

ENERGY TRANSITION IN MEXICO:

A FAIR COAL PHASE-OUT FOR A PARIS COMPATIBLE SCENARIO IN MEXICO

POLICY PAPER

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EXECUTIVE SUMMARY

Designing a fair coal phase-out strategy in Mexico is one of the most urgent measures to address the climate emergency and to ensure an energy transition under a perspective of justice, human rights, and gender equality. However, clear policy actions for a fair coal phase-out are not yet part of the public agenda. This policy paper points out the serious social, environmental, and human rights implications of the coal industry in the most important coal region of the country, the state of Coahuila. It also outlines several key elements for designing a fair coal phase-out plan with focus on community, dialogue, and participation. To this end, political, regulatory, and cultural barriers need to be overcome in Mexico.

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INTRODUCTION

Compared with the experience from South Africa, Germany, and other G20 countries, which have a long trajectory studying the social, environmental, and economic implications around coal and the pathways for a just transition, there is still a considerable knowledge and action gap in Mexico regarding a fair coal phase-out. Therefore, this policy paper aims to inform decision-makers on the importance of developing a plan for a fair coal phase-out and substitution plan with renewable energy sources.

In addition to its high contribution to greenhouse gas emissions, coal mining has severe social and environmental implications.

The first chapter points out the importance of accelerating the global coal phase-out (CPO) to keep the earth's temperature increase below 1.5°C, especially in those economies that still rely on coal to generate electricity. It also highlights Mexico's insufficient action to tackle the global climate crisis and the energy and climate policy setbacks.

The second chapter focuses on the socio-environmental impacts of the coal industry in Mexico and highlights the very serious human rights violations resulting from coal mining. It looks into recent analyses of pollution and degradation of natural resources in Coahuila's coal region, emphasizes the severe health impacts on the population living near the coal mines, and points out the human rights violations caused by the working conditions in the mines. In addition, this section exposes the environmental and human rights impacts of air, water, and soil pollution, displacement and forced resettlement of populations, loss of territory, and access to land, among others.

The third chapter outlines the elements necessary to implement a plan that ensures the exit of coal under a climate justice and human rights approach. This section also contains the public policy principles regarding coal phase-out and emphasizes the importance of having a social justice approach to energy policy planning and decision-making. Finally, it integrates lessons learned from other organizations that have worked in the defense and protection of human rights in the regions most affected by the coal industry in Mexico.

The fourth chapter describes some of the main challenges a fair transition away from coal faces, such as political interests, lack of information, and economic dependency. It also explores the opportunities that the local communities and the national context have created to enhance the public debate around the subject.

The final section remarks that coal and its phase-out have not received enough political attention in Mexico. It ends by highlighting the most relevant challenges (cultural, social, political, economic, and regulatory) for implementing a CPO pathway from a bottom-up perspective and under a just energy transition approach as part of the domestic agenda.

1. A FAIR COAL PHASE-OUT IN A PARIS COMPATIBLE SCENARIO

The Paris Agreement, signed in 2015 and ratified by Mexico in 2016, is centered on three long-term goals. First, keeping the global average temperature increase below 2°C and ideally below 1.5°C above pre-industrial levels. Second, increasing adaptive capacity to the adverse effects of climate change and promoting resilience. Third, increasing financial flows to achieve resilient, low greenhouse gas emission development. It also highlights the importance of a just transition and climate justice while taking action to fulfill its ambitions.

Substituting coal from the global energy mix is a crucial step to accomplish the long-term goals outlined in the Paris Agreement and reduce greenhouse gas emissions. Coal is one of the most polluting fossil fuels for power generation, as it contributes to roughly 39% of global CO₂ emissions from electricity generation (Friedlingstein, 2020). Furthermore, coal mining represents 11% of global methane emissions (Kholod et al., 2020). Therefore, a coal phase-out is key for achieving the emissions scenario outlined in the Paris Agreement, which requires global methane emissions to drop 35% by 2050 and CO₂ emissions to decrease 45% by 2030 and reach net-zero emissions by 2050 (IPCC, 2018).

The G20 consumes and exports the world's largest amount of coal, as this fossil fuel maintains a significant share of their electricity generation (CT, 2020). Only five G20 countries have established dates for coal substitution², and thirteen nations have defined limits on coal financing as part of their domestic and international policy (CT, 2020a). However, the Organisation for Economic Co-operation and Development (OECD) member countries have increased coal power generation by 11% from January 2020 to January 2021 (IEA, 2021). This is a significant challenge considering that being on track with the Paris Agreement goals implies that all countries should be substituting coal from their energy matrix by 2030 (UNEP, 2020).

i. Methane gas (CH₄) is a short-lived climate pollutant with a global warming potential approximately 25 times greater than CO₂ in a 100-year scenario.

ii. Canada, France, Germany, Italy, and the UK have set coal phase-out targets. Brazil, the EU, and China have policies to reduce coal consumption. For further information please visit: <https://www.climate-transparency.org/g20-climate-performance/the-climate-transparency-report-2020>



Climate action is particularly critical in the post-pandemic context. By the end of the year 2020, CO₂ emissions in the G20 economies fell 7.5% compared to 2019, and a 4% to 9% reduction was registered worldwide (CT, 2020a). Nonetheless, the global emissions decline seems short-lived based on the current upward trends in the oil sector, coal extraction, and power generation in the United States and Southeast Asia (IEA, 2021a; IEA, 2021b). In addition, countries such as Canada, the UK, France, and Germany have fiscal stimuli that are coherent with a path to a green recovery, yet the remaining G20 countries, including Mexico, support polluting industries, such as coal mining, or lack robust climate change criteria (CT, 2020b).

To comply with the provisions of the Paris Agreement's, Mexico and all other countries must immediately curb their greenhouse gas emissions, reach peak emissions within this decade and initiate accelerated decarbonisation in all relevant sectors. Nonetheless, despite international commitments and domestic climate goals, Mexico has not established any coal phase-out strategy.

The federal government is committing to fossil fuels and strengthening the coal industry (CFE, 2021; PEMEX, 2021). Over two-thirds (71%) of national emissions come from the energy sector, and one fifth (20.3%) of the emissions from the energy sector come from electricity generation (INECC, 2018). While coal power plants only generate around 10% of the country's electricity, they represent 22% of the sector emissions (INECC, 2018). Therefore, substituting coal power generation should be a top priority of the Mexican government to contribute to its domestic climate goals and international efforts to avoid the severe impacts of climate change.

Both the Climate Change General Law and the Energy Transition Law set the target of a minimum share of clean energy in electricity generation at 25% by 2018, 30% by 2021, and 35% by 2024 (Ley de Transición Energética, 2015). Still, there are numerous inconsistencies and contradictory measures within the policy framework for decarbonizing the energy sector. For instance, in Mexico, the share of renewables in electricity generation is among the lowest of the G20, as it increased by only 3% between 2014-2019 compared to the 20% average increase for G20 countries. Consequently, fossil fuels still account for 89% of Mexico's primary energy supply, one of the highest among G20 economies (CT, 2020b).

Aligning national efforts to global climate goals requires transformational changes within the next few years, such as transitioning away from coal and heavy oil in power generation. According to an assessment by ICM, Carbon Trust, and WRI (2019), aligning emissions to the 6.8GtCO₂e sectoral budget for a 1.5°C pathway requires a complete phase-out of coal-fired power generation by 2030. In addition, the decarbonization of the energy sector requires a robust political framework and a consistent plan to include net-zero emission technologies such as renewables for power generation.

Moreover, Mexico has been a member of the Powering Past Coal Alliance (PPCA) since 2017, where it committed to "achieve a sustainable and inclusive phase-out of traditional coal-fired power plants and work on a plan for the substitution of electricity by renewable energy and the adaptation of electricity infrastructure" by 2030 (PPCA, 2017). Nevertheless, the Mexican government has not designed a single plan or program to phase out or replace its 5,378 MW of coal power installed capacity, with two power plants located in the northern state of Coahuila and one in the southern state of Guerrero. On the contrary, the federal government even announced its commitment to buy more coal, modernize existing power plants, and create a new coal-fired power plant with a capacity of 1,400 MW (Climate Scorecard, 2019).

If Mexico aims to comply with its climate change commitments, the Federal Electricity Commission (CFE, for its Spanish acronym) needs to retire its coal power plants as soon as possible and implement a socially inclusive, participatory, and just coal phase-out pathway considering its economic, social and environmental impacts. The actions taken in this sector could contribute to the climate change mitigation agenda and provide significant economic, environmental and human health benefits.

2. SOCIO-ENVIRONMENTAL IMPACTS OF THE COAL INDUSTRY



Climate change contribution is not the only impact from the coal industry. Mexico's government needs to protect and guarantee the human right to a healthy environment and public health. Therefore, acting on coal means protecting its population from the profound social, environmental, and health impacts of coal power generation.

In Mexico, the coal industry is linked to substantial negative environmental, health, and social impacts. Furthermore, there are documented violations of human rights associated with the working conditions and health of miners, as well as vulnerable communities' access to a clean environment. From mining to coal burning, the economic chain of coal power generation has been the subject of public discussion due to constant claims of human rights abuse, social inequalities, and rugged land and water pollution impacts, among others (Martínez et al., 2018).

Coal is one of the most polluting fuels as a source of electricity. Burning coal releases various pollutants and toxins into the air, such as mercury, lead, sulfur dioxide, nitrogen oxides, heavy metals, and particulates. These pollutants are linked with various impacts on communities' health, such as respiratory diseases, cancer, neurological disorders, and brain damage. In addition, coal power generation emits ash that accumulates in rivers and other surface water bodies, which generates imbalances in ecosystems and affects the quality of the water used for human consumption, thereby affecting the human rights to a healthy environment, health, water, life, and physical integrity, endangering local livelihoods and limiting alternative economic activities.

According to preliminary studies, pollutant emissions from Coahuila's two power plants expose roughly 800,000 people to sulfur dioxide (SO₂) concentrations that exceed the World Health Organization (WHO) guidelines and 670,000 people to high inhalable particulate matter (PM_{2.5}) concentrations (CREA, 2021). In addition, emissions combine with toxic depositions of heavy metals, such as mercury, carried by coal dust and fly ash. Furthermore, the PM_{2.5} concentrations, due to their diameter, affect certain population groups such as women and children more, as it can cause a decrease in their lung function and lead to the development of diseases such as asthma (Ortuza, F., Tornel, C., 2016). Consequently, around 431 excess deaths are attributable to coal burning, particularly related to severe cases of ischemic heart diseases or respiratory infections (CREA, 2021).

Mexico's coal mining is concentrated in Coahuila's Coal Region (99%). Although this industry is closely related to the local economy, it also causes significant environmental impacts. Large mining companies often operate without Environmental Impact Assessments (EIAs) and environmental management practices (Martínez et al., 2018). In the last decade, illegal open-pit mining has increased in the region, leading to ecosystem fragmentation and its impact on biodiversity and natural habitats. Later, these extractions are discarded, exposing toxic waste materials which leads to water and soil acidification that affects both groundwaters and social environments. The fundamental right of access to clean water is severely impacted by the physical alteration of underground and superficial hydrographic networks caused by mineral extraction.

Due to the inhalation of dust and other chemicals, mineworkers

have a high incidence of lung cancer and other respiratory diseases such as asthma, pneumoconiosis, and chronic pulmonary obstruction (Iriarte P., Iriarte T., 2014). Besides, miners have a higher occurrence of other forms of cancer—colon, leukemia, and kidney—, chronic heart and kidney disease, hypertension, and depression. However, health risks are not restricted to workers. As a result of water pollution, there is a greater risk of low birth weight, congenital disabilities, infants' lower cognitive development, and different types of cancer in communities adjacent to mines. Health risks rise significantly with the increased intensity of mining activity (Hendryx, M., 2015).

While coal mining in Coahuila generates more than 6,000 direct and indirect jobs (Dávila y Valdés, 2021), miners are exposed to occupational hazards and human rights violations. Coal mining has been associated with human tragedies, such as that of the Pasta de Conchos mine (2006), in which 63 miners lost their lives. In addition, this industry has been characterized by a lack of investment in the safety of its operations. In Coahuila, between 2006 and 2017, 180 miners lost their lives in work-related accidents, and it is estimated that for each death, there were 10 cases of injured miners and 600 safety incidents (Martínez et al., 2018). In the most recent accident in Muzquiz, Coahuila in June 2021, the mine collapsed and left seven miners dead. Moreover, in the last two decades, informal employment of miners and job insecurity have also grown. Furthermore, the local economic benefits are limited. The average salary equals two minimum wages, and 11,000 homes (21%) have a roof made of metal sheets, asbestos, or even cardboard, in a region where temperatures reach below zero in the winter, thus illustrating the economic inequalities.



The dominance of the coal industry limits economic, educational, and training alternatives for workers in the region. The region's development is intricately linked to the economic flows of the industry, causing mass migration and high unemployment rates when coal extraction is low and periods of a more dynamic economic activity when more coal is bought and mined. A fair coal phase-out needs to consider these dynamics, where the coal industry shapes the local economy, employment, land use, and health.

Chart 1: **Most prevalent negative impacts of coal mining and coal power generation**

	Human health	Climate, Air, Water and soil	Livelihoods and economy
Mining	- Silicosis - Chronic pulmonary disease - Asthma - Lower respiratory infections - Lung cancer - Bronchitis - Ischemic heart disease - Noise pollution - Premature deaths - On-site injuries to miners - Mine collapses and deaths of miners	- Surface water contamination - Groundwater pollution - Soil contamination from suspended particles - Soil acidification through water runoff - Degradation of vegetation - Loss of wildlife - Soil erosion - Topsoil loss	- Local population displacement for mining projects - Massive land acquisition by mines - Local economic dependency - Migration caused by reduced opportunities - Child labor in illegal mines - Violence and intimidation
Power generation	- Chronic pulmonary disease - Asthma - Lower respiratory infections - Lung cancer - Bronchitis - Ischemic heart disease - Noise pollution - Premature deaths	- GHG emissions - Pollutant emissions of SO_x, NO_2, CO_2, $PM_{2.5}$, PM_{10} - Surface water contamination - Groundwater pollution - Acid rain - Fly ash fallout - Soil contamination from acid rain and ash fallout	- Impact to agriculture through acid rain and water pollution - Power generation increases mining activities - Monopsony with control of coal contracts.

Source: ICM 2021

3. CRITICAL INSIGHTS FOR A FAIR COAL PHASE-OUT PATHWAY



A fair coal phase-out pathway mitigates not only GHG but also recognizes and attends to the inequalities created by the technology and its transition and delivers social benefits at the local level. Mexico is highly vulnerable to climate change impacts, whose effects are particularly severe for low-income and rural communities. Building a fair coal phase-out process can reduce vulnerability and maximize local benefits and opportunities, such as adding value to the economic chain, creating job opportunities, providing clean energy supplies, reducing energy poverty, and promoting gender inclusion. However, a transition away from coal under these characteristics requires comprehensive planning that considers the many social, economic and political challenges.

One aspect to consider during the design of a fair transition away from coal is the historical ties of the industry with the communities. The state of Coahuila, for instance, concentrates 48.3% of coal power installed capacity and 99% of the national coal extraction. Over 100 years of coal mining activities have shaped the cultural identity of the region. Moreover, the two coal power plants, Carbon I and II, generate around 7,596 million pesos of income flow and 6,056 jobs in the state (Dávila and Ibarra, 2021). Therefore, implementing a coal phase-out without a

human rights approach and gender perspective and without acknowledging the local context and implications might deepen social inequalities among different social groups, including miners, women, and youth.

Implementing a phase-out with a gender perspective can reduce the existing gender inequalities in the region. For example, coal mining has been an activity dominated mainly by men, which increases women's economic dependence and an unequal distribution of women's participation in the local economy. According to locals, women are usually only seen as the widows or mothers of miners.

Additional to the technical dimension, a fair transition should be framed under the following dimensions:

- **1. Political dimension:** build a robust governance structure based on transparency, enabling access to reliable information, inclusive participation, open dialogues among decision-makers and social groups, promoting consistent commitments with climate goals and social needs, as well as accountability mechanisms.

- **2. Social dimension:** use a bottom-up inclusive approach with a fair distribution of costs and benefits that guarantees human rights, mitigating the industry's social and environmental impacts, working toward long-lasting, environmental, and socially sustainable solutions.

The following orientations are critical for driving a fair CPO process:

When designing the pathway	Assessments: ■ Develop social, cultural, and economic impacts assessments of a transition away from coal. This process must guarantee the participation of local populations to address their needs and concerns. ■ Explicitly and clearly incorporate the imperative of justice, gender perspective and a human rights approach from the design phase onwards.
	Transparency: ■ Define, create and strengthen transparency and accountability mechanisms as cross-cutting approaches throughout the pathway. ■ Establish the necessary mechanisms to secure free and informed participation in decision-making processes. ■ Guarantee access to clear, timely, reliable, and consistent data regarding health impacts and transition costs, among others.
	Open the dialogue: ■ Build a broad dialogue and consultation process with all potential stakeholders, sponsored by national and local authorities, focusing on historically excluded sectors such as women, youth, and seniors. This dialogue must take part early in the decision-making process, and it must have the power to influence the design and implementation of every stage of the pathway.
Actions to guarantee long-term results	Addressing injustices: ■ Implement mitigation and adaptation strategies to address and remedy previous environmental and health impacts caused by the industry. ■ Establish compensation mechanisms for environmental and social impacts. ■ Implement robust and independent assessment and monitoring mechanisms of the positive and negative outcomes of the transition.
	Guaranteeing resources: ■ Incorporation of provisions in local and federal regulation to guarantee resource availability and process evaluation. ■ Review how budget decisions are made and ensure they are based on climate change criteria. For example, guarantee the long-term allocation of resources necessary for the retirement of power plants, renewable energies incentives, secure early retirement funds, training programs in green jobs, monitoring and evaluation of programs, among others.
	Generating alternatives: ■ Guarantee investment in clean alternatives and suspend future investment for any coal-related project. ■ Establish tax incentives for clean technologies and social enterprises in the region to create job opportunities, local development, and environmental services. ■ Pursue the creation of enough quality jobs in clean alternatives and training programs directed toward the impacted workforce, according to their own determination for their future. ■ Foster strategies to reduce energy intensity and consumption and increase the efficiency of the local economy.

A fair energy transition must guarantee and safeguard human rights, including work, health, participation, and access to a clean environment. In addition, a transition means a widespread economic restructuring and diversification, and as such, it is the opportunity for every stakeholder to address, attend and remedy the present and future impacts of the coal industry through a democratic, inclusive, and transparent process.

4. CHALLENGES AND OPPORTUNITIES



Substituting coal in a coal-dependent region faces numerous challenges, from energy policies and political interests to economic diversification and information. However, coal phase-out also opens a wide range of opportunities. Other countries' experiences implementing a fair coal phase-out pathway prove that implementing a just transition allows communities to build a sustainable future through dialogue and participation. Moreover, accelerating the participation of clean and fair power alternatives could reduce health impacts by improving air and water quality and addressing historical inequalities, including land access and labor rights. It is crucial to consider the challenges associated with the implementation of a fair coal phase-out pathway to ensure long-lasting benefits in the socio-environmental and economic spheres.

Mexico's current energy policies pose a significant challenge. Historically, Mexico has linked energy sovereignty to the use and exploitation of fossil fuels. Federal policies favor the use of fossil fuels in the power sector, with coal and fuel oil standing out. For example, during the first year of President López's administration (2019), about 9 out of every 10 pesos allocated to the energy

sector were assigned to strengthen state-owned companies to increase oil production. Only the remaining 8% of the sector's budget supported institutions that promote clean energy, such as the National Commission for the Efficient Use of Energy (CONUEE), the National Institute of Electricity and Clean Energy, and the National Institute of Nuclear Research (PEF, 2019).

Several initiatives promoted by the president have targeted the 2013 Energy Reform secondary laws impacting clean energy transition goals and renewable energy projects. Proposed changes to the Electric Industry Law (LIE) and proposed electricity reform mainly seek to modify the energy dispatch rules to prioritize CFE power plants (Presidencia de la República, 2021). These actions represent a challenge to the development of and investment in community, small-scale, and privately-owned renewable energies, affecting the region's ability to generate clean energy alternatives to coal.

Another challenge is that a fair transition is not part of the political debate, and therefore, it is not part of the government's priorities. However, in recent years, climate change effects (such as heatwaves, floods, and other extreme weather events) and local impacts derived from coal have increased public awareness towards the urgency of a transition away from coal within certain groups in the Coahuila region. For instance, collectives representing miners' rights asking for a just transition have emerged, making their voices heard and asking for appropriate and practical solutions.

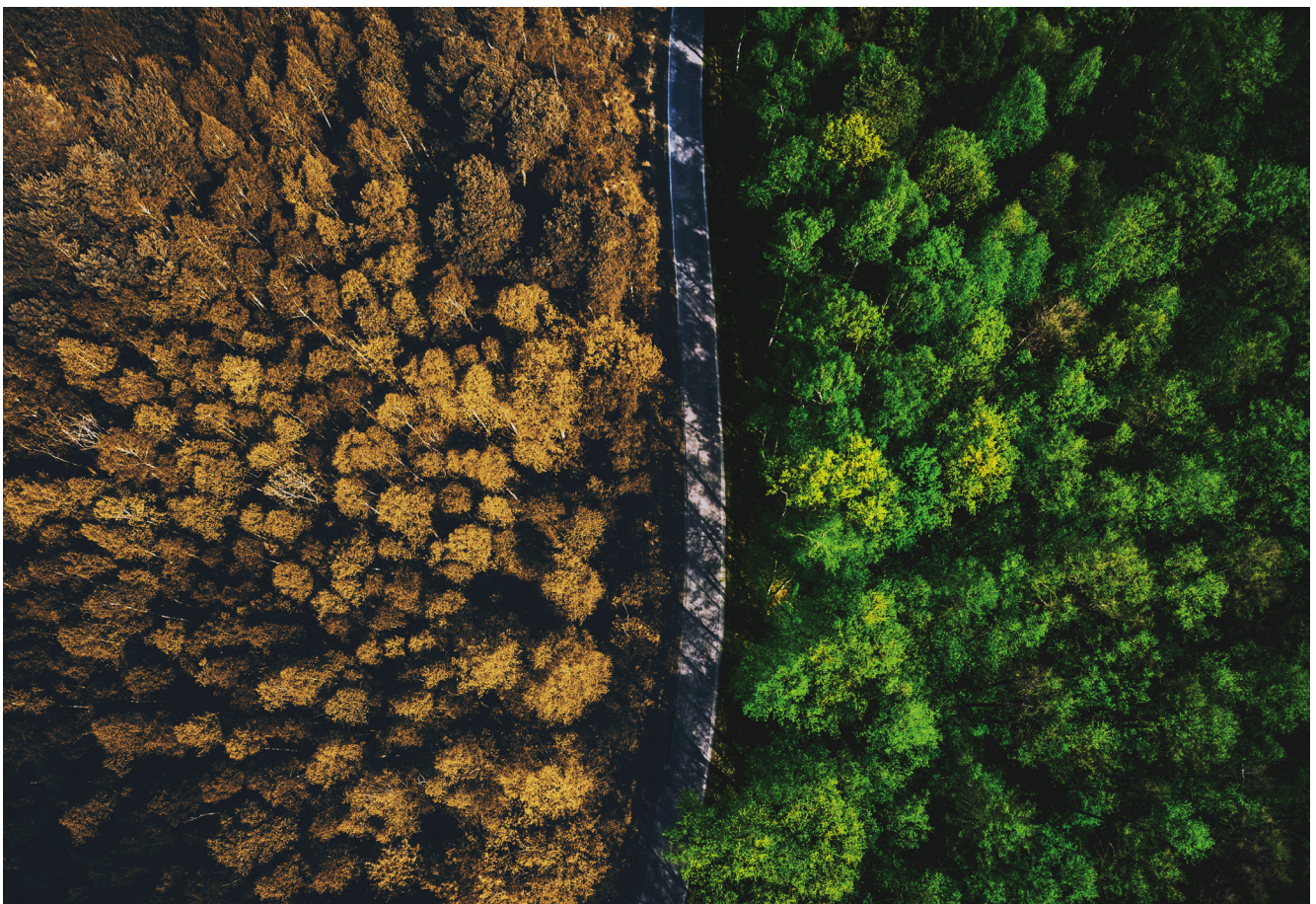
Locally, mining communities face the challenge of agreeing on the alternatives for economic diversification. With few alternatives, most solutions proposed by power groups are carbon and energy-intensive activities such as steel production or environmentally unacceptable options such as fracking. Moreover, local moguls and entrepreneurs who benefit from the coal industry are pressuring the communities to support additional mining activities and economic development linked to the coal value chain. Recently, local populations have pushed for the creation of local economic value chains and community ties through grassroots initiatives such as urban gardens, organic greenhouses, sustainable tourism, among others.

For both policymakers and communities, access to information has been a primary challenge in the coal industry. In order to have

a fair transition, it is essential to narrow the information gaps concerning the coal industry, including its impacts, activities, contracts, localized data, and stakeholders involved. Several NGOs and communities have emphatically pushed for more transparency in the coal and mining industry in general.

In addition, international instruments such as the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (known as the Escazú Agreement) aims to guarantee the right of access to information about the environment, public participation in environmental decision-making and environmental justice. By ratifying this agreement, Mexico committed to guaranteeing those conditions, and, if properly implemented, can be used as tools to overcome this challenge.

This chapter underpins that a fair transition away from coal faces many challenges at the national and local levels. Moreover, each of the challenges is linked to opportunities to drive coal away from the region. Recent data shows that coal extraction and burning have declined in Mexico's coal region. There is a historic opportunity to make Coahuila a region free from coal power generation.



5. CONCLUSION

As the Paris Agreement and the Powering Past Coal Alliance deadlines approach, the social, economic, and environmental implications of climate change continue to worsen. Although countries worldwide have expressed their interest in achieving carbon-neutrality through renewable energy goals, nature-based solutions, climate finance, among other measures, the definition and implementation of a fair coal phase-out plan is not part of the political discussion in all countries.

In 2017, the launch of the Powering Past Coal Alliance answered the social demands and science behind a cleaner energy future. It provided an opportunity to direct governments' attention toward phasing out coal because of the industry's socio-environmental implications and its importance for their domestic climate agendas. However, a transition away from coal revealed more complex realities than initially planned: most of the regions dependent on coal have deep cultural and economic ties with this fossil fuel as it is a source of employment, income, and therefore the economic livelihood of families. As a result, people and governments in several coal regions worldwide closed ranks against a transition without proper compensations and alternatives. The Solidarity and Just Transition Silesia Declaration in 2018 explicitly recognizes the social dimension on the transformation of regions and industries, acknowledging that a people-centered approach during coal phase-out scenarios is critical.

In Mexico, the discussion on coal phase-out has been absent during the current federal administration. Even though several countries are encouraging coal phase-out projects, Mexico's President Andrés Manuel López Obrador announced plans to expand the generation and extraction of this fossil fuel in the coal-mining region in the state of Coahuila (CFE, 2020b)—where 99% of the coal is extracted. Local populations and environments are the most affected by these policies.

A considerable challenge for a just transition in Mexico is the lack of transparent and reliable information about the socio-environmental and human rights impacts of the coal industry. Constantly, the absence of consistent databases, homogenized methodologies, and participatory processes in decision-making gives room to opacity and policy simulation. CFE, for instance, does not have publicly available data on its impacts and monitoring stations around the region. However, most impacts can be contrasted through publicly available environmental impact assessments, local NGO campaigns, press releases, and independent studies from similar regions around the world. As explained throughout this document, huge health impacts reach thousands of people; environmental devastation is widespread and visible; water scarcity and pollution are part of everyday life in the region; human rights abuses are present and local power groups control resources, among other negative social impacts.

There are multiple challenges for a just transition. Locally, industry moguls want to keep the coal power and iron and steel industries, pressuring local and federal governments to maintain the status quo. At the federal level, the current administration has

promoted the CFE power generation, including coal (CFE, 2021; PEMEX 2021). Although the new proposed energy dispatch prioritizes renewable energy, it keeps this fossil fuel in the electricity mix, which, as mentioned before, goes against international and national climate goals.

Moreover, further discussion on the use of coal in other industries is pending. Evaluation of the impacts of coal along its value chain, from mining to burning—in any industry—is essential to tackle all coal-related emissions. Metallurgy and the iron and steel industry use more than half of the coal resources in Mexico. Therefore, a comprehensive coal phase-out pathway seeking to reduce emissions, create development alternatives to mining regions, and address its impacts must take into account coal-burning in all industries.

A just and socially inclusive transition away from coal means designing a phase-out pathway that considers all these social, environmental, economic, political, and cultural elements. It also means including the local population and potential stakeholders in the process. A fair transition is not possible if past injustices are not addressed and if mining communities are left without safe and sustainable alternatives. This process also needs to recognize and thoroughly mitigate past, present, and future impacts on the health of workers and the general population. It also needs to work on remedy plans to address the vast environmental impacts of the coal industry, such as clearing thousands of acres of topsoil and vegetation, water pollution by heavy metals and other toxins, and water availability.

Social, health, and environmental impacts are worsening in the coal region and the climate crisis requires urgent action. Mexico has a chance to guarantee the human right to a safe environment and participation while complying with its international commitments established in the Paris Agreement, PPCA, and Silesia Declaration. Establishing clear targets in the country's NDCs to substitute coal as a fuel is one of many steps needed towards a cleaner and healthier future. As demanded by the local population, NGOs, and environmentalists: Mexico needs a public dialogue and open process to design a socially inclusive coal phase-out pathway, to mitigate past and present impacts of the industry, and to create sustainable alternatives.

REFERENCES

1. **CFE (2020a)** CFE cumple instrucción presidencial: formaliza compra de carbón con 60 productores de la región carbonífera de Sabinas, Coahuila.
2. **CFE (2020b)** Anuncia CFE la adquisición de carbón para impulsar la reactivación económica de la zona carbonífera de Coahuila. <https://app.cfe.mx/Aplicaciones/OTROS/Boletines/boletin?i=1287>
3. **CREA. (2021).** Air quality, health and toxics impacts of coal power and coal mining in Coahuila, Mexico. Centre for Research on Energy and Clean Air.
4. **Climate Scorecard (2019)** Mexico Ramps up Plans for Coal in the New Government's Development Strategy. May 2019 <https://www.climate-scorecard.org/2019/05/mexico-ramps-up-plans-for-coal-in-the-new-governments-development-strategy>
5. **CT (2020a).** Climate Transparency Report. Retrieved from <https://www.climate-transparency.org/g20-climate-performance/the-climate-transparency-report-2020>
6. **CT (2020b).** Country Profile - México. Climate Transparency. Retrieved from <https://www.climate-transparency.org/countries/americas/mexico>
7. **Dávila Flores, A., & Valdés Ibarra, M. (2021).** Del carbón a las renovables: Análisis económico para la transición eléctrica en México. México: Centro de Investigaciones Socioeconómicas de la Universidad Autónoma de Coahuila y WWF.
8. **DOF (2015)** Ley de Transición Energética. Diario Oficial de la Federación 12 24, 2015. Retrieved from http://dof.gob.mx/nota_detalle.php?codigo=5421295&fecha=24/12/2015
9. **EIA (2021).** Oil markets face uncertain future after rebound from historic Covid-19 shock. International Energy Agency. Retrieved from <https://www.iea.org/news/oil-markets-face-uncertain-future-after-rebound-from-historic-covid-19-shock>
10. **Friedlingstein, P. O. (2020).** Global Carbon Budget 2020. Earth System Science Data (12), 3269-3340. Retrieved from <https://doi.org/10.5194/essd-12-3269-2020>
11. **Gaceta Parlamentaria de la Cámara de Diputados (2021).** Iniciativa de Decreto por el que se reforman los artículos 25, 27 y 28 de la Constitución Política de los Estados Unidos Mexicanos. Cámara de Diputados del Honorable Congreso de la Unión, LXV Legislatura. <http://gaceta.diputados.gob.mx/PDF/65/2021/oct/20211001-I.pdf>.
12. **Hendryx, M. (2015).** The public health impacts of surface coal mining. The Extractive Industries and Society, 2(4), 820-826.
13. **ICM (2020).** Rutas sectoriales de descarbonización para México al 2030 y proyecciones a 2050. Ciudad de México: Embajada Británica en México. Retrieved from http://www.iniciativaclimatica.org/wp-content/uploads/2021/03/PresupuestoCarbono_DOC-POL.pdf
14. **IEA (2021a).** Coal 2020: Analysis and forecast to 2025. International Energy Agency. Retrieved from <https://www.iea.org/reports/coal-2020>
15. **IEA (2021b).** Monthly Electricity Statistics. International Energy Agency. Retrieved from <https://www.iea.org/reports/monthly-oecd-electricity-statistics>
16. **IEA (2021c).** Oil 2021: Analysis and forecast to 2026. International Energy Agency. Retrieved from <https://www.iea.org/reports/oil-2021#executive-summary>
17. **IEA (2021d).** Short-Term energy Outlook. Energy Information Administration. Retrieved from <https://www.eia.gov/outlooks/steo/>
18. **INECC (2018).** Inventario Nacional de Emisiones de Gases y Compuestos de Efecto Invernadero 1990-2015. Instituto Nacional de Ecología y Cambio Climático.
19. **IPCC (2018).** Global Warming of 1.5°C: Summary for Policymakers. Switzerland: Intergovernmental Panel on Climate Change. Retrieved from https://www.ipcc.ch/site/assets/uploads/2018/11/SR1.5_SPM_Low_Res.pdf
20. **Kholod, N., Evans, M., Pilcher, R. C., Roshchanka, V., Ruiz, F., Coté, M., & Collings, R. (2020, May 20).** Global methane emissions from coal mining to continue growing even with declining coal production. Journal of Cleaner Production, 256(120489). Doi: <https://doi.org/10.1016/j.jclepro.2020.120489> <https://doi.org/10.1016/j.jclepro.2020.120489>
21. **Martínez Espinoza, E., Saldaña Saldaña, E., Olvera Briseño, R., Navarro Ballesteros, J. O., & Auerbach, C. (2018).** El carbón rojo de Coahuila: aquí acaba el silencio. Heinrich Böll Stiftung y Organización Familia Pasta de Conchos.
22. **Ortúzar, F., Tornel, C (2016)** Controlando los Contaminantes Climáticos de Vida Corta: Una oportunidad para mejorar la calidad del aire y mitigar el cambio climático. El caso de Brasil, Chile y México. Primera edición: 2016. Asociación Interamericana para la Defensa del Ambiente (AIDA)

23. **PEMEX (2021)** Business Plan for PEMEX and its subsidiary production companies.
https://www.pemex.com/acerca/plan-de-negocios/Documents/pn_2021-2025-completo.pdf
24. **PPCA (2017)** The Powering Past Coal Alliance (PPCA) Declaration: <https://www.poweringpastcoal.org/about/declaration>
25. **Presidencia de México (2013)** 'Explicación de la Reforma Energética', available at:
<https://www.gob.mx/sener/documentos/explicacion-ampliada-de-la-reforma-energetica>
26. **SEMARNAT (2020)**. Contribución Determinada a nivel Nacional: México. Secretaría de Medio Ambiente y Recursos Naturales. Retrieved from
https://www.gob.mx/cms/uploads/attachment/le/603401/-Contribuci_n_Determinada_a_nivel_Nacional.pdf
27. **UNEP (2020)**. Emissions Gap Report 2020. United Nations Environmental Programme. Retrieved from
<https://www.unep.org/emissions-gap-report-2020>
28. **UNFCCC (2015)**. Paris Agreement. United Nations Framework Convention on Climate Change. Retrieved from
<https://unfccc.int/es/process-and-meetings/the-paris-agreement/que-es-el-acuerdo-de-paris>