


Charting a New Course: Policy Options for the Next Stage in U.S.-Mexico Relations

U.S.-Mexico Energy and Climate Collaboration

By Duncan Wood

Wilson Center
MEXICO INSTITUTE

February 2017

KEY POLICY RECOMMENDATIONS

- Embrace the existing North American energy dialogue as it has become a critical resource in preparing for the future of global and regional energy markets. Greater coordination to improve energy system efficiency.
- Ensure “friendly” oil suppliers such as Canada and Mexico—Mexico’s continuing status as a “friendly” oil supplier means that the United States has an interest in assisting its southern neighbor to maximize the potential of its oil fields
- Develop a dialogue between Mexican and U.S. counterparts that focuses on efficient regulation. Mexico should work with the United States to reduce the burden of its own regulatory system for energy firms. Share the successful U.S. experience in energy regulation and in reducing regulatory burden, which will help Mexico succeed and integrate its energy markets.
- Energy infrastructure planning presents an opportunity to coordinate investments across the border to ensure that benefits are optimized for both countries. Embrace opportunities for ongoing energy infrastructure projects that take into account the increasingly integrated nature of energy markets. Plan cross-border electricity transmission in such a way as to benefit both producers and consumers with lower-cost and shorter-distance options for transmission.
- Export U.S. natural gas via pipeline to Mexico and to Central America. A focus on increasing natural gas production and use in the United States is entirely compatible with the change underway in Mexico. Continued Mexican consumption of cheap gas from the United States will ensure both stable prices and improve Mexican economic competitiveness.
- Create agreements between regional system’s operators in the U.S. southwest with the CENACE and CFE to overcome intermittency problems and allow for the optimization of existing and future renewable resources.
- Continue working on climate and energy issues with Mexico at the level of U.S. states, such as California.

U.S.-MEXICO ENERGY AND CLIMATE COLLABORATION

By Duncan Wood

Four years ago, as the administration of Enrique Peña Nieto began, the Mexico Institute outlined a number of areas in which productive collaboration could take place between the Mexican and U.S. governments. Those areas focused on non-oil related energy issues for an obvious reason: at the time, Mexico's oil and gas sector remained closed to private and foreign investment, and collaboration in this area was stifled at best.

The constitutional reforms of December 2013 (and the implementing legislation of the following year) changed this scenario dramatically and profoundly. A full opening of the hydrocarbons value chain to private and foreign investment, and the gradual construction of a competitiveness marketplace for energy suppliers have revolutionized the Mexican energy model. This is not just the case in oil and gas, of course: the electricity sector too has been extensively liberalized and 2016 saw two major generation auctions successfully carried out by the government. There has been impressive progress in developing Mexico's renewable energy potential, and remarkably (given the expected expansion of its hydrocarbons sector), ongoing commitments to limit carbon gas emissions.

A full opening of the hydrocarbons value chain to private and foreign investment, and the gradual construction of a competitiveness marketplace for energy suppliers have revolutionized the Mexican energy model.

This chapter will examine the progress that has taken place in Mexico's energy sector and the energy relationship between Mexico and the United States over the past four years. More importantly, it will propose meaningful paths for collaboration based on three main factors: 1) the transformation of energy systems worldwide; 2) the opportunities presented by a liberalized energy sector in Mexico; and 3) the interest shown by the incoming Trump administration in the energy sector. Most importantly, the incoming administration should embrace the existing North American energy dialogue as it has become a critical resource in preparing for the future of global and regional energy markets.

Why Energy Matters

Before analyzing the progress that has been made in the bilateral and regional energy relationship, it is worth remembering why energy matters so much. Of course it is a major component of both countries' economies, responsible for wealth creation, innovation, and employment. Across Mexico and the United States, millions of people work in the traditional energy sector, and millions more are finding work in the areas of renewable energy and energy efficiency.[1]

[1] "U.S. Energy Employment Report 2016," Department of Energy, 2016, https://www.energy.gov/.

But secure access to comparatively low-priced energy is also crucial for economic competitiveness. Prior to Mexico's energy reform, high prices for industrial consumers of electricity compromised manufacturing competitiveness in the country, and natural gas shortages meant repeated stoppages at factories in the north of the country. Since the reform was passed, prices have been reduced dramatically in Mexico, falling by between 21 percent and 30 percent for industrial consumers between September 2014 and September 2015.[2] This has significantly improved the economic competitiveness of Mexican manufacturers.

Wilson Center Energy Cooperation Recommendations from 2013

• There is a pressing need for infrastructure investment in the transportation of oil and, most importantly, gas. The creation of a truly regional gas market requires large-scale construction of gas pipelines, both within Mexico and across the border.
• Regulatory cooperation between the energy and environmental agencies of both countries is urgently needed. As transboundary oil and gas reserves are exploited, the two nations should harmonize their standards and regulations for hydrocarbons exploration and production.
• The question of cross-border electricity transmission has been a feature of bilateral talks since 2010, but little has yet been achieved. It is vital that the bilateral mechanism is given a sense of urgency and importance from both governments.
• The development of a Smart Grid for electricity transmission and distribution in Mexico is an issue that would benefit from further bilateral cooperation. U.S. funding for initial research into the building of a smart grid should now be followed by increased technical cooperation.
• The impressive advances in energy efficiency in the United States in recent years presents a model that Mexico would do well to study. Some work has already been done in Mexico to put in place an energy efficiency strategy, and collaboration with U.S. agencies would be of great benefit.
• Long-term discussions should begin between Mexico, the United States and Canada over the questions of carbon emissions, carbon pricing and a carbon tax. Although the possibility of a national carbon tax or cap and trade system in the U.S. appears distant, it is important that all three of the NAFTA partners understand the others' approach to this issue and monitor future policy developments closely.

[2] "Electricity tariffs dropped in Mexico in 2015," *Enerdata*, August 31, 2015, http://www.enerdata.net/.

Mexico's New Energy Model

After 75 years of running a closed and monopolistic model in its energy sector, in December 2013 the Mexican government won Congressional approval for a far-reaching reform package that liberalized both the hydrocarbons and the electricity sectors. This paradigm shift happened in the face of considerable opposition from left-wing parties and nationalists, but the Peña Nieto government was still able to win a two-thirds majority in both chambers of Congress and approval from a majority of the state legislatures. Over the next two years, implementing legislation was passed by Congress, and regulatory frameworks and organisms have been constructed.

In December 2014, Energy Secretary Pedro Joaquin Coldwell announced the nation's first oil bidding round (Ronda 1) since 1938, and over the following two years successful auctions were held for fields in shallow and deep waters and for onshore blocks. Although the first of these auctions (Ronda 1.1), in July 2015, was a disappointment with only 2 out of 14 blocks awarded, the National Hydrocarbons Commission (CNH) and Energy Ministry (SENER) listened to investor feedback and changed the process for subsequent auctions, to impressive effect. In Ronda 1.2, 3 out of 5 blocks were allocated (with impressive winning bids ensuring higher than expected revenue for the government), and Ronda 1.3 saw all 25 available blocks awarded. The "jewel in the crown" of Ronda 1, however, came in December 2016, one year after the completion of Ronda 1.3, and three years after the signing of the constitutional reform. In this auction, the CNH was successful in allocating 8 out of 10 available fields, with the winning bids coming in with royalty commitments far above the levels expected by the government (Figure 1). On the same day as Ronda 1.4, the CNH also oversaw the bidding process for the historic Trion Deepwater field farm-out, in which firms competed to partner with Pemex in an existing field in the Perdido belt. In total, the first bidding round of the new hydrocarbons model saw the signing of 39 contracts and is expected to generate $49 billion dollars.

Figure 1. Ronda 1.4 Results

Area 1: Cinturon Plegado de Perdido		
Contractual Area	**Winner**	**Royalty Rate %**
1	China Offshore Oil Corporation	17
2	Total & Exxon	5
3	Chevron, Pemex & Inpex	7.44
4	China Offshore Oil Corporation	15.01
Area 2: Cuenca Salina		
Contractual Area	**Winner**	**Royalty Rate %**
1	Statoil, BP & Total	10
2	No winner	0
3	Statoil, BP & Total	10
4	PC Carigali & Sierra	22.99
5	Murphy, Ophir, PC Carigali & Sierra	26.91
6	No winner	0

Source: Oil and Gas Mexico

The success of this extraordinary change in Mexico's hydrocarbons industry was brought about in large part by the willingness of the Mexican government to engage in dialogue with the investor community. When Energy Secretary Pedro Joaquin Coldwell announced the Ronda 1 terms in December of 2014, he declared that the government was open to feedback from the private sector and foreign investors to be able to improve on the investment climate. Although this may be seen as standard practice in other jurisdictions, in Mexico this marked a dramatic departure from the traditional, state-imposed reality in the hydrocarbons sector. Not only did Mexico welcome foreign investment, it invited the investors to help shape the rules of the new system.

Not only did Mexico welcome foreign investment, it invited the investors to help shape the rules of the new system.

Mexico's petroleum markets are also being revolutionized on the downstream side. Beginning in January 2016, private companies are now allowed to compete with Pemex in the retail market and, in April 2016, private companies were allowed to import refined products without having to go through Pemex. This liberalization of the refined products market has seen enormous interest from foreign oil companies, with Gulf already opening its first gasoline stations in the country in mid-2016. Lastly, 2017 will see the partial liberalization of gasoline prices in Mexico, which has brought a consumer backlash as prices have risen dramatically.

However, significant challenges still remain for Mexico's hydrocarbons sector. Pemex continues to face enormous financial pressure due to an overwhelming tax burden from the government, crippling labor liabilities and dramatically reduced revenues due to falling production and low international oil prices. Pemex's production decline has been profound and dramatic, falling from 3.4 million barrels per day in 2004 to less than 2 million per day in 2017. Pemex has also been hemorrhaging money on its downstream operations: its six refineries have been operating at only 66 percent capacity over the past few years, and it is estimated that they result in a US$9 billion loss every year for the company. This also means that Mexico has been importing record supplies of gasoline, reaching 867,000 barrels per day in July of 2016.[3]

Pemex continues to face enormous financial pressure due to an overwhelming tax burden from the government, crippling labor liabilities and dramatically reduced revenues due to falling production and low international oil prices.

Having said this, Pemex is finally beginning to adapt to the new environment. In February 2016, the company brought in a new CEO, Jose Antonio Gonzalez Anaya, who has committed to partnering with the private sector across the value chain. The proof of this commitment came in December 2016, when Pemex not only participated in a winning

[3] Alex Wood, "A Look at the Future of the Mexican Petroleum Industry after Energy Reform," *Mexico Institute*, October 25, 2016, https://www.wilsoncenter.org/.

consortium in December 2016 for a deep-water block in the Perdido Belt in Round 1.4, but also entered an association within the Trion field through a farm-out. The winning bid in the farm-out process, from Australia's BHP Billiton, not only ushered in a new era of collaboration for Pemex, it also brought a $624 million cash payment for the company, a most welcome injection at the end of what had been a very difficult year. These events suggest that change is coming fast for the company and that there is significant reason to be optimistic about the future.

These events suggest that change is coming fast for the company and that there is significant reason to be optimistic about the future.

At the same time as this extraordinary process was unfolding, Mexico was continuing with a transformation of its natural gas sector. During 2011 and 2012, the country had experienced severe natural gas shortages, leading to industrial consumers being cut off from supplies at critical moments, compromising their ability to meet orders. Building on existing commitments, the Peña Nieto administration has continued to expand Mexico's natural gas pipeline network, and even more importantly, has overseen new cross-border pipeline projects that have brought much needed low-cost gas in from the United States.

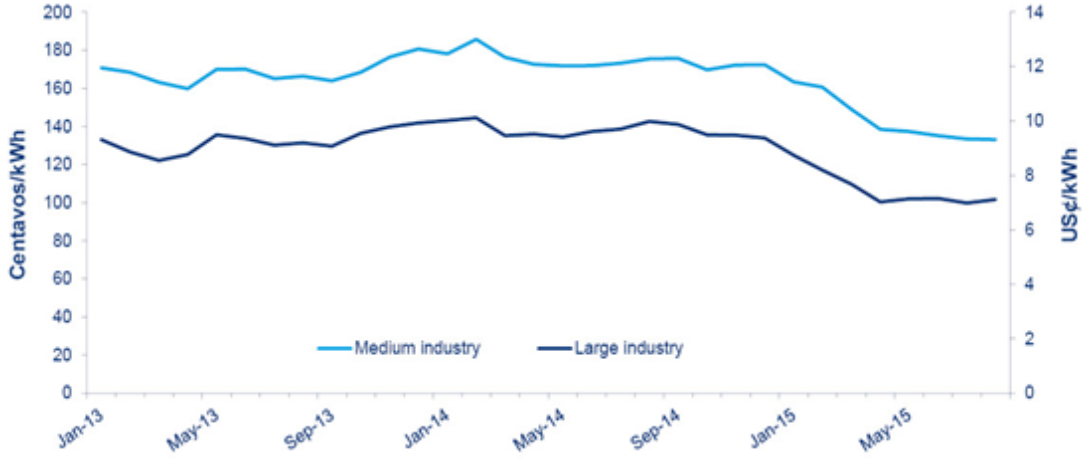
The influx of natural gas into Mexico is also helping the transformation of the electricity system (Figures 2, 3). As with the hydrocarbons industry, Mexico's power sector has been completely opened up to competition thanks to the 2013 constitutional reform. Before the reform, the power sector was dominated by the state-owned utility, the Comision Federal de Electricidad (CFE), a monopolistic system that only allowed private power generation under certain conditions. The electricity reform consists of the following major elements:

1. The power sector is transitioning from a vertically integrated industry with a dominant state-owned utility to a decentralized market.
2. Private investment is now permitted throughout the electricity value chain.
3. Power generation is becoming a fully competitive activity.
4. An independent body, the CENACE, now runs the wholesale electricity market.
5. Open access is guaranteed to the power grid for all market participants.

The CFE itself is also being transformed. From its formerly monopolistic position, the utility is now being unbundled so that it will be split into several companies that will compete with each other and with private firms.

Access to stable supplies of natural gas in Mexico is bringing a massive transformation of generating capacity. It is estimated that 44 percent of generation capacity additions up to 2029 will be natural gas based, as well as a number of conversions of existing fuel oil powered plants to gas.

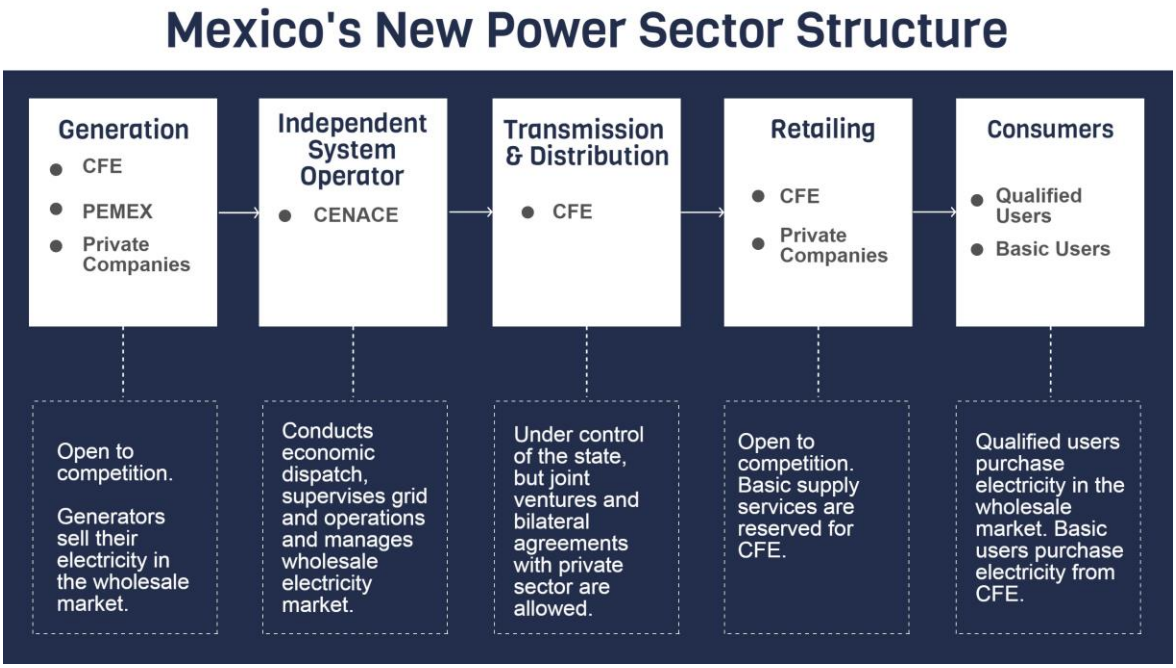
Figure 2. Mexico's Industrial Power Prices



Source: Wood Mackenzie

The importance of the power sector reforms was made clear by Mexico's Energy Minister, Pedro Joaquin Coldwell, when he called it, "the economic competitiveness reform." As Alejandro Chanona Robles has argued, "access to reliable and affordable power can give businesses a competitive edge over their rivals, stimulate job creation and spur economic growth…Studies suggest that cheaper electricity can substantially boost Mexico's manufacturing base."[4]

Figure 3. Mexico's New Power Sector Structure



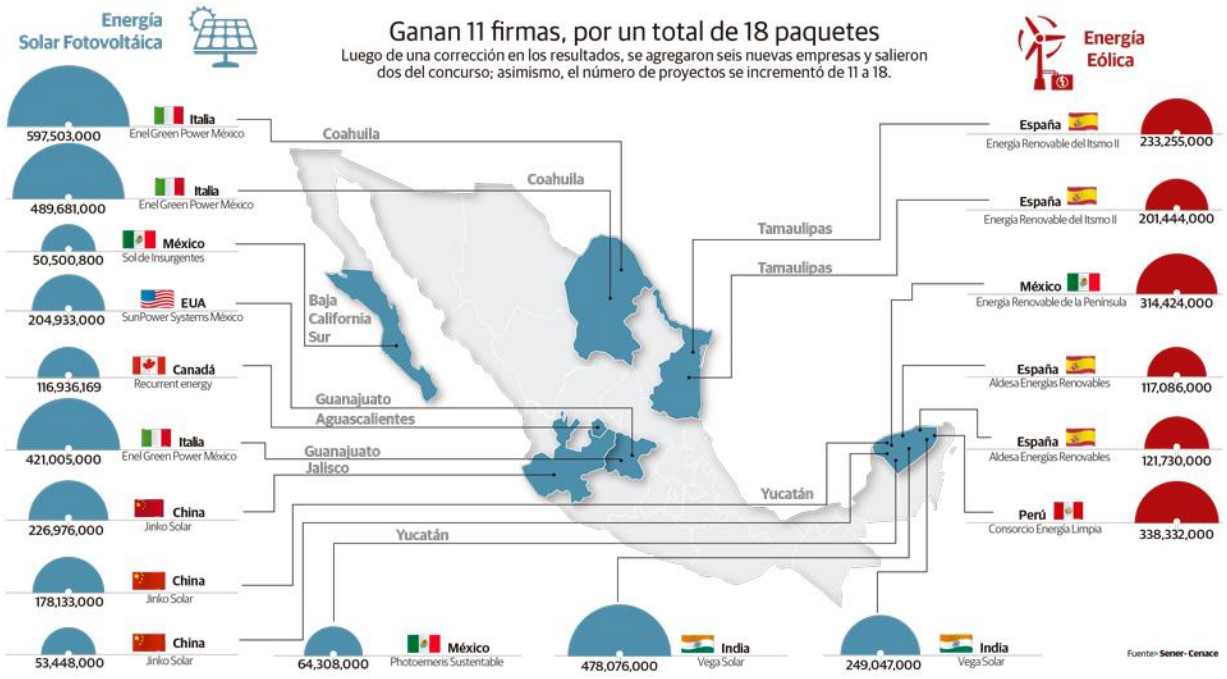
Source: Alejandro Chanona Robles (2016)

[4] Alejandro Chanona Robles. "Tracking the Progress of Mexico's Power Sector Reform." *Mexico Institute*. June 6, 2016. https://wilsoncenter.org/.

But Mexico's power sector transformation has also already brought significant investment in new renewable energy capacity. In March 2016, the country's first electricity generation auction was held, with 18 renewable power contracts awarded, attracting record-low prices per MW of power generated (Figure 4). This was followed by a second auction in September, which saw even lower prices guaranteed.

Mexico's power sector transformation has also already brought significant investment in new renewable energy capacity.

Figure 4. Results of Mexico's First Renewable Energy Auction, 2016



Source: awstruepower.com

Further changes will follow in Mexico's power markets, with an opening of the capacity market in February 2017 and the launch of a market for Clean Energy Certificates (CECs) in 2018. This latter initiative will cement the government's already impressive commitment to reducing carbon emissions and boosting renewable energy production in Mexico.

The Liberation of the U.S.-Mexico Energy Dialogue

For decades, Mexican sensitivities regarding the connection between energy and national sovereignty prevented the development of a modern and multi-faceted dialogue over energy cooperation between the two countries. The 2013 reform, however, has opened the way for comprehensive interaction on energy policy. In February 2014, only two months after the approval of the reform, the three North American heads of government

met in Toluca, in the State of Mexico, to discuss the future of regional integration. Energy featured high on the agenda, and it was agreed that the energy ministers of the three countries would begin a regular dialogue. The first meeting took place in December of that year, in Washington, DC, with the ministers agreeing on an agenda for cooperation focused on:

1) Collaboration on the generation of North American energy data, statistics and mapping to be made available to the public;
2) Responsible and sustainable best practices for the development of unconventional oil and gas;
3) Modern, resilient energy infrastructure for North America in all aspects, physical as well as institutional, including policies, regulations, workforce, innovation, practices to promote energy efficiency and sustainable technologies.

The breadth of this agenda helps to emphasize the potential for collaboration now that the Mexican energy system has been transformed. The MOU signed by the energy minsters institutionalized a framework for sharing information among the participants with the goal of promoting dialogue and cooperation. Under the North American Cooperation on Energy Information initiative (NACEI), the three ministers agreed to set up a working group that would facilitate this coordination, including the following agencies:

- Canada: Department of Natural Resources, Statistics Canada and the National Energy Board;
- Mexico: the Secretaría de Energía (SENER) (Secretariat of Energy), Comisión Reguladora de Energía, Comisión Nacional de Hidrocarburos, Petróleos Mexicanos, Comisión Federal de Electricidad, Centro Nacional de Control de Gas Natural, Centro Nacional de Control de Energía and the Instituto Nacional de Estadística y Geografía (INEGI) (National Institute of Statistics and Geography);
- United States: the Energy Information Administration (EIA) of the Department of Energy and the U.S. Census Bureau.

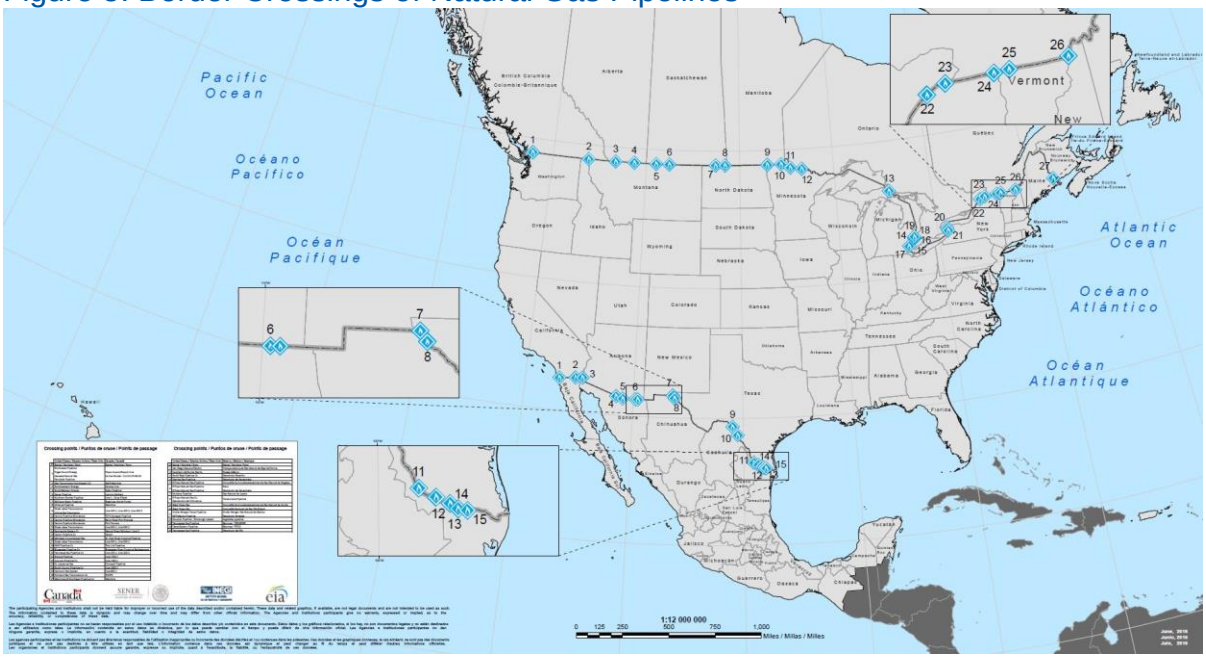
The group was specifically tasked with the following activities:

a. comparing, validating, and improving respective energy import and export information;
b. sharing publicly available geospatial information related to energy infrastructure;
c. exchanging views and information on projections of cross-border energy flows;
d. harmonizing terminology, concepts, and definitions of energy products.

The NACEI began work immediately on the gathering of statistics and mapping resources. Available to the public at www.eia.gov/special/trilat/, the result is an impressive resource that allows for a truly regional understanding of energy resources for the first time. The maps created thus far are an extraordinary resource that allows for a visualization of energy infrastructure across the North American region and expands the potential for cross-border cooperation and planning in a way that had not been possible before (Figure 5). What's more, the harmonization of statistics from all three countries

allows for meaningful and simple comparisons. In this way, the North American energy dialogue has opened the way for deep long-term collaboration.

Figure 5. Border Crossings of Natural Gas Pipelines



Crossing points / Puntos de cruce / Points de passage

ID	United States / Estados Unidos / États-Unis Name / Nombre / Nom	Canada / Canadá Name / Nombre / Nom
1	Northwest Pipeline Puget Sound Energy Cascade Natural Gas Ferndale Pipeline	Hipco Import/Export Line Us-Can Border -11+12+17+18+19
2	Gas Transmission Northwest LLC	ANG Mainline
3	Northwestern Energy	Carway Line
4	NorthWestern Energy	Aden Pipeline
5	Havre Pipeline	Loomis-Herbert
6	Northern Border Pipeline	Line 1 - Zone 9 Sask
7	Williston Basin Pipeline	Steelman-North Portal
8	Alliance Pipeline	Mainline
9	Great Lakes Transmission Viking Gas Tranmssion	Line 400-1, Line 400-2, Line 400-3
10	Centra Pipeline Minnesota	TCPL/Sprague Pipeline
11	Centra Pipeline Minnesota	Rainy River/Fort Frances
12	Centra Pipeline Minnesota	Fort Frances
13	Great Lakes Transmission	Line 900-1, Line 900-2
14	Panhandle Eastern PL	Detroit River/Windsor 1 And 2
15	Vector Pipeline Co	Vector
16	Michigan Consolidated Gas	St. Clair River Crossing Pipeline
17	Great Lakes Transmission	Line 500-1, Line 500-2
18	ANR Pipeline Co	The Link Pipeline
19	Bluewater Pipeline Co	Bluewater River Crossing Replacement
20	Tennesse Gas Pipeline Co	Line 200-1, Line 200-2
21	Empire Pipeline	Line 1700-1
22	Iroquois Pipeline Co	Line 1400-1
23	St. Lawrence Gas	Cornwall Pipeline
24	North County Pipeline Co	Line 1600-1
25	Vermont Gas System	Line 800-1
26	Portland Gas Transmission Co	PNGTS
27	Maritimes & Northeast Pipeline Co	Mainline

Crossing points / Puntos de cruce / Points de passage

ID	United States / Estados Unidos / États-Unis Name / Nombre / Nom	Mexico / México / Mexique Name / Nombre / Nom
1	San Diego Gas and Electric	Transportadora de Gas Natural de Baja California
2	Southern California Gas Co	Ecogas México
3	North Baja Pipeline Co	Gasoducto Rosarito
4	Sierrita Gas Pipeline	Gasoducto de Aguaprieta
5	El Paso Natural Gas Pipeline	Compañía de Autoabastecedores de Gas Natural de Nogales
6	El Paso Natural Gas Pipeline El Paso Natural Gas Pipeline	Naco Gasoducto de Aguaprieta
7	Norteno Pipeline	Gas Natural de Juarez
8	El Paso Natural Gas Co Gasoductos de Chihuahua	Tarahumara Pipeline
9	West Texas Gas	Compañía de Autoabastecedores de Gas Natural de Acuña
10	West Texas Gas	Compañía Nacional de Gas (Río Bravo)
11	Kinder Morgan Texas Pipeline NET Mexico Pipeline	kinder Morgan Gas Natural de Mexico Gasoducto Noreste
12	Houston Pipeline - Edinburgh Lateral	Argüelles pipeline
13	Tennessee Gas Pipeline	Reynosa - TENNESSE
14	Texas Eastern Pipeline	Reynosa- TETCO
15	Tennessee Gas Pipeline	Gasoducto del Río

Source: U.S. Energy Information Administration

The leadership role played by the United States in this regional approach was underlined by the 2015 Quadrennial Energy Review (QER), which focused extensively on the North American region and on the opportunities for energy cooperation. The two major conclusions of the QER chapter on North America were:

1. The United States has significant energy trade with Canada ($140 billion per year) and Mexico ($65 billion).
2. Greater coordination will improve energy system efficiency and build resiliency to disruptions of the North American energy market, data exchanges, and regulatory harmonization.

In 2015, the EIA, Canada's National Energy Board and SENER produced a 2015 Trilateral Energy Outlook (www.eia.gov/special/trilat/pdf/2015trilateral.pdf). This report established projections for crude oil, refined products, and natural gas and electricity markets across the region to 2029. Although the report's authors emphasize that "it does not reflect results of an integrated North American energy model" nor should it "be construed as an official outlook for any of the Trilateral members," there is, for the first time, the possibility of a more holistic approach to planning the future of North America's energy sector.

There is, for the first time, the possibility of a more holistic approach to planning the future of North America's energy sector.

The December 2014 meeting of the energy ministers was followed in May of 2015 by a meeting on the margins of the Energy and Climate Partnership of the Americas Ministerial and the Clean Energy Ministerial meetings in Merida, Mexico. The three ministers agreed to form a new Working Group on Climate Change and Energy, involving regular interactions between teams from all three countries. The agenda that was laid out in Merida included:

- Reliable, resilient, and low-carbon electricity grids;
- Modeling and deployment of clean energy technologies, including renewables;
- Energy efficiency for equipment, appliances, industries, and buildings, including energy management systems;
- Carbon capture, use, and storage;
- Climate change adaptation and resilience; and
- Emissions from the oil and gas sector, including methane and black carbon.

Mexican Secretary of Energy Coldwell emphasized that this agenda demonstrated a commitment to "a path to achieve deep de-carbonization." U.S. Secretary Moniz instead emphasized the potential for "facilitating cooperation to deploy innovative renewable energy technologies, modernize the grid, and increase energy efficiency to combat climate change and reach greenhouse gas targets while growing low-carbon economies in North America."

This institutionalization of an energy and climate agenda in the region has been identified as a pre-requisite for meaningful and sustained cooperation.[5] Building on the experience of the North American Energy Working Group (NAEWG) in the early 2000's, the new working group will facilitate coordination by a dual process of socialization and harmonization. The first process has already shown its value: the coming together of the energy policy representatives of the three countries has been successful in encouraging both mutual understanding and increased interaction between the ministries. The second process will take longer, and we should not expect it to be a linear or an even process. Harmonization of regulations and standards makes more sense in some areas than others (and sometimes bilateral rather than trilateral), and in most areas the goal should be compatibility and coordination rather than full homogenization.

Another area that has progressed impressively since 2013 has been regulatory cooperation. As Mexico has opened its sector to private participation, its regulatory agencies have been strengthened and their power expanded. The Comision Nacional de Hidrocarburos (CNH) has been charged with running the bidding process for oil blocks in Rounds 1 and 2, and the Comision Reguladora de Energia (CRE) has overseen both the opening of the electricity market alongside SENER and the CENACE, and the regulation of transportation, storage and distribution of hydrocarbons, including natural gas. Furthermore, a new environmental regulatory agency, the Agencia de Seguridad, Energia y Ambiente (ASEA), was created by the energy reform to oversee the industrial safety and environmental protection aspects of the hydrocarbons sector. Operating under the control of the environmental ministry (SEMARNAT), the ASEA has had to progress rapidly since its inception in 2015. In fact, all three regulatory agencies have had to adapt to dramatically altered circumstances during the first three years of Mexico's new energy model. To do so, they have made a concerted effort to acquaint themselves with international best practice and Mexican contact with U.S. (and Canadian) regulators has been an integral part of that process. Regulatory exchanges with California and Texas (and Alberta) have been particularly significant, as have exchanges with U.S. federal organizations such as the Bureau of Safety and Environmental Enforcement (BSEE), the Bureau of Ocean Energy Management (BOEM), the Bureau of Land Management (BLM), the Environmental Protection Agency (EPA), the Federal Energy Regulatory Commission (FERC) and the Pipeline and Hazardous Materials Safety Administration (PHMSA).

Another area that has progressed impressively since 2013 has been regulatory cooperation.

[5] Duncan Wood, "Integrating North America's Energy Markets: A Call for Action," *Mexico Institute*, December 16, 2014, https://wilsoncenter.org/.

U.S.-Mexico Climate Cooperation

Mexico has long been recognized as an emerging market leader in international climate change negotiations.

Mexico has long been recognized as an emerging market leader in international climate change negotiations. Beginning with the presidency of Felipe Calderon, Mexico has attempted to develop an aggressive approach to global climate talks that is backed up by progress on climate mitigation and renewable energy policy at home. President Peña Nieto's continuation of this policy surprised some who had predicted a hydrocarbons-friendly approach, and has even strengthened Mexico's global climate position by securing legislation in Mexico's Congress that commits the country to a 50 percent reduction in carbon emissions by 2050, alongside ambitious targets for electricity generation from renewable sources. Mexico was also the first developing country to declare its Intended Nationally Determined Contribution (INDC) under the Paris Accord process in April 2015, and has undertaken a commitment to reduce its black carbon emissions by 51 percent by 2030. Largely thanks to this commitment, Mexico and the United States became partners in pushing the Paris Accord in December 2015, setting the stage for further cooperation at a regional level.

The North American energy dialogue has been an important force driving cooperation on climate issues. In July 2016, at the Ottawa North American Leaders' Summit (NALS), Mexico agreed to join the existing U.S.-Canada agreement on methane emissions reductions. The trilateral accord, commits the countries to reducing methane emissions from the hydrocarbons industry by up to 45 percent by 2025. Mexico had previously resisted a commitment to reduce its emissions, partly due to opposition from Pemex, and partly due to an overwhelming policy agenda thanks to the energy reform implementation. Alongside pressure from the Canadian and U.S. governments, extensive efforts by civil society groups, including the Environmental Defense Fund (EDF) to promote the emissions reductions were successful in convincing the Peña Nieto administration of the importance of a trilateral accord. The EDF, quoting Mexican government figures, estimate that methane emissions from the hydrocarbon industry make up 19 percent of total methane emissions in the country.

Trilateral cooperation can also be credited with 2016's most important global climate accord, the Kigali Agreement on phasing out hydroflourocarbons (HFCs) in October. In 2009, during a meeting of the Montreal Protocol, the United States, Canada and Mexico (plus the Maldives) pushed for international cooperation to reduce HFC emissions as a crucial component of fighting climate change.

Building a New Agenda: Regulation and Infrastructure Lead the Way

The beginning of the administration of President Donald Trump in January 2017 presents an opportunity to move the energy relationship between Mexico and the United States in exciting new directions, in addition to consolidating existing areas of agreement. Although

the specifics of the new administration's energy policy are far from clearly defined at the time of writing, four clear priorities emerged during the presidential election campaign that are likely to persist and have implications for the energy relationship with Mexico. First, the Trump campaign emphasized the need to eliminate U.S. dependence and focus on importing oil from friendly nations. The second goal is a concern with reducing the regulatory burden faced by private energy firms. Though much of this regulation takes place at the level of state agencies, it is likely that the EPA will see its mandate to regulate carbon gas emissions greatly reduced. Furthermore, the appointment of former Texas governor Rick Perry as Energy Secretary signals a move to cut back on red tape, to promote the exploitation of America's shale, oil and natural gas reserves. Third, throughout the campaign, Trump emphasized the need to invest in U.S. infrastructure to generate jobs and improve competitiveness. This is likely to have ramifications for the energy sector. Lastly, the new administration has signaled its intent to boost the use of natural gas, both as a way of reducing emissions and lowering energy costs for the consumer.

Donald J. Trump Campaign Platform on Energy

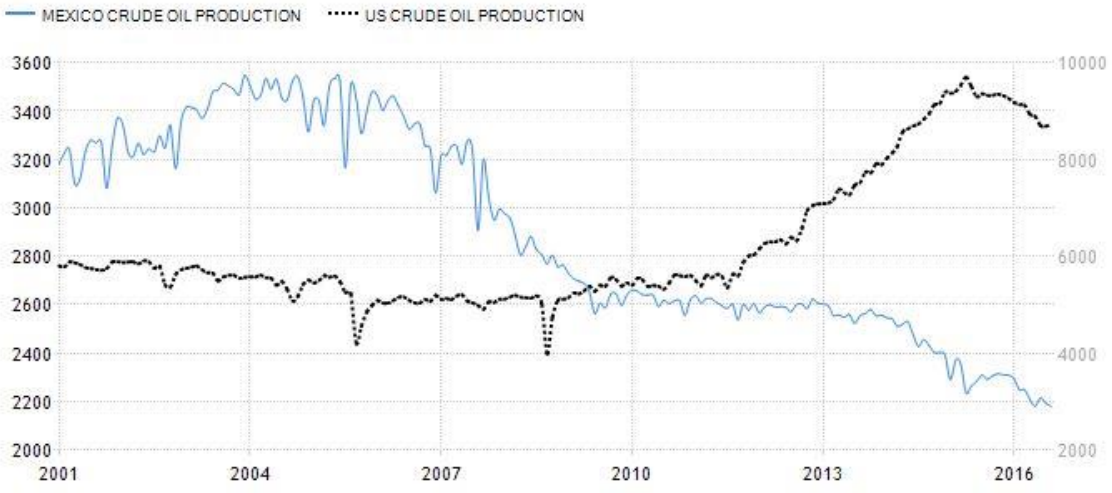
• Make America energy independent, create millions of new jobs, and protect clean air and clean water; conserve natural habitats, reserves and resources.
• Declare American energy dominance a strategic economic and foreign policy goal of the United States.
• Exploit untapped shale, oil, and natural gas reserves, plus hundreds of years in clean coal reserves.
• Become, and stay, totally independent of any need to import energy from the OPEC cartel or any nations hostile to our interests.
• Open onshore and offshore leasing on federal lands, eliminate moratorium on coal leasing, and open shale energy deposits.
• Encourage the use of natural gas and other American energy resources to reduce emissions, reduce the price of energy and increase economic output.
• Reduce and eliminate all barriers to responsible energy production.

Each of the Trump administration's energy priorities has important implications for the bilateral relationship. The first element of the Trump energy platform that has direct relevance for Mexico is the goal of becoming "totally independent of any need to import energy from the OPEC cartel or any nations hostile to our interests." Ensuring "friendly suppliers," such as Canada and Mexico, has long been a goal of U.S. energy policy, and Mexico stands to benefit from this. Although the Trump administration will seek to boost national production to ensure independence, most experts recognize that North American, rather than U.S., oil independence is a much more reasonable target at which to aim. This means that the Trump administration should recognize the importance of ensuring the long-term success of Mexico's energy reforms.

Two factors make this point particularly relevant. First, Mexico has seen a prodigious decline in oil production in recent years and the reforms are the best hope of reversing that decline in the years to come (Figure 6). Secondly, the reform is coming under attack from opposition parties in Mexico and, with the possibility of a shift to the left in the 2018

presidential election, there is a risk that the reform will stall or be rolled back. This would be an alarming prospect for both the United States and for a number of its companies that have been successful in winning oil contracts in Ronda 1.

Figure 6. Mexican vs. U.S. Oil Production 2001-2016 (thousands of barrels per day)



Source: tradingeconomics.com

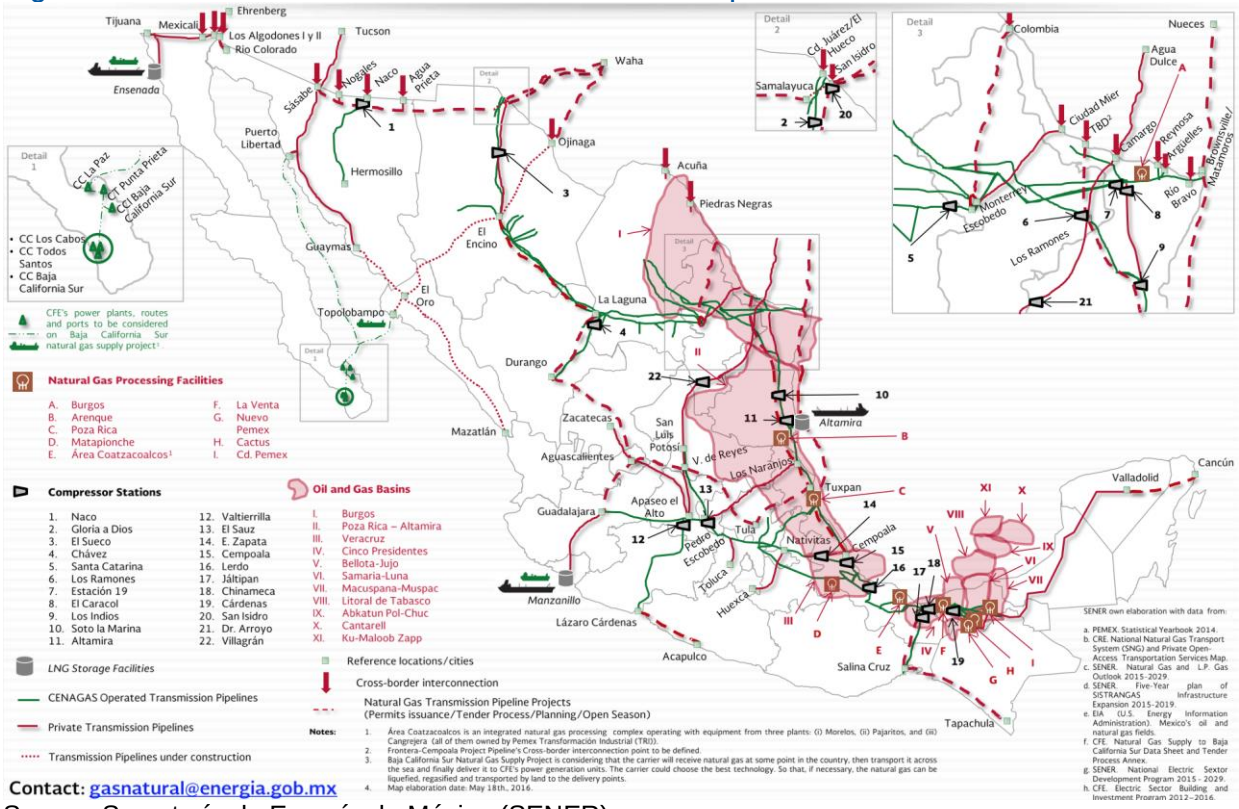
The second element, regulatory simplification, provides a compelling opportunity for Mexico to work with the United States to reduce the burden of its own regulatory system for energy firms. Although its regulations and regulatory bodies have seen substantial progress since the reforms of 2013, Mexico still has a regulatory system in place that seeks to prohibit, rather than facilitate activity by the energy industry. The change of tone in Washington provides an opportunity for Mexico's regulatory agencies to develop a dialogue with their U.S. counterparts that focuses on efficient regulation, something that the emerging private oil and gas industry is crying out for in Mexico. Critical issues concern repetitive paperwork, interagency coordination, permitting, and the use of online compliance mechanisms. If the United States is about to see a concerted push towards more efficient regulation, then it behooves Mexico to follow suit, to maintain competitiveness and to facilitate the integration of energy markets. Existing dialogue with state regulators in Texas have already emphasized the importance of a paradigm shift in Mexican regulation; the approach of the new U.S. government offers a chance to take that conversation even further. The existing North American dialogue provides the forum in which this can take place.

With regards to the third energy priority, infrastructure spending, there are ample opportunities for ongoing energy infrastructure projects that take into account the increasingly integrated nature of energy markets, from oil and gas pipelines to cross-border transmission lines and a coordinated approach to refining capacity. A crucial element of the success of the Mexican energy reform has been the arrival of natural gas from the United States, through pipeline

It is vital that future Mexican demand is considered with enough anticipation to ensure that pipeline capacity exists to carry gas to market.

projects that cross the border (Figure 7). These took years to plan and build, and it is vital that future Mexican demand is considered with enough anticipation to ensure that pipeline capacity exists to carry gas to market. Mexico's refineries are likely to see an overhaul in the next few years as Pemex seeks partners for its refining division that consistently loses around U.S. $9 billion a year. If Mexico plans to invest in building new refining capacity, it would be wise to consider the current and future state of the U.S. refining sector, which is aging and has limited capacity.

Figure 7. U.S.-Mexico Cross-Border Natural Gas Pipelines



Source: Secretaría de Energía de México (SENER)

Electricity is also ripe for cross-border cooperation. Little has been done over the past four years to increase the interconnections between Mexico and the United States, with only 10 connections linking the markets of the two countries (four connections to the Western Electricity Coordinating Council or WECC, and six to the Electricity Reliability Council of Texas or ERCOT). However, given the increase in capacity in Mexico and the rapid growth of the renewable energy industry on both sides of the border, there now exists an opportunity to plan cross-border transmission in such a way as to benefit both producers and consumers with lower-cost and shorter-distance options for transmission. A prime example of this is the concept of an electricity transmission line in Mexico's northern border states that would allow electricity to travel not only between Mexican states and across the border to U.S. consumers, but also permit electrons generated from wind energy projects in Texas to travel across the border to Mexico, move along the border and then cross back over into California, where demand for renewable energy is growing rapidly (Figure 8). In January 2017, the United States and Mexico signed a new

cooperation agreement on grid reliability, setting the stage for increased connectivity between the two countries' electricity systems.[6]

Figure 8. Mexico's Planned Electricty Transmission Projects

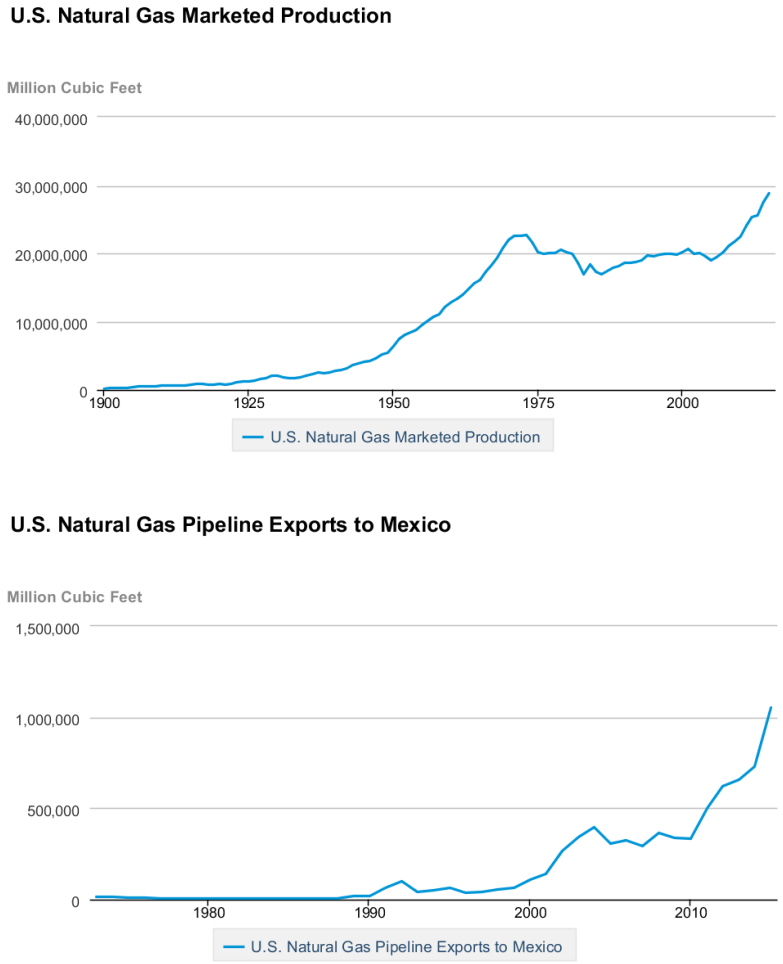
Source: Cesar Hernandez Ochoa, Third Annual North American Energy Forum

Finally, it is worth focusing on the Trump administration's goal of boosting the production and use of natural gas. If gas production is to grow in the United States, new consumers will be needed to sustain a price that allows for investment in the sector. Fortunately for gas producers, it is expected that Mexico will see its demand for natural gas grow rapidly, and it is estimated that exports to Mexico will soon reach between 8-10 percent of U.S. production (Figure 9). Mexico plans to dramatically boost its internal natural gas pipeline network over the next few years, and it is expected to grow more than 90 percent before the end of this decade. In addition to satisfying demand in Mexico, in the long-term there is the opportunity to export U.S. natural gas via pipeline to Central America and through LNG facilities built along the Mexican coast. Although this could also, of course, be achieved in the United States, zoning restrictions and social license problems often make these projects costly and difficult to complete on time. In Mexico, there would likely be an easier path to construction (although social opposition to energy projects has been a growing problem in recent years).

It is expected that Mexico will see its demand for natural gas grow rapidly, and it is estimated that exports to Mexico will soon reach between 8-10 percent of U.S. production.

[6] "U.S. Energy Secretary and Mexico Energy Minister Sign Bilateral Principles to Promote Electricity Reliability of Interconnected Power Systems", January 9 2017, https://www.energy.gov/articles/us-energy-secretary-and-mexico-energy-minister-sign-bilateral-principles-promote

Figure 9. U.S. Natural Gas Production and Exports to Mexico



Source: U.S. Energy Information Administration

It is less obvious where a meaningful agenda can emerge between Mexico and the United States on the issue of climate change. Much will depend on the incoming administration's attitude toward the Paris Accord and to reducing carbon emissions. However, collaboration between Mexico and the United States on renewable energy goes back a long way[7] and we should expect that meaningful cooperation would continue on this issue. The question of transmission for renewables has already been mentioned, but it would also make sense to consider the creation of agreements between regional system's operators in the U.S. southwest with the CENACE and CFE to overcome intermittency problems

It would also make sense to consider the creation of agreements between regional system's operators in the U.S. southwest with the CENACE and CFE to overcome intermittency problems and allow for the optimization of existing and future renewable resources.

[7] Duncan Wood, *Environment, Development and Growth: U.S.-Mexico Cooperation in Renewable Energies* (Woodrow Wilson International Center for Scholars, 2010).

and allow for the optimization of existing and future renewable resources. The experience of the Midcontinent Independent Systems Operator (MISO) in combining hydroelectric resources from Manitoba with wind power produced in Minnesota highlights the potential for linking Mexican and U.S. resources.[8] Furthermore, the government of California has indicated its desire to continue working on climate and energy issues with Mexico, bringing attention to the potential for ongoing collaboration at the level of U.S. states.

Conclusion

As the Trump administration takes office, the energy relationship between Mexico and the United States is at a historic high point. Mexico's new energy model, based on market dynamics and attracting private and foreign investment, has opened the way for a highly constructive and productive dialogue between national authorities and their counterparts in Canada and the United States. The regular meetings that have taken place between the energy minsters of the three NAFTA countries have served to deepen mutual understanding and to further energy cooperation at both the regional and global levels.

As the Trump administration takes office, the energy relationship between Mexico and the United States is at a historic high point.

Four areas can be added to the existing agenda of energy and climate cooperation. Ensuring Mexico's continuing status as a "friendly" oil supplier means that the United States has an interest in assisting its southern neighbor to maximize the potential of its oil fields. Second, sharing the successful U.S. experience in energy regulation, and in particular in reducing regulatory burden, will help Mexico succeed and integrate its energy markets. Third, energy infrastructure planning presents an opportunity to coordinate investments across the border to ensure that benefits are optimized for both countries. Lastly, a focus on increasing natural gas production and use in the United States is entirely compatible with the change underway in Mexico. Continued Mexican consumption of cheap gas from the United States will ensure both stable prices and improve Mexican economic competitiveness.

Mexico has an unprecedented opportunity at the beginning of the new administration to build an even stronger energy relationship with the United States. Existing North American cooperation, the progress seen under the energy reform and the interest of the Trump administration in helping the U.S. energy sector to grow provide the ideal platform for a vibrant dialogue on these issues, one that can drive prosperity and employment creation in both nations.

[8] Jordan Bakke, Zheng Zhou & Sumeet Mudgal, "Manitoba Hydro Wind Synergy Study", *Midcontinent Independent Systems Operator*, https://www.misoenergy.org/.

Bibliography

Bakke, Jordan; Zou, Zheng; Mudgal, Sumeet. “Manitoba Hydro Wind Synergy Study.” *Midcontinent Independent Systems Operator*. https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/Planning%20Materials/Manitoba%20Hydro%20Wind%20Synergy%20TRG/Manitoba%20Hydro%20Wind%20Synergy%20Study%20Final%20Report.pdf.

Brick, James. “Is Mexico’s energy industry ready to boom?” *Wood Mackenzie*. October 8, 2015. https://www.woodmac.com/blog/is-mexicos-energy-industry-ready-to-boom/.

Chanona Robles, Alejandro. “Tracking the Progress of Mexico’s Power Sector Reform.” *Mexico Institute*. June 6, 2016. https://www.wilsoncenter.org/publication/tracking-the-progress-mexicos-power-sector-reform.

“Electricity tariffs dropped in Mexico in 2015.” *Enerdata*. August 31, 2015. http://www.enerdata.net/enerdatauk/press-and-publication/energy-news-001/electricity-tariffs-dropped-mexico-2015_33880.html.

Hernandez Ochoa, Cesar. Keynote speech, Third Annual North American Energy Forum, Wilson Center, Washington D.C., September 22, 2016.

“Mexican Crude Oil Production.” Trading Economics. 2017. http://www.tradingeconomics.com/mexico/crude-oil-production.

“Mexico Awards Eight out of Ten Deep Water Blocks in Ronda 1.4.” *Oil and Gas Mexico*. December 2016. http://www.oilandgasmexico.com/2016/12/05/mexico-awards-eight-out-of-ten-deep-water-blocks-in-r01-l04/.

“National Gas Infrastructure.” *Secretaría de Energía*. 2016. http://www.gob.mx/cms/uploads/attachment/file/114573/511.DGGNP.DGS.109.16.OT.08_Mapa_Infraestructura_y_Cuencas_Productoras_de_Gas_Natural_2016__Inst-En_Ingl_s_.pdf.

“North American Cooperation on Energy Information (NACEI).” U.S. Energy Information Administration Beta. www.eia.gov/special/trilat/.

“Reflections on the First Renewable Energy Auction in Mexico.” AWS Truepower. April 18, 2016. https://www.awstruepower.com/reflections-on-the-first-renewable-energy-auction-in-mexico/.

“U.S. Energy Employment Report 2016.” *Department of Energy*. 2016. https://www.energy.gov/sites/prod/files/2016/03/f30/U.S.%20Energy%20and%20Employment%20Report.pdf.

“U.S. Energy Secretary and Mexico Energy Minister Sign Bilateral Principles to Promote Electricity Reliability of Interconnected Power Systems”, Department of Energy, January 9 2017, https://www.energy.gov/articles/us-energy-secretary-and-mexico-energy-minister-sign-bilateral-principles-promote

Wood, Alex. “A Look at the Future of the Mexican Petroleum Industry after Energy Reform.” *Mexico Institute*. October 25, 2016. https://www.wilsoncenter.org/publication/look-the-future-the-mexican-petroleum-industry-after-energy-reform.

Wood, Duncan. *Environment, Development and Growth: U.S.-Mexico Cooperation in Renewable Energies*. Woodrow Wilson International Center for Scholars, 2010.

Wood, Duncan. “Integrating North America’s Energy Markets: A Call for Action.” *Mexico Institute*. December 16, 2014. https://www.wilsoncenter.org/publication/integrating-north-americas-energy-markets-call-for-action.

About the Author

Duncan Wood is the director of the Mexico Institute at the Wilson Center. Prior to this, he was a professor and the director of the International Relations Program at the Instituto Tecnologico Autonomo de Mexico (ITAM) in Mexico City for 17 years. He has been a member of the Mexican National Research System, an editorial advisor to both Reforma and El Universal newspapers, and is a member of the editorial board of Foreign Affairs Latinoamerica. In 2007, he was a non-resident Fulbright Fellow and, between 2007 and 2009, he was technical secretary of the Red Mexicana de Energia, a group of experts in the area of energy policy in Mexico. He has been a Senior Associate with the Simon Chair and the Americas Program at the Center for Strategic and International Studies (CSIS) in Washington, D.C. His research focuses on Mexican energy policy, including renewable energy, and North American relations. He studied in the UK and Canada, receiving his PhD in political studies from Queen’s University, Canada, and is a recipient of the Canadian Governor General’s Visit Award for contributions to the Mexico-Canada relationship.