

Renewable Energy in Mexico: Policy Challenges and Solutions

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Introduction

This paper examines the barriers to Mexico's clean energy transition, focusing on how corruption, weak institutions, and fossil fuel dominance constrain renewable energy growth and opportunities for electrification, particularly in rural and indigenous communities. Although Mexico has abundant solar, wind, and geothermal potential, progress has stalled due to fossil fuel preference in policy, a legacy of corruption, and a significantly weakened regulatory and judicial framework.

After reviewing the history of Mexico's energy sector and intersections with politics, economics and geography, and a SWOT (strengths, weaknesses, opportunities, and threats) analysis of the country's renewable energy transition, this paper identifies key challenges: regulatory and political instability, institutional corruption, underutilized renewable potential, limited grid infrastructure, and the exclusion of rural and Indigenous communities in planning processes. These obstacles discourage clean energy investment and reinforce reliance on fossil fuels, despite growing energy demand and climate commitments, and limit policies that promote sustainable reductions in energy poverty. The paper proposes governance and technical policy solutions such as restoring regulatory independence, passing constitutional protections for renewables, institutionalizing Indigenous participation, modernizing the grid, expanding off-grid solar for rural areas, and clean energy tax incentives.

Historical and Political Context

With the nationalization of the Mexican petroleum industry in the early 20th century, the dominance of domestic oil became institutionalized as a matter of national pride and economic security. This additionally provided opportunities for corruption as the oil industry became

intricately linked with the single party political dominance of PRI, creating a feedback loop of extractivism in both the energy sector and exploitative political norms.

In 1938, President Lázaro Cárdenas signed an executive order expropriating all foreign oil companies from Mexico, instead establishing the firm *Petróleos Mexicanos* (Pemex) as a state-owned monopoly. (Office of the Historian) This cemented oil as a pillar of Mexican nationalism and economic policy, making energy deeply political. Pemex became a powerful institution shielded from scrutiny, fostering inefficiency and corruption. (Maurer) In 2000, the Institutional Revolutionary Party (PRI) lost the presidency for the first time in 71 years, with Vicente Fox of the PAN party taking office. (Olson, 2024) While this marked a shift toward more competitive elections, entrenched interests (especially in the oil and energy sectors) remained intact. Pemex continued to operate with little transparency, and corruption persisted under new leadership. (Beikman, 2021) In 2013, Mexico enacted sweeping constitutional energy reforms, opening oil, gas, and electricity sectors to private and foreign investment. (Alpizar-Castro and Rodriguez-Monroy, 2016) These reforms were seen as a break from Pemex's monopoly and a step toward modernization and renewable investment. However, implementation was plagued by corruption scandals, particularly with contracts and regulatory bodies, undermining public trust and slowing the growth of clean energy. In 2018, Andrew Manuel Lopez Obrador (AMLO), a reformist populist candidate running on an anti-corruption, nationalist platform, was elected president and promoted policies favoring energy independence in an attempt to limit economic reliance on the United States. (Goldwyn, 2018) AMLO prioritized energy sovereignty and revitalized Pemex and CFE (the Federal Election Commission), often at the expense of private and renewable energy projects, to the point where even oil industry investors expressed concerns at his opposition to diversification. (Bradstock, 2023) His administration curtailed wind and solar permits, drawing

criticism from environmentalists, investors, and foreign trade partners. Anti-corruption and nationalist rhetoric was used to justify these rollbacks, though the suite of policies limited expansion into renewable energy markets that would have reduced energy poverty, driven down costs for consumers, and created a more stable, diversified domestic energy market.

Geography, Economy, and Energy

Mexico's domestic energy market is possible due to the country's abundant natural resources including petroleum, natural gas, and bio fuel timber, in addition to critical minerals like silver, copper, gold, lead, zinc. (CIA World Factbook, 2025) But the physical geography is severely shaped by current climate threats including water scarcity and desertification in the northern and central regions of the state, deforestation, and severe air and water pollution in urban areas. (Climate Change Knowledge Portal) Climate vulnerability is a key concern in Mexico, both exacerbated by prior nonrenewable usage and a key motivator for the transition to renewables. However, issues of water access and scarcity have limited interest in hydroelectric power, with the country's strongest potential in the wind, solar, and geothermal spaces. (National Renewable Energy Lab, 2022)

Mexico's energy intensity and needs come from an economy largely driven by the manufacturing sector, specifically in its integration with northern neighbors as part of a North American supply chain. (Payan et al, 2024) Historically, Pemex has been a major driver of the country's economic development in contribution to overall GDP, but has also driven economic inequality and political corruption due to clientelism and cronyism. (Watkins, 2019)

Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

For policy analyses, a strengths, weaknesses, opportunities, and threats (SWOT) analysis can showcase a more comprehensive state of affairs in understanding the landscape of a particular policy issue. In understanding the policy challenges and potential solutions facing Mexico's renewable energy transition, a thorough understanding of the division between these four segments of analysis can guide the subsequent discussion.

In its strengths for a potential renewable energy transition, as previously discussed Mexico has abundant natural resources and physical geography positioned for sourcing wind, solar, or geothermal energy. (National Renewable Energy Lab, 2022) Additionally, the established manufacturing base, strategic location and integration with both the rest of Latin America and the North American supply chain creates ripe conditions for private investment interest. (Grunstein and Payan, 2022) But the weaknesses persistently counteract these high points, as not only the historical corruption and political integration of fossil fuels interests, but the entrenched system of extractivist benefit for Pemex limits the ability of the renewable energy sector to establish even a foothold, let alone dominance. And despite historical periods of one party rule, the lack of regulatory independence created a system of regulatory instability, concerning investors and raising questions of possible returns.

But there are many opportunities to gain overcoming these weaknesses in pursuit of a renewable energy domestic market. In a country with an energy poverty rate of 34%, renewables create the opportunity for a decentralized grid that can better deliver to underserved communities, primarily rural and indigenous populations. (Soriano-Hernández et al, 2022) This creates the additional benefit of a democratization in a country that has long sidelined indigenous groups from participation, by opening participation in energy planning. The environment would benefit from decreased carbon emissions, serving to strengthen the country's climate mitigation planning, and

would also derive economic benefits from greater cost savings over time due to renewables' long run affordability.

The main threat to enactment of these policies, though, is political resistance. The long extractivist participation of fossil fuel interests in politics can not be easily undone, and Mexico's own vulnerabilities in implementing sufficient judicial reform highlights challenges that would arise in attempts at regulatory reform. (McCarter & English, 2024) Global energy prices and economic performance also exist as a threat to substantial reform, given how past policymakers have used economic concerns to push back on renewable energy agendas and continued to fund Pemex, despite the shortsightedness of such decisions.

Challenges

In their discussion of the political economy of energy poverty, Aklin et al posit that the challenges of renewable energy transitions are less challenges of technical capability and more so challenges of governance, with transition only possible in situations where both institutional capacity and local accountability are high. (Aklin et al, 2018, p. 61) In Mexico, as discussed in the prior discussions of corruption and extractivism, the institutional capacity is low. Local accountability is a thornier topic, as underserved communities such as indigenous groups have been historically excluded from planning processes, but possibility exists, as Mexico has a strong civil society system that organizes for government accountability. (Aklin et al, 2018, p. 81) Where challenges exist, then, are due to the gap between government action and citizen demands.

Governance Challenges

Institutional corruption underlies the key governance challenges preventing Mexico's renewable energy transition both historically and in the present. Transparency International highlights that judicial impunity and eroded public trust are key challenges in Mexico, and are a significant barrier to effective renewable energy transition, ranking the country's transparency as 140th out of a total list of 180. (Transparency International, 2025) A climate of instability repels private and foreign investment, hinders renewable energy expansion, and undermines the credibility of climate and energy goals.

Since the nationalization of the petroleum industry in 1938, the systems of patronage guiding Pemex and the Federal Electricity Commission (CFE) have long impacted their effective operations, and have operated the systems not towards expanded energy access but increased profit for leadership. (Guerrero) Contracts are often awarded to companies with little transparency or competitive bidding, and despite legislation passed to limit corruption, Mexico lacks the auditing ability and judicial strength to enforce corruption violations, allowing Pemex and CFE to act with relative impunity. One significant example was in 2019, when multiple governments and corporations across Latin America were implicated in the widesweeping Odebrecht corruption scandal, in which the Brazilian corruption firm Odebrecht was found guilty of bribery totaling over \$785 million USD. (Rodriguez Martinez and Castro, 2019) However, under AMLO's presidency, he used Odebrecht involvement in energy projects to cancel multiple renewable energy projects and direct more money to Pemex, under the guise of an anticorruption campaign, despite Pemex's own corruption scandals. (The Dialogue)

One of the most significant challenges, given Mexico's state limited capacity, is the regulatory and political instability that limit the confidence and forward planning needed for the longer term investments in renewable energy systems. (Grunstein, 2024) Some of the specific

challenges are that the Energy Regulatory Commission and National Center for Energy Control are political appointees serving on behalf of the president, and not independent. Presidential desire for control has also accounted for Mexico's reluctance in joining broader North American energy markets as required under USMCA, further complicating the political stability of the domestic energy market. (Grunstein and Payan, 2022)

Other governance challenges are further undemocratic in nature, exacerbating corruption and the systemic political inclusion of indigenous communities. Though endemic of a broader system of exclusion, in one case study of the development of a wind farm project in the Mexican state of Oaxaca, the project went forward without free, prior, and informed consent from the indigenous Zapotec community of Unión Hidalgo. (European Center for Constitutional and Human Rights, 2020) Building on a long colonial history, the French firm that developed the wind project did not know that they would be required to even consult with Unión Hidalgo, because the state government did not recognize their land claims. So even where measures exist to require community input, without rightful land acknowledgements, then policies for consent are not fully implemented. Without community input, projects risk threatening local sacred sites, agricultural lands, and important ecosystems that communities are dependent on. Even though it was a wind farm in development, this can be seen as an example of "green extractivism" as previous systems of extractivism and corruption are continued with only a slight change to the guise of sustainability. (Tornel, 2023)

Energy poverty continues, with 34% of Mexican households suffering from energy poverty due to affordability issues, even if grid connection possibilities exist; this gap in rural areas is largely driven by government prioritization of utility-scale projects for manufacturing or urban areas, as opposed to off-grid or community-based solutions. (Soriano-Hernández et al, 2022)

Where energy development projects do extend to previously underserved communities, the benefits are not accessible to all. The structures of fossil fuel industry contract corruption extend to renewable development operating in the same political system, as clean energy contracts are negotiated with the same elites, creating systems of kickbacks and benefits for only a select few. (Velasco-Herrejon and Bauwens, 2024)

Technical Challenges

On the technical front, issues of the country's original grid development limit expansion and evolution. The original grid was developed and built to serve centralized fossil fuel plants, not decentralized renewable energy sources; grid congestion currently bottlenecks transmission for wind and solar generation, artificially making the generation financially unviable. (Fuentes, 2025) Public investment in grid modernization has stalled as resources are diverted to fossil fuel legacy projects, while the private sector is unwilling to participate in transmission development due to regulatory uncertainty. (Mexico Energy Insights, 2025) The outdated grid is not well developed for distributed generation (such as mini-grids or rooftop solar), already an issue given rural communities' disproportionate access, further hindered by government financial incentives for further centralization in pursuit of "energy sovereignty policies," despite the populist benefits of decentralization. (Oxford Institute for Energy Studies, 2025) The lack of grid modernization prevents any further action on remedying the underutilization of renewable energy potential in the country, even despite the high potential for wind, solar, and geothermal: but if the infrastructure does not exist to transport energy from the areas of generation to the regions of need, or opportunities for communities to develop their own off-grid solutions, then many new clean energy developments are dead on arrival.

Policy Solutions

Despite the significant challenges facing Mexico in its clean energy transition, a conversion to renewables is possible, but only if the government is willing to undertake the significant work of the following policy suggestions, first addressing solutions to the governance problem, and then addressing technical policy solutions for energy development.

Governance Solutions

The first, and most pressing, policy solution to address would be to establish regulatory independence of the CFE. The politicization of energy regulation discourages investment, and establishing an independent board would be a necessary first step to create favorable market conditions for clean energy. (Goytia, 2022) The Mexican legislature should pass reforms guaranteeing autonomy, an apolitical appointment structure for CFE with fixed terms for commissioners, and create an independent judicial review panel for accountability measures.

To address democratic inclusion and the support of local accountability, Mexico must also find ways to institutionalize indigenous inclusion, given that the lack of free, prior, informed consent leads to project delays, community resistance, and human rights violations. (Soriano-Hernández et al, 2022) The federal government should make free, prior, and informed consent a legal prerequisite for any energy project, and state governments should establish regional indigenous energy councils. Indigenous representation should also be included in federal energy planning commissions, and may not actually create that much political opposition, given the acceptance in Mexican political culture of gender quotas for enforcing gender equity in the legislature. (Lucio, 2014)

Legal uncertainty limits long-term investment in the renewable energy transition, so the government should also establish a constitutional right to clean energy access, via the passage of a constitutional amendment, given the inclusion of prior energy reforms via the constitutional amendment process, and not just legislation, in regards to the nationalization, privatization, and then re-nationalization of the petroleum industry. (Williams, 2025)

Technical Solutions

On the front of technical solutions once the governance reforms have been addressed, the first issue must be to focus on grid modernization. An outdated grid limits capabilities for renewable energy, especially given the high solar and wind potential in rural regions. (Oxford Institute for Energy Studies, 2025) Planning commissions should prioritize investment in high voltage transmission lines to target the renewable resource-rich Oaxaca, Sonora, and Baja, and do so by encouraging public-private partnerships for transmission expansion, and create opportunities for off-grid, not solely centralized transmission. Further, the government could require smart grid and energy storage systems to be included in national planning documents.

Once a modern grid is established, energy poverty can be addressed by focusing on off-grid solutions, particularly solar, for rural regions. The government can launch a federal rural electrification fund with matching funds from states and municipalities to install community-owned solar microgrids. To further contribute to equitable economic development, municipalities should offer technical training and local employment for solar installation. (Velasco-Herrejon and Bauwens, 2024)

Historical fossil fuel subsidies have crowded out clean energy investment by artificially making non renewables cheaper. (Watkins, 2019) The Mexican legislature should replace the

fossil fuel subsidies with targeted tax credits for wind and solar, energy storage, and grid modernization. Creating a progressive carbon pricing system where revenue funds further clean energy projects could further drive down the costs of renewables, fulfilling the current administration's populist platform of energy affordability while also contributing to climate mitigation plans.

Conclusion

In Mexico, the key division in renewable energy development moving forward is the tension between political interest versus political capability. While the Morena Party under the current President Sheinbaum messaged a commitment to climate mitigation and clean energy policies, their actions can be in direct contrast to their own platform, as seen in Sheinbaum's expansion of domestic oil production. (Barrera, 2024) To address these contradictions, and overcome almost a century of extractivist politics and corruption, it will take not only technical energy solutions but a systematic overhaul of the Mexican regulatory framework and judicial systems of enforcement. This is where the challenge of political capability comes into play, but if Morena is committed to sustainably addressing climate change, energy poverty, and corruption, then they must be willing to not perpetuate new transgressions under existing infrastructure. For both the grid, and the regulatory systems, extensive change is necessary for evolution.

Bibliography

- Aklin, Michael, Patrick Bayer, S.P. Harish, and Johannes Urpelainen. *Escaping the Energy Poverty Trap*. 2018.
- Alpizar-Castro, Israel and Carlos Rodriguez-Monroy. "Review of Mexico's energy reform in 2013: Background, analysis of the reform and reactions." *Renewable and Sustainable Energy Reviews* 56. May 2016. <https://doi.org/10.1016/j.rser.2015.12.291>
- Barrera, Adriana. "Exclusive: Mexico's Pemex looks to boost gas and oil reserves during Sheinbaum presidency, document shows." *Reuters*. October 23, 2024. <https://www.reuters.com/markets/commodities/mexicos-pemex-looks-boost-gas-oil-reserves-during-sheinbaum-presidency-document-2024-10-23/>
- Biekman, Cas. "PEMEX Suppliers in Pandora Papers Underscore Corruption Issue." *Mexico Business News*. October 13, 2021. <https://mexicobusiness.news/oilandgas/news/pemex-suppliers-pandora-papers-underscore-corruption-issue>

- Bradstock, Felicity. "AMLO's Oil-Heavy Energy Policies Face Scrutiny." *OilPrice.Com*. December 23, 2023. <https://oilprice.com/Energy/Energy-General/AMLOs-Oil-Heavy-Energy-Policies-Face-Scrutiny.html>
- CIA World Factbook. "Mexico." *CIA.gov*. July 8, 2025. <https://www.cia.gov/the-world-factbook/countries/mexico/>
- Climate Change Knowledge Portal. "Mexico: Risks." *World Bank*. n.d. <https://climateknowledgeportal.worldbank.org/country/mexico/vulnerability>
- European Center for Constitutional and Human Rights. "Wind farm in Mexico: French energy firm EDF disregards indigenous rights." November 2020. https://www.ecchr.eu/fileadmin/Fallbeschreibungen/CASE_RESPORT_EDF_MEXICO_NOV2020.pdf
- Fuentes, Rolando. "Policy Issues and Challenges Under Mexico's New Electricity Reform." *Bake Institute, Rice University*. February 18, 2025. <https://www.bakerinstitute.org/research/policy-issues-and-challenges-under-mexicos-new-electricity-reform>
- Goldwyn, David. "Mexico's Energy Reforms: The Prospects Under an AMLO Administration." *The Atlantic Council*. July 2, 2018. <https://www.atlanticcouncil.org/blogs/new-atlanticist/mexico-s-energy-reforms-the-prospects-under-an-amlo-administration/>
- Goytia, Maria Jose. "Mexico's Energy Policy Discourages Foreign Investment." *Mexico Business News*. September 13, 2022. <https://mexicobusiness.news/energy/news/mexicos-energy-policy-discourages-foreign-investment>
- Grunstein, Miriam. "From Market Guardians to Monopoly Keepers: Regulatory Capture in Mexico's Energy Sector." *Baker Institute, Rice University*. December 10, 2024. <https://docs.google.com/document/d/173imoSFucO6Fs1MiZwJX1F0IHmTK0pXIRoczpaSQaGo/edit?tab=t.0>
- Grunstein, Miriam and Tony Payan. "What's up with the USMCA and Mexico's Energy Policy?" *Baker Institute, Rice University*. September 14, 2022. <https://www.bakerinstitute.org/research/whats-usmca-and-mexicos-energy-policy>
- Guerrero, Gabriel Toledo. "Corruption in the Mexican Energy Industry: Recommendations and Proposals." *Wilson Center Mexico Institute*. N.d. https://www.wilsoncenter.org/sites/default/files/media/documents/publication/corruption_in_the_mexican_energy_industry_recommendations_and_proposals.pdf
- Lucio, Jose Miguel Cabrales. "Gender and constitutionalism in Mexico: from quotas to parity?" *Constitution Net*. April 28, 2014. <https://constitutionnet.org/news/gender-and-constitutionalism-mexico-quotas-parity>
- Maurer, Noel. "The Empire Struck Back: Sanctions and Compensation in the Mexican Oil Expropriation of 1938." *Harvard Business School*. <https://www.hbs.edu/businesshistory/Documents/maurer-article-mexican-oil.pdf>
- McCarter & English. "Judiciary Under Fire: Understanding Mexico's Controversial Judicial Reform." *McCarter & English*. November 11, 2024. <https://www.mccarter.com/insights/judiciary-under-fire-understanding-mexicos-controversial-judicial-reform/>
- Mexico Energy Insights. "Power Grid Instability in Mexico: A Threat to Industrial Operations." *Mexico Energy LLC*. 2025. <https://mexicoenergyllc.com.mx/blogs/mexico-energy-insights/power-grid-instability-in-mexico-a-threat-to-industrial-operations>

- National Renewable Energy Lab. "Mexico: North American Clean Energy Powerhouse." *NREL, US Department of Energy*. 2022. <https://docs.nrel.gov/docs/fy22osti/82580.pdf>
- Office of the Historian. "Mexico Milestones: 1937–1945." US Department of State. N.d. <https://history.state.gov/milestones/1937-1945/mexican-oil>
- Olson, Jared. "The fall of Mexico's PRI party, a once-dominant political force." *Al Jazeera*. May 31, 2024. <https://www.aljazeera.com/news/2024/5/31/the-fall-of-mexicos-pri-party-a-once-dominant-political-force>
- Oxford Institute for Energy Studies. "Mexico's Electricity Sector Re-Centralization and Its Implications for Emerging Markets." *The Oxford Institute for Energy Policy*. February 2025. <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2025/02/Mexicos-Electricity-Sector-Re-Centralization-and-Its-Implications-for-Emerging-Markets.pdf>
- Payan, Tony, Rodrigo Montes de Oca, Rolando Fuentes, Roberto Durán-Fernández. "The Power Problem: Nearshoring and Mexico's Energy Sector." *Baker Institute, Rice University*. July 3, 2024. <https://www.bakerinstitute.org/research/power-problem-nearshoring-and-mexicos-energy-sector>
- Rodriguez Martínez, Marta and Blanca Castro. "What is the Odebrecht corruption scandal in Latin America, and who is implicated?" *EuroNews*. April 18, 2019. <https://www.euronews.com/2019/04/18/what-is-the-odebrecht-corruption-scandal-in-latin-america-and-who-is-implicated>
- Soriano-Hernández, Pavel, Adolfo Mejía-Montero, and Dan van der Horst. "Characterisation of energy poverty in Mexico using energy justice and econophysics." *Energy for Sustainable Development*. Vol. 71, December 2022. <https://doi.org/10.1016/j.esd.2022.09.005>
- The Dialogue. "Are López Obrador's Latest Policies Detrimental to Mexico's Power Sector?" *Leadership for the Americas*. N.d. <https://thediologue.org/analysis/is-lopez-obrador-upending-the-power-sectors-landscape/>
- Transparency International. "Mexico." 2025. <https://www.transparency.org/en/countries/mexico>
- Tornel, Carlos. "Energy justice in the context of green extractivism: Perpetuating ontological and epistemological violence in the Yucatan Peninsula." *Journal of Political Ecology*. 2023. <https://journals.librarypublishing.arizona.edu/jpe/article/5485/galley/5337/view/>
- Velasco-Herrejon, Paola and Thomas Bauwens. "Are energy transitions reproducing inequalities? Power, social stigma and distributive (in)justice in Mexico." *Global Environmental Change*. Volume 87, July 2024. <https://www.sciencedirect.com/science/article/pii/S0959378024000876>
- Watkins, Deborah. "Pemex and the Mexican Economy." *Advisor Perspectives*. March 8, 2019. <https://www.advisorperspectives.com/commentaries/2019/03/08/pemex-and-the-mexican-economy>
- Williams, Adam. "Mexico Energy Industry Transformed By Constitutional Reforms." *Wilson Center*. January 3, 2025. <https://www.wilsoncenter.org/article/mexico-energy-industry-transformed-constitutional-reforms>