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U.S.-Mexico Climate Change Agenda Working Group

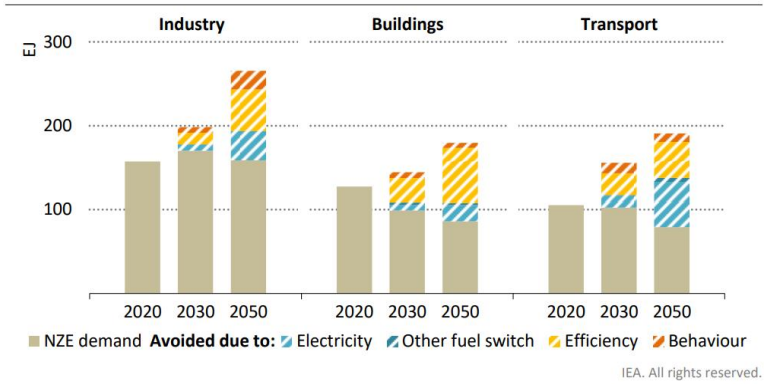
Briefing Paper – Energy Efficiency
for Discussion on Wednesday, June 9, 3:00 pm EDT

Introduction

Energy efficiency means using less energy to provide the same or higher level of service, for any type of service provided. In its 2021 study, *Net Zero by 2050: A Roadmap for the Global Energy Sector,* the International Energy Agency (IEA) states that a "major worldwide push to increase energy efficiency is an essential part" of the path to net zero emissions (NZE) by 2050.[1] The IEA's proposed roadmap contemplates a global rate of efficiency improvements averaging 4% per year through 2030—about three times the average over the last two decades -- with a focus on improved energy efficiency in industry, buildings, and transport.[2]

The linkage between energy efficiency and emissions reduction is through reduction of energy consumption. Less energy consumption means fewer emissions. According to the IEA, "[w]ithout the energy efficiency, behavioural changes and electrification measures deployed in the NZE, final energy consumption would be around 300 EJ [exajoules = 10^{18} joules] higher in 2050, almost 90% above the 2050 level in the NZE."[3] The chart below shows the key role that efficiency (yellow shading) plays in reducing energy consumption across industry, buildings, and transport to 2030 and then to 2050:

Total final consumption and demand avoided by mitigation measure in the NZE



Energy efficiency plays a key role in reducing energy consumption across end-use sectors

Notes: Other fuel switch includes switching to hydrogen-related fuels, bioenergy, solar thermal, geothermal or district heat.

The American Council for an Energy Efficient Economy (ACEEE) takes the position that efficiency can be deployed even to a greater degree than the IEA shows.[4] The ACEEE 2019 report *Halfway There: Energy*

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[1] IEA Net Zero by 2050: A Roadmap for the Global Energy Sector, https://iea.blob.core.windows.net/assets/ad0d4830-bd7e-47b6-838c-40d115733c13/NetZeroby2050-ARoadmapfortheGlobalEnergySector.pdf, p. 14.

[2] *Id.* at p. 14.

[3] *Id.*

[4] IEA: Tripling the Speed of Efficiency Progress a Must for a Net-Zero Carbon World | ACEEE.

Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050[5] found that efficiency can reduce 2050 greenhouse gas emissions in half.

The U.S. and Mexico both recognize the importance of energy efficiency and have fostered efforts to improve energy efficiency across their respective economies. In 2018, the ACEEE published its 2018 International Energy Efficiency Scorecard, evaluating the efforts of 25 of the world's leading economies in the categories of national efforts, buildings, industry, and transportation.[6] The U.S. and Mexico were both ranked overall in the middle of the pack, with the U.S. ranked at #10 (tied with Canada) and Mexico at #12. The top five countries in terms of energy efficiency were Germany, Italy, France, the United Kingdom, and Japan. Clearly, the U.S. and Mexico both have room for improvement. Annex A to this paper shows the factors that the ACEEE used in makings its rankings and how the U.S. and Mexico fared in those rankings, with Germany included for comparison purposes.

In broad terms, energy efficiency is attained in the fields of buildings (including appliances), industry and transportation as follows:

- Buildings and appliances: Energy-related building codes to support a move to zero-carbon buildings, i.e. buildings that are highly energy efficient and use renewable or de-carbonized electricity; building retrofit programs; more efficient heating and cooling systems; minimum energy performance standards for appliances and replacement schemes for low-efficiency appliances.[7]
- Industry: Energy management systems; best-in-class industrial equipment such as electric motors, variable speed drives, heaters, and grinders; and process integration options such as waste heat recovery.[8]
- Transportation: Stringent fuel-economy standards; no sales of new passenger cars with internal combustion engines (ICEs) after a fixed date, resulting in a shift to sales of electric vehicles (EVs), which use less energy than the average ICE car for the same level of activity; improvement in the fuel economy of heavy vehicles through alternate technologies such as hydrogen fuel cells; improved efficiency in aviation and shipping,[9]

The U.S. and Mexico will need to improve their performance in all three of these areas to push toward net zero emissions by 2050. Improvement of energy efficiency would also have broader collateral benefits in terms of competitiveness. The U.S., Canada and Mexico are parties to the U.S.-Canada-Mexico Agreement (*Tratado México-Estados Unidos-Canada*, or T-MEC in Spanish). Their close alignment on energy efficiency in the middle of the pack according to the ACEEE rankings suggests that they could work together to increase efficiency through shared norms and strategies, and thereby reduce energy costs and foster free trade among the three countries. This would strengthen the North American countries' competitive position as against other economic blocs.

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[5] Pathway to Cutting Energy Use and Carbon Emissions in Half (aceee.org).

[6] https://www.aceee.org/research-report/i1801.

[7] *Id.* at pp. 65-66.

[8] *Id.* at p. 66. See generally Energy Management Proves Cost Effective in Industrial and Commercial Facilities | ACEEE

[9] IEA Net Zero by 2050 at 66 & fn. 13 ("In 2020, the average battery electric car required around 30% of the energy of the average ICE car to provide the same level of activity.")

Energy Efficiency in the U.S.

In the United States, energy efficiency policy is effectuated by a mix of federal, state, and local governments.

U.S. Federal Energy Efficiency Policy

Under the administration of President Barack Obama, energy efficiency was a top priority.[10] The ACEEE found particular energy savings from the Obama policies with respect to light and heavy duty vehicles, appliance standards and the administration's clean power plan.[11] The administration of President Donald Trump, consistent with its anti-regulation agenda, scaled back federal fuel economy standards, froze most appliance standards, rolled back a few standards, and changed the rules on how standards and environmental regulations are set to make the process more difficult and more open to attack.[12] Under President Joe Biden, the federal government will likely take an aggressive posture to increase energy efficiency, as indicated by its initial moves.[13] The following are some key areas where the U.S. federal government is active in energy efficiency:

- Fuel Economy Standards. The National Highway Traffic and Safety Administration (NHTSA) within the U.S. Department of Transportation (DOT) sets and enforces Corporate Average Fuel Economy (CAFE) standards for cars and light trucks, while the Environmental Protection Agency (EPA) sets related GHG standards.[14] The CAFE standards are fleet-wide averages that must be achieved by each automaker for its car and light truck fleet each year. During the Obama administration, NHTSA and EPA worked together on their efforts to regulate fuel economy and emissions. Key fuel efficiency actions in recent years at the federal level are as follows:

    - In 2012, NHTSA and EPA established final passenger car and light truck CAFE standards for model years (MY) 2017-2021, projected to require in MY 2021, on average, a combined fleet-wide fuel economy of 40.3-41.0 mpg.[15]

    - In 2016, the NHTSA and EPA adopted a final rule on "Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2," pertaining to model years 2021-2027. This rule promoted a new generation of cleaner, more fuel-efficient trucks by encouraging the development and deployment of new and advanced cost-effective technologies.[16] The rule was partially stayed, i.e. prevented from

[10] The US will save trillions of dollars if Obama's energy efficiency legacy stands | ACEEE
[11] *Id.*
[12] 2020 Was A Wild Ride; Opportunities Await In 2021 | ACEEE; Trouble Ahead for US Appliance Efficiency Standards | ACEEE.
[13] Biden administration announces new Energy Star standards, plans for emissions targets for federal buildings - The Washington Post.
[14] NHTSA establishes CAFE standards under the Energy Policy and Conservation Act (EPCA) of 1975, as amended by the Energy Independence and Security Act (EISA) of 2007, while EPA establishes GHG emissions standards under the Clean Air Act.
[15] Corporate Average Fuel Economy (CAFE) Standards | US Department of Transportation
[16] Final Rule for Phase 2 Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles | Regulations for Emissions from Vehicles and Engines | US EPA.

going into effect, as a result of litigation with respect to application of the rule to truck trailers.[17]

- In 2020, under the Trump administration, the NHTSA and EPA rolled back CAFÉ standards so that the required increase in fuel efficiency for MY 2021 -2026 was reduced to 1.5% per year, as compared to an increase of roughly 5% per year under the 2012 standard; this resulted in a 40.4 mpg projected average required fuel economy for light vehicles in MY 2026, compared to a 46.7 mpg projected requirement under the 2012 standards.[18] This action was viewed by energy efficiency advocates as a "completely unnecessary and destructive action that will cost Americans at the pump and in the air we breathe."[19]

- Earlier, In 2019, the Trump administration – in the face of the State of California's plan to impose higher fuel efficiency standards than under the contemplated federal standards – issued a rule which (1) withdrew a statutory waiver that, since the passage of the Clean Air Act in 1963, had permitted California to set its own fuel efficiency standards, and (2) purported to establish that the federal fuel efficiency standard would preempt any state standard.[20]

- In 2021, the newly elected Biden administration took steps to cancel the Trump rule limiting California's ability to set its own fuel efficiency standard.[21]

- Federal appliance and equipment standards. The Department of Energy (DOE), through the Buildings Technologies Office (BTO), sets minimum energy efficiency standards for approximately 60 categories of appliances and equipment used in homes, businesses, and other applications, as required by existing law. Beginning with the Energy Policy and Conservation Act of 1975, Congress has passed a series of statutes establishing minimum energy conservation standards for consumer products and commercial and industrial equipment. The products regulated by the program represent about 90% of home energy use, 60% of commercial building energy use, and 30% of industrial energy use.[22] By 2030, cumulative operating cost savings from all standards in effect since 1987 will reach nearly $2 trillion.[23]

- Government Energy Management. The Federal Energy Management Program (FEMP) within DOE provides training, technical assistance, and best practice resources for federal agencies to assist with the implementation of efficient federal facility and fleet operations,[24] including implementation of the Guiding Principles for Sustainable Federal Buildings and Associated Instructions, issued in

[17] Phase 2 Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles (fas.org).
[18] Fact Sheet: SAFE Vehicles Rule | NHTSA
[19] Rollback of fuel efficiency standards will harm U.S. economy and public health for years | ACEEE.
[20] 2019-20672.pdf (govinfo.gov).
[21] cafe_preemption_nprm_04222021_1_0.pdf (nhtsa.gov).
[22] About the Appliance and Equipment Standards Program | Department of Energy.
[23] Appliance and Equipment Standards Program | Department of Energy.
[24] Government Energy Management | Department of Energy

December 2020.[25] DOE, through its State and Local Solution Center, also provides resources to enable strategic investments in energy efficiency and renewable energy technologies at the state and local levels, including through community-based nonprofits.[26]

- Support for Advanced Manufacturing. DOE's Advanced Manufacturing Office (AMO) supports R&D projects, R&D consortia, and early-stage technical partnerships with national laboratories, companies (for-profit and not-for profit), state and local governments, and universities through competitive, merit reviewed funding opportunities designed to investigate new manufacturing technologies.[27]

- Energy Efficiency Funding Programs. There are numerous programs through the federal government that provide grants or other funding to support energy efficiency efforts. The following are examples of those funding programs:

    - The Diesel Emissions Reduction Act (DERA) Program grants. Supplementing the fuel efficiency standards, DERA grants are distributed in part by the EPA and in part by the states for the purpose of reducing diesel emissions. Congress appropriated $87 million for the DERA Program for FY2020 and $90 million for FY 2021. The DERA Program was reauthorized in the Consolidated Appropriations Act, 2021 (P.L. 116-260), through 2024.[28]

    - DOE/EERE Funding Opportunities. The Energy Efficiency and Renewable Energy (EERE) office within DOE offers funding opportunities, including for building efficiency under the auspices of BTO and for advanced manufacturing under the auspices of AMO. A website showing all current grant opportunities offered by EERE is at Financial Opportunities: Funding Opportunity Exchange (energy.gov).

    - DOE's Weatherization Assistance Program. DOE's Weatherization Assistance Program ("WAP") reduces energy costs for low-income households by providing funding to increase the energy efficiency of their homes, which can include multi-family residences.[29] Under this program, DOE awards grants to state governments, which then contract with local agencies to deliver weatherization services to eligible, low-income residents who apply for assistance. DOE funding for the WAP for fiscal year 2019 was $257 million.[30]

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[25] Sustainable Federal Buildings | Department of Energy. The Guiding Principles are at Guiding Principles for Sustainable Federal Buildings and Associated Instructions (sustainability.gov).
[26] State and Local Solution Center | Department of Energy.
[27] Advanced Manufacturing Office | Department of Energy.
[28] The Diesel Emissions Reduction Act (DERA) Program (congress.gov).
[29] Q&A: The Weatherization Assistance Program | Department of Energy.
[30] See PowerPoint presentation by Annamaria Garcia, Director, Office of Weatherization and Intergovernmental Program, Office of Energy Efficiency and Renewable Energy, DOE, dated February 13, 2019, to the House Appropriations Subcommittee on Energy and Water Development, U.S. House of Representatives, https://docs.house.gov/meetings/AP/AP10/20190213/108877/HHRG-116-AP10-Wstate-GarciaA-20190213-SD002.pdf.

State Energy Efficiency Policy

During the years of the Trump Administration, many states took action to advance energy efficiency, in part to fill the lack of movement at the federal level. State actions included adoption of energy-saving targets for utilities, generally through state public utility commissions; increased clean energy goals; expansion of equity-focused programs to assist low-income energy users; adoption of new appliance efficiency standards; and steps to advance electric vehicles and other clean transportation options. The 2020 State Energy Efficiency Scorecard issued by the American Council for an Energy Efficient Economy (ACEEE)[31] provides a detailed review of the energy efficiency actions taken in all 50 states and the District of Columbia.

Rather than provide an overview of the state energy efficiency programs throughout the United States, this paper will highlight the energy efficiency programs undertaken by the State of California. California is a leader in energy efficiency and took first place for 2020 among all the states for its energy efficiency regime, according to ACEEE's 2020 State Energy Efficiency Scorecard.

- California's Energy Efficiency Programs. California's goal in implementing its energy efficiency regime is to double the state's energy efficiency savings by 2030 against a 2015 base, pursuant to the Clean Energy and Pollution Reduction Act of 2015.[32] California's energy efficiency programs include the following:[33]

    - State Government. The California state government leads by example by benchmarking energy usage in state buildings, requiring energy-efficient fleets and buildings, and encouraging the use of energy savings performance contracts. California has adopted a commercial building energy disclosure requirement, as well as a residential multifamily disclosure requirement. The State has several research and development institutions focused on energy efficiency investments. California also offers several incentives for energy efficiency investments to schools, industry, residential consumers, and the public sector, as well as PACE financing (Property Assessed Clean Energy financing).

    - Buildings. California has building energy efficiency standards, published as the California Energy Code within the California Building Standard Codes. The standards are required by statute to be performance-based, offering flexibility for builders and designers. The standards are updated periodically by the California Energy Commission. The California Energy Code is considered to be one of the most aggressive and best enforced energy codes in the United States. California is working toward the goal of achieving zero net energy in

[31] The scorecard may be downloaded through https://www.aceee.org/state-policy/scorecard. For an ACEEE overview of the scorecard, see Scorecard: States Adopt New Energy-Saving Rules but COVID-19 Slows Overall Progress | ACEEE.

[32] This Act is known as SB 350 for the 2015 senate bill that, upon approval by both houses of the California legislature and signature by the Governor, was adopted into law as the Act. Bill Text - SB-350 Clean Energy and Pollution Reduction Act of 2015. (ca.gov). The energy efficiency goal is set forth in California Public Resources Code §25310(c), adopted as part of the Act.

[33] The following list of California programs is from the ACEEE's State and Local Policy Database. California | ACEEE

- the 2020 Standards for residential buildings and 2030 Standards for nonresidential buildings.

- Combined Heat and Power. Combined heat and power (CHP)—sometimes called cogeneration—is an integrated set of technologies for the simultaneous, on-site production of electricity and heat. California has implemented a variety of policies to encourage CHP including interconnection standards, incentive programs, financial assistance, and additional supportive policies.

- Utilities. California has robust utility-sector customer energy efficiency programs, whereby the utilities foster customer awareness of energy efficiency program and sometimes provide related financial support in various forms. Investor-owned utilities (IOUs) administer energy efficiency programs with oversight by the California Public Utilities Commission (CPUC), which establishes key policies and guidelines, sets program goals, and approves spending levels. The state's publicly owned utilities also administer customer programs. The investor-owned electric and gas utilities in California have "decoupling," which is a regulatory mechanism that removes incentives for increased sales of electricity or gas by providing stable revenue for utilities regardless of sales volume. Utilities may also earn performance incentives for energy efficiency efforts. Consistent with the goal of doubling California's energy efficiency savings by 2030, the CPUC in 2019 adopted 10-year efficiency goals for the state's major electric and gas IOUs.

- Transportation. California has some of the most comprehensive transportation policies in the nation. California sets its own fuel efficiency and GHG emission standards under a specific waiver to federal exclusivity in this area. Its fuel efficiency and emission standards were more aggressive than the "rolled back" federal standards during the Trump administration. California had numerous lawsuits with the Trump administration over federal fuel efficiency and emission standards, and the Trump Administration's efforts to withdraw California's waiver which allowed California to set its own standards. California has also taken action to support electric vehicles, hybrids and fuel cell vehicles. Most recently, California Governor Gavin Newsom signed an executive order to end the sale of gasoline-powered cars in the state by 2035.[34] The order aims to phase out cars with internal combustion engines within 15 years by requiring that all new passenger cars and trucks sold in California in 2035 be zero-emission vehicles.

- Appliance and Equipment Standards. California was the first state in the country to adopt appliance and equipment efficiency standards. Under applicable law, the California Energy Commission is granted authority to adopt appliance and equipment efficiency standards. As of 2019, California had adopted standards on more than 50 products, many of which have subsequently become federal standards. California has collaborated with other countries to set harmonized standards for products that have a worldwide market.

[34] Governor Newsom Announces California Will Phase Out Gasoline-Powered Cars & Drastically Reduce Demand for Fossil Fuel in California's Fight Against Climate Change | California Governor

The Cities' Energy Efficiency Policy

United States cities have also been active in establishing energy efficiency programs. ACEEE's 2020 City Clean Energy Scorecard[35] identified more than 160 efficiency and clean energy actions by 100 large cities in the year since the last Scorecard. Importantly, a number of cities have adopted mandatory building performance standards. Cities have also been focused on equity concerns, with cities increasing engagement with, and clean energy investments in, low-income communities and communities of color.[36]

The Challenge to Increased Energy Efficiency in the U.S.: Current Efforts are Not Enough

With all the energy efficiency programs that the U.S. has in place at the federal, state and city level, current efforts are not enough. The IEA contemplates a global rate of efficiency improvements averaging 4% per year through 2030 to reach net zero emissions by 2050. However, the U.S. Energy Information Administration (EIA) forecasts that the U.S. under its "Reference Case" will have a rate of efficiency improvement far below 4% per annum.

Efficiency improvement is measured in terms of the rate of change of energy intensity, i.e. energy used per dollar of GDP.[37] In a Schedule to its Annual Energy Outlook 2021, the EIA reports that U.S. energy intensity will decline in the Reference Case at a rate of 1.5% per annum over the period 2020 to 2050, if measured in terms of delivered energy, and 1.6% per annum over the same period, if measured in terms of total energy.[38] Since the Reference Case assumes, among other things, that (1) current laws and regulations as of September 2020 remain unchanged, and (2) current views on economic and demographic trends, and technology improvements are unchanged,[39] this means that under present circumstances, the U.S. annual improvement in energy efficiency will be 1.5-1.6% per annum, below the benchmark 4% per annum. The U.S. will have to increase its efforts on energy efficiency if it wants to reach the 4% per annum benchmark.

Energy Efficiency in Mexico

Energy efficiency efforts in Mexico are primarily at the federal level. Mexico has improved its energy efficiency efforts over the last several years. In its 2018 international scorecard, the ACEEE reports that "Mexico was the most improved country this year, ranking 12th out of the 25 countries evaluated. In the 2016 edition it ranked 19th out of 23."

[35] The City Clean Energy Scorecard | ACEEE.
[36] 2020 Was A Wild Ride; Opportunities Await In 2021 | ACEEE.
[37] IEA Net Zero by 2050 at p. 14.
[38] Annual Energy Outlook 2021, Tables: Table 20. Macroeconomic Indicators, Energy Intensity (Growth 2020-2050, (https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2021&region=0-0&cases=ref2021&start=2019&end=2050&f=A&linechart=~ref2021-d113020a.13-18-AEO2021~ref2021-d113020a.14-18-AEO2021&ctype=linechart&sourcekey=0
[39] EIA Annual Energy Outlook 2021, p. 4, https://www.eia.gov/pressroom/presentations/AEO2021_Release_Presentation.pdf

Mexican Federal Energy Efficiency Policy

Mexico's Ministry of Energy (*Secretaría de Energía*, or SENER) is responsible for Mexico's energy strategy and policy, including with respect to energy efficiency in accordance with the Energy Transition Law adopted in December 2015.[40]

In this regard, SENER has adopted a Transition Strategy to Promote the Use of Cleaner Technologies and Fuels (*Estrategía*)[41] as well as a National Program for the Sustainable Use of Energy (*PRONASE*),[42] both of which include provisions on energy efficiency and establish energy efficiency goals for Mexico. The energy efficiency goal of the *Estrategía* is defined in terms of a rate of reduction of the intensity of final consumption. For the period 2016-2030 a reduction of 1.9% per year is required, while for the period 2031-2050 it must be reduced 3.7% per year:

Energy efficiency goals

2016-2030	**2031- 2050**
Average annual rate of 1.9% reduction in the intensity of final energy consumption	Average annual rate of 3.7% reduction in the intensity of final energy consumption
Source: SENER-CONUEE	

It is noteworthy that the goal for improvement in energy efficiency for the period 2016-2030 is less than half the 4% per annum IEA benchmark while the goal for the period 2031-2050 is much closer to the 4% figure.

Transition Strategy to Promote the Use of Cleaner Technologies and Fuels (*Estrategía*)

The first ***Estrategía*** under the Energy Transition Law was published on December 2, 2016, in the Official Gazette of the Federation (DOF, for its acronym in Spanish). Then, in November 2019, the Advisory Council for the Energy Transition issued various opinions and recommendations in order to assist in updating the Estrategía. And, on February 7, 2020, an update to *Estrategía* was published in the DOF.[43]

[40] Ley de la Transición Energética. Ley de Transición Energética (diputados.gob.mx).

[41] Estrategia de Transición para Promover el Uso de Tecnologías y Combustibles más Limpios (Estrategia). An overview of the Estrategia is at Estrategia de Transición para Promover el Uso de Tecnologías y Combustibles más Limpios | Comisión Nacional para el Uso Eficiente de la Energía | Gobierno | gob.mx (www.gob.mx). The latest version of the Estrategía is at https://www.dof.gob.mx/nota_detalle.php?codigo=5585823&fecha=07/02/2020.

[42] Programa Nacional para el Aprovechamiento Sustentable de la Energía (PRONASE). For a commentary on the PRONASE for the period 2014-2018, see Programa Nacional para el Aprovechamiento Sustentable de la Energía (PRONASE) 2014-2018 | Comisión Nacional para el Uso Eficiente de la Energía | Gobierno | gob.mx (www.gob.mx). The most recent version of the PRONASE 2014-2018 is at https://www.dof.gob.mx/nota_detalle.php?codigo=5469371&fecha=19/01/2017.

[43] ACUERDO por el que la Secretaría de Energía aprueba y publica la actualización de la Estrategia de Transición para Promover el Uso de Tecnologías y Combustibles más Limpios, en términos de la Ley de Transición Energética. DOF: 07/02/2020 https://www.dof.gob.mx/nota_detalle.php?codigo=5585823&fecha=07/02/2020

The Estrategía is the guiding instrument of national policy in the medium and long term in terms of clean energy and energy efficiency obligations. This instrument indicates a national goal of energy efficiency in a horizon of 15 years (medium-term planning component) and 30 years (long-term planning component).

The main actions called for are the substitution of individual automobile transport for greater use of public transport (transport sector); the replacement of equipment by those of high efficiency (industry sector) and an increase in the efficiency of intensive equipment, as well as a significant increase in the use of thermal envelopes (residential and commercial buildings), as well as in municipal public services and agribusiness.[44]

National Program for the Sustainable Use of Energy (PRONASE)

The **PRONASE** was published for the first time in the DOF on April 28, 2014, and was updated for the period 2014-2018 on January 19, 2017, in the DOF (*PRONASE 2014-2018*).[45] PRONASE is the instrument that establishes the actions, projects and activities derived from the Estrategía, which allow achieving the energy efficiency goals in the short term (Article 35 of the LTE).

PRONASE takes up the energy efficiency policies, actions and indicative goals established in the National Strategy. It is presents 6 objectives to drive and promote energy efficiency in the country:[46]

1. Development of energy efficiency programs.
2. Regulation of energy efficiency.
3. Cooperation mechanisms.
4. Strengthening of institutional capacities.
5. Energy saving culture.
6. Research and technological development.

PRONASE proposes to reduce demand from both the energy sector and final consumption without affecting productivity and competitiveness by significantly increasing energy efficiency, introducing new technologies and substantially modifying the way energy is consumed.

The National Energy Efficiency Commission (*Comisión Nacional para el Uso Eficiente de la Energía*, or CONUEE)

The National Energy Efficiency Commission (*Comisión Nacional para el Uso Eficiente de la Energía*, or CONUEE) is a decentralized body of SENER, responsible for promoting energy efficiency, enacting and supervising the enforcement of energy efficiency standards and providing technical expertise regarding sustainable energy use throughout all the energy value chain from supply to consumption.[47] It was created through the Law of the Energy Transition published in the DOF on December 4, 2015.[48]

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[44] *Id.*
[45] Programa Nacional para el Aprovechamiento Sustentable de la Energía (PRONASE) 2014-2018. https://www.gob.mx/conuee/acciones-y-programas/programa-nacional-para-el-aprovechamiento-sustentable-de-la-energia-pronase-2014-2018
[46] *Id.*
[47] Ley de la Transición Energética, Arts. 17, 18.
[48] Ley de Transición Energética (diputados.gob.mx).

CONUEE and the Roadmap on Energy Efficiency

In compliance with Transitory Article Fourth of the Energy Transition Law, CONUEE published on its website, on January 23, 2017,[49] the first version of the Roadmap on Energy Efficiency (*Hoja de Ruta de Eficiencia Energética*) as a reference instrument that must be periodically reviewed and subjected to continuous improvement processes.[50] Under the Energy Transition Law, a Roadmap (*Hoja de Ruta*) is a guide that establishes the sequence of steps to achieve an objective, in which participants, time and necessary resources are specified.[51]

Accordingly, the Roadmap on Energy Efficiency incorporates an energy transition scenario that includes energy efficiency actions that could be viable in different sectors of final consumption. The Roadmap specifies that the most relevant sectors for the application of energy efficiency without affecting the development of the country are industry, transport and buildings, with a demand reduction potential of 41%, 50% and 35% respectively.

The essential components for reducing energy demand are concentrated in: a) Significant increase in energy efficiency in equipment and systems, b) Increase in recycling processes in key industries, c) Substitution of obsolete equipment for those of high efficiency, d) Increased use of public transport and electrification of transport systems (public and private).

Sector Actions

The Roadmap for Energy Efficiency established 5 guiding axes for the implementation of actions and public policies in the strategic sectors of the country:

- Regulation and public policy
- Institutions
- Capabilities
- Markets and financing
- Research, development and innovation

These guiding axes have the objective of configuring a new energy system with low-carbon technologies necessary for the design and development of plans, policies and programs (public and private) and the development of technical capacities for the analysis and management of Projects.

In addition, the Road Map points out the importance of creating financing mechanisms for institutions and programs, as well as promoting research, development and innovation in energy efficiency and technologies to achieve decarbonization goals.

These sectoral actions are integrated into three parts: 1) Time scope (implementation period), 2) Actors (role of develop in implementation) and 3) Elements and resources.

[49] Hoja de Ruta de Eficiencia Energética | Comisión Nacional para el Uso Eficiente de la Energía | Gobierno | gob.mx (www.gob.mx).

[50] The current versión of the document "Hoja de Ruta de Eficiencia Energética" is available at https://www.gob.mx/cms/uploads/attachment/file/313765/HojadeRutadeEficienciaEnergeticavOdeB24012017SCC_07112017_VF .

[51] Ley de Transición Energética, Ley de Transición Energética (diputados.gob.mx), Art 3, XXI.

CONUEE and the Official Mexican Energy Efficiency Standards (NOMs)

Under the Energy Transition Law (LTE), Article 18, sections V, XIV and XIX and Article 36, section IX establish that the CONUEE has the power to (1) Issue Official Mexican Standards (*Normas Oficiales Mexicanos* or NOMs) on Energy Efficiency; (2) Develop standardization on energy efficiency, supporting the preparation of NOMs and evaluation of conformity with the NOMs, (3) Order verification visits to, and require the presentation of information by, those who carry out activities related to the sustainable use of energy; and (4) Execute the actions established in PRONASE (discussed above),

The development of energy efficiency standards must take into account a series of general principles: homogeneity, balance, cooperation, as well as harmonization or homologation with the corresponding regional or international standards of energy efficiency and ensuring economic and environmental benefits.

The topics to be standardized can be proposed by any sector: manufacturer, consumer, the public, or the agency empowered to regulate the matter at issue. In this process participate: Consultative Committee for the Preservation and Rational Use of Energy Resources (CCNNPURRE)[52] and the National Commission for Regulatory Improvement Commission Regulatory (CONAMER) of the Ministry of Economy. [53]

According to the 2018 Balance of the Official Mexican Norms of Energy Efficiency, the products and systems under NOM-ENER (Energy Standards) are: household appliances, air conditioners, lighting systems, buildings and the industrial and commercial sector. In addition, the report considers that "the energy efficiency NOMs, under the responsibility of CONUEE, have contributed significantly to making Mexico efficient, competitive and responsible in caring for the environment, since they have contributed to the preservation of non-renewable energy resources, the global fight against climate change and national technological development by allowing other public and private actors, through of a wide variety of actions, to improve their competitiveness and meet their objectives of social responsibility."[54]

The NOMs include the parameters that must be met to improve energy efficiency (such as energy intensity or maximum power), as well as the test method by which compliance with that parameter is demonstrated and, in the case of most of the equipment, with a label, visible to the public at points of sale, which refers to the level of compliance above the minimum values of the required parameters.[55]

Currently, Mexico has 33 NOMs focused on most of the major household goods that use electricity and gas (refrigerators, gas stoves, water heaters, clothes washing machines, air conditioning equipment), equipment and lighting systems for interiors and exteriors, building materials, electric motors and, even, the regulation of the standby power of various electronic equipment. A list of all energy efficiency NOMs currently in place, together with related notices and resolutions, is attached as Annex B to this paper.

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[52] Mtro (conuee.gob.mx).

[53] CONAMER: La Comisión Nacional de Mejora Regulatoria【2021】 (gobmx.mx)

[54] SENER (2018). Normas Oficiales Mexicanas de Eficiencia Energética Balance al 2018, https://www.conuee.gob.mx/transparencia/boletines/NOM/documentos/BALANCE_2018_NOM-ENER_final%20_6042020.pdf

[55] CONUEE (2020). Palabras del Ing. Odón de Buen R., Director General de la Conuee, en la apertura del Taller Regional sobre Aparatos y Equipos Súper Eficientes, organizado por la Agencia Internacional de Energía que se llevó a cabo el 11 de febrero de 2021. https://www.gob.mx/conuee/documentos/palabras-del-ing-odon-de-buen-r-director-general-de-la-conuee

It is estimated that in Mexico equipment that represents up to 55% of its final energy consumption is subject to mandatory energy efficiency regulations. It should be noted that many of the NOMs have undergone several updates and some of them are homologated in efficiency levels and test methods with which they are applied in the United States and Canada.

Regarding Mexico's evaluation and compliance system, it is made up of test laboratories, certification bodies and inspection units. At the end of 2020, the country had an infrastructure to assess conformity made up of 87 test laboratories, 215 inspection units, and 17 certification bodies.[56]

Since the entry into force of the first three EE NOMs in 1996, the work that Mexico has developed in the field of energy efficiency has had positive results, especially in the residential sector:

- All households that have electricity (about 98%) have at least one equipment that complies with the energy efficiency NOMs and where energy services, such as lighting, refrigeration, hygiene and thermal comfort are obtained with less energy and lower cost.
- An average home in a temperate climate (about 55% of homes) consumes less than it did 25 years ago (example use of refrigerator).
- The consumption of gas (LP and natural), used to heat water, in the residential sector in Mexico, which had been growing at 6% per year until the end of the last century, stopped growing since 2000 and has decreased steadily to date.

In addition to the technical regulation, there are other instruments such as the labeling of equipment and electrical appliances to recognize higher levels of energy efficiency by the Trust for the Saving of Electric Energy (FIDE, by its acronym in Spanish Fideicomiso para el Ahorro de Energía Eléctrica).

In April 2021, CONUEE presented the "Manual for the design and operation of energy efficiency programs in public buildings of state governments". The objective of the manual is to guide state officials to implement programs for saving and efficient use of energy in public buildings, based on the experience of more than 20 years of Conuee in the framework of the Energy Efficiency Program in the Public Administration Federal (APF), where 2,400 properties participate, which include more than 7,000 buildings with around 14 million square meters.[57]

Energy Efficiency in Mexico according to the International Energy Agency

Mexico joined the IEA in 2018 as the first member from Latin America. Mexico is strongly committed to energy efficiency as part of its wider energy reforms. Its policy coverage in multiple energy end-use sectors

[56] CONUEE (2020). Palabras del Ing. Odón de Buen R., Director General de la Conuee, en la apertura del Taller Regional sobre Aparatos y Equipos Súper Eficientes, organizado por la Agencia Internacional de Energía que se llevó a cabo el 11 de febrero de 2021. https://www.gob.mx/conuee/documentos/palabras-del-ing-odon-de-buen-r-director-general-de-la-conuee

[57] Gama, Israel (2021). Presenta Conuee manual para diseñar programas de eficiencia energética en edificios públicos estatales en Global Energy. https://globalenergy.mx/noticias/electricidad/presenta-conuee-manual-para-disenar-programas-de-eficiencia-energetica-en-edificios-publicos-estatales/

has increased substantially since 2010 and in 2013, Mexico became the first country in Latin America to introduce a fuel economy standard.[58]

Mexico still has several challenges in meeting its climate objectives and the Sustainable Development Goals such as ensuring access to clean cooking and, in remote areas, universal access to energy.

Energy efficiency improvements in Mexico since 2010 prevented 5% of additional energy use in 2018. These results are due to the structural changes and energy efficiency policies made mainly in the industrial (adopted motor efficiency Minimum Energy Performance Standards at the IE3 level, matching those across North America), transport (introduction of fuel efficiency standards for passenger cars) and building sectors (buildings codes). [59]

According to the IEA, Mexico has opportunities to increase energy efficiency based on the Efficient World Scenario[60]:

- Introduction of fuel efficiency standards for trucks could unlock efficiency gains.
- Adopting energy management systems across motor-driven systems would also boost efficiency as well as Mexico's promotion of energy efficiency learning networks.
- Continued strengthening and implementation of Mexico's Roadmap for Building Energy Codes and Standards.

The E4 Programme[61] has worked with Mexico to progress with firm foundations for energy efficiency in terms of legislation, strategy, and capacity. These include: a long-term energy efficiency strategy, energy efficiency targets set under the Energy Transition Law, and a roadmap for building energy codes and standards.

According to the IEA (2018), energy efficiency has a potentially important role to play regarding to the increasing energy consumption per capita, and Mexico has opportunities to improve energy efficiency at little or no net cost in the transport, industrial and buildings sectors.[62] The general recommendation by IEA are:

- Enhance demand-side data collection in order to inform policy and program decisions.
- Formulate a quantitative efficiency target and strategy, consistent with climate targets, to mobilize government resources and capabilities and monitor its progress on an annual basis.
- Phase out electricity subsidies to provide the right price signal for energy efficiency.
- Consider establishing a dedicated energy efficiency fund and other market-based mechanisms to trigger greater private-sector financing and support the development of an energy services market in Mexico.

[58] IEA (2021). E4 Country Profile: Energy Efficiency in Mexico. https://www.iea.org/articles/e4-country-profile-energy-efficiency-in-mexico.
[59] IEA (2021). E4 Country Profile: Energy Efficiency in Mexico. https://www.iea.org/articles/e4-country-profile-energy-efficiency-in-mexico.
[60] Under the Efficient World Scenario, the increase in energy consumption could be limited to just 10% between now and 2040.
[61] Energy Efficiency in Emerging Economies (E4) Programme.
[62] International Energy Agency (2017). Energy Policies Beyond IEA Countries – México 2017. https://iea.blob.core.windows.net/assets/d82993b9-6034-4c56-b9f5-5860e82be975/EnergyPoliciesBeyondIEACountriesMexico2017.pdf

- Introduce, in cooperation with car manufacturers, an energy efficiency or CO2 emission-related labelling system for passenger cars.
- Enhance the adoption of buildings energy codes and standards for building components (e.g. building envelope, including insulation and windows), through better co-ordination, support and enforcement between federal and local governments, as well as through awareness campaigns.
- Enhance technical support and consider financial incentives, including tax credits and market-based mechanisms, for heavy industrial consumers of energy to implement energy management systems and conduct energy audits.
- Strengthen the financial incentives for SMEs to optimise the cost-benefit relation of the Eco Business Credit program by:
    - Introducing targeting criteria
    - enhancing targeted efforts to disseminate best practices to increase awareness.

Efficiency Energy at Energy Sectoral Program (PROSENER 2020-2024)

Mexico's energy policy is articulated in a series of policy documents, building on the overall guidance from the National Development Plan (NDP). A key document is the Energy Sectoral Program (PROSENER 2018-2024), published in the DOF on July 8, 2020,[63] which sets national objectives, strategies and indicators to guide energy policy actions.

The six high level objectives of this central energy policy strategy (SENER, 2013) are to:

1. Achieve and maintain sustainable energy self-sufficiency to satisfy the energy demand of the population with national production.
2. Strengthen the productive companies of the Mexican State as guarantors of energy security and sovereignty, and a lever for national development to trigger a multiplier effect in the private sector.
3. Organize the scientific, technological and industrial capacities that are necessary for Mexico's energy transition throughout the 21st century.
4. Raise the level of efficiency and sustainability in the production and use of energy in the national territory.
5. Ensure universal access to energy, so that all Mexican society has it available for its development.
6. Strengthen the national energy sector so that it constitutes the base that promotes the development of the country as a power capable of satisfying its basic needs with its resources, through the productive state, social and private companies.

In order to meet the energy transition goals, the current administration establishes as a priority objective "Raising the level of efficiency and sustainability in the use of energy", with an approach that contributes to mitigating the effects of climate change and guarantee the rights of indigenous peoples and other social groups settled in the areas where energy projects are carried out, creating spaces for consultation and participation in energy generation projects under the guiding principle of the National Development Plan "Leave no one behind, leave no one out."[64]

[63] SENER, PROGRAMA Sectorial de Energía 2020-2024.
https://www.dof.gob.mx/nota_detalle.php?codigo=5596374&fecha=08/07/2020
[64] *Id.*

Regarding energy efficiency (which is fundamental in the sector), it considers a constant improvement in energy performance to be important, which requires the replacement of equipment and facilities with more efficient technologies, under economic conditions and the country's electricity market. Therefore, it is important to promote the efficient generation and consumption of energy efficient products, to contribute to the rational use of energy, through the development and strengthening of regulations on energy efficiency and monitoring their compliance. In the same way, regulations regarding construction, new materials, facility design, bioclimatic architecture and consumption habits that contribute to the reduction in energy generation must be considered.

Additionally, the PROSENER 2020-2024 contemplates:

- Implementation of energy efficiency and sustainability through actions for the efficient use of energy, technology substitution, energy diagnostics and social workshops.
- Incorporation of energy efficiency criteria into the curricula of professions and technical profession programs, as well as the continuous training of professionals through their union and business organizations.
- Involvement of society in the rational use of energy and the benefits of such actions.
- CFE and private generators to raise the level of energy efficiency in their production processes.
- A movement towards the circular economy to reduce the energy demand necessary for the entire production cycle.

The Challenge to Increased Energy Efficiency in Mexico: System-wide and Sectoral Barriers

In order to provide SENER and CONUEE with inputs aimed at complying with the Energy Transition Law, a dialogue was held with different actors from sectors related to energy transition issues regarding the present and future of this issue in Mexico. This dialogue resulted in the 2016 Long-Term Political Framework for Energy Efficiency (*Marco Político de Largo Plazo para la Eficiencia Energética*).[65] The Framework identified both system-wide and sectoral barriers with respect to achievement of long-term energy efficiency objectives.

The system-wide barriers were as follows:

- energy subsidies
- limited information and little available for data management
- insufficient information campaigns on energy efficiency
- level of intra-institutional coordination in the public sector,
- insufficient fiscal and financial instruments

Additionally, various sectoral barriers were listed, mainly for the sectors of industry, transport, buildings, municipal services and the agricultural sector.

- Buildings: Limited capacities in municipalities to develop and enforce building regulations geared towards energy efficiency. Insufficient resources by the State to increase energy efficiency in public buildings, as well as obsolete local legal framework agendas in the field of construction. In general, the idea that building with EE criteria is more expensive.

[65] https://www.gob.mx/cms/uploads/attachment/file/194644/Marco_Pol_tico_de_Largo_Plazo_para_la_EE_DASE_241116_REV2_090217_1-82.pdf

- Industry: Lack of financing and incentives to promote energy efficiency, as well as the difficulty of maintaining continuity to public policies in the long term. Cultural resistance to a change to more efficient industrial processes or technologies, mainly from small and medium-sized companies. An absence of incentives to promote research and development of more efficient processes and technologies for the sector.
- Transport: Lack of verification of compliance with environmental and safety regulations. The absence of programs and economic incentives that promote energy efficiency and the non-use of fossil fuels. A lack of harmonization between the official Mexican standards for transport energy efficiency and the standards of Canada and the United States. Insufficient infrastructure and financing for the promotion of electromobility.
- Municipal services: Insufficient knowledge on the part of the various actors (society, businessmen and officials) on energy use, energy efficiency and its benefits, as well as a lack of continuity in municipal development programs that are reflected in the lack of human and financial resources for the implementation of energy efficiency measures.

Collaboration on Energy Efficiency Between the U.S. and Mexico

U.S. Federal Government Collaboration with Mexico

Prior to the Trump administration, the U.S. and Mexico had a deep working relationship on energy efficiency issues, through bilateral programs between SENER and DOE and through multilateral programs that include both countries, such as the programs of the Clean Energy Ministerial, founded in 2010.[66]

During the last four years, DOE's relationship with Mexico focused more on energy security and supply, through the U.S. Mexico Energy Business Council, led by DOE and SENER, along with the U.S. Department of Commerce and the Mexican Secretariat of the Economy. However, funding for efficiency programs with Mexico has continued through the U.S. Agency for International Development (USAID).

Also, there has been continued cooperation on energy efficiency between the Lawrence Berkeley National Laboratory (LBNL), a U.S. research lab, through its Mexico Energy Initiative, and SENER/CONUEE, as follows:

- Efficiency standards for air conditioners have been a recent focus of these efforts, as air conditioning is an important component of Mexico's electricity load and an expected source of increased energy demand in the future.[67] Many air conditioners for the North American market are also manufactured in Mexico, making harmonization of efficiency standards across the U.S. and Mexican markets an easier sell.

[66] Earlier, there was a "North American Energy Working Group (NAEWG)," established in spring of 2001 by the Canadian Minister of Natural Resources, the Mexican Secretary of Energy and the U.S. Secretary of Energy, to enhance North American energy cooperation. The NAEWG included energy efficiency with its scope of work and to this end developed a paper on "North American Energy Efficiency Standards and Labeling." English version at North America Energy Efficiency Standards and Labeling. Spanish version at Microsoft Word - america_norte_documento.doc (www.gob.mx).

[67] Lawrence Berkeley National Laboratory, Mexico Energy Initiative, Cooling Initiative, https://mexico.lbl.gov/cooling-initiative

- LBNL's Energy Pathways Initiative is "a collaborative, multidisciplinary, and multisector effort to improve and expand the data and analysis needed by decision makers and researchers in Mexico" to meet Mexico's clean energy goals more rapidly and effectively. [68] Researchers from the LBNL work with Mexican policymakers to elevate the profile of energy efficiency, among other energy-related missions. Partner institutions in Mexico include SENER, CONUEE, and a range of universities and research organizations. Additionally, former LBNL researcher Claudia Sheinbaum Pardo was elected Mayor of Mexico City in July 2018. During her tenure at LBNL, Sheinbaum Pardo examined energy efficiency in the building, transportation, and industry sectors, and is likely to bring her nuanced and science-based perspective to managing Mexico City's growing energy needs.

The U.S. and Mexico also cooperate through their joint operation and management of the North American Development Bank / Border Environment Cooperation Commission (NADB/BECC). The purposes of the NADB/BECC are "to provide financing to support the development and implementation of infrastructure projects, as well as to provide technical and other assistance for projects and actions that preserve, protect or enhance the environment to advance the well-being of the people of the United States and Mexico."[69] NADB/BECC has been active in funding energy efficiency matters within the border region.[70] The following are some examples of these funding efforts:

- NADB/BECC provided technical assistance to establish a "Energy Efficiency Learning Network" with the State of Coahuila, Mexico, initially with 14 water utilities from within the State. The activities included a diagnosis of utility operations and energy efficiency, with the participants committing to implement various EE measures. [71] Other participants in this project, completed in 2018, included the German Development Bank KfW and the Gesellschaft für Internationale Zusammenarbeit or GIZ (German Society for International Cooperation).[72]

- In an earlier project NADB/BECC worked with Baja California utilities, the Baja California state water commission and the USAID to advance projects based on recommendations resulting from previously conducted energy audits. BECC, NADB and USAID supported technical development tasks needed to advance three projects: replacement of old pumps in the Colorado River aqueduct in Tijuana; solar power and facility improvements at a wastewater treatment plant in Mexicali; and improvements at another wastewater treatment plant in Ensenada.[73]

- In a 2020 project, NADB/BECC is providing funding to a program to lease or finance up to 223 natural gas-fueled vehicles for public and private personnel transportation services within the Mexican border region. The project will, among other things, encourage more people to use public transportation instead of other less efficient means of transportation, such as taxis or private

[68] Energy Pathways Initiative | Mexico Energy Initiative (lbl.gov).
[69] See https://www.nadb.org/about/overview.
[70] NADB/BECC can provide funding for projects only within 100 kilometers [62 miles] north of the international boundary and within 300 km [186 miles] south of the border. https://www.nadb.org/uploads/content/files/Policies/Charter_Eng.pdf
[71] https://www.nadb.org/uploads/files/35_pid_2110_red_de_aprendizaje_sobre_eficiencia_energtica.pdf
[72] *Id.*
[73] https://www.nadb.org/uploads/files/becc2015_performance_results.pdf .

vehicles.[74] Since one of the principles set forth in Mexico's Road Map for Energy Efficiency is "Increased use of public transport," this funding is in support of Mexico's energy efficiency strategy.

With the inauguration of President Biden and his administration's efforts on climate, cooperation with Mexico on energy efficiency is likely to be re-energized. Presidents Biden and Lopez Obrador issued a joint declaration after their first meeting on March 1, 2021 and emphasized cooperation on energy efficiency (as well as short-lived climate pollutants) as areas of focus for bilateral efforts on climate.[75]

U.S. State Government Collaboration with Mexico

The U.S. border states north of the U.S. Mexico border have many ties with Mexico in the energy sector.[76] In terms of energy efficiency, the State of California, acting through the California Energy Commission (CEC) has taken the lead. The CEC's energy efficiency collaboration with Mexico has included a number of initiatives, as follows:

- The CEC collaborates with multiple California-Mexico border stakeholders, including the Mexican federal government, Mexican states, and Mexican universities, on energy priorities, including the advancement of energy efficiency and clean tech development. Key areas of engagement in 2018 included the review of proposals for joint research projects between California and Mexico on energy efficiency in buildings and the role of data and analytics in establishing and progressing toward energy efficiency targets. [77]

- On June 1, 2018, the CEC partnered with Mexico's CONUEE and LBNL to host a joint webinar to discuss recent updates and future collaborations on energy efficiency policy, with a special emphasis on data and the need to increase efficiency in air conditioning in Mexico, given the anticipated large increase in cooling load in Northern Mexico over the coming decades.

- The CEC is working with the University of California, Davis (UC Davis) and the Mexican state of Jalisco to build a Center of Lighting Technology (*Centro de Tecnología de Iluminación* [CTI]) at the *Universidad Autonoma de Guadalajara*. Its design is based on the California Lighting Technology Center at UC Davis. The CTI's mission is to transform the lighting industry in Mexico, directing it toward more efficient, higher quality lighting. The project is funded by SENER and the National Council of Science and Technology (CONACYT).[78]

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[74] Value Arrendadora Border-Wide Vehicle Program for Public Transportation in Mexico | NADB: North American Development Bank.

[75] The White House, U.S. Mexico Joint Declaration, March 1, 2021, https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/01/u-s-mexico-joint-declaration/

[76] *See generally* Good Neighbor Environmental Board, 19th Report, *Energy Production, Transportation and Demand in the Transborder Region: Opportunities and Impacts* (2019), https://www.epa.gov/sites/production/files/2020-01/documents/19thgneb_report_published_final_508compliant.pdf

[77] CalEPA, 2018 Annual Report, The California-Mexico Border Relations Council, A Summary of Activities Undertaken in 2018 (March 2019), pp. 4, 35-37. https://calepa.ca.gov/wp-content/uploads/sites/6/2019/04/2018_CA-Mexico_Border_Relations_Council_Annual_Report.a.pdf

[78] CalEPA, 2019 Annual Report, The California-Mexico Border Relations Council, A Summary of Activities Undertaken in 2019 (December 2020), pp. 7, 20. https://calepa.ca.gov/wp-content/uploads/sites/6/2021/02/CA_MEX_border_report_2019.FINAL_.pdf.

Next Steps in Cooperation on Energy Efficiency Between the U.S. and Mexico

Collaboration on energy efficiency between the USA and Mexico must be based on the following specific actions:

- Having government officials/experts from the two sides get together to discuss the respective regulatory regimes and learn from each other, including on the following topics:
    - Comparing regulatory frameworks and potential areas for improvement
    - Comparing monitoring and data validation efforts and potential areas for improvement
    - Comparing enforcement efforts and potential areas for improvement
- Harmonization of standards
- Financial assistance – from government bodies or multilateral funds
- Transfer of technology and technical assistance or support – from government bodies or NGOs
- Promotion of bilateral cooperation with the participation of agencies and ministries related to energy efficiency and climate change issues
- Promotion of the exchange of information between states of both countries and the implementation of good local practices
- Promotion of multi-stakeholder alliances

It is clear the U.S. and Mexico have a long history of bilateral cooperation in the field of energy efficiency, which in the past has included exchange of information, technical assistance, and technology transfer programs coordinated by SENER and DOE. Several state, municipal and university cooperation programs have enriched these experiences. Both countries have benefited in the past from this collaboration, and presidents López Obrador and Biden have publicly stated their commitment to promote more contacts and bilateral cooperation in this area (Joint Declaration March 1, 2021). The time is propitious for the two governments to develop a binational cooperation strategy on energy efficiency and on short-lived climate pollutants, discussed in the prior session of the Working Group .

Both countries have in place their own national legislation and strategies, with many areas where more exchange of information and technical assistance can improve chances of a successful implementation. IEA has already made several recommendations to the Mexican government on the way to increase energy efficiency. The Biden Administration is very committed to the same general goal. Therefore, it is proposed that DOE and SENER establish a Bilateral Technical Group on how to pursue such bilateral cooperation. This Bilateral Group on Energy Efficiency and Short Lived Climate Pollutants should discuss all the issues identified above and draft a bilateral cooperation strategy 2021-2041.

Annex A

American Council for an Energy Efficient Economy
The 2018 International Energy Efficiency Scorecard
Scorecard and rankings – the United States, Mexico and Germany

(Germany, #1 in rankings, is included for comparison purposes; 25 countries ranked)

Source: https://www.aceee.org/research-report/i1801, Table 3, p 10; Table 4, pp 12-14.

Metric	Max Points	Germany Points/rank	United States Points/rank	Mexico Points/rank
Total	**100**	**75.5 / #1[1]**	**55.5 / #10[2]**	**54 / #12**
National efforts total	**25**	**22 / #1**	**15.5 / #8**	**9 / #18**
Change in energy intensity (2010–2015)	6	4	3	2
Spending on energy efficiency	5	5	4	0
Energy savings goals	3	3	0	1
Efficiency of thermal power plants	3	2	2	2
Tax credits and loan programs	2	2	2	1
Spending on energy efficiency R&D	2	2	2	0.5
Size of the ESCO market	2	2	1	0.5
Water efficiency policy	1	1	0.5	1
Data availability	1	1	1	1
Buildings total	**25**	**20 / #5[3]**	**16 / #12**	**18 / #8[4]**
Appliance and equipment standards	5	4	5	3
Residential building codes	3	3	2.5	2.5
Commercial building codes	3	3	2.5	3
Building retrofit policies	4	3	2	2
Building rating and disclosure	2	2	0.5	0
Appliance and equipment labeling	2	2	1.5	1.5
Energy intensity in residential buildings	3	1.5	1	3
Energy intensity in commercial buildings	3	1.5	1	3

[1] Germany tied with Italy for #1 in overall rankings.
[2] The U.S. tied with Canada for #10 in overall rankings.
[3] Germany tied with Italy for #5 in Buildings.
[4] Mexico tied with Poland for #8 in Buildings.

Metric	Max Points	Germany Points/rank	United States Points/rank	Mexico Points/rank
Industry total	**25**	**20.5 / #2[5]**	**13 / #14[6]**	**17.5 / #6**
Energy intensity of the industrial sector	6	5	3	5
Voluntary energy performance agreements with manufacturers	3	3	2	3
Mandate for plant energy managers	2	0	0	2
Mandatory energy audits	2	2	0	2
CHP share in total installed capacity	2	1	0.5	0
Policy to encourage CHP	2	2	2	1
Minimum efficiency standards for electric motors	2	2	2	2
Policy to encourage energy management	2	2	1	1
Investment in manufacturing R&D	2	1.5	2	0
Agriculture energy intensity	2	2	0.5	1.5
Transportation total	**25**	**13 / #9[7]**	**11 / #12[8]**	**9.5 / #17[9]**
Fuel economy standards for light-duty vehicles	4	4	3	1
Fuel economy of light-duty vehicles	3	2	0	1
Fuel economy standards for heavy-duty tractor trucks	3	0	3	0
Vehicle miles traveled per capita	3	0.5	0	2
Freight transport per unit of economic activity	2	1	1	0
Energy intensity of freight transport	3	2	1	1
Use of public transit	3	1.5	1	2.5
Investment in rail transit versus roads	3	1	1	1
Smart freight initiatives	1	1	1	1

[5] Germany tied with Italy for #2 in Industry.
[6] The U.S. tied with Ukraine for #14 in Industry.
[7] Germany tied with Canada for #9 in Transportation.
[8] The U.S. tied with Brazil and Taiwan for #12 in Transportation.
[9] Mexico tied with Russia for #17 in Transportation.

Annex B

Official Mexican Standards on Energy Efficiency[1]

NOM-001-ENER-2014 (PDF) Eficiencia energética de bombas verticales tipo turbina con motor externo eléctrico vertical. Límites y método de prueba.

NOM-002-SEDE/ENER-2014 (PDF) Requisitos de seguridad y eficiencia energética para transformadores de distribución.

NOM-003-ENER-2011 (PDF) Eficiencia térmica de calentadores de agua para uso doméstico y comercial. Límites, método de prueba y etiquetado.

NOM-004-ENER-2014 (PDF) Eficiencia energética para el conjunto motor-bomba, para bombeo de agua limpia de uso doméstico, en potencias de 0,180 kW (¼ HP) hasta 0,750 kW (1 HP).- Límites, métodos de prueba y etiquetado.

NOM-005-ENER-2016 (PDF) Eficiencia energética de lavadoras de ropa electrodomésticas. Límites, método de prueba y etiquetado.

NOM-006-ENER-2015 (PDF) Eficiencia energética electromecánica en sistemas de bombeo para pozo profundo en operación.- Límites y método de prueba.

NOM-007-ENER-2014 (PDF) Eficiencia energética para sistemas de alumbrado en edificios no residenciales.

NOM-008-ENER-2001 (PDF) Eficiencia energética en edificaciones, envolvente de edificios no residenciales.

NOM-009-ENER-2014 (PDF) Eficiencia energética en sistemas de aislamientos térmicos industriales.

NOM-010-ENER-2004 (PDF) Eficiencia energética del conjunto motor bomba sumergible tipo pozo profundo. Límites y método de prueba.

NOM-011-ENER-2006 (PDF) Eficiencia energética en acondicionadores de aire tipo central, paquete o dividido. Límites, métodos de prueba y etiquetado.

NOM-012-ENER-2019 (PDF) Eficiencia energética de unidades condensadoras y evaporadoras para refrigeración. Límites, métodos de prueba y etiquetado.

NOM-013-ENER-2013 (PDF) Eficiencia energética para sistemas de alumbrado en vialidades.

NOTA Aclaratoria a la Norma Oficial Mexicana NOM-013-ENER-2013 (PDF), Eficiencia energética para sistemas de alumbrado en vialidades.

NOM-014-ENER-2004 (PDF) Eficiencia energética de motores de corriente alterna, monofásicos, de inducción, tipo jaula de ardilla, enfriados con aire, en potencia nominal de 0,180 a 1,500 kW. Límites, método de prueba y marcado.

[1] CONUEE (2013). Normas Oficiales Mexicanas en Eficiencia Energética. https://www.gob.mx/conuee/acciones-y-programas/normas-oficiales-mexicanas-en-eficiencia-energetica-vigentes

NOM-015-ENER-2012 (PDF) Eficiencia energética de refrigeradores y congeladores electrodomésticos. Límites, métodos de prueba y etiquetado.

NOM-015-ENER-2018 (PDF) Eficiencia energética de refrigeradores y congeladores electrodomésticos. Límites, métodos de prueba y etiquetado.

NOM-016-ENER-2016, (PDF) Eficiencia energética de motores de corriente alterna, trifásicos, de inducción, tipo jaula de ardilla, en potencia nominal de 0,746 kW a 373 kW. Límites, métodos de prueba y marcado.

NOM-017-ENER/SCFI-2012 (PDF) Eficiencia energética y requisitos de seguridad de lámparas fluorescentes compactas autobalastradas. Límites y métodos de prueba.

NOM-018-ENER-2011 (PDF) Aislantes térmicos para edificaciones. Características, límites y métodos de prueba.

NOM-019-ENER-2009 (PDF) Eficiencia térmica y eléctrica de máquinas tortilladoras mecanizadas. Límites, método de prueba y marcado.

NOM-020-ENER-2011 (PDF) Eficiencia energética en edificaciones, Envolvente de edificios para uso habitacional.

RESOLUCIÓN por la que se modifican los valores de coeficiente global de transferencia de calor (K) de la Tabla 1, se agregan definiciones y se acota la verificación de la Norma Oficial Mexicana NOM-020-ENER-2011, Eficiencia energética en edificaciones.

NOM-021-ENER/SCFI-2017 (PDF) Eficiencia energética y requisitos de seguridad al usuario en acondicionadores de aire tipo cuarto. Límites, métodos de prueba y etiquetado.

NOM-022-ENER/SCFI-2014 (PDF) Eficiencia energética y requisitos de seguridad al usuario para aparatos de refrigeración comercial autocontenidos. Límites, métodos de prueba y etiquetado.

NOM-023-ENER-2018 (PDF) Eficiencia energética en acondicionadores de aire tipo dividido, descarga libre y sin conductos de aire. Límites, métodos de prueba y etiquetado.

NOM-024-ENER-2012 (PDF) Características térmicas y ópticas del vidrio y sistemas vidriados para edificaciones. Etiquetado y métodos de prueba.

NOM-025-ENER-2013 (PDF) Eficiencia térmica de aparatos domésticos para cocción de alimentos que usan gas L.P. o gas natural. Límites, métodos de prueba y etiquetado.

NOM-026-ENER-2015 (PDF) Eficiencia energética en acondicionadores de aire tipo dividido (Inverter) con flujo de refrigerante variable, descarga libre y sin ductos de aire. Límites, métodos de prueba y etiquetado.

NOM-027-ENER/SCFI-2018 (PDF) Rendimiento térmico, ahorro de gas y requisitos de seguridad de los calentadores de agua solares y de los calentadores de agua solares con respaldo de un calentador de agua que utiliza como combustible gas L.P. o gas natural. Especificaciones, métodos de prueba y etiquetado.

AVISO mediante el cual se modifica el Transitorio Primero de la Norma Oficial Mexicana NOM-027-ENER/SCFI-2018, Rendimiento térmico, ahorro de gas y requisitos de seguridad de los calentadores de agua solares y de los calentadores de agua solares con respaldo de un calentador de agua que utiliza como combustible gas L.P. o gas natural. Especificaciones, métodos de prueba y etiquetado, publicada el 28 de agosto de 2018. (PDF)

NOM-028-ENER-2017 (PDF) Eficiencia energética de lámparas para uso general. Límites y métodos de prueba.

NOM-029-ENER-2017 (PDF) Eficiencia energética de fuentes de alimentación externa. Límites, métodos de prueba, marcado y etiquetado.

NOM-030-ENER-2016 (PDF) Eficacia luminosa de lámparas de diodos emisores de luz (led) integradas para iluminación general. Límites y métodos de prueba.

NOM-031-ENER-2012 (PDF) Eficiencia energética para luminarios con diodos emisores de luz (leds) destinados a vialidades y áreas exteriores públicas. Especificaciones y métodos de prueba.

NOM-031-ENER-2019 (PDF). Eficiencia energética para luminarios con led para iluminación de vialidades y áreas exteriores públicas. Especificaciones y métodos de prueba.

NOM-032-ENER-2013 (PDF) Límites máximos de potencia eléctrica para equipos y aparatos que demandan energía en espera. Métodos de prueba y etiquetado.

NOM-163-SEMARNAT-ENER-SCFI-2013 Emisiones de bióxido de carbono (CO2) provenientes del escape y su equivalencia en términos de rendimiento de combustible, aplicable a vehículos automotores nuevos de peso bruto vehicular de hasta 3 857 kilogramos.

AVISO mediante el cual se dan a conocer los parámetros para el cálculo de las emisiones de bióxido de carbono (CO_2) en los vehículos automotores ligeros nuevos con peso bruto vehicular que no exceda los 3 857 kilogramos, que utilizan gasolina o diésel como combustible cuyo año-modelo sea 2017.

AVISO mediante el cual se dan a conocer los parámetros para el cálculo de las emisiones de bióxido de carbono (CO_2) en los vehículos automotores ligeros nuevos con peso bruto vehicular que no exceda los 3 857 kilogramos, que utilizan gasolina o diésel como combustible cuyo año-modelo sea 2018.