

MEXICAN POWER SECTOR POLICIES

Economic and Trade Impacts*

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Since taking office in December 2018, Mexico's president, Andrés Manuel López Obrador, has taken a series of steps that undermine private investment in the country's power sector, including its burgeoning renewable energy sector, and erode key aspects of the sweeping market-oriented energy reform approved by Congress under his predecessor in 2013. The moves appear driven by a desire to reduce private sector investment in the power sector and consolidate the monopoly of the state electric utility, the Federal Electricity Commission (CFE)¹, as part of López Obrador's goal to achieve "energy sovereignty" for Mexico.

The regulatory changes affecting the electric power sector have broader implications for Mexico's economy and its trade and economic relations with its key North American trading partner, the United States. These recent steps have deterred investment in Mexico's wider energy industry and other economic sectors by raising the perception of regulatory risk. Investors in Mexico and the United States have already taken legal action against some of the regulatory changes. The new regulations could also have detrimental impacts on cross-border trade in energy and other goods and services. Higher electricity tariffs could raise the cost of Mexican export products and undermine the ability of US companies to diversify their supply chains and relocate some operations from China to Mexico in a "nearshoring" process. Within Mexico, some of the gains

in the power sector in creating private sector jobs and lowering electricity costs through competitive auctions could be lost.

Energy Policy Changes and Impact on Private Investment

López Obrador's administration has sought to steadily strip away key aspects of the 2013 energy reform and systematically undermine private investment in the power sector, as outlined below.

In December 2019, a "wishlist" prepared by CFE was leaked to the public. In it, CFE requested a series of regulatory modifications to strengthen its position in the market vis-à-vis private companies. Many of its requested changes, including the latter six of the eight policies outlined below, have since been enacted, though many have subsequently been blocked in court. In July 2020, the energy ministry (SENER) published the 2020-2024 Energy Sector Planning Program, a policy planning document, which established a series of strategies and objectives, including strengthening CFE and modifying the rules of the

1. All acronyms refer to the Spanish abbreviation

*This policy brief presents the initial findings of a forthcoming report to be published by the Dialogue in October 2020.

wholesale electricity market in alignment with regulations that undermine private investment in the power sector. In a recently leaked memo to public officials and regulators dated July 22, López Obrador laid out a list of actions he said should be undertaken to strengthen Pemex and CFE, including supplying national electricity demand first from hydropower, then from CFE plants, then from private wind and solar projects, and lastly from private combined cycle plants (which generate using both a fuel and the heat produced by combusting that fuel).

Many of the regulatory and policy changes have been challenged in court by companies and environmental organizations and could be overturned. However, regardless of the final outcome, the government's approach has deeply undermined investor confidence in Mexico.

1. CANCELLATION OF LONG-TERM ELECTRICITY GENERATION AUCTIONS

What happened? January 2019: CENACE, the power system operator, cancelled Mexico's planned fourth long-term clean energy auction at the request of SENER, marking the indefinite cancellation of government-led clean energy auctions in the country.

What's the impact? The cancellation closed the main mechanism to bring private investment to the sector and came as a surprise to investors, given that the three tenders held under the previous government had been highly successful in bringing new investment for projects providing energy at very competitive prices in a transparent process. The end of the auctions leaves CFE with fewer options to buy energy from new sources, forcing it to rely more on its older, more polluting fossil fuel plants.

2. CANCELLATION OF TRANSMISSION AUCTIONS

What happened? January 2019: SENER and CFE cancelled two megaprojects for the development of high-voltage direct current transmission lines. The CFE Yautepec-Ixtepec Line, spanning six states, would have transported wind energy generated in the wind-rich southern state of Oaxaca to the central part of the country, which has high industrial and residential electricity demand. The SENER project would have connected the Baja California Electric System, isolated from the rest of the country, with the National Interconnected System (SIN), the country's largest electric grid.

What's the impact? The projects would have reduced congestion costs, thus lowering electricity rates, and encouraged expansion of generation projects, improving reliability of the national grid.

3. RELAXATION OF CFE'S TERMS OF STRICT LEGAL SEPARATION

What happened? March 2019: SENER published an amendment to the "Terms of Strict Legal Separation" of CFE, which were originally published in January 2016 as part of the energy reform in an effort to safeguard open access to the grid, efficient operation, and effective competition in the power sector. The amendment reverses parts of these terms, for example, allowing CFE to share information on operation, planning, maintenance, and commercial strategy among some of its own subsidiaries, coordinate its subsidiaries to benefit from economies of scale and create efficiencies, and share employees in some cases.

What's the impact? The way these amendments favor CFE could imply negative impacts on the market, due both to the increase in the firm's market power—which is already significant—and to the elimination of mechanisms that seek to prevent collusion between its subsidiaries, as noted by the Mexican antitrust surveillance organism (COFECE).

4. CLEAN ENERGY CERTIFICATES ISSUED TO CFE'S LEGACY POWER PLANTS

What happened? October 2019: SENER amended the regulations for Clean Energy Certificates (CELs), which are financial instruments that accredit the production of clean energy, providing clean power generators with additional income to that of the sale of energy. Under the Electricity Industry Law, only clean energy plants that obtained generation permits after the law took effect in August 2014 could obtain CELs, which encouraged the expansion of new clean energy generation. However, SENER's amendment expanded the type of plants that could receive CELs to include several legacy hydroelectric, thermoelectric, and nuclear power plants owned by CFE.

What's the impact? This move would have flooded the market, driving CEL prices down and negatively impacting the value of most private clean energy generators' assets. However, private generators challenged this measure in federal courts, where several injunctions have been granted, and, as of today, the measure has not been implemented.

5. CRE'S AMENDMENT PROPOSAL FOR SELF-SUPPLY GENERATION PERMITS

What happened? February 2020: the Energy Regulatory Commission (CRE, the power sector regulator) issued a draft regulation proposing to change the terms to request authorization to modify or transfer self-supply electricity generation permits. The proposal is currently under the regulatory improvement process before the National Commission of Regulatory Improvement (CONAMER).

What's the impact? The measures would effectively block the rights of generators that obtained permits before the energy reform to modify their permits and interconnection agreements under the abrogated Electric Power System Public Service Law. The move would prevent them from changing the volume of generation output or adding new partners as beneficiaries of the self-supply scheme.

6. CENACE'S COVID-19 GRID SAFETY RESOLUTION

What happened? April 2020: CENACE published a resolution on operational control of the national grid, citing the need to ensure grid reliability amid the drop in electricity demand resulting from measures to combat the Covid-19 pandemic. CENACE said it would suspend pre-operational testing of wind and solar PV plants in the process of starting commercial operation, impose electricity volume limits on key transmission lines, and review licenses requested by generators for scheduled maintenance. Perhaps most importantly, the resolution requires the participation of "must-run" power plants in some regions of the National Electric System (SEN) to maintain control of voltage regulation in the system.

What's the impact? The resolution has been suspended for now following a series of lawsuits. If enforced, this measure would hurt all recently built renewable power plants that need testing to start operations. Critically, the resolution does not indicate whether market rules will be used to determine dispatch of must-run plants or whether the decisions will be discretionary. If market rules are bypassed, must-run plants could displace variable renewable energy generators that would otherwise have priority dispatch according to the economic dispatch principle of Mexican regulation, which holds that the cheapest energy source should be dispatched first. The resolution aims to benefit older, more expensive, and more polluting fossil fuel power plants, such as fuel oil plants owned by CFE.

7. SENER RELIABILITY POLICY

What happened? May 2020: SENER issued a policy establishing "reliability" as the core principle to allow interconnection to the SEN and to dispatch energy, establishing interconnection priority for the projects specified as strategic to SENER.

What's the impact? By prioritizing certain reliability criteria over lowest marginal cost for dispatch, the policy effectively blocks the supply of intermittent renewables and other conventional technologies and favors dispatch of CFE plants that would otherwise be excluded, particularly fuel oil plants. It violates the economic dispatch principle and will raise electricity costs by requiring generation from more expensive plants. Power companies and environmental groups have challenged the policy and obtained injunctions that halted its application until a final decision is made.

8. INCREASE IN TRANSMISSION TARIFFS FOR LEGACY INTERCONNECTION AGREEMENTS

What happened? May 2020: CRE adopted two resolutions increasing tariffs that projects with legacy interconnection agreements, including conventional and renewable self-supply projects built before the energy reform, must pay CFE for transmission of the electricity they generate. The increase ranges from 407% to 775%, affecting both renewables and efficient cogeneration projects under the self-supply scheme, according to the document released by CFE. The resolution violates the reform's Electricity Industry Law, which allows legacy projects to continue operating under the prior legal framework or opt into the new regime.

What's the impact? The decision is expected to lead to an increase in transmission tariffs for many industrial and commercial users, rendering some projects unviable and complicating the operation of existing plants. The tariff increase may affect more than 251 grandfathered renewable and conventional projects with an overall value of more than \$17 billion. Many generators have filed lawsuits against the measures and some federal courts have granted injunctions that freeze the new tariffs until the merits of the proceedings are decided. Normally these charges are paid by the beneficiaries of the self-supply schemes, so large energy consumers will be affected by these increases.

Economic and Trade Impacts

The policy changes described above, if implemented, will have detrimental effects that reverberate well beyond the energy sector, negatively impacting Mexico's economy and even trade with the United States. Within Mexico, the private power sector has helped boost employment, and if private sector-run plants are not permitted to come online, additional jobs will be threatened. Renewable energy equipment, particularly for wind, is an important source of US-Mexico trade and of employment in Mexico. A host of multinational companies in Mexico use private sources of power generation, which has allowed them to take advantage of lower electricity prices. Any rise in electricity costs stemming from measures that inhibit private investment in the power sector would have to be covered through an increase in tariffs to consumers or by government subsidies. Energy-intensive industries comprise a significant share of Mexico's GDP and are important sources of employment. Some of Mexico's largest producers in energy-intensive industries, like steel, beer, and automotive, have benefited from the opening to private investment in the power sector, allowing these companies to generate and consume cleaner energy at more competitive prices. These companies are also major exporters to the United States. But the recent policy changes will likely increase energy costs for companies in these industries, damaging their competitiveness in globalized markets and affecting consumer prices and employment in both Mexico and the United States.

Many major multinational companies depend on private sources of power generation, which has allowed them to take advantage of lower electricity prices. Private companies also supply a large share of total generation.

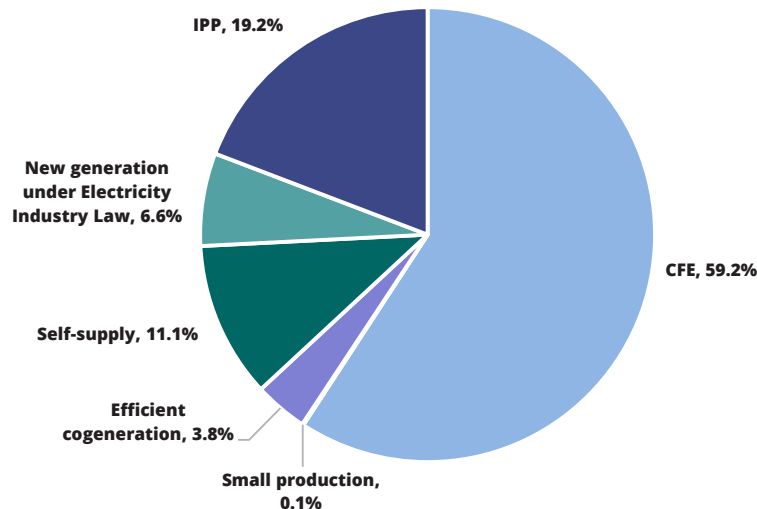
The main private participants in the wholesale electricity market are energy generators, qualified suppliers, and qualified users. Large-scale "qualified" users can enter the wholesale electricity market by participating directly as a market participant or purchasing energy directly from qualified suppliers (private or CFE qualified suppliers) at negotiated rates. In contrast, "basic" users, such as individual households, purchase power from CFE Basic Supplier at regulated tariffs established by CRE.

Qualified users constitute a large group of companies, including many major multinational companies that trade with the United States. As of February 2020, CRE reported there were 387 registered qualified users including various industries such as cement (Cementos Moctezuma), steel (Suacero), plastic manufacturing (Polímeros Nacionales), paint manufacturing (Consorcio Comex), food manufacturers (Nestlé México), and mining (Minera Excellon de México). These private companies generally purchase renewable or conventional power through bilateral contracts with private generators.

On the supply side, private players generate a significant share of total power. According to SENER, at the end of 2018, private producers accounted for 28.6 GW, or 40.8%, of the country's capacity compared to CFE's 41.5 GW (59.2%). Of private generation capacity at the end of 2018,

FIGURE 1: INSTALLED CAPACITY BY TYPE OF PERMIT (DECEMBER 2018)

Source: Infraestructura actual del Sistema Eléctrico Nacional 2019-2033, PRODESEN



Independent Power Producers (IPPs) accounted for 47%, with the other 53% supplied by generation permits under the Electricity Industry Law, self-supply contracts, small producers, and efficient cogeneration (see Figure 1). Private companies also generate a significant and growing share of their energy using renewable sources, especially when the energy is consumed by private companies through the wholesale market or self-supply. According to CRE figures, of around 10 GW of private capacity in the wholesale market, 53% is renewable; of 10.5 GW of self-supply capacity, 44% is renewable; and of 15.4 GW of capacity sold to CFE by IPPs and small producers, just 4.8% is renewable.

Before the reform, CFE generated power supply for basic users through both its own plants and by purchasing electricity from IPPs. This financing mechanism allowed international companies to build power plants and facilitated their connection to the grid. Currently, there are 31 of these power plants with a generation capacity of 14,104 MW which will provide power for CFE over the next 25 years, mainly from natural gas-fired combined cycle power plants. More recently, new projects have also come online after contracts were awarded in the clean energy auctions.

Privately-run energy generation projects in Mexico are generally cheaper than CFE-owned plants, meaning that the new policies seeking to limit private electricity supply in the power market in favor of more expensive CFE plants will prevent the decline in electricity costs that could be gained through private generation. Any rise in costs will have to be covered through an increase in tariffs to consumers or in government subsidies, which would ultimately be paid by taxpayers.

Generation costs are generally lower for privately-run power plants than for CFE plants. Costs for renewable energy technologies awarded in the three long-term auctions were the lowest of any technology and contract type in the first six months of 2020 (see Figure 2). This is partly a function of the lower marginal costs of renewables. While generation costs for conventional power plants vary depending on the type of fuel as well as the type of technology used and can fluctuate significantly due to movements in global energy markets, for wind and solar projects, once the plant is built, marginal generation costs are close to zero, since the primary energy is the wind and sun, and generating costs reflect only financing, operation, and maintenance costs. Costs are also falling fast for these technologies, as reflected in the low costs recorded

by projects awarded contracts in recent long-term auctions as opposed to older renewable projects owned by private companies and CFE, and projects that use conventional non-renewable generation sources. But privately owned conventional technologies in Mexico are also generally cheaper than CFE-owned conventional power plants. For example, IPP combined cycle plants had lower costs in the first six months of 2020 than CFE combined cycle plants. In addition, CFE uses more outdated and expensive technologies, like diesel and fuel oil.

The private electricity sector has helped boost employment in Mexico, providing tens of thousands of direct and indirect jobs, and the sector is poised for further growth. However, if private sector-run power plants are not permitted to come online, additional jobs will be threatened.

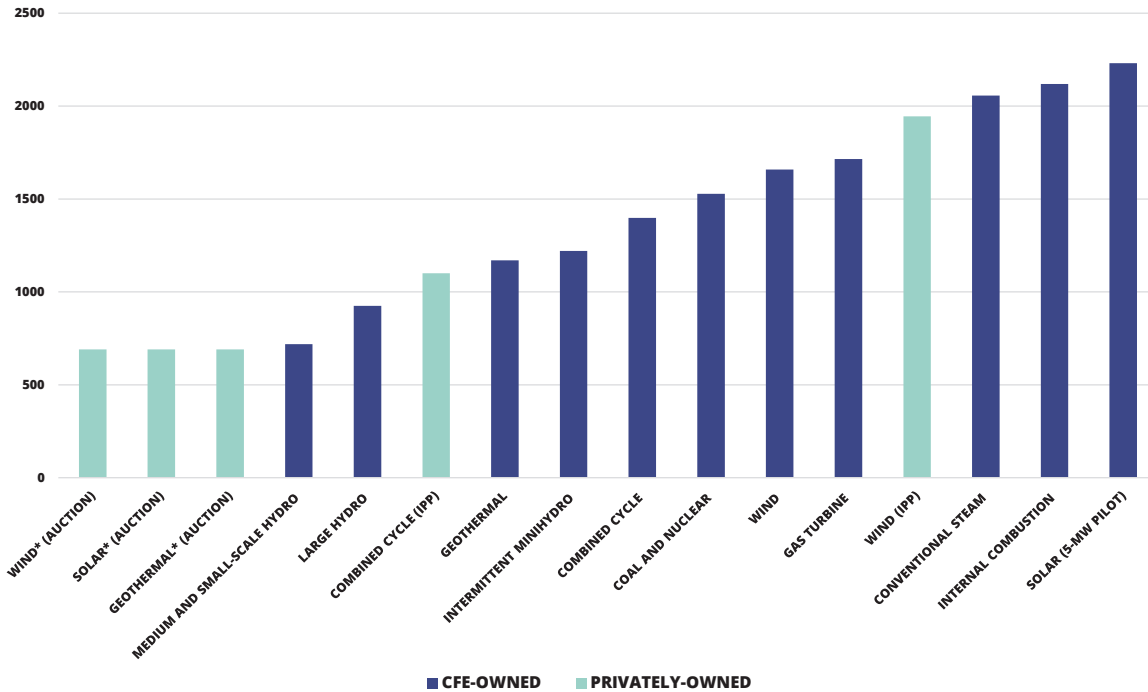
Private energy companies directly and indirectly employ more than 81,500 people, of which more than 12,000 are employed in the wind industry and almost 56,000 in solar, including distributed generation, with the nearly 14,000 remaining jobs in the conventional energy sector, according to a group of Mexican energy industry associations. According to the Mexican Wind Association (AMDEE), the Mexican wind manufacturing industry indirectly employs an additional 43,000 across companies including TPI Composites, Nordex-Acciona, Viakon-Prolec, Frisa, Auge, Arcosa, Speco, and Windarmex.

Employment in both the wind and solar industries could increase significantly if the construction of new plants is authorized. For example, AMDEE estimates that employment in the wind industry could reach 35,000 jobs by 2024. Conversely, industry groups estimate that SENER's May 2020 "reliability policy" would threaten 113,000 potential power sector jobs from 2021-2033 if it came into effect, as well as 24 billion dollars in power sector investments.

"The policy changes will have detrimental effects that extend beyond the energy sector."

FIGURE 2: AVERAGE GENERATION COSTS (\$MXN/MWH) BY TECHNOLOGY AND OWNERSHIP, JAN-JUN 2020

Source: Memorias de cálculo de tarifas de suministro básico, CRE



* Auction costs include prices of Clean Energy Certificates and are averaged across all technologies.

Note: All this power is purchased by CFE Basic Supply, which originates this information based on its portfolio of power purchase contracts with CFE, IPPs, and auction projects.

Renewables equipment is an important source of US-Mexico trade and of employment in Mexico. Wind equipment supply chains in particular are deeply linked across the border. Thus, policies that undermine private investment in renewables will threaten manufacturing jobs in Mexico and supply chains of exporters to the United States.

In the wind sector, Mexico has emerged as an important hub for assembling equipment, including wind blades, towers, and electronic parts such as cables and transformers. The wind equipment is then exported mainly to the United States as well as other Latin American countries. The top three Western wind turbine original equipment manufacturers, Vestas, GE, and Siemens—which together supply more than 90% of the US market—all have operations in Mexico. Vestas secured in February 2020 an engineering, procurement, and construction order for the 108-MW Energía Sierra Juárez II wind power plant, a joint venture between IEnova and Saavi Energía, to be located in Tecate, Baja California. The 306-MW Mesa La Paz wind farm in Tamaulipas, in operation since January 2020 and owned by a joint venture between The AES Corporation and Grupo BAL, uses turbines supplied and installed by Vestas.

Eight GE wind turbines are used in the Santa Catarina wind farm in Nuevo León, owned by Mexican hydropower firm Comexhidro. And Siemens Gamesa will supply 60 units of its SG 4.5-145 wind turbines with a flexible power rating of 4.2 MW to Enel Green Power’s Parque Amistad III and IV wind farms in Coahuila, Mexico. These projects were awarded to Enel during the third clean energy auction in 2017.

Mexico boasts three of its own wind manufacturing plants. Arcosa Industries, headquartered in Dallas, builds wind towers in Mexico for export to the United States. In 2018, following strong results in its 2018 fiscal year, the company had 1,726 workers in Mexico. Speco Wind Power, a subsidiary of Korean company Speco, located in Coahuila, with 299 employees, specializes in supplying industrial plants and steel fabrication works including wind turbine towers. Windarmex, a subsidiary of Windar Renovables, owned by Spain’s Grupo Daniel Alonso Windarmex, produces wind towers for domestic use and export. The company, located in the port of Altamira, Tamaulipas, generates 200 direct and more than 100 indirect jobs.

Energy-intensive industries are central to Mexico's economy, comprising a significant share of Mexico's GDP and providing important sources of employment.

Some 30% of Mexico's GDP was generated by industry and 17% was generated by manufacturing in 2019, according to the World Bank. The industrial sector (including industry and manufacturing) is the second-largest consumer of energy in the country, according to SENER's latest National Energy Balance 2018 (see Figure 3). Indeed, industrial sector consumption made up 31% of total energy consumption in 2018, of which 36% was electricity consumption. These energy-intensive industries also provide a large number of jobs in the country. The steel industry, for example, provides over 670,000 direct and indirect jobs in Mexico. The heavy-duty vehicle industry last year provided close to one million direct and indirect jobs in Mexico, according to Mexico's Institute of Statistics and Geography. General Motors, the largest-light duty vehicle manufacturer in Mexico, alone provided direct employment to more than 20,000 people, based on their 2020 report.

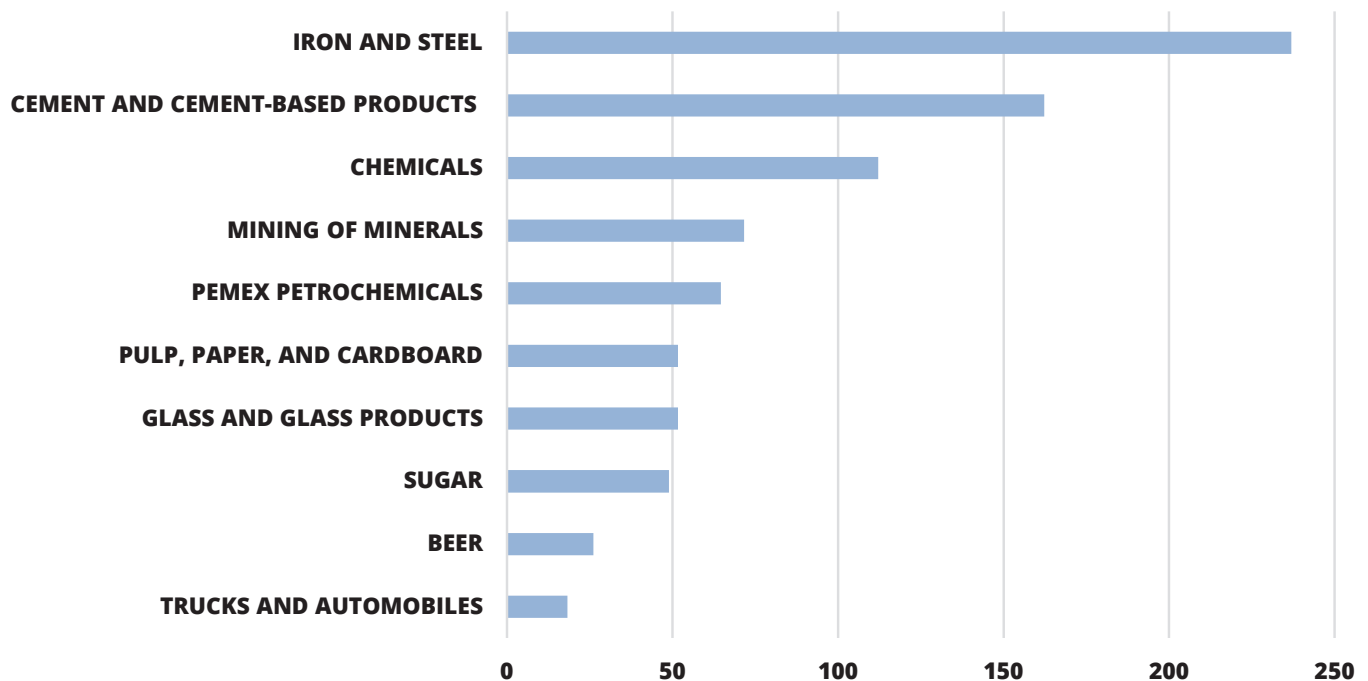
Many of Mexico's most energy-intensive industries produce critical products that are exported to the United States. Some of the largest Mexican producers in energy-intensive industries have benefited from the opening to private investment in the power sector, allowing these companies to generate and consume cleaner energy at more competitive prices, which gives them a competitive edge in global markets. These companies are major exporters to the United States, providing inputs and products for consumers throughout the country at competitive prices.

STEEL TRADE: Mexico was the world's 15th-largest producer of steel and the third-largest steel exporter to the United States in 2019, providing 13% of total US steel imports. Over 70% of Mexico's steel exports go to the United States.

Deacero, Mexico's third largest steel producer, was the first company in the Mexican industrial sector to participate directly in the wholesale electricity market as a qualified user. As a result, Deacero is able to manage its own

FIGURE 3: ENERGY CONSUMPTION (IN PETAJOULES) FROM MEXICO'S TOP 10 ENERGY CONSUMING INDUSTRIES (2018)

Source: Balance Nacional de Energía 2018, SENER



electricity supply and benefit from choosing among several suppliers to buy electricity at the lowest prices. A company with over 8,000 employees, Deacero has also been able to consume energy from renewable sources and manage the sale and purchase of CELs. The company will be supplied with almost half of the renewable energy produced by the 66-MW Eólica Río Bravo windfarm. The project is to begin construction in July 2021 in the municipality of Méndez, Tamaulipas, with commercial operation scheduled for July 2024. Ternium, Mexico's fourth-largest steel producer, as well as several other companies, will also receive power generated from the plant. Deacero has an integrated cross-border supply chain and exports a large share of its products to the US. The company owns several steel manufacturing plants in Mexico and three in the United States (two in Texas and one in Missouri). According to Deacero CEO Raúl Gutiérrez, the company ships 40% of its products abroad, with half of its exports going to the United States.

BEER TRADE: Mexico is a major beer exporter, according to the US National Beer Wholesalers Association, providing 70% of all beer imported into the United States, and accounting for a 10% share of all beers sold in the country. In Mexico, the beer industry generates approximately 900,000 jobs, both direct and indirect.

Grupo Modelo, Mexico's largest brewer by market share, has shifted to using renewable sources such as wind and solar to help power its production facilities. In 2019, the

group executed a long-term purchase power agreement (PPA) with qualified supplier Ammper Energia for more than \$60 million. As a result, Grupo Modelo will receive clean energy and CELs produced from a solar PV power plant located in Chihuahua. Grupo Modelo also has a PPA with Spanish company Iberdrola to receive electricity on a long-term basis from a 220-MW PIER wind farm in Puebla state. During construction, the wind farm generated more than 500 direct jobs and led to contracts with 11 Mexican suppliers.

Another major beer producer and retailer, Heineken México, announced the execution of a PPA with Enel Energía México, the Enel Group's retail subsidiary, in 2020. Enel will provide Heineken with 100% renewable energy for 10 years to power brewery operations at its plant in Meoqui, Chihuahua. Each year the plant will be supplied with 28.8 GWh of renewable energy, avoiding 16,100 tons of CO₂.

AUTOMOTIVE TRADE: Mexico is a top provider of vehicles to the US market. Last year, Mexico exported 86% of the almost four million light-duty vehicles it produced to the United States.

In the auto sector, General Motors México consumed 21% of its electricity from renewable sources in 2019. PPAs signed by the company allowed it to acquire wind power for its four manufacturing facilities. In addition, the company owns installed PV capacity of 20 kW and 90 kW in its Silao Facility and San Luis Potosí facilities, respectively.



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