

ENERGY EFFICIENCY IN BUILDINGS

AUGUST 2019

Mexico

STATUS AND TRENDS

Mexico (officially the United Mexican States) is a federal republic located in North America. It shares its borders with the United States of America (Northern border) and Guatemala and Belize (Southern border) and has extensive coastlines at the Pacific Ocean and the Caribbean Sea. The country is very mountainous and has four mountain ranges; however, there is a high rate of deforestation, which endangers the local biodiversity. Mexico ranks high worldwide both in terms of population and area.

Mexico made a good recovery from the economic crisis in 2009, yet recently the country's GDP growth decreased from 3.3% in 2015 to 2% in 2017 (The World Bank, 2018b). Mexico was the first Latin American country to become member of the Organisation for Economic Co-operation and Development (OECD) in 1994, the same year of the ratification of the North American Free Trade Agreement (NAFTA) with the US and Canada. Mexico has had very strong economic growth since then, as the national GDP measured in Purchasing Power Parity (PPP) grew by over 260% since 1994. At the same time, the country's CO₂ emission increased from 332,817 kilotons in 1995 to 480,271 kilotons in 2017 (The World Bank, 2018c).

In line with its economic growth, Mexico's energy consumption has increased. As presented in the *Balance Nacional de Energía* (National Energy Balance), there is a correlation between national electricity consumption and GDP (2017). In fact, over the period from 1994 to 2016, also the electricity consumption of Mexico doubled having reached 23 Mtoe in 2016 (International Energy Agency, 2018a). Total final energy consumption has been also growing resulting in Mexico becoming a net energy importer in 2016.

The primary energy supply in Mexico is strongly dominated by fossil fuels, constituting about 90% of the national energy mix. Two state-owned companies, Federal Commission of Electricity and Pemex, manage the

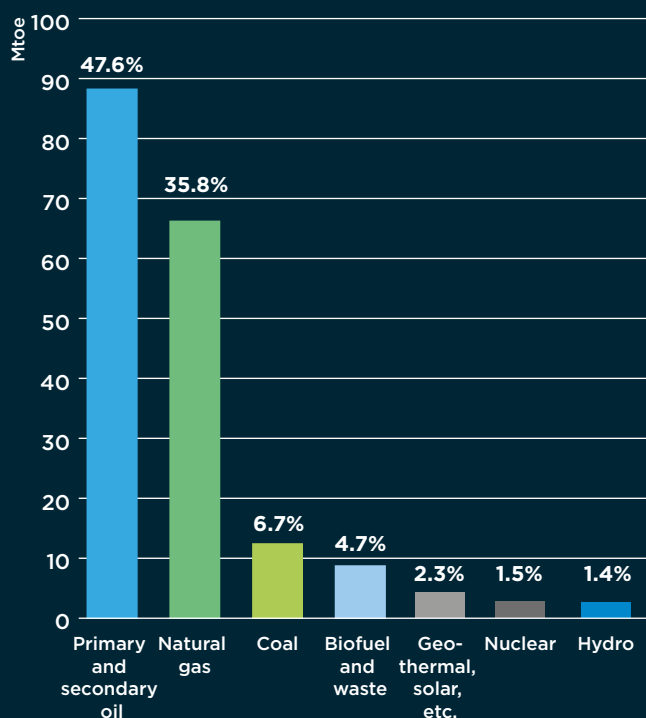


KEY INDICATORS

- Climate(s): savannah, semi-arid and desert
- 129.2 million people (80% of which live in urban areas)
- GDP PPP 2,304.5 bln. 2018 USD
- Primary energy intensity 4 Mj/2011 USD PPP GDP
- Emissions/population 3.9 tCO₂/capita

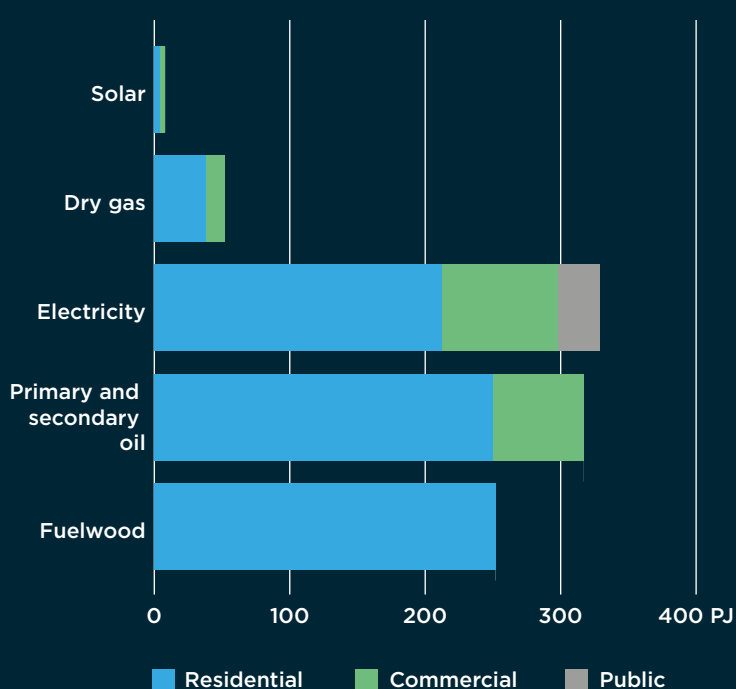
Source: The World Bank, 2018a

Figure 1. Total Primary Energy Supply (TPES) by source in 2016



Source: International Energy Agency (2018b)

Figure 2. Energy consumption in the building sector in 2016



Source: Secretaría de Energía (2018a)

energy production of Mexico. The electricity sector is federally owned by different companies, that mainly rely on hydro and thermal energy sources for generation (Secretaría de Energía, 2017).

Final energy consumption of Mexico was 5,305 PJ in 2016. The transportation sector accounted for 47% of the total consumption, followed by industry (32%) and building sector (18%). In particular, the residential sector in 2016 consumed 18 Mtoe, the commercial 4 Mtoe and public buildings 0.7 Mtoe (Secretaría de Energía, 2018a). It is estimated that the energy demand of the building sector will increase from 24 Mtoe in 2014 to 33 Mtoe in 2040 (New Policy in International Energy Agency, 2016).

Residential buildings account for 84% of the total building stock in Mexico. The increasing workforce and urbanisation rate in Mexico have led to the growth of the building floor area, including green buildings. It is expected that by 2025 the construction of new green buildings will grow by 6% compared to the rate in 2018. This is mainly due to the support of agencies working to expand the green building market. Since 2014, the number of new green buildings has been continuously growing across the country, largely driven by green mortgages issued by Infonavit (the largest mortgage lender of Latin America), and the number is projected to further increase by 2025 (International Finance Corporation, 2017). Currently there are 372 LEED certified sites, equal to 91 million sq. ft. with 47% of sites at the highest levels (gold and platinum certification). Lastly, there are other programs for green buildings in Mexico, such as TripAdvisor's GreenLeaders, Energy Start Challenge for Industry and LEED for Homes (The Green Building Information Gateway, 2018).

INSTITUTIONAL FRAMEWORK

The principal institution in charge of the national energy strategy and policy in the field of energy efficiency is the Secretaría de Energía (SENER – Secretariat of Energy). At the moment the SENER is responsible for development of the long-term energy efficiency strategy and a roadmap for the country (Secretaría de Energía, 2018b). The Comisión Nacional para el Uso Eficiente de la Energía (CONUEE – National Energy Efficiency Commission) is a decentralised body of the SENER that promotes energy efficiency with outreach activities, technical consultancy and supervises enforcement of energy efficiency standards, also at the sub-national level. CONUEE has established a program of outreach and education on energy savings in residential buildings, focusing on appliances, lighting and cooling (Comisión Nacional para el Uso Eficiente de la Energía, 2018).

Furthermore, the Consejo Consultivo para la Transición Energética (Advisory Council for Energy Transition) is the institution in charge of advising the SENER on Mexican clean energy transition process and national energy plans, including those on energy efficiency improvements. The institutions participating in the Advisory Council include a range of national secretariats dealing with the matters of health, economy, environment, urban development and others (International Energy Agency, 2017).

The Programme of Energy Savings in the Electricity Sector, promoted by the Comisión Federal de Electricidad (Federal Electricity Commission), has provided technical assistance and training on various aspects of energy efficiency as its objective. Moreover, since 1990, the Commission

has been testing performance to promote more energy efficient appliances and ensure their quality (APEC Energy Working Group, 2017). Similarly, the Asociación Nacional de Normalización y Certificación (ANCE – National Association for Standardisation and Certification of the Electricity Sector) is a non-governmental institution that aims at implementing energy management standards in enterprises. In the commercial sector, the Fideicomiso para el Ahorro de Energía (FIDE – Trust Fund for Electricity Savings) is a private non-profit institution, also composed by members of the government, which promotes and funds projects on energy efficiency improvements. Another institution created to finance energy efficiency actions is the Fideicomiso para el Programa para el Aislamiento Térmico (FIPATERM – Trust Fund for energy savings via insulation of households), which works to support thermal insulation of residential buildings in the warmest areas of Mexico, as well as replacement of inefficient appliances (International Energy Agency, 2017).

Associations dealing with energy efficiency in buildings include the Calidad y Sustentabilidad en la Edificación (CASEDI – Quality and Sustainability in Buildings) that is a civil associations promoting sustainability in cities and buildings, and the Alianza por la Eficiencia Energética (ALENER – Alliance for Energy Efficiency), which is a public-private association providing technical and commercial services on buildings' energy efficiency. Energy consumption data are collected by national agencies and the Cámara Mexicana de la Industria de la Construcción (CMIC – Mexican Chamber of Construction Industry) is the public agency dealing with the construction industry in Mexico. Green mortgage initiatives for new and existing buildings are managed by the Instituto del Fondo Nacional de la Vivienda para los Trabajadores (INFONAVIT – Institute for National Fund of Workers' Housing) (ibid.).

The Mexican government established the Red de Ciudades Sustentables en la Megalópolis (Network of Sustainable Cities in the Megalopolis), whose goal is to establish a pathway towards sustainability of the urban conglomerate in Central Mexico. Amongst others, objectives of this network include implementation of building standards for energy efficiency. The scope of work of the network includes projects on buildings, urban waste, transport, industry, energy and air quality (Comisión Ambiental de la Megalópolis, 2018).

POLICY FRAMEWORK

Mexico ratified the Paris Agreement and in 2016 submitted its Intended National Determined Contributions (INDCs)¹. Despite not mentioning energy efficiency targets, the INDCs pledged to reduce unconditionally 25% of its Greenhouse Gases (GHG), under Business as Usual (BAU) scenario. This target could increase up to 40% in a conditional manner. Mexico's INDC include energy as one of the sectors to achieve this target².

The current policy framework on energy efficiency in Mexico is built principally upon the Ley de Transición Energética (LTE – Energy Transition Law) of 2015. The Law establishes the institutional set up and support mechanisms for clean energy transition, which include Transition Strategy to Promote the Use of Cleaner Technologies and Fuels, Special Programme for the Energy Transition and National Programme for Sustainable Use of Energy (Diario Oficial de la Federación, 2015). The Energy Transition Law requires the establishment of energy efficiency goals and reduction targets mandated by the National Programme for Sustainable Use of Energy.

The Transition Strategy by SENER is the principal strategic plan and it defines action areas and sets targets to be achieved by 2030 and 2050. The action areas mostly include regulatory improvements to generate synergies amongst institutions and to support technology diffusion in the country. The medium-term goal (2016-2030) is to reduce final energy intensity by 1.9% per year, and by 3.7% in the long-term (2031-2050), so that the average reduction between 2016 and 2050 is of 2.9% (Comisión Nacional para el Uso Eficiente de la Energía, 2016).

The Programa Nacional para el Aprovechamiento Sustentable de la Energía (PRONASE – National Programme for the Sustainable Use of Energy) is the instrument which establishes the strategies, objectives and targets for a sustainable use of energy, including energy efficiency (Secretaría de Energía, 2014).

In line with the Energy Transition Law, in 2017 the SENER and CONUEE developed a Roadmap for Energy Efficiency, which includes 66 energy efficiency actions and strategies to achieve the targets under the Transition Strategy. The roadmap targets local and sub-national governments, and is meant to complement and encourage implementation of relevant actions. Concerning the building sector, the roadmap requires that by 2030 building codes for energy efficiency to be adopted and incorporated into the building regulations at the subnational level. It also urges that by 2030 public records on buildings are compiled and that reporting mechanisms on buildings energy consumption are established. The roadmap also requires strengthening the institutional coordination between states and municipalities and to develop technical skills of the personnel in the field of buildings energy efficiency, by establishing programs to professionalise energy managers in buildings. Lastly, the roadmap requires utilisation of financial tools to meet energy efficiency targets and analyse best-practices and case studies (Comisión Nacional para el Uso Eficiente de la Energía, 2017).

The national government designed a number of financial measures to promote energy efficiency, such as tax schemes and low-interest loans (Asia Pacific Economic Cooperation, 2017). With regards to funds for energy efficiency, the government also established trusts and funds

¹ no NDC was submitted at the time of completion of this report

² subject to a global agreement addressing important topics including international carbon price, carbon border adjustments, technical

cooperation, access to low-cost financial resources and technology transfer, all at a scale commensurate to the challenge of global climate change

for the energy efficiency of the building sector. Specifically, the Programme of Energy Savings in the Electricity Sector (PAESE) finances the deployment of energy efficient technologies, which include air conditioning and lighting. In addition, the Sustainable Energy Fund (FSE) provides finance to scientific research and technology development targeting energy efficiency. Lastly, the Fund for Energy Transition and Sustainable Energy Use (FOTEASE) is not operating anymore, but from 2008 to 2015 it supported more than 30 energy efficiency projects. One of the projects targeted the residential sector with the Programa de Mejoramiento Sustentable en Vivienda Existente (Programme for Sustainable Improvements in Existing Buildings), which included replacement of windows with more efficient ones, installation of efficient lighting as well as air conditioning systems (Gobierno de Mexico, 2016). Each year CONUEE develops an Annual Work Plan, also in support of cross-sectoral strategies and actions. The national policy portfolio is aligned with the National Development Plan (NDP), which among others includes a goal to promote energy efficiency (International Energy Agency, 2017). Focusing on energy efficiency of residential buildings, the EcoCasa programme promoted efficient social housing with measures to improve building materials and components (Sociedad Hipotecaria Federal, 2018).

The building standards for residential and commercial sectors are adopted at the federal level and implemented by local governments and municipalities. In order to increase the interest and engagement of local governments, through its strategy “Energy Performance Rating System for Buildings of the Federal Public Administration”, CONUEE established at the federal level a labelling scheme for new public buildings. This scheme requires achievement of the minimum qualifications and compliance with additional requisites, regarding the energy performance of new and existing buildings (Adviesbureau voor Energiestrategie, 2017). In addition, in Mexico the FIDE stamp works as the national voluntary energy-labelling programme, under which manufacturers submit the certified test results on their products to align with the FIDE requirements (Sociedad Hipotecaria Federal, 2018) (Asia Pacific Energy Research Centre, 2015).

INTERNATIONAL SUPPORT

Since 2018, the World Bank-led project ‘Energy Efficiency in Public Facilities for Mexico’ has been working in various cities on improving energy efficiency in different sectors, including municipal buildings. The actions include policy and institutional development, public facility investments and capacity building activities for energy efficiency. The project is led by SENER and has collaborations with the Global Environment Facility and the World Bank (The World Bank, 2018d).

The Energy Efficiency in Emerging Economies programme was established in 2014 by the International Energy Agency (IEA) and has been funded by the European Commission and by numerous governments (i.e. Canada, Denmark, Germany, Italy, Japan, Sweden, Switzerland, and the United Kingdom). This programme targets six countries, including

Mexico, and has worked to develop legislation and capacity in terms of energy efficiency. In relation to the building sector, energy efficiency targets for the LTE and a roadmap for building codes and standards for Mexico were developed under this programme (International Energy Agency, 2019). Building off the results from the programme, the IEA and local Mexican experts worked on a space cooling strategy, in light of the recommendations to focus on cooling and refrigeration (The Danish Climate Envelope, 2017).

In 2017, the Excelencia en Eficiencia Energética en Edificios – Programa E4 (Excellence in Energy Efficiency in Buildings) was initiated as a pilot project, which evaluates energy efficiency performance of residential buildings and bank offices, aiming at establishing voluntary labelling of products and buildings. The project was developed in collaboration with the German International Cooperation Agency (GIZ), the National Institute of Ecology and Climate Change (INECC) and CONUEE (Instituto Nacional de Ecología y Cambio Climático, 2018).

Linked to the actions in buildings, there are also efforts to improve energy efficiency of related products. Between 2010 and 2015, the Efficient Lighting and Appliances Project was working on replacement of incandescent bulbs, old air conditioners and refrigerators with more efficient alternatives, leading to total energy savings of 9.6 TWh (Global Environment Facility, 2018). The project was funded by the Global Environment Facility Fund and implemented by the World Bank, in collaboration with SENER, Nacional Financiera (Nafinsa – a Mexican development bank) and Banco Nacional de Obras y Servicios Públicos (Banobras – a state-owned development bank of Mexico).

Between 2013 and 2016, Mexico, Colombia and Germany jointly established a Regional Fund for the Promotion of Triangular Cooperation in Latin America and the Caribbean. The project was based on the concept of tripartite cooperation between the abovementioned countries. One of the objectives of the Fund was to export Mexico’s model of green mortgages to Colombia, based on the Infonavit’s scheme, and to gain knowledge on sustainable urban development and spatial planning (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2018). The project was funded by the German Federal Ministry of Economic Cooperation and Development (BMZ) and led to creation of a Sustainable Housing Network for Latin America and the Caribbean. The Network was created to enhance the knowledge sharing and cooperation among Latin American countries in the field of sustainable housing (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2014).

Since 2015, the World Resources Institute (WRI) Mexico, C40 Cities Climate Leadership Group, the Building Efficiency Accelerator (BEA) and the Financing Sustainable Cities Initiative (FSCI) have organised several workshops to promote building efficiency in cities, focusing on topics of performance management and finance. These activities included trainings on Greenhouse Gas Protocols and building efficiency regulations. The workshops targeted

local and national governments, industry stakeholders, civil society, and the academia (World Resources Institute, 2019a). In particular, the workshop in January 2018 resulted in drafting clean energy roadmaps for each of the participant cities. The FSCI supported other capacity building activities, such as the Clean Energy Finance Academy for various cities' representatives, including one from Mexico City (Building Efficiency Initiative, 2018) (Financing Sustainable Cities, 2018).

The WRI and BEA also worked with the government of Mexico City, business associations, and civil society organisation to develop the building code for energy efficiency. Additionally, WRI and BEA identified the necessity for a national model building energy code with the requirements on energy efficiency (World Resources Institute, 2019b). In 2016, the national government endorsed the Mexico Conservation Code for Buildings and released a guide for cities on implementation of its requirements for commercial and residential buildings (Energy Smart Communities Initiatives, 2019). In addition, collaboration between WRI, BEA, and Mexico City lead to the update of the local construction regulations with a special focus on lighting and water heating. WRI and BEA are collaborating with other cities (Guadalajara and Mérida) to implement the building code for commercial and residential buildings at the local level (World Resources Institute, 2019b).

In addition, the Ministry of Energy and the Ministry of the Environment and Natural Resources of Mexico have been implementing a Nationally Appropriate Mitigation Action (NAMA) since 2014, supported by GIZ. The NAMA targets energy efficiency improvements by Small and Medium Enterprises (SME) by providing concessional loans to them and replacing obsolete and inefficient equipment. The NAMA also aims to extend the scope to include SMEs in other sub-sectors, such as hotels, chemical industry, food processing industry, etc., in order to increase the scale of CO₂ emissions reduction and energy savings (NAMA Facility, 2019a). Lastly, in 2012, the Ministry of Environment and Natural Resources and the Ministry of Agrarian, Territorial and Urban Development have developed the "Implementation of the New Housing NAMA", funded by GIZ and Kreditanstalt für Wiederaufbau (KfW) and implemented by the National Housing Commission (CONAVI) and Sociedad Hipotecaria Federal (SHF). For the first time NAMA focused exclusively on the building sector and energy efficiency and aimed to promote energy efficient measures across low-income households. It includes technical assistance and financial incentives for housing developers, as well as upgrades of energy efficiency standards. This NAMA will last until 2020 and target a wide range of stakeholders, from end-users to the national government and the private sector (NAMA Facility, 2019b).

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