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The Mexican Energy Reform and Clean Energy: Lessons from the Swedish-Norwegian Scheme of Clean Energy Certificates

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THE MEXICAN ENERGY REFORM AND CLEAN ENERGY: LESSONS FROM THE SWEDISH-NORWEGIAN SCHEME OF CLEAN ENERGY CERTIFICATES

ABSTRACT

The recent approval of a Clean Energy Certificates market in Mexico is part of the broad Energy Reform in the country since the end of 2013. Clean Energy Certificates create an incentive for new investment and a source of extra income for green energy producers in the electricity market. Mexico's scheme is based on similar Green Trade Certificates schemes, which promote investment in renewable energy by setting quotas on electricity producers and requiring certain electricity users to buy certificates. This article briefly looks at the early adopters, Sweden and later Norway, where a similar scheme has been implemented since 2003. The Nordic scheme, along with other policy measures, has proven effective in increasing the share of renewables. This article analyzes the Mexican Energy Reform's approach to renewable energy, and explains how Mexico can learn from its Swedish and Norwegian counterparts.

INTRODUCTION

Mexico has a growing population of around 122 million people, with an increasing demand for energy.[1] Along with this demand comes electricity production and related greenhouse gas emissions, mainly from the combustion of fossil fuels. To address this problem, Mexico has made drastic changes to its institutional frameworks during the last decade. But the Mexican legislature has been slow to prioritize the public policy issues originating in the energy sector and climate change. After a series of legislative paralyses and failed reforms in the energy field, Mexico's

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1. DATOS DE PROYECCIONES, CONSEJO NACIONAL DE POBLACIÓN [CONAPO], http://www.conapo.gob.mx/es/CONAPO/Proyecciones_Datos (last visited Apr. 29, 2016).

Congress finally agreed to pass a constitution-level reform (the Reform) on December 20th, 2013. Prior to the Reform, the Mexican Constitution provided for an exclusive state monopoly over the hydrocarbon sector.[2]

Considering the expected anthropogenic causes of climate change, and that around two-thirds of global emissions come from the energy sector, any modern energy reform must prioritize low greenhouse gas sources of energy.[3] But Mexico's Reform largely focuses on fossil fuel energy, leaving a smaller portion to cleaner sources. One reason for this is that Mexico's state budget highly depends on revenues generated from fossil fuels,[4] though the good decades of easy production and major oil prosperity have been declining.[5] The Reform has disproportionately focused on fossil fuels and not properly incentivized an increased share of renewable energy. However, the Reform does provide for a landmark scheme of Clean Energy Certificates (CELs).

Market-based policy schemes have been promoted globally to encourage the production of green electricity. Sweden was an early adopter of "green energy certificates"[6] in 2003.[7] This market-based policy instrument encourages investments in greener electricity generation by making it equally competitive with traditional ways of producing energy—without requiring direct public subsidies. Norway joined Sweden's green electricity certificate market in 2013, creating a joint Nordic market for Tradable Green Certificates.[8]

This article analyzes how Mexico's legislation, as part of the Reform, has approached renewables, and will focus on its scheme for CELs. To do so, it will analyze the lessons learned from the Nordic scheme.

1. THE MEXICAN ENERGY REFORM

In December 2013, the Mexican government published an official decree amending Articles 25, 27, and 28 of the Mexican Constitution.[9] Article 25 legislates

2. *See* CONSTITUCIÓN POLÍTICA DE LOS ESTADOS UNIDOS MEXICANOS [C.P.] (Const. of Mexico)., art. 25, 27, 28, Diario Oficial de la Federación [DO] (Official Journal of the Federation), 5 de febrero de 1917 (Mex.).

3. INT'L ENERGY AGENCY [hereinafter IEA], TRANSPORT, ENERGY AND CO2: MOVING TOWARDS SUSTAINABILITY 44 (2009), https://www.iea.org/publications/freepublications/publication/transport2009.pdf.

4. *Cayó Dependencia Del Petróleo en Finanzas Públicas: SHCP*, LA JORNADA (June 9, 2015), http://www.jornada.unam.mx/ultimas/2015/06/09/cayo-dependencia-del-petroleo-en-finanzas-publicas-shcp-7391.html

5. IEA, IEA STATISTICS: MONTHLY OIL STATISTICS (Feb. 9, 2016), http://www.iea.org/media/statistics/surveys/oil/oil.pdf.

6. Alternately referred to as "clean energy certificates" (CELs) and "renewable energy certificates" (RECs).

7. *See* SWEDISH ENERGY AGENCY [SEA], THE ELECTRICITY CERTIFICATE SYSTEM (last updated Oct. 20, 2015) http://www.energimyndigheten.se/en/sustainability/the-electricity-certificate-system/.

8. Agreement between the Governments of the Kingdom of Norway and the Kingdom of Sweden on a Common Market for Electricity Certificates (Unofficial Translation) [hereinafter Electricity Certificates Agreement], Nor.-Swed., June 29, 2011, https://www.regjeringen.no/globalassets/upload/oed/pdf_filer_2/elsertifikater/agreement_on_a_common_market_for_electricity_certificates.pdf; *see generally* NORD POOL, www.nordpoolspot.com (last visited May 3, 2016) (Norway).

9. *See* C.P., art. 25, 27, 28, DO, 5 de febrero de 1917 (original text), 9 de noviembre de 1940 (Nov. 9, 1940 reform), 20 de diciembre de 2013 (Dec. 20, 2013 reform).

in broad terms the stewardship of national development and the involvement of the state in economic activity. The Reform amended paragraphs four, six, and eight of Article 25, creating the figure of Productive State Enterprises (Empresas Productivas del Estado) and related legislation.[10] To paragraph six, the Reform added the term "sustainability" to the way Mexico must support public and private enterprises looking forward in order to care for the environment and general well-being.[11] The amended paragraph eight encourages the protection of economic activity by promoting competitiveness and implementing a national policy for sustainable industrial development, including sectorial and regional aspects.[12]

Second, the Reform amended paragraph six of Article 27. Article 27 broadly regulates ownership of the land, water, and mineral resources within the boundaries of the national territory, as well sets the right to private property.[13] Before the Reform, paragraph six dictated the State's exclusive participation in the hydrocarbon sector in all its process, and banned any type of concessions or contracts with private companies in this sector.[14] Following the Reform, Article 27 continues to maintain that no concessions will be granted in electrical activities.[15] Indeed, paragraph seven of Article 27 was added to maintain the inalienable and imprescriptible public ownership of hydrocarbons and to keep the unavailability of concessions with private companies in this sector.[16] However, the amendment opens the possibility for the State to sign contracts with private individuals and their participation in the electrical industry under certain strategic conditions.[17] With the

10. *Id.* at art. 25, DO, 20 de diciembre de 2013 ("El sector public tendrá a su cargo, de manera exclusiva, las areas estratégicas que se señalan en el artículo 28, párrafo cuarto de la Constitución, mantiendo siempre el gobierno federal la propiedad y el control sobre los organismos y Empresas Productivas del Estado que en su caso se establezcan.").

11. *Id.* ("Bajo criterios de equidad social, productividad y sustentabilidad se apoyará e impulsará a las empresas de los sectores social y privado de la economía, sujetandolos a las modalidades que dicte el interés public y al uso, en beneficio general, de los recursos productivos, cuidando su conservación y el medio ambiente.").

12. *Id.* ("La ley alentará y protegerá la actividad económica que realicen los particulares y proveerá las condiciones para que el desenvolvimiento del sector privado contribuya al desarrollo económico nacional, promoviendo la competitividad e implementando una política nacional para el desarrollo industrial sustentable que incluye vertientes sectoriales y regionales, en los terminos que establece esta constitución.").

13. *See generally id.* at art. 27, DO, 5 de febrero de 1917, 9 de noviembre de 1940 (Article 27 represents a highly recognized historical moment in Mexican history, when President Lázaro Cárdenas nationalized the oil industry in 1938. A series of commemorations takes place every March 18th to remember said historical event).

14. C.P., art. 27, DO, 9 de noviembre de 1940 (" . . . el dominio de la nación es inalienable e imprescriptible, y solo podrán hacerse concesiones por el gobierno federal a los particulares o sociedades civiles o comerciales constituidas conforme a las leyes mexicanas . . . "). For textual excerpts of different versions of Article 27, *see* Iván Saldaña, *Las modificaciones al artículo 27 constitucional*, EXCELSIOR (Aug. 8, 2013), http://www.excelsior.com.mx/nacional/2013/08/07/912670#imagen-1.

15. *Id.* at art. 27, DO, 20 de diciembre de 2013 ("tratandose del petróleo y de los hidrocarburos . . . la propiedad de la nación es inalienable e imprescriptible y no se otorgarán concesiones . . . en cualquier caso, los hidrocarburos en el subsuelo son propiedad de la nación y así deberá afirmarse en las asignaciones o contratos.").

16. *Id.*

17. *Id.* ("con el propósito de obtener ingresos para el estado que contribuyan al desarrollo de largo plazo de la nación, esta llevará a cabo las actividades de exploración y extracción del petróleo y demás

goal of raising public revenue and promoting national development, the Reform opens the door to allocations through the newly-created Productive State Enterprises and contracts through the Productive State Enterprises and directly with private companies under certain conditions of participating in the hydrocarbon sector.[18]

The Reform also amended paragraphs four and six of Article 28, adding a paragraph.[19] In order to harmonize it with other amendments, paragraph four maintains that certain exclusive State activities are not to be considered monopolies.[20] Paragraph six maintains the independence of the Central Bank, and under the reform creates a public trust called the Petroleum Fund for Stabilization and Development,[21] with the Central Bank as its administrator.[22] This trust receives, manages, and distributes revenues from contracts with private companies in the hydrocarbon sector, except for the related taxes. Finally, the Reform added paragraph eight, creating two new regulation bodies, the National Commission of Hydrocarbons (Comisión Nacional de Hidrocarburos) and the Energy Regulatory Commission (Comisión Reguladora de Energía).[23]

Following the constitutional changes, in April 2014 President Peña Nieto sent proposed initiatives including secondary energy legislation to Congress. Congress considered nine new laws and twelve amendments. Along with the Constitutional components of the Reform, these changes are considered the "Energy Reform."

1.1 What the Energy Reform Means

The main change promoted by the Reform is permitting private participation in the exploration and extraction of oil and other hydrocarbons.[24] The Reform established that the processing, refining, transportation, storage, and distribution of hydrocarbons and their byproducts may be carried out by private individuals or corporations through respective permits.[25] For instance, private participation may be carried out through allocations from Productive State Enterprises such as "PEMEX,"[26] or via contracts with private individuals (corporations).[27] This represented a change of such magnitude that it required a new institutional arrangement.

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hidrocarburos mediante asignaciones a Empresas Productivas del Estado o a través de contratos con estas o con particulares . . . para cumplir con el objecto de dichas asignaciones o contratos Las Empresas Productivas del Estado podrán contratar con particulares . . . ").

18. *Id.*

19. C.P., art. 28, DO, 20 de diciembre de 2013.

20. *Id.* ("No constituyen monopolios las funciones que el estado ejerza de manera exclusiva . . . ").

21. *Id.* ("El Estado tendrá un Banco Central que será autónomo en el ejercicio de sus funciones y en su administración . . . ").

22. *Id.* (" . . . El Estado contará con un fideicomiso público denominado Fondo Mexicano del Petróleo para la estabilización y el desarrollo, cuya institución fiduciaria será el Banco Central . . . ").

23. *Id.* ("El Poder Ejecutivo contará con los órganos reguladores coordinados en materia energética, denominados Comisión Nacional de Hidrocarburos y Comisión Reguladora de Energia . . . ").

24. *See generally* C.P., art. 27, DO, 20 de diciembre de 2013.

25. *Id.*

26. *Id.*

27. *Id.*

Despite its private thrust, the Reform maintains domestic interests. The Reform added a paragraph to Article 27 maintaining that the State is the inalienable and imprescriptible owner of all fossil fuels (solids, liquids, and gas), adding that no concessions for their exploitation will be granted.[28] To reconcile these seemingly contradictory terms, the new paragraph states that in order to increase State revenues and contribute to long-term development, the State may, through its "state productive enterprises" and/or separately, sign contracts with private companies to carry out exploration and extraction of fossil fuels, maintaining State ownership of such hydrocarbons at all times.[29]

In terms of clean energy, the Reform adds Transitory[30] Article 17, stating that Congress shall make adjustments to the legal framework to ensure environmental protection.[31] The means include incorporating criteria and best practices in the areas of energy efficiency, reducing greenhouse gases, and lowering the waste and carbon footprint in all energy processes. The law also imposes obligations to reduce its emissions on electricity producers.[32]

1.2 Major Aspects of Mexico's Energy Reform

The Instituto Mexicano para la Competitividad (Mexican Institute for Competitiveness, or IMCO) highlights the most relevant contours of the Reform:[33] while hydrocarbons continue to belong to the State, the Reform permits private participation in exploration, extraction, refining, transport, and storage of hydrocarbons. Some private investment is allowed in the generation, sale, and distribution of electricity with respective public contracts. Nuclear energy continues to be an exclusive activity of the State and solely for peaceful purposes. The Reform also changes the status of the state-owned enterprises to Productive State Enterprises, aiming for them to become more productive.[34] Finally, the Reform promotes mechanisms to tackle unlawful practices.[35]

The Reform establishes a de facto preference for the exploration and extraction of hydrocarbons, as well as for the transmission and distribution of electricity, over any other activity.[36] Despite this de facto preference, however, the

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28. *Id.*

29. C.P., art. 27, DO, 20 de diciembre de 2013.

30. Transitory Articles (artículos transitorios) are special articles occasionally added with amendments.

31. C.P., art. transitorio 19, DO, 20 de diciembre de 2013; *see also ¿Qué es ASEA*, AGENCIA DE SEGURIDAD, ENERGÍA Y AMBIENTE [ASEA] (National Agency for Security, Energy, and the Environment), http://www.asea.gob.mx/?page_id=9872 (last visited May 3, 2016) (ASEA is also known as the Agencia Nacional de Seguridad Industrial y de Protección al Medio Ambiente del Sector Hidrocarburos, or National Agency for Industrial Security and Protection of the Environment from the Hydrocarbon Sector).

32. C.P., transitory art. 19, DO, 20 de diciembre de 2013.

33. *Principales puntos de la #ReformaEnergetica*, INSTITUTO MEXICANO PARA LA COMPETITIVIDAD [hereinafter IMCO] (Mexican Inst. for Competitiveness), http://imco.org.mx/articulo_es/principales-puntos-de-la-reformaenergetica/ (last visited Apr. 29, 2016).

34. C.P., art. 25 (Mex.).

35. IMCO, *supra* note 33 (Several press reports cite unlawful practices (corruption, illicit enrichment) coming from high ranking officials in PEMEX including its union during the last decades.).

36. *Id.*

Reform creates from oil revenue a National Fund oriented to support research for clean energy technologies. In addition, the Reform requires the State to ensure the protection and care of the environment, improve energy efficiency, and reduce emissions from the Energy Industry[37] by developing a national strategy for transitioning to cleaner forms of energy.

At the time of the Reform, Partido Revolucionario Instutional (PRI), Partido Acción Nacional (PAN), Partido Verde Ecologista de México (PVEM) and Partido Nueva Alianza (PANAL) voted in favor of the Reform. On the other hand, left wing opposition parties—including the Partido de la Revolución Democrática (PRD), Partido del Trabajo (PT), Movimiento Ciudadano (MC) and political organizations like the Movimiento de Regeneración Nacional (MORENA)—disagreed with the overall content of the Reform and wanted the State to maintain exclusive authority over hydrocarbons, from production to distribution.[38] Despite the opposition, at the time it was widely known that the hydrocarbon sector needed infrastructure improvements[39] due to lower production of conventional fields and a lack of adequate long-term investment in the sector,[40] in addition to the obviously dishonest practices within the administration of the State Enterprises.[41]

2. CLIMATE LEGISLATION

Climate change and its effects present a global problem that must be addressed by all stakeholders.[42] According to the International Energy Agency (IEA) in 2012, Mexico ranked as the thirteenth largest carbon dioxide (CO_2) emitter with 1.37% of global emissions. In 2012, Mexico became one of the first countries to enact a law intended to protect the environment from the negative effects of climate change.[43] Under this general law, the country sets the target to decrease its

37. C.P., art. 25 (Mex.) (the law establishes that private and public enterprises should preserve nature and follow productive and sustainable criteria.).

38. Arturo Cano, *La izquierda gana el debate pero perderá la votación de la reforma energética* [*The left wins the debate but will lose the vote on energy reform*], LA JORNADA, Mar. 5, 2016, http://www.jornada.unam.mx/ultimas/2013/12/08/poco-importa-el-largo-debate-sobre-reforma-energetica-a-los-senadores-5781.html (left wing political parties at the time represented in Congress voted against the Reform because the main voting needed to take place in an alternative forum due to protests).

39. IMCO, NOS CAMBIARON EL MAPA: MÉXICO ANTE LA REVOLUCIÓN ENERGÉTICA DEL SIGLO XXI 4 (2013), http://imco.org.mx/wp-content/uploads/internacional/ICI2013-completo.pdf (THEY CHANGED OUR MAP: MEXICO BEFORE THE ENERGY REVOLUTION OF THE TWENTY-FIRST CENTURY).

40. *Id.*

41. For press reports citing unlawful practices (corruption) within the PEMEX administration, *see Corrupción "sangra" a Pemex con 11,900 mdd* (Corruption Bleeds Pemex of 11.9 Million Dollars), FORBES (Jan. 23, 2015), http://www.forbes.com.mx/corrupcion-sangra-pemex-con-11900-mdd/; Raymundo Riva Palacio, *La Corrupción en Pemex* (The Corruption in Pemex), EL FINANCIERO (Oct. 1, 2015), http://www.elfinanciero.com.mx/opinion/la-corrupcion-en-pemex.html.

42. Environmental legislation can set up the framework for the implementation of policy instruments. Public bodies have attempted to address the public issue of climate change through the use of environmental policies. Examples of such public intervention include economic instruments directed to shape the way the market develops by implementing certain policies such as certain taxation, tariffs, restriction and subsidies. *See* Per Mickwitz, *A Framework for Evaluating Environmental Policy Instruments*, 9.4 EVALUATION 415, 415–36 (2003).

43. *See* Ley General de Cambio Climático [LGCC] (General Law of Climate Change), DO, 6 de junio 2012 (Mex.).

greenhouse gas (GHG) emissions by 50% from 2000 levels by 2050. By the year 2024, Mexico must generate at least 35% of its electricity from clean sources.[44] The Intended Nationally Determined Contribution (INDC), which followed, was consistent with this target.[45] Therefore, this law orders that by the year 2024 Mexico must generate at least 35% of its electricity from clean sources.

3. RENEWABLE AGENDA IN MEXICO

Mexico is well-situated for the development of renewable energy. It has an ideal geographical location and abundance of natural resources across the country. For example, a 2013 report from PricewaterhouseCoopers (PwC) indicates that in the northern region, especially in the Baja California Peninsula, there is great potential to generate solar energy due to the high level of solar radiation and to generate wind power.[46] This area also possesses great geothermal potential because approximately 800 kilometers (km) of the Peninsula is located on a neo-volcanic axis.[47] Other renewables could come from bioenergy generating from biomass residues, and the small-scale hydroelectric power.[48]

In 2008, Mexico adopted the "Law for the Promotion of Renewable Energy and Financing the Transition" (LAERFTE)[49] along with the "Law for the Sustainable Enjoyment of Energy"[50] to regulate the use of renewable energy. However, the 2013 Reform mandated the creation of new laws in order to harmonize the new framework.[51]

3.1 The Unfair Competition from Fossil Fuels

Following the Reform, Mexico first aimed to increase revenue from the production of fossil fuels by integrating the private sector into energy development and restructuring the scheme of state-owned petroleum enterprises.[52] As a result, the central component of the Reform is increasing production of fossil fuels[53]—despite

44. *Id.* at art. 116, DO, 6 de junio 2012 (Mex.).

45. *See* CLIMATE TRANSPARENCY, ASSESSING CLIMATE PROTECTION AND PERFORMANCE: G20 COUNTRY PROFILE MEXICO (2015), http://www.climate-transparency.org/wp-content/uploads/2016/02/CP_MEXICO_2015.pdf.

46. PRICEWATERHOUSECOOPERS MEXICO (PWC) ET AL., PLAN INTEGRAL PARA EL DESARROLLO DE LAS ENERGÍAS RENOVABLES EN MÉXICO 2013–2018 (2013), http://awsassets.panda.org/downloads/130222_plan_integral_para_desarrollo_de_energias_renovables.pdf (Integrated Plan for the Development of Renewable Energy in Mexico).

47. *Id.*

48. *Id.*

49. Ley para el Aprovechamiento de Energías Renovables y el Financiamiento de la Transición [LAERFTE] (Law for the Development of Renewable Energy and Financing the Transition), DO, 28 de noviembre de 2008, 7 de junio de 2013 (últimas reformas) (Mex.).

50. Ley para el Aprovechamiento Sustentable de la Energía [LASE] (Law for the Sustainable Development of Energy), DO, 28 de noviembre, 2008 (Mex.).

51. C.P., art. 27 and 28 (Mex.).

52. After the Reform, state-owned enterprises (PEMEX, CFE) were fundamentally changed and converted to Productive State Enterprises. SECRETARÍA DE ENERGÍA [SENER] (Secretariat of Energy), KEY ELEMENTS OF THE ENERGY REFORM 2 (2016), http://embassyofmexico.org/web/KeyElementsofthe EnergyReform.pdf.

53. Mainly targeting unconventional sources like shale oil and gas.

global climate circumstances.[54] A 2014 report by the IEA includes new estimates of a long-term increase of up to 75 percent in State oil production.[55] This disproportionate focus on fossil fuels is apparent through heavy subsidization of oil-based fuels for the transport sector; however, the Reform also aims to liberate the market and gradually eliminate the subsidies.

3.2 Legislation to Promote Renewables in Mexico

After approving the Reform, the Mexican Congress passed the New Energy Transition Law (NETL) in 2015.[56] NETL's main objective is to regulate in favor of the sustainable use of energy as required by the constitutional mandate in the Reform.[57] It also aims to enable the State to meet its international commitments for cleaner energy deployments, regulate the sustainable use of clean energy, and reduce emissions in the electricity sector.[58] The norm defines sustainable use of energy as the optimal use of the power in all processes and activities for exploitation, production, processing, distribution, and consumption, and also includes energy efficiency.

The purpose of NETL is to regulate the sustainable use of energy as well as the clean obligations and reducing emissions of Electric Energy Industry.[59] To this end, it provides for a gradual increase in the share of clean energy in the electricity sector in order to meet the targets set for the generation of clean energy and reduce emissions.[60] NETL imposes obligations on the electricity industry in order to "help meet clean energy goals in the terms established in the applicable legislation."[61] It also establishes the Secretaría de Energía and the Comisión Reguladora de Energía (CRE) as the key government agencies responsible for implementing NETL, and sets goals for the Secretaría de Energía: a minimum share of clean energy in power generation of 25% by 2018, 30% by 2021, and 35% by 2024.[62] NETL also "upgrades the baseline of CO_2 emissions in concordance with the Climate Change Act and requires the publication of an annual report on GHG emissions and other air pollutants from each power generation plant using fossil fuels."[63]

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54. *See generally* FRESHFIELDS-BRUCKHAUS-DERINGER LLP, WHAT YOU NEED TO KNOW ABOUT MEXICO'S ENERGY REFORM (2014), http://www.freshfields.com/uploadedFiles/SiteWide/Knowledge/Mexico%20Energy%20Reform%20Client%20Briefing.pdf.

55. *Id.*

56. Ley de Transición Energética (Law of the Energy Transition) (NETL), DO, 24 de diciembre 2015, http://www.diputados.gob.mx/LeyesBiblio/pdf/LTE.pdf (Mex.).

57. The new law is based on and aims to take the place of existing clean energy laws passed in 2008. *See* LASE, DO, 28 de noviembre 2008 (Mex.); LAERFTE, DO, 28 de noviembre 2008, ultimas reformas, DO, 7 de junio 2013 (Mex.). These laws also aim to reorganize the main administrative functions of the public bodies in the energy sector. *Id.*

58. Ley de Transición Energética, art. 14, 24 de diciembre de 2015 (Mex.).

59. *See id.* at art. 1, art. 27, 24 de diciembre de 2015 (paraphrasing the original text).

60. *Id*. at art. 4, 24 de diciembre 2015.

61. SENER, KEY ELEMENTS OF THE ENERGY REFORM 2 (2016), http://embassyofmexico.org/web/KeyElementsoftheEnergyReform.pdf (2016),

62. Ley de Transición Energética, DO, art. transitorio 3, 24 de diciembre 2015 (Mex.).

63. *See id.* at art. 9.

3.3 New Clean Energy Certificates Scheme in Mexico

The Reform also promotes renewable energy through marketable clean energy certificates (Certificados de Energías Limpias, or CELs). CELs are an economic instrument setting achievable energy targets related to environmental policy.[64] Under the 2014 Electrical Industry Law, private enterprises that do not meet the required percentage of clean energy can acquire CELs in order to avoid fines for not complying with the minimum targets.[65] Modeled off schemes in Norway and Sweden,[66] Mexico's CEL scheme aims to achieve greater and faster disposition of cleaner energy technologies than would be achieved in a traditional, "business as usual" scenario.[67] The CELs are expected to be launched in early 2016, and purport to operate similarly to Renewable Energy Certificates (RECs) operating in thirty U.S. states and other countries.[68]

The scheme is expected to promote the State's competitiveness as it looks to diversify its energy matrix, aiming for a larger share of renewables.[69] A report from IMCO predicts that this change will enhance Mexico's energy security.[70] Another foreseeable positive effect is the proliferation of energy efficient practices.[71] In order to promote investment in renewable energy, it is necessary to provide some kind of long-term certainty to investors to provide extra incentives for investors in the renewable field.[72] Another positive impact could come from the internal development and production of cleaner technologies.[73] The law also promotes

64. Ley de la Industria Eléctrica, DO, 11 de agosto 2014 (Mex.).

65. *Id*.

66. Lessons from the Norwegian-Swedish Electricity Certificate Market, *infra* Pt. 4. Under the Norwegian and Swedish schemes, energy-intensive users are required to buy a certain amount of renewable energy, and if they cannot meet the quota they must purchase CELs from clean energy generators. The income from such certificates serves as an extra income and incentive. Ultimately, the scheme's intent is to increase the share of renewables.

67. IMCO, SOBRE LA LEY DE TRANSICIÓN ENERGÉTICA. POSICIÓN INSTITUCIONAL (July 2013), http://imco.org.mx/temas/sobre-la-ley-de-transicion-energetica-posicion-institucional/ (last visited Apr. 29, 2016).

68. *See, e.g.*, Green Power Partnership, ENVTL. PROTECTION AGENCY, http://www3.epa.gov/greenpower/gpmarket/rec.htm (last visited Apr. 29, 2016) (U.S.); Jonathan Dettman, Andrew Ritten and Angela Snavely, Renewable Energy Certificates and Renewable Portfolio Standards, BIOMASS MAG. (Apr. 29, 2011), http://biomassmagazine.com/articles/5491/renewable-energy-certificates-and-renewable-portfolio-standards.

69. IMCO, *supra* note 67 (stating that CELs promote clean energy by reducing externalities, diversifying energy sources, and leveling the cost between clean energy versus fossil fuels).

70. IMCO, CELS: CONSIDERACIONES PARA PROMOVER SU INVERSIÓN (CONSIDERATIONS TO MOVE YOUR INVESTMENT FORWARD) 15 (2015), http://imco.org.mx/wp-content/uploads/2015/04/2015_CELs_DocumentoCompleto3.pdf (Mexico has the lowest energy security risk of the OECD countries; however, the risk of electric diversification is much higher than the OECD average and the risk of import spending has increased at a fast pace. In recent years, Mexico increased its energy intensity in the transport and energy spending per capita CO2 emissions. On the other hand are exposure to the volatility of crude oil prices and increased exposure to imports of both gas and oil.).

71. The IMCO report acknowledges the great potential of renewables: if properly installed and maintained, new renewable infrastructures most likely will be productive.

72. *Id.*

73. *Id.*

greater transparency and information.[74] For example, it creates an inventory of clean energy accessible to anyone.[75]

Despite these advantages, certain involved actors—primarily from the industry sector—resisted the certificate scheme. For instance, Industry Chambers (CONCAMIN, CANACINTRA, CANACERO, CAINTRA)[76] argued in a joint press release at the end of 2015 that the CELs might result in higher electricity prices.[77] IMCO, however, signals that this possibility is minimal based on international experience.[78] In the past fifteen years, countries such as Australia, Sweden, Great Britain, Belgium, Poland and Chile, as well as thirty U.S. states have implemented similar mechanisms (there known as Renewable Portfolio Standards). The purpose of these markets is to increase development of renewable energy by forcing a percentage of energy produced by generators and purchased by distributors and consumers to come from renewable energy sources.[79] The certificate mechanism allows renewable energy to compete with fossil energy in terms of production costs. Previous studies show a positive correlation between these types of certificates and increased investment in cleaner sources of energy.[80] If Mexico's scheme reaches these targets for renewable energy, GHG emissions and the use of fossil fuels from the electricity sector should decrease.

4. LESSONS FROM THE NORWEGIAN-SWEDISH ELECTRICITY CERTIFICATE MARKET

Scandinavian countries are well known for being leaders in terms of renewable energy promotion.[81] Sweden started its program of Green Energy Certificates in 2003, and Sweden and Norway have had a joint program of Green Energy Certificates in place since 2012.[82] These certificate schemes aim to promote energy production from specific renewable sources such as wind and solar. The Nordic joint scheme is based on the stand-alone Swedish system established in 2003. At that time, Sweden's system was set in place to make the production of renewable

74. *Id.*

75. *Id. See also* Ley de Transición Energética, DO, 24 de diciembre 2015 (Mex.).

76. Confederación de Cámaras Industriales (CONCAMIN) (Confederation of Industrial Chambers), Cámara Nacional de la Industria de la Transformación (CANACINTRA) (Nation Chambers of Industry and Transformation), Cámara Nacional de la Industria del Hierro y el Acero (CANACERO), Cámara de la Industria de Transformación de Nuevo León (CAINTRA) (Chambers of Industry and Transformation of Nuevo Leon).

77. Press Release from the Cámara Nacional de la Industria del Hierro y el Acero [CANACERO] (Mexican Iron and Steel Producers Association), Por Una Ley de Transición Energética Sustentable y Sostenible que Garantice la Competitividad de México (In Support of a Law for Sustainable and Cost-Effective Energy Transition that Guarantees Mexico's Competitiveness), 10 de diciembre, 2015, http://www.canacero.org.mx/Es/assets/desplegado12102015.pdf (arguing that, if there are not enough CELs on the market, electricity prices for the industry will be higher) (Mex.).

78. IMCO, *supra* note 70, at 8.

79. *Id.*

80. *Id.*

81. *See, e.g.*, *Sweden tackles climate change*, SWEDISH INST., https://sweden.se/nature/sweden-tackles-climate-change/ (last visited May 3, 2016) (Sweden).

82. *See generally* NORD POOL, *supra* note 8.

energy more cost efficient and thereby promote its increase.[83] Its target was adding 25 terawatt-hours (TWh) of renewable electricity by 2020 in comparison to the year 2002.[84] The Swedish system was put in place to replace older mechanisms such as public grants and subsidies.[85]

In context, the Nordic joint certificate scheme was created after the passage of the European Renewable Energy Directive ("the Directive") of 2009 to promote, via policy, the increase of renewable energy.[86] The Directive requires that by the year 2020 at least 20 percent of the total energy needs within the EU should be from renewable sources attained by differentiated national targets.[87] For Sweden, the target was set at 49 percent by the year 2020.[88] In order to achieve such targets, the Directive encourages cooperation among EU members and also allows cooperation with third party countries.[89]

Such cooperation occurs through "cooperation mechanisms" including statistical transfers of renewable energy, joint renewable energy projects (like the Nordic certificate scheme), and other support schemes.[90] In January 2012, Norway and Sweden were some of the first countries that joined to create a common market for electricity certificates, following a cooperation mechanism through the European Renewable Energy Directive.[91] Thus, the Nordic certificate scheme is considered the first cross-border renewable support scheme in the world.[92]

4.1 The Norwegian-Swedish Electricity Certificate Scheme

Generally, CELs act as financial support for the production of renewable electricity. This system is market based, with the main objective of increasing a country's share of electricity from renewable sources with the most cost effective means. The Nordic scheme provides financial incentives for renewable energy sources including wind, solar, tidal, geothermal, certain hydro and biofuels, and peat in Combined Heat and Power (CHP) plants. The joint market's current target is an

83. SWEDISH ENERGY AGENCY [SEA], THE ELECTRICITY CERTIFICATE SYSTEM (last updated Oct. 20, 2015) http://www.energimyndigheten.se/en/sustainability/the-electricity-certificate-system/.

84. *Id.*

85. *Id.*

86. Council Directive 2009/28/EC, 2009 O.J. (L 140) 8 (EU); *see also* RENEWABLE ENERGY DIRECTIVE, EUROPEAN COMM'N, https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive (last visited Apr. 29, 2016).

87. *Id.*

88. Council Directive, *supra* note 86 (EU); *see also* RENEWABLE ENERGY DIRECTIVE, EUROPEAN COMM'N, *supra* note 81.

89. Council Directive, *supra* note 86, at 37 (EU); *see also* RENEWABLE ENERGY DIRECTIVE, EUROPEAN COMM'N, *supra* note 86.

90. Council Directive *supra* note 86, at 25 (EU) (cooperation mechanisms include Statistical Transfer between Estonia and Luxembourg, Joint Projects/Statistical Transfer between Malta and Italy, Joint Projects between the Netherlands and Portugal, and a Joint Project offshore wind park in the North Sea (between the Netherlands, Belgium, UK, and Luxembourg, among others); *see also* RENEWABLE ENERGY DIRECTIVE, EUROPEAN COMM'N, *supra* note 86.

91. SEA, *supra* note 83.

92. *REFILE-Norway and Sweden agree to raise renewable energy target*, REUTERS (Mar. 13, 2015), http://af.reuters.com/article/energyOilNews/idAFL5N0WF0YY20150313.

increase of at least 26.4 TWh in electricity production between 2012 and 2020, which would represent an equal increase of 13.2 TWh by each country.[93]

The Nordic system works as follows: first, electricity producers receive one electricity certificate unit from the Swedish and Norwegian State for each megawatt-hour (MWh) of electricity produce from renewable sources. Then, the electricity producers can sell their certificates, generating extra income.

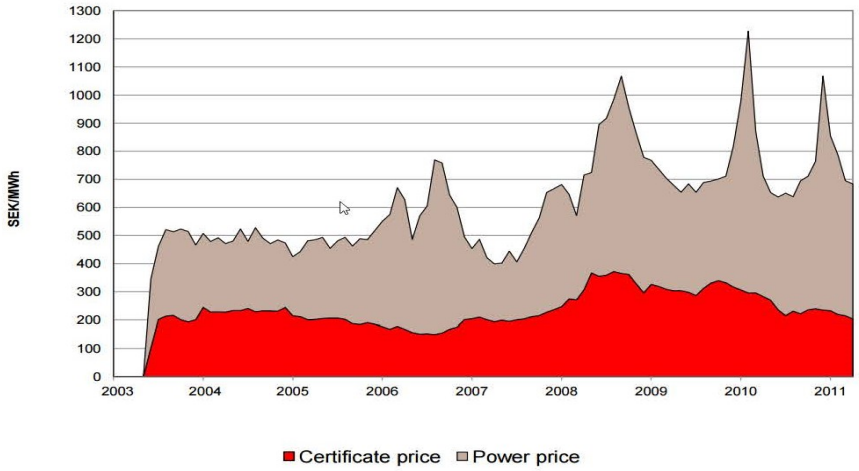

Fig. 1: Certificate and power price equals the total income for the electricity producer.[94]

Certificates are traded on an open market with prices agreed upon by purchasers (electricity users) and sellers (electricity generators). The purchasers are mainly parties required to meet electricity quotas set by the Swedish and Norwegian Act Concerning Electricity Certificates.[95] According to a Report from the Swedish Energy agency (SEA) in 2016, "quotas are calculated based on the expected expansion of renewable electricity, expected electricity sales and electricity use by the organisations with the quota obligations."[96] Finally, the electricity supplier might pass on the cost of the certificates to the final consumer for his monetary contribution to the system.

93. Eva Centeno Lopez, MINISTRY OF ENTERPRISE, ENERGY AND COMMUNICATIONS, COMMON SWEDISH NORWEGIAN CERTIFICATE MARKET FOR RENEWABLE ELECTRICITY (April 12, 2013), http://ec.europa.eu/competition/state_aid/modernisation/centeno-lopez_en.pdf (Sweden).

94. *See generally* NORD POOL, www.nordpoolspot.com (last visited May 3, 2016) (Norway).

95. *See, e.g.*, Agreement between the Governments of the Kingdom of Norway and the Kingdom of Sweden on a Common Market for Electricity Certificates (Unofficial Translation) [hereinafter Electricity Certificates Agreement], Nor.-Swed., June 29, 2011, https://www.regjeringen.no/globalassets/upload/oed/pdf_filer_2/elsertifikater/agreement_on_a_common_market_for_electricity_certificates.pdf; *see generally* NORWEGIAN WATER RESOURCES AND ENERGY DIRECTORATE, https://www.nve.no/english/ (last visited May 3, 2016); SEA, THE NORWEGIAN-SWEDISH ELECTRICITY CERTIFICATE MARKET ANNUAL REPORT 2013, 10 (2013) [hereinafter Annual Report 2013 (Nor.-Swed.)].

96. SEA, ENERGY IN SWEDEN 2015, at 37 (Dec. 2015), https://www.energimyndigheten.se/globalassets/statistik/overgripande-rapporter/energy-in-sweden-till-webben.pdf.

The certificates have a validity of up to one year, maintaining a demand for new certificates.[97] The quotas will gradually increase until the year 2020. After that, the curve is expected to decrease.[98] In the following figure one can observe how the electricity certificates scheme broadly operates:

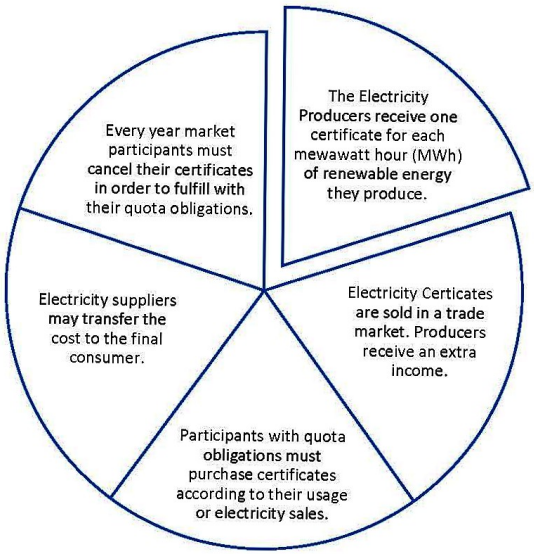

Fig. 2: The process of the Nordic Electricity Certificate Scheme.[99]

Certificate trading takes place in the common market between electricity producers and participants with quota obligations. Both must have an electricity certificate account. The trading can also take place via brokers and the price of the certificate is agreed to on the day of the purchase.[100]

The primary market participants are power suppliers with yearly obligation quotas corresponding to their electricity sales and/or consumption. Other participants include consumers with consumption higher than 60 MWh per year, consumers using electricity bought in the Nordic electricity exchange, and registered power-intensive industries by SEA.[101]

4.2 Analysis of the Norwegian-Swedish Electricity Certificate Policy in Sweden

The main expected advantages of tradable green certificate-based quota systems is that they are cost-efficient, ensure stable development toward set goals,

97. Annual Report 2013 (Nor.-Swed.), *supra* note 95, at 12.

98. *Id.* at 10–11.

99. *See generally* IEA, IEA STATISTICS, http://www.iea.org/statistics/ (last visited May 3, 2016) (author's graphical representation based on IEA data).

100. Annual Report 2013 (Nor.-Swed.), *supra* note 95, at 5, 11.

101. SEA, *supra* note 96, at 22, 19 n.7.

and drive innovation and cost-reduction.[102] Evaluating the Norwegian-Swedish Electricity Certificate scheme by its environmental effectiveness and cost efficiency, one can conclude that it has been an effective environmental policy. It has upgraded the share of renewable electricity while promoting economic prosperity, considering GDP growth.[103] Now, as CELs obligate intensive power users to purchase a share of renewable electricity while incentivizing renewable energy installations from electricity generators (now private companies as well), IMCO suggests a similar path of increased renewables in the Mexican matrix.[104]

4.2.1 Environmental Effectiveness

Since energy production accounts for a great part of global emissions,[105] increasing sources of renewable energy is an important condition for lowering the environmental impact of energy production. The Norwegian-Swedish Energy Certificate Scheme favors cleaner sources of electricity production. Starting in 1990, Sweden's renewable energy sources accounted for about 33% of its total consumption.[106] By the year 2011, this share had increased to 48%.

Currently, hydro and nuclear power are the main sources of electricity generation in Sweden.[107] One must consider that these are carbon neutral technologies. Hence, Sweden reported that 51.1% of its electricity consumption came from renewable sources in 2012. The year after, in 2013, renewable sources accounted for 52.1% of the total consumption.[108] Consequently, by 2012, Sweden had already achieved its 2020 target goal of producing at least 49% of its electricity from renewable sources.[109]

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102. Anna Bergek & Staffan Jacobsson, *Are Tradable Green Certificates a Cost-Efficient Policy Driving Technical Change or a Rent-Generating Machine? Lessons from Sweden 2003–2008*, 38 ENERGY POL'Y 3, 1255–71 (2016).

103. Press Release from the Swedish Minister for Strategic Development and Nordic Co-operation, Sweden's "Minister for the Future" believes in a fossil-free future with economic growth (Nov. 24, 2015), https://sweden.se/wp-content/uploads/2015/11/SI_NewClimateEconomy_PressRelease.pdf.

104. IMCO, *supra* note 67; Jesus Alarcon, ¿PARA QUÉ SIRVEN LOS CERTIFICADOS DE ENERGÍA LIMPIA QUE PROPONE LA REFORMA ENERGÉTICA? (What is the purpose of the Clean Energy Certificates proposed by the energy reform?), IMCO, ANIMAL POLÍTICO (May 21, 2014), http://imco.org.mx/medio_ambiente/para-que-sirven-los-certificados-de-energia-limpia-que-propone-la-reforma-energetica/.

105. IEA, IEA STATISTICS, CO^2 EMISSIONS FROM FUEL COMBUSTION 7 (2015), https://www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2015.pdf (estimating that 68 percent of global CO_2 emissions come from energy production).

106. IEA, IEA STATISTICS, SWEDEN: ELECTRICITY AND HEAT FOR 1990, http://www.iea.org/statistics/statisticssearch/report/?country=SWEDEN&product=ElectricityandHeat&year=1990 (last visited Apr. 29, 2016).

107. IEA, IEA STATISTICS, SWEDEN: ELECTRICITY AND HEAT FOR 2013, http://www.iea.org/statistics/statisticssearch/report/?country=SWEDEN&product=ElectricityandHeat&year=2013 (last visited Apr. 29, 2016).

108. *Id.*; IEA, IEA STATISTICS, SWEDEN: ELECTRICITY AND HEAT FOR 2012, http://www.iea.org/statistics/statisticssearch/report/?year=2012&country=SWEDEN&product=ElectricityandHeat (last visited Apr. 29, 2016).

109. RENEWABLE ENERGY DIRECTIVE, EUROPEAN COMM'N, *supra* note 86.

Sweden is a highly export-oriented economy; in 2012 alone, the export industry contributed to about 50% of its GDP.[110] SEA estimates an increase of about 20% in energy consumption from the industrial sector by 2020. [111] In addition, the SEA expects a total electricity generation of about 175 TWh with exports of about 24 TWh by 2020.

One must consider energy efficiency as a factor in reducing electricity demand.[112] Between 1990 and 2013, Sweden reduced its GHG emissions by 22% while economically growing by 58% of its GDP.[113] The remarkable success during this period is partially due to the increase of renewables in its power matrix. As one can observe in the following graph, the use of wind power had a considerable increased between 2004 and 2010, after the implementation of the Green Trade Certificates (GTC):

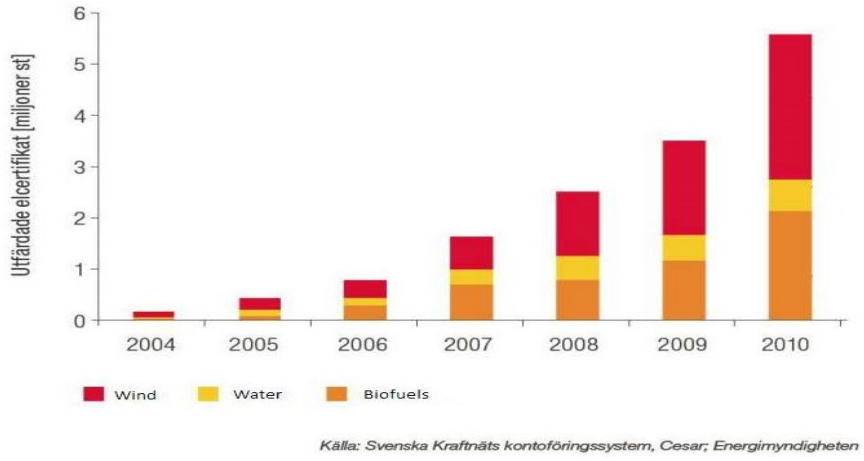

Fig. 3: Increase of Energy Produced from Wind and Biofuels from 2004 to 2010 under Sweden's certificate scheme.[114]

4.2.2 Cost Efficiency

In September 2015, SEA reported that despite the low price of electricity certificates in 2014,[115] the development of renewable electricity continued at a high

110. IEA, ENERGY POLICIES OF IEA COUNTRIES, SWEDEN, 2013 REVIEW, EXCERPT, THE FRAMEWORK: ENERGY POLICY AND CLIMATE CHANGE 49 (2013), http://www.iea.org/textbase/nppdf/free/2013/sweden2013_excerpt.pdf.

111. *Id.*

112. *Id*. at 4.

113. SWEDISH INSTITUTE, FACTS ABOUT SWEDEN: CLIMATE IS KEY FOR SWEDEN 3 (2015), https://sweden.se/wp-content/uploads/2015/08/Environment_low_resolution.pdf.

114. *See generally* IEA, IEA STATISTICS, http://www.iea.org/statistics/ (last visited May 3, 2016) (author's graphical representation based on IEA data).

115. Press Release from the SEA, Continued High Expansion of Renewable Electricity Despite Lower Certificate Price (last updated Sept. 29, 2015, 15:56), http://www.energimyndigheten.se/en/news/2015/continued-high-expansion-of-renewable-electricity-despite-lower-electricity-certificate-price/

pace.[116] On this basis, the SEA concluded that "the price of the electricity certificates does not necessarily reflect the willingness to invest in new renewable projects."[117] Therefore, investment may have resulted from other external factors besides the certificate scheme. However, CELs arguably play a key role in increasing renewables in the Nordic case. The SEA reported in 2015 that under the mutual agreement with Norway, 10.3 TWh of renewable electricity production has been added since the year 2012. Meanwhile, quota-obligated electricity consumption fell in the year 2014 by about 88.4 TWh, resulting in a quota obligation of 12.5 million electricity certificates.[118] Mexico could learn from this Nordic experience by pursuing additional mechanisms to promote the increase share of renewables, such as direct taxation on emissions.[119]

Cost effectiveness can also be evaluated by examining consumer costs for electricity certificates. Figure 4 demonstrates that during the time of Sweden's stand-alone scheme the bulk of consumer costs went directly back to supporting electricity producers—encouraging them to invest more in renewables, and thus meeting the main objective of the market-based mechanism.

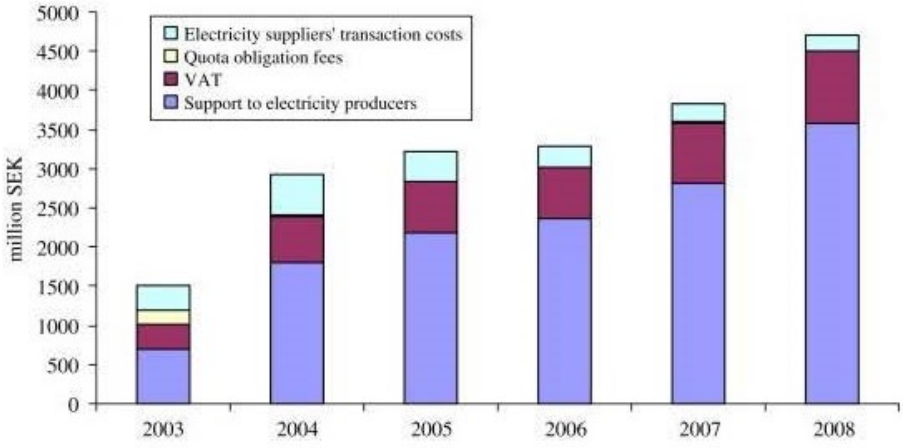

Fig. 4: Consumer costs for electricity certificates in the Swedish TGC system.[120]

Figure 5 by SEA in 2013 shows the fluctuation in certificate prices from 2003 to 2012. From this, one can observe that in the last years the price went down compared to the previous levels of 2008 and 2009. Therefore, we can argue that the

116. In Sweden, the development was mainly in solar energy, while in Norway wind power accounted for the largest increase.

117. *Id*.

118. Press Release, *supra* note 115.

119. *See, e.g.*, SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES [SEMARNAT] (Secretariat of the Environment and Natural Resources), CARBON TAX IN MEXICO (May, 2014), https://www.thepmr.org/system/files/documents/Carbon%20Tax%20in%20Mexico.pdf (Mex.).

120. See generally IEA, IEA STATISTICS, http://www.iea.org/statistics/ (last visited May 3, 2016) (graphical representation based on IEA data).

market has adapted well to the prices of CELs, and the scheme has kept stable for the evaluation period.

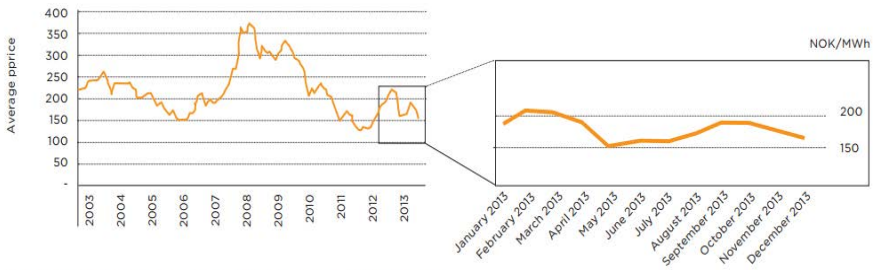

Figure 8. Electricity certificate prices 2003-2013

Source: CleanWorld, ICAP and Svensk Kraftmäkling

Fig. 5: Electricity Certificates Prices from 2003 to 2013.[121]

To add on, according to the Swedish Government,[122] Sweden plans to invest $546 million in clean energy projects alone in 2016, aiming to lower its emissions by at least 40% by the year 2020 and become one of the first fossil free nations in the world.[123]

5. CONCLUDING POINTS

Mexico's constitutional Energy Reform, along with its secondary laws, has renovated the institutional framework of the State's energy sector. Though the main focus of the Reform was on the development of new fields for the extraction of hydrocarbons, the Reform also incorporates cleaner ways of producing electricity. One of these schemes is the recently-approved Clean Energy Certificates (CELs), which aims to create a market for renewable energy certificates and establish a set of clear targets for renewable clean energy in the midterm.

Market-based green energy certificates have helped to increase the share of renewable energy in Sweden and Norway by attracting investors to the production of renewable energy. Energy agencies report that the collaboration mechanism established between Norway and Sweden has expanded the market while ensuring its liquidity.[124] Yearly quota obligations ensure enough demand for certificates.

121. *Id.*

122. *Regeringen Investerar för Klimatet* (The Government is Investing in Climate), REGERINGSKANSLIET (Sept. 16, 2015), http://www.regeringen.se/pressmeddelanden/2015/09/regeringen-investerar-for-klimatet/.

123. Anna Hirtenstein, *Sweden Boosts Renewables to Become First Fossil-Fuel-Free Nation*, BLOOMBERG BUSINESS (Sept. 16, 2015, 10:54 AM MDT), http://www.bloomberg.com/news/articles/2015-09-16/sweden-boosts-renewables-to-become-first-fossil-fuel-free-nation.

124. SEA, THE NORWEGIAN-SWEDISH ELECTRICITY CERTIFICATE MARKET: ANNUAL REPORT 2013 at 8, 16, 20, 24, 25–28 (2014), http://www.energimyndigheten.se/globalassets/fornybart/elcertifikat/sv-norsk-marknad/electricity_certificate_market_annual_report_2013.pdf.

Sweden's increase renewable energy shares allows it to export its electricity remnants and ensures low to zero emissions from supplying electricity. As a result, the Swedish government is investing in smarter grids, innovative storage capacity, as well as exploring an increase in the electrification of the transport sector to further reduce its GHG emissions, among other actions.

The Nordic Case serves as precedent for the implementation of similar market-based instruments to promote the share of renewables. Clean Energy Certificates can help increase the share of renewable electricity by creating competitive costs. In order to be successful in the Mexican context, it will be crucial to adapt the new certificates to market circumstances, as other countries have done in implementing similar schemes.

International experience has shown that this type of market-based instruments can lead to an increase in renewable energy shares. As climate calls with urgency for more abatement of human-induced climate change, time will tell if such targets for renewable energy will be achieved in Mexico.