, Zacatecas gas pipeline, Bajio gas pipelines as well as the Ramones I, Ramones II and Ramones Sur gas pipelines, which corresponds to 10,336 km controlled by the NationalNatrural Gas Control Center (CENAGAS), of a total of 17,210 km that make up the national natural gas transportation network. The rest of the pipeline length is managed by the private sector and therefore not connected to Sistrangas (SENER, 2019). 86% of this infrastructure is located in the north of the country and the rest in the south. In October 2019, 1,679 km were under construction. Sistrangas has not been able to supply natural gas to the southeast of the country due to the decline in production in the last 10 years due to the decrease in investment in gas-producing fields as well as the need of gas for pneumatic injection in oil producing fields.

For its part, SIE-PEMEX (s/f) indicates that the production of petrochemicals has been in constant decline since 2010, until in 2018 a 69% decrease was recorded compared to 1995, the year of maximum production in the subsector with 19,271 thousands of tons (cited by SENER, 2020). The PEMEX 2019-2024

Business Plan provides for the reintegration of the Cosoleacaque Petrochemical Complex for the production of fertilizers as well as increasing the operational reliability of the Morelos and La Cangrejera Petrochemical Complexes for the production of aromatics, ethylene and derivatives.

Regarding the effective electricity generation capacity of the CFE, Independent Power Producers (PIE) and other permit holders connected to the grid, it was 70,053 MW, with 59.2% belonging to the CFE, 19.2% of the PIE and 21.6% to the rest of the permit holders while that energy consumption was 317,278 GWh, of which 51% was produced with combined cycle plants, 13.2% with conventional steam thermal plants, 10.2% hydroelectric, 9.2% coal-fired, 4.3% nuclear , 3.9% wind power and the remaining 8.2% with other sources. Therefore, the gross production of electrical energy with renewable sources was 23.2%, even without reaching the goal of 25% registered in the LTE.

The National Transmission Network (RNT) allows electricity to be conducted from generation plants to the General Distribution Networks (RGD) and industrial zones. Until the end of 2018, it is made up of 108,018 km of network with 51% of lines from 161 to 400 KV and the rest from 68 to 138 KV, with a transformation capacity of 113,143 MVA. Through the RGD, energy is supplied to homes as well as to medium and small companies through a laying of 838,831 km in medium and low voltage, 2100 high to medium voltage substations with a capacity of 75,151 MVA and 1,489,503 medium to low voltage transformers with a capacity of 55,156 MVA.

Through the SAIDI, SAIFI and CAIDI quality and continuity indices, the following indicators are available: 26.98 minutes/user, 0.50 interruptions/user and 53.76 minutes/interruption. In the RGD there are losses of 13.45% equivalent to 31,455 MWh, broken down into technical losses with 5.92% (13,835 MWh) and non-technical losses 7.54% (17,621 MWh).

In the LIE, with the electrical reform it is contemplated that all the facilities granted before the reform are maintained, incorporating private organizations in a disadvantageous way for the CFE, by creating the subsidiary called CFE Legacy Contracts in order to carry out the administration and operation of the private agents, with which there were losses of 7,820 million pesos in 2018. The duration of the aforementioned legacy contracts are scheduled until 2039, thereby generating losses of 160,000 million pesos.

The presence of private companies in the SEN consists of 255 self-supply facilities for small production, import and export, generating 45.8 TWh, which covers 14% of national consumption (CFE, 2018, page 138).

The MEN began operations in January 2016, still going through an implementation stage causing energy imbalance. Despite the growing number of private organizations involved in the market, the CFE, through its EPS and subsidiaries, practically represents the total demand and 90% of the SEN's production capacity. This includes the representation of legacy plants and contracts and private producers in the MEM.

The aforementioned problems must be overcome through a new energy model in which sustainable energy self-sufficiency is achieved. For which, hydrocarbon exploration activities, construction of hydrocarbon processing infrastructure must be increased, seeking to reduce dependence on imports, satisfying the demand of the national market with own production. Increasing the generation of electrical energy, specifically with alternative energies seeking to achieve goals of the LGCC and LTE in terms of environmental impact and reduction of emissions.

Strengthening the productive companies of the Mexican State and with it energy security and sovereignty as well as the promotion of national development seeking to synergize the private sector.

Regardless of representing one of the most important inputs for all economic activities, the influence of the energy sector is reflected in 2 indicators: in 2018 the production activities of crude oil and natural gas as well as electricity generation, distribution and transmission represented 4.6 % of the national GDP (National Institute of Geography and Informatics Statistics, s/f) and the contribution of 19% of PEMEX to the income of the federal budget (Secretary of Finance and Public Credit, 2018).

Regulations and asymmetric tax regimes limited the free participation of SOEs in the energy sector, an example of this was the agreement A/057/2018 that established for PEMEX Industrial Transformation (Petri) the methodology to determine first-hand and terminal sales prices of storage, with which there were losses for the state-owned company and its prices remained capped while the competitors knew in advance the sale prices of PEMEX. The aforementioned agreement was repealed by the Energy Regulatory Commission (CRE) on December 16, 2019 through agreement A/043/2019. Through a modification to the agreement, on February 22, 2019, a regulation of the import-export of hydrocarbons and petroleum derivatives was established, through which it is required to demonstrate access to suppliers, logistics and clients for the development of the activity to the applicants for the respective permit, in order to clarify the respective market.

The imposition of an overloaded fiscal regime on PEMEX brought with it an excessive increase in its debt, doubling during the past six-year term and reaching 2.12 trillion pesos in 2018 (PEMEX, 2019, page 56) .

On the other hand, the decline in the production of crude oil and natural gas dating from 2004 and 2009 respectively, has been reversed in the present administration since 2019 by showing an inflection and starting to

have an increase of 5.7 and 9.0% correspondingly. and equally allocate an investment of 210,746 million pesos for PEMEX Exploration and Production, 31% higher than in 2018.

Given the problem of recent years of increased unscheduled stoppages at PEMEX refineries and the consequent decrease in the volume of crude oil refined in the National Refining System (SNR), a program was implemented to rehabilitate the 6 refineries and increase its level of reliability through an investment of 25,000 million pesos of which in 2019 12,500 million pesos were applied for the procurement, purchase of spare parts and equipment, the culmination of the program is anticipated for 2020.

Along the same lines, on December 9, 2018, the construction of a new refinery in Paraiso, Dos Bocas, Tabasco was announced. SENER granted Petri the respective refining permit after complying with the applicable regulations. Construction began on May 24, 2019, when the contract for the conditioning of the Dos Bocas construction platform was awarded and the award of 6 engineering, procurement and construction packages for the work on July 26, 2019 (SENER, 2020).

For the generation of electricity by private entities and based on article 12, section I of the LIE, the CRE granted 1,188 electricity generation facilities to private generators, known as Independent Power Producers (PIE) for the generation of 84,491 MW and 165 facilities for the CFE for 45,558 MW. Through self-supply contracts, they disguised themselves as "partners" who, by contributing shares with minimum capital, had access to subsidized rates for carrying electricity using the CFE's transmission and distribution infrastructure.

The figure of External Power Producers (PEE) refers to private companies with independent generation for exclusive sale to the CFE. For which land purchase permits, feasibility studies, construction of plants and their interconnection to the electricity grid, as well as fuel supply, were granted. At the end of the contracts, the generation plants will not become part of the CFE. Under this scheme there are 31 facilities with an installed generation capacity of 14,104 MW with guaranteed sale of energy to the CFE for 25 years. In cases of force majeure that prevent these facilities from generating electricity, they may be exempt from liability, but with access to the collection of fixed charges. All the aforementioned situations embodied in the Terms of Strict Legal Separation, which include responsibility for cost coverage for natural disasters, generate cost overruns in the production of electricity.

In order to allow the power generation plants from renewable energies to come into operation, the CRE granted facilities based on article 17 of the LIE, giving rise to the need to expand the RNT, which has not occurred. since the enactment of the energy reform generating a technical and economic challenge for the CFE. Additionally, differences between authorized and actual collection rates cause losses for the parastatal. As an example of the above, the case of 2018 can be analyzed, in which the total reported costs of the MEM and the Basic Supply services were 533,444 million, the income for CFE basic supplies was in the order of 390,039 million pesos; The transfer of resources considered in the federation's expenditure budget was 81,405 million pesos, which in sum presented a deficit of 61,999 million pesos. In addition, the real costs of electricity generation with legacy contracts were 358,872 million pesos, while those recognized by the CRE are 313,300 million pesos, resulting in a loss of 45,572 million pesos (CFE, 2019, p. 11). In the same way, the portage fee for these contracts is charged at an amount lower than the actual cost, originating an estimated subsidy of around 7,000 million pesos.

Delving into electricity rates, these generally had an adjustment of 17% from 2016, specifically the one that had the highest increase was public service (water and lighting) with an increase of 31.6% seriously impacting several municipalities, while the one with the lowest adjustment was domestic with 3.8%.

In short, the energy reform brought with it the financial and operational limitation of the CFE, which is why it is urgent to rescue it through an energy policy based on the national public interest that allows the CFE to participate under equitable conditions in the sector.

Given all of the above, in the PND numeral III. Economy The rescue of the energy sector is foreseen as a highly important objective through policies that promote the development of SOEs. With respect to renewable energies, in the first place the renewal of obsolete equipment of hydroelectric plants is proposed, at the same time the use of the same alternative energies is visualized to supply energy to small isolated communities where around 2 million people live.

ENERGY POLICIES OF THE GOVERNMENT OF MEXICO

The energy policies of the current administration of the Mexican state are linked to priority objectives of the 2020-2024 Energy Sector Program in the manner described below.

Scientific, technological and industrial capacities required for the energy transition

Regarding the exploration and extraction of hydrocarbons, the national participation was expected to be 26.4% for shallow waters and land areas as well as 3.5% for deep waters in 2019 with a gradual increase up to 35% and 8% respectively with an investment of 47,871 million pesos. (National Hydrocarbons Commission (CNH), s/f), which represent 57% of the investment projected by SENER for the 2015-2019 period and verified

by the Ministry of Economy. In order to increase this participation in the activity, it is considered to increase both investment and technology transfer in the sector. Regarding this last item, in 2011 there were 6,843 professionals in the area, while in 2017 there were already 4,210. This is why it is essential to improve the industry-academy link, including the training of high-level human resources (IMP-ININ-INEEL, s/f).

Due to the aforementioned deficit of highly qualified personnel in the country, this situation is reflected in the technological balance of payments with a deficit of 171 million in 2017, since the transactions of the subsector did not exceed 200 million pesos in the period 2013- 2017 (Conacyt, 2017). Likewise, due to the lack of support for research and technological development activities, the country presents a low registration of patent applications of the order of 20 applications per million inhabitants, while in contrast in a highly developed country technology such as South Korea where 4,669 applications per million inhabitants are registered. Similarly, in contrast to the national situation, in countries such as Brazil, Norway, the United Kingdom, and Saudi Arabia, the aforementioned academy-industry link is achieved through strategic management in which needs, challenges, and problems are detected; Short, medium and long-term objectives and goals are set, solutions are developed and applied, as well as the evaluation devices. In this sense, the priority objective of the energy sector program ¨Scientific development, technology and national industry¨ seeks to establish a diagnosis of the particular technology requirements for solving problems in the sector, the above aligned with the guiding principle of the PND ¨Economy for well-being¨ (World Intellectual Property Organization, s/f).

In the Prodesen 2019-2033 and SENER's First Work Report of September 1, 2019, the rescue of the energy sector is reflected, specifically in Principle 7 development of national science, technology, engineering and industry for energy industrialization, Principle 14 training and permanent training of workers in the energy sector, and Principle 24 transition to renewable energy on science, technology and national production of the required capital goods and equipment, for which specialized personnel committed to such principles are required. . Given which investment in research, development and technological innovation and its implementation to achieve energy sovereignty becomes a decisive factor.

Elevation of efficiency and sustainability in production and use of energy in the country

Due to international GHG reduction commitments for climate change remittance, the LTE published in the DOF on December 24, 2015 states that SENER will establish as minimum goals the involvement of renewable energies for the generation of electricity, in a 25 % for 2018, 30% for 2021 and 30% for 2024. For this, the participation of the private sector has been promoted, however, the participation of the SOEs as well as the academic and professional sector is necessary for the development of the equipment production chain and electricity generation components with primary renewable energies, thereby promoting the generation of jobs, specialized technology in the area, as well as the training of specialized human resources. Along the same lines, the government of Mexico established as a priority objective of the Energy sector Program "Raise the level of efficiency and sustainability in the use of energy" seeking to mitigate the effects of climate change and respect for the rights of indigenous groups. and social neighbors of the areas of exploitation of natural resources, aiming to generate spaces for dialogue and participation in energy projects, in line with the guiding principle of the PND "Leave no one behind, leave no one out" (SENER, 2020).

Assurance of universal access to energy for the development of Mexican society

SENER-private sector interaction in past six-year terms was oriented to the commercial aspect since the government entity collected the respective recommendations in order to include them in policies and regulatory framework, but not with the social sector, with which generic rules were applied, giving rise to a poorly regulated situation. In this sense, the lack of infrastructure in the southeast is typical, as an example for the supply of natural gas in Yucatan, Quintana Roo and Campeche, given that during the Fourth Review of the Five-Year Plan for the Natural Gas Transportation and Storage System 2015 -2019, in the current administration, projects such as the reconfiguration of the Cempoala compression station that would be completed in early 2020 and the Mayacan interconnection (Cuxtal I Project) were considered, through which the Yucatan Peninsula will be supplied with natural gas to the be completed in the third quarter of 2020.

Part of the problematic consequence of the application of only commercial criteria towards the social sector in electricity generation projects from renewable sources is mainly in the occupation of surfaces, when business rights are prioritized over those of the communities residing in the areas, a situation that has to be corrected through the application of rights policies and justice criteria for conflict resolution.

For this purpose, the 2020-2024 energy sector program established the priority objective "Ensuring universal access to energy, so that all Mexican society has access to it for its development" with a view to protecting the rights of indigenous peoples. and marginalized social groups (SENER, 2020).

CONSOLIDATION OF THE ENERGY SECTOR FOR SYNERGY WITH NATIONAL DEVELOPMENT

As stated, by 2018 the production of crude oil and natural gas had been reduced by almost half. In this area of the 103 contracts awarded to private companies by bidding, only 35 of them had a production during 2019 of 16.7 thousand barrels per day, which represents only 1% of national production. Based on this, during 2018 the tenders were canceled and PEMEX develops the corresponding exploration and exploitation works with its own resources. As a result of this management of the oil sector focused on exploitation and almost no exploration, the durability of proven reserves dropped from 22 years in 2000 to 8.5 years in 2018.

In order to reverse the risks that may derive from the above, possible interruptions in the energy supply that expose the country's economic and social activities to discontinuity, it is essential to ensure the stewardship of the state in energy matters through the necessary investments in SOEs in order to preserve reserves of resources and infrastructure necessary for the adequate supply of energy and related inputs, with which energy sovereignty, economic development and national security will be achieved in order to maintain a dynamic participation in the world economy, based on a rational and sustainable use of renewable and conventional energy sources through scientific development and local technological and industrial innovation aimed at achieving the energy transition towards clean energy (SENER, 2020).

II. FINAL DISCUSSION

The energy policies of the current administration of the Mexican state are embodied in the 2020-2024 energy sector program aligned with the 2019-2024 National Development Plan, in observance of articles 25, 26, 27 and 28 of the Political Constitution of United Mexican States, in accordance with the powers granted to SENER by the Planning Law and the Organic Law of the Federal Public Administration and other applicable legal regulations. Mandatory compliance for sectoral regulatory bodies, sectoral institutions, EPE and research centers grouped in SENER in the exercise of their functions. The main objective of the program is the rescue and promotion of the energy sector; specifically productive state companies, decentralized agencies and research institutes, in order to achieve self-sufficiency and energy security. Within the same scope, the transition towards renewable energies of the current national energy matrix is established.

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