

ENERGY SAFETY NETS

MEXICO
CASE
STUDY



OMBUDSMAN
ENERGÍA MÉXICO



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ABBREVIATIONS

| | |
|-----------------|--|
| CFE | Comisión Federal de Electricidad |
| CLAD | Centro Latinoamericano de Administración para el Desarrollo |
| CONAPO | Consejo Nacional de Población |
| CONASUPO | Compañía Nacional de Subsistencias Populares |
| CONEVAL | Consejo Nacional de Evaluación de la Política de Desarrollo Social |
| CONUEE | Consejo Nacional para el Uso Eficiente de la Energía |
| DAC | Tarifa Doméstica de Alto Consumo |
| DICONSA | Distribuidora y comercializadora S.A. |
| ENCEVI | Encuesta Nacional sobre Consumo de Energéticos en Viviendas Particulares |
| ENIGH | Encuesta Nacional Ingreso – Gasto de los Hogares |
| ESN | Energy Safety Net |
| FIDE | Fideicomiso para el Ahorro de Energía Eléctrica |
| FSUE | Fondo de Servicio Universal Eléctrico |
| IBT | Increasing Block Tariff |
| IEPS | Impuesto Especial sobre Producción y Servicios |
| IFE | Instituto Federal Electoral |
| INE | Instituto Nacional Electoral |
| INEGI | Instituto Nacional de Estadística y Geografía |
| LIE | Ley de la Industria Eléctrica |
| LPG | Liquefied Petroleum Gas |
| MORENA | Movimiento de Regeneración Nacional |
| PAN | Partido Acción Nacional |
| PEMEX | Petróleos Mexicanos |
| PRI | Partido Revolucionario Institucional |
| PRODESEN | Programa de Desarrollo del Sistema Eléctrico Nacional |
| SEDESOL | Secretaría de Desarrollo Social |
| SEGALMEX | Seguridad Alimentaria Mexicana |

| | |
|--------------|--|
| SENER | Secretaría de Energía |
| SHCP | Secretaría de Hacienda y Crédito Público |
| VDT | Volume-Differentiated Tariff |

A note on currency

Mexico uses the Mexican peso (MXN). For currency conversions, the exchange rate used is an average of the relevant year(s) detailed in the text. Where no year is provided, the report assumes an exchange rate of USD 1 = MXN 18.74.

MAP OF MEXICO



EXECUTIVE SUMMARY

This case study examines the use of social assistance mechanisms in Mexico to enable access to modern energy services by very poor and vulnerable households, referred to as Energy Safety Nets (ESNs). Mexico has two decades of experience with social safety nets providing cash payments to eligible poor families. Since the 1970s, successive governments have relied on general energy subsidies to enable access to energy. These subsidies disproportionately benefit wealthier households who consume more energy and can fail to reach some of the poorest and most vulnerable people. General energy subsidies also consume fiscal resources that could be reallocated to other programs without adding to the total state budget.

The study analyzes four programs in Mexico that meet the definition of an Energy Safety Net. The most important ESN is a subsidy for residential electricity consumption. Though this is not a general energy subsidy, its design means that it is received by almost all electricity consumers. The complex electricity tariff structure in Mexico includes an increasing block tariff, (IBT) a volume-differentiated tariff (VDT) and a regionally-differentiated tariff, with below-cost tariffs for all consumers except a small number whose energy use is high. On average, the subsidy covers 54 percent of the cost of residential electricity and in aggregate is equivalent to 0.5 percent of total GDP. Although the subsidized tariff provides support for poor and vulnerable households, it is perceived as an inefficient mechanism for doing so.

The other three ESNs analyzed in the study were better targeted to poor and vulnerable house-

holds but two of the three were relatively short-lived, and the future of the third is uncertain. The first, the energy component of *Oportunidades*, the national social assistance program, was named *Oportunidades Energéticas* and provided cash transfers to eligible households to support part of their energy expenditure; it was implemented under only one federal administration, between 2007 and 2011. The second, a pilot program selling reduced-price LPG through a small number of Diconsa stores, began in 2017 and ended in 2018. The third, the Universal Electricity Service Trust Fund (*Fondo de Servicio Universal Eléctrico* (FSUE)) was established to provide electricity to people in remote communities without access. It began operating in 2016 and by mid-2018 had connected 42,000 households, with another 96,000 planned.

Oportunidades Energéticas and the sale of subsidized LPG through Diconsa stores no longer exist. Both schemes were initiated during the last months of a presidential tenure and ended by the next federal government. As of late 2019, FSUE was on hold pending a review by the López Obrador Administration.

While subsidized electricity tariffs and support for access to electricity through the FSUE have not been linked to social assistance programs, *Oportunidades Energéticas* was a component of a bigger social safety net and the reduced-price LPG pilot scheme used Diconsa stores that were set up to supply subsidized goods to poor and marginalized communities. The energy policy reforms of 2013 provide a mandate for a targeted

social assistance program to support timely and adequate access to energy at affordable prices for vulnerable groups of users, but further analysis is needed on the specific policies and measures to implement such a program. However, several recommendations emerge from this study:

- Electricity tariff subsidies should be targeted at poor households. This could be achieved by revising the threshold level for high-consuming tariffs or determining eligibility for subsidized tariffs using the social assistance register.
- The scope of the FSUE should be widened to support access to clean cooking technologies for the poorest and most vulnerable households.
- Subnational governments and agencies should be involved in the design of ESNs, be encouraged to measure and periodically evaluate levels of energy poverty in their jurisdictions and be involved in the targeting of beneficiaries for ESNs.
- Further research should be undertaken to inform energy policy reforms and the design of ESNs.

INTRODUCTION



The main objective of this case study is to understand social assistance mechanisms, known as Energy Safety Nets (ESNs), in Mexico that enable poor and vulnerable households to access modern energy services.

The report provides in-depth information on the following aspects of ESNs in Mexico: the contextual background, the modalities and operation of ESNs and their institutional and procedural characteristics. It assesses the evidence on the impact and effectiveness of ESNs in relation to providing energy access and increasing energy consumption by different social groups, their interaction with other social protection programs, challenges to their delivery and effectiveness, and the effects of these measures on the operation of energy markets.

The analysis of Mexico's experience with ESNs was carried out in mid-2019 and included qualitative and quantitative analysis. The qualitative approach included two consultative workshops, a literature review, 35 interviews with key informants and an electronic survey to broaden participation from regions in the country outside of the capital city. The quantitative approach involved reviewing data from national surveys (ENIGHⁱ and ENCEVIⁱⁱ) and statistics on energy consumption, tariffs, prices and subsidies.

This country case study builds on findings presented in the working paper *Energy Safety Nets: A Literature Review* (Scott and Pickard 2018). However, the term Energy Safety Net is rarely used in literature consulted for this research and had to be explained to invited experts from the sector in interviews and workshops. While there have been attempts at ESNs throughout Mexico's history, the term is not yet used widely to describe the programs discussed in this research.

This country case study—like the other five, covering Brazil, Ghana, India, Indonesia and Kenya—seeks to answer four research questions:

- What policy measures have been used in Mexico to enable very poor and marginalized people to access and use modern energy services?
- How effective have these measures been in enabling the poorest social groups to access and use modern energy services?
- What links have there been/are there between these measures and wider/other social assistance programs?
- What changes could be made to enhance the effectiveness of existing policy measures in enabling very poor people to access modern cooking energy services?

Energy Safety Net (ESN) is an umbrella term for government-led approaches to support very poor and vulnerable people to access essential modern energy services, defined as electricity and clean fuels and technologies for cooking, by closing the affordability gap between market prices and what poor customers can afford to pay.

ESNs can make physical access (i.e. connections) to electricity or clean fuels affordable for poor and vulnerable people, or they can make the unit price of electricity or fuel affordable to consume. ESNs include some form of targeting or eligibility criteria to direct benefits to those who need them.

CONTEXTUAL OVERVIEW



Mexico is the fifth largest country by territory in the Americas and the thirteenth largest in the world (INEGI 2018a). It has a population of close to 130 million inhabitants making it the tenth most populous country in the world, and the largest Spanish-speaking state (INEGI 2018a). Mexico is composed of 32 federal entities with their own local governments and almost 2,500 municipalities, covering almost 2,000,000 square kilometres (770,000 square miles).

The country can be divided into three regions: northern, central and southern. Each region has distinct characteristics regarding climatic patterns, energy access and energy consumption patterns. In the warmer northern region, the maximum electricity demand occurs at midday in summer, owing to the use of air conditioners. In the colder southern region, energy demand peaks during winter nights due to household heating usage. These regional variations impact

how households consume energy throughout the year.

Mexico's experience with ESNs is intrinsically linked to macro-political changes (see Box 1) but has also been driven by socioeconomic and energy-related variations.

ECONOMIC AND SOCIAL CONTEXT

In 2018, Mexico had the world's fifteenth-largest economy with a nominal GDP of USD 1.3 trillion (IMF 2018). However, its per-capita GDP at USD 10,073 was the lowest in the OECD countries (OECD 2018). Income inequality in Mexico is extremely high and social and economic disparities are reflected in levels of access to energy and energy consumption.

In the first quarter of 2019, the economically active population (people aged 15 and older) was

Figure 1

Regions of Mexico



Source: INEGI 2019

Box 1: Impact of national politics on welfare programs

The story of modern Mexican institutions and the country's industrial, social and economic organization cannot be separated from the history of post-revolutionary corporatism developed over the 70 years of one-party rule government beginning at the end of the 1920s. The Institutional Revolutionary Party (*Partido Revolucionario Institucional* (PRI)) drove the formation of the federal government and subsequently controlled both houses in the federal legislature, in addition to state and municipality governments, advancing presidents, governors and members of the legislature from 1929 to 2000.

In 2000, Vicente Fox, the candidate for a new party, the Party for National Action (*Partido Acción Nacional* (PAN)), was elected President of Mexico. This was the first time in the country's history that

an election had led to a political transition from the governing party to an opposition party (Woldenberg 2012). Fox was followed by another PAN president, Felipe Calderón, who won the 2006 election by 1 percent.

Following these two opposition administrations, PRI returned to power in the 2012 presidential election when Enrique Peña Nieto, former governor of the State of Mexico, was elected president. In 2018, the twice runner-up Andrés Manuel López Obrador won the presidential election with his party Movement for National Regeneration (*Movimiento de Regeneración Nacional* (MORENA)).

Each one of these recent four administrations had its own political priorities and amended existing programs and policies to implement its objectives.

| Period | President | Priorities | Welfare policy changes |
|-----------|--------------------------------------|-------------------------------|---|
| 2000-2006 | Vicente Fox (PAN) | Public administration reform | Created <i>Oportunidades</i> as a direct cash transfer from a federal agency using federal census, based on the 1997 <i>Progresa</i> program |
| 2006-2012 | Felipe Calderón (PAN) | Public security | Continued with <i>Oportunidades</i> but included several components such as pensions for the elderly and policies regarding agriculture and energy |
| 2012-2018 | Enrique Peña Nieto (PRI) | Economic reforms | Transformed <i>Oportunidades</i> into <i>Prospera</i> to be more focused on the "crusade against hunger" component |
| 2018-2024 | Andrés Manuel López Obrador (MORENA) | Austerity and anti-corruption | <i>Prospera</i> to be replaced with a series of social welfare programs that consist primarily of cash transfers aimed at young people, pensions for the elderly and single mothers, young students and disabled people |

approximately 56 million, representing 60 percent of the population. The unemployment rate was low, accounting for 3.5 percent of the population, but informal sector employment represented almost 28 percent and the subemployment rate was 7.4 percent. The female unemployment rate was 3.6 percent and male unemployment was slightly lower at 3.4 percent (INEGI 2019).

Inequality within Mexico

The Gini Index is a measure of household income inequality.ⁱⁱⁱ Mexico has a Gini coefficient of 0.458, the highest in the OECD countries.^{iv} This value indicates that the income of the wealthiest 20 percent is 10 times greater than that of the poorest 20 percent (OECD 2019).

While at the national level Mexico’s Human Development Index (HDI) score of 0.774 places it in the “high” human development category, the level of development is uneven across the country. Some federal entities, such as Ciudad de México, Nuevo León, Querétaro and Sonora (see map on page 8), fall into the “very high” HDI category, comparable with countries such as Argentina, Chile, Kuwait, Malaysia and Russia. However, federal entities such as Chiapas, Guerrero and Oaxaca rank below 0.7 and are in the “low” HDI category along with countries such as Bolivia, Democratic Republic of Congo, Iraq, Morocco and South Africa (UNDP 2018). Even at the state level, the locations and dimensions of poverty are complex and varied. For example, Ciudad de México, in the “very high” HDI category, has one of the country’s highest unemployment rates (4.8 percent) while in the lower-HDI regions of Guerrero and Oaxaca unemployment rates are among the lowest (1.6 percent and 1.5 percent, respectively) (INEGI 2019).

Poverty

In 2018, 61 million people had an income below the moderate poverty line (MPL), representing almost 50 percent of the total population. Within this group, 21 million (17 percent of the population) lived with an income below the extreme poverty line (EPL). Moreover, poverty levels continue to vary significantly by region, with extreme poverty persisting in relatively few, southern and south-central states. The five poorest states contain 62 percent of the total population living in extreme poverty conditions. This figure rises to 81 percent for the 10 poorest states while the remaining 22 states have less than 2 percent of their total population living in extreme poverty.

Table 1 shows that poverty incidence across all states is higher for rural households than for urban households, for indigenous households than for non-indigenous households, and for women more than for men, especially when multiple factors are combined.

Table 1

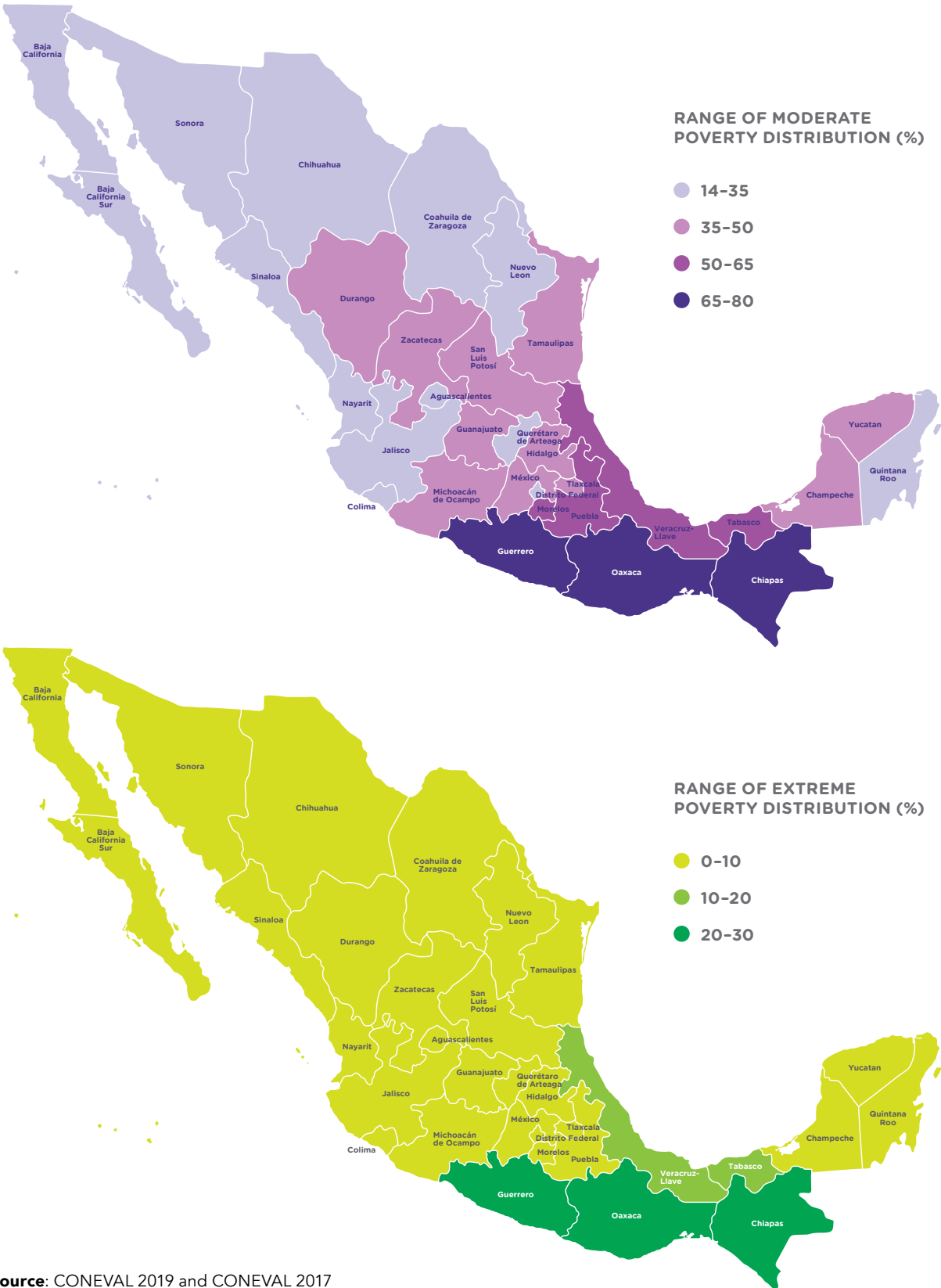
Poverty incidence in Mexico

| | TOTAL POVERTY RATE (%) | MODERATE POVERTY RATE (%) | EXTREME POVERTY RATE (%) |
|---|------------------------|---------------------------|--------------------------|
| Urban | 39.1 | 34.4 | 4.7 |
| Rural | 58.2 | 40.8 | 17.4 |
| Indigenous | 77.6 | 42.8 | 34.8 |
| Non-indigenous | 41.0 | 35.2 | 5.8 |
| Women | 43.1 | 36.4 | 6.7 |
| Men | 43.0 | 35.4 | 7.6 |
| Rural, indigenous females (least-favored group) | 85.1 | 40.1 | 45.0 |
| Urban, non-indigenous men (most-favored group) | 37.2 | 33.2 | 4.0 |

Source: CONEVAL 2017

Figure 2

Moderate (above) and extreme (below) poverty distribution by state



Source: CONEVAL 2019 and CONEVAL 2017
Note: Estimations based on the MEC of MCS-ENIGH 2018.

In Mexico, poverty is considered multidimensional and includes economic welfare and access to social rights. Levels of poverty are currently measured using income and six additional indicators: education, health, social security, nutrition, housing and access to basic services. The first step in a poverty assessment is to define the extreme and moderate poverty lines for income separately for rural and urban areas (Table 2).

Once the income dimension of poverty has been identified, the assessment considers the six social rights indicators (Table 3). If a household is above the moderate poverty line (MPL) and does not

lack any of the six social rights, then it is considered non-poor. If a household’s income is above the MPL but it lacks any of the six social rights, it is considered a vulnerable household. A household with income below the MPL with access to the six social rights is categorized as moderately income poor, while a lack of any of the social rights indicates a multi-dimensional moderately poor household. If a household’s income is below the extreme poverty line (EPL) it is categorized as an extreme poor income household if it lacks access to one or two social rights, and as a multi-dimensional extreme poor household if it lacks three or more social rights.

Table 2
Extreme and moderate poverty lines, July 2019

| | URBAN | | RURAL | |
|------------------------------------|---------|--------|---------|--------|
| | MONTHLY | DAILY | MONTHLY | DAILY |
| Extreme poverty line (EPL) | \$83 | \$2.8 | \$59 | \$2 |
| Moderate poverty line (MPL) | `\$162 | `\$5.4 | `\$105 | `\$3.5 |

Source: CONEVAL 2018

Box 2: Evolution of poverty measurement in Mexico

Prior to 2002, Mexico did not have a standard methodology for poverty measurement.

To address the lack of consistency between figures used by different government bodies and academic institutions, in 2001 the federal government convened experts to develop a standard poverty index and subsequently published poverty figures for the first time. Mistrust of the published data led to the creation of an independent policy and research institution, the National Council for the Evaluation of Social Development Policy (*Consejo Nacional de Evaluación de la Política de Desarrollo Social* (CONEVAL)), under

the Social Development Act (*Ley General de Desarrollo Social* (LGDS)) of 2004.

In addition to regulating and coordinating the evaluation of social development policies and programs, CONEVAL’s mandate was to develop guidelines and criteria for defining and measuring poverty. Data were to be disaggregated at the municipal level and collected every five years to enable regular monitoring of changes in the levels of poverty in different states and municipalities, and identify policy priorities. In 2018, CONEVAL published its first 10-year analysis (2008 to 2018).

Table 3

Multidimensional poverty measures in Mexico

| | INCOME | EDUCATION | HEALTH | SOCIAL SECURITY | NUTRITION | HOUSING | ACCESS TO BASIC SERVICES | CATEGORY |
|--------|-----------|-----------|--------|-----------------|-----------|---------|--------------------------|--------------------------------|
| Case 1 | Above MPL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Non poor |
| Case 2 | Above MPL | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | Non poor with a vulnerability |
| Case 3 | Below MPL | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Income moderate poor |
| Case 4 | Below MPL | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | Multidimensional moderate poor |
| Case 5 | Below EPL | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | Income extreme poor |
| Case 6 | Below EPL | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | Multidimensional extreme poor |

Source: CONEVAL 2018

ACCESS TO, AND CONSUMPTION OF, MODERN ENERGY SERVICES

Electricity access

Mexico launched an intensive electrification policy in the 1960s that resulted in more than 99 percent of households having access to energy by the mid-2000s. In 2016, the Federal Electricity Commission (*Comisión Federal de Electricidad* (CFE)), the state-owned electric utility, estimated that 41,697 communities, home to approximately 440,000 households or 1.8 million people and representing roughly 1.5 percent of the population, had no access to electricity. Almost 31,000 of these communities comprise only one or two households, making it cost ineffective to extend the electricity grid to connect them (SENER 2016a). These communities are also located in remote and difficult-to-access areas, typically more than five kilometres from distribution network infrastructure (SENER 2016b). Economic factors are widely acknowledged as the reason for not connecting these communities to the centralized grid. These factors in-

clude the cost of installing grid infrastructure and the likelihood that total consumption would not be enough to cover operating and maintenance costs.

For these reasons, future electrification policy for communities without electricity access is shifting towards local distributed power generation funded by the Fund for Universal Electricity Service (*Fondo de Servicio Universal Eléctrico* (FSUE)). This involves alternative distributed electricity systems—including mini-grids and stand-alone systems using solar panels and batteries—and training for communal ownership, operation and maintenance. Nonetheless, there are no data on FSUE’s progress to date. There is also a lack of clarity as to which entity is responsible for implementation and payment models (i.e. if beneficiaries are obliged to pay for the systems, and, if so, how much and to which entity). The Mexican Government included a program in its most recent five-year National Development Plan (2019–2024) to provide off-grid electricity to 45,000 communities, though few details have been provided (see Box 3).

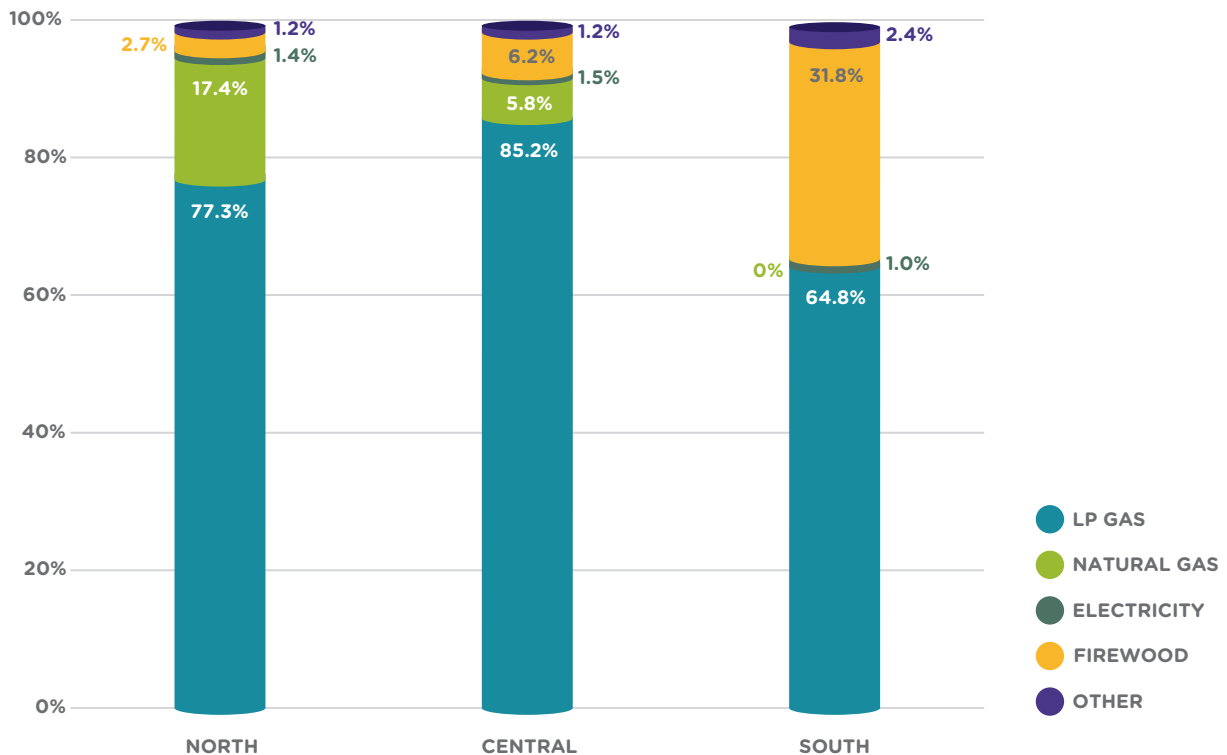
Box 3: The 45k communities plan

The 2019–24 National Development Plan includes a program to provide energy access for 45,000 communities via distributed renewable electricity generation (DRE), such as mini-grids and solar PV, focused on providing power for water pumping, milling, education and health-care infrastructure. The plan provides no details about future implementation of the program. The plan also excludes mention of key indicators; which communities will benefit; which entities will build the infrastructure, including whether pri-

vate sector actors will participate; the financing mechanisms; or the timeframe for the program. It also appears to contradict other government policies. For example, CFE does not foresee installation of solar PV until 2023 according to the National Electric System Development Program (*Programa de Desarrollo del Sistema Eléctrico Nacional* (PRODESEN)) and the investments envisaged are large-scale solar parks. There is also no mention of CFE building DRE as part of other social programs.

Figure 3

Residential energy consumption by region, 2018



Source: CONUEE 2018 and INEGI 2019

Clean cooking access

Progress on access to clean cooking has fallen considerably behind progress on access to electricity. Approximately 85 percent of Mexican households use a gas stove for cooking, 79 percent use LPG, and 6 percent use natural gas (INEGI 2018b). The remaining 15 percent of households use firewood as their main source of cooking energy. As with income poverty, regional differences are stark with natural gas commonly used in northern states where there is infrastructure for residential supply (Figure 3). Southern states, in contrast, are much more likely to use firewood than gas.

Energy Consumption by Income Level

According to the National Survey of Income and Expenditure (ENIGH), an average Mexican household spent 4.35 percent of their total income on energy (electricity, natural gas, LPG,

fuel oil, firewood, charcoal and candles) in 2018. However, disaggregation by income decile reveals that most of the population spend more than this (Figure 4). Only the top two deciles spent less than the average with the lowest four income deciles spending 5.4 percent or more of their income on energy. In contrast, households in the tenth decile (the richest group) spent less than 3.2 percent of their income on energy.

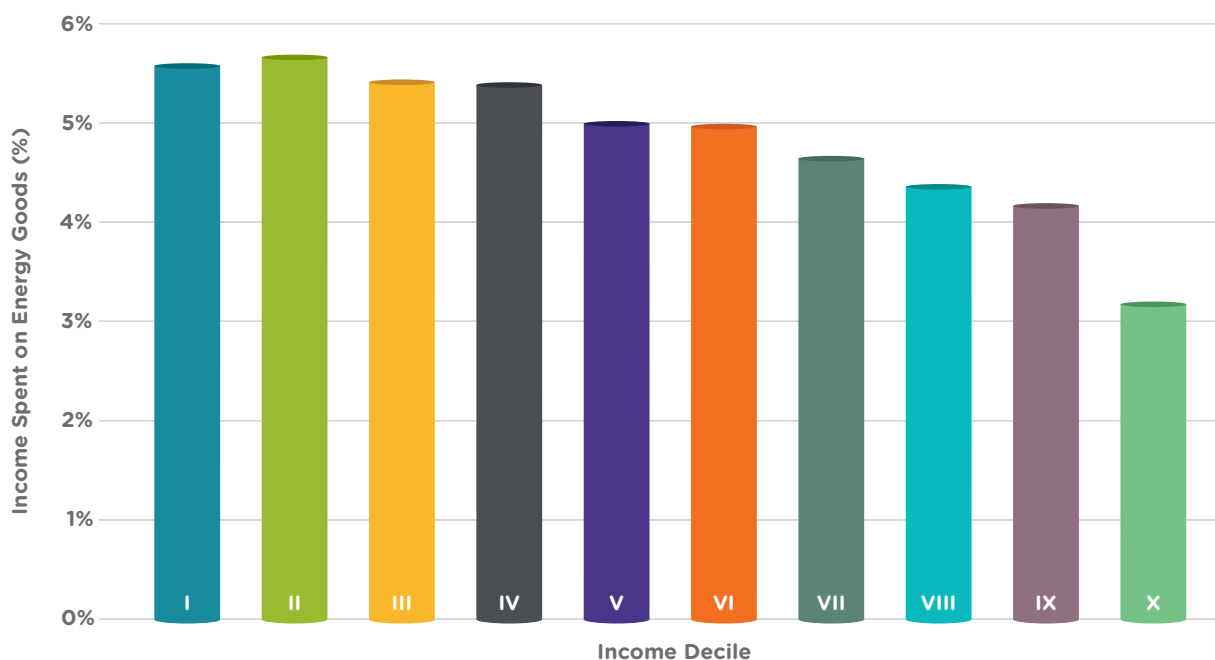
Percentage of household income put toward meeting energy needs, national average

| | |
|------|-------|
| 2014 | 4.56% |
| 2016 | 4.17% |
| 2018 | 4.35% |

Source: ENIGH 2018

Figure 4

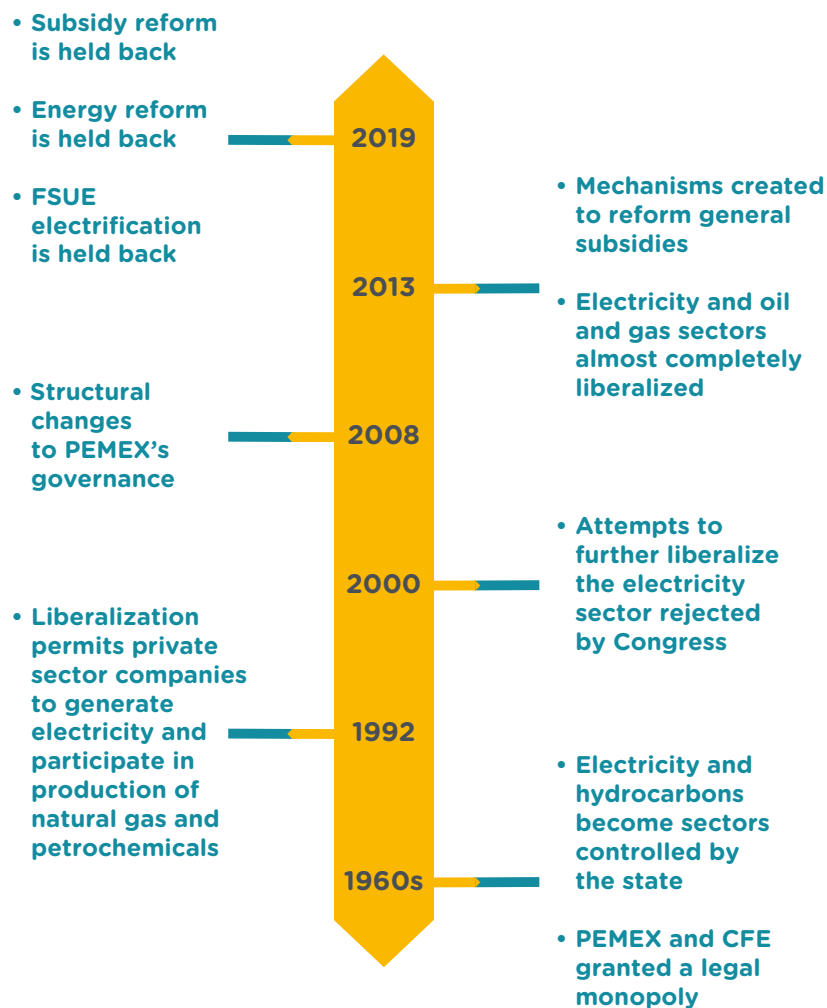
Share of total income spent on energy goods by income decile, 2018



Source: INEGI 2019

Figure 5

Major changes to the Mexican energy sector



Source: Authors' construction

Energy Subsidies

Subsidies to household electricity consumption have existed within multiple tariff structures since the 1970s. These accounted for 78 percent of the total subsidy for electricity consumption in 2016, with agriculture and industry receiving 11 percent and 10 percent, respectively (Sanchez et al. 2018). The subsidy mechanism is expressed in CFE financial statements under 'tariff insufficiency', i.e., losses associated with revenue foregone because of the subsidized tariffs.

Between 2013 and 2019 the subsidy amounted to nearly USD 15 billion (CFE 2019a; SHCP 2019).

General LPG subsidies were applied between 2003 and 2012 in the form of capping the price of LPG paid by customers. Because *Petróleos Mexicanos* (PEMEX) produced or imported LPG at international reference prices but then sold it at a regulated price, this had a large impact on its finances. The subsidy amounted to around USD 11 billion over this 10-year period (SENER 2013).

Energy Policy Reform

The Mexican energy sector has undergone a series of reforms in the last five decades (Figure 5). In the 1960s, the government put the electricity and hydrocarbon sectors under state control and created legal monopolies for these sectors that were granted to the state-owned companies CFE and PEMEX, respectively.

The Mexican Government tried repeatedly to reform the energy sector in 1992, 2000 and 2008 with little success as the proposals were limited by the provisions pertaining to state control contained in the constitution and any successful changes were cosmetic. In 2013, Enrique Peña Nieto's Administra-

tion garnered enough political support to carry out a comprehensive reform of the energy sector (and the Mexican Constitution) creating 10 new laws and reforming 12 others.

Some of the most important changes of the Nieto Administration involved liberalizing all areas of the Mexican energy sector, creating a new set of regulations, and reforming subsidies for petroleum fuels and electricity to target support towards protecting the poorest and most vulnerable and the environment. The López Obrador Administration has sought to reverse some of these changes by re-establishing the primacy of state-owned companies, increasing the state's role in the energy market, and limiting private investments in the energy sector (PND 2019).

SOCIAL SAFETY NETS



Social safety nets were introduced in Mexico in the 1980s and have evolved over time. The largest social assistance effort was launched in 1988 under the name *Solidaridad* (Solidarity). Since then, subsequent administrations have changed the program's priorities and renamed it. It became *Progresa* (Progress) in 1997, *Oportunidades* (Opportunities) in 2002 and *Prospera* (Prosperity) in 2014.

Since taking power in 2018, President López Obrador's administration has transformed the *Oportunidades/Prospera* social safety net and renamed the federal census that is used as the basis for targeting (from *Sedesol* to *Bienestar*). Several social programs with new goals for poverty alleviation have been introduced to replace *Prospera*, the most important of which are listed below. As of late 2019, no Energy Safety Nets (ESNs) linked to a broader social safety net program had been announced.

Table 4
Evolution of social safety nets in Mexico

| PERIOD | ADMINISTRATION | SOCIAL PROGRAM | FOCUS AREAS | CHARACTERISTICS |
|-----------|-------------------------------|----------------------|--|---|
| 1988-1994 | Carlos Salinas (PRI) | <i>Solidaridad</i> | Nutrition, education, health, housing, basic services and land property | Cash transfers, went to the governments of federative entities |
| 1994-2000 | Ernesto Zedillo (PRI) | <i>Progresa</i> | Nutrition, health, education and infrastructure | Driven by political considerations |
| 2000-2006 | Vicente Fox (PAN) | <i>Oportunidades</i> | Education, health, nutrition, young students and elderly persons | Cash transfer program using federal census, included conditional cash transfers |
| 2006-2012 | Felipe Calderón (PAN) | <i>Oportunidades</i> | Education, health, nutrition, young students, elderly persons and energy | Similar program to that of the previous administration, included energy component |
| 2012-2018 | Enrique Peña Nieto (PRI) | <i>Prospera</i> | Education, health and nutrition | Similar program to that of the previous administration, dropped energy component and targets for young students and elderly persons |
| 2018-2024 | Andrés López Obrador (MORENA) | <i>Bienestar</i> | Multiple | A series of conditional and unconditional cash transfers with separate target populations and desired outcomes (see Table 5) |

Source: Rojas 1992; Rocha 2001; Sedesol 2007, 2012; Bienestar 2019

Table 5

New social safety nets of López Obrador Administration, 2019

| PROGRAMME | TYPE | DESCRIPTION | TARGET | AMOUNT |
|--|--|--|--|--|
| 1. Welfare for the Elderly <i>(Pensión de las personas adultas mayores)</i> | Unconditional cash transfer. | Aims to contribute to improve the living conditions of elderly people. | Indigenous people aged 65 and over; people aged 68 and over; people aged between 65 and 68 who are still part of the <i>Prospera</i> programme. | USD 75 every two months. |
| 2. Welfare for People with Disabilities <i>(Pensión para el bienestar de las personas con discapacidad)</i> | Unconditional cash transfer. | Aims to contribute to improve the living conditions of people with disabilities and promote social inclusion. | Children and young people with permanent disabilities from ages 0 to 29; indigenous persons with permanent disabilities from ages 30 to 64; adults with permanent disabilities from ages 30 to 67. | USD 75 every two months. |
| 3. “Benito Juárez” Scholarship <i>(Becas para el Bienestar “Benito Juárez”)</i> | Conditional cash transfer requiring school attendance. | Aims to increase the capacity of Mexican families through ensuring basic education and fostering familial commitment to education. | Households with children up to the age of 15 living in extreme poverty conditions with an income below the minimum welfare line. | USD 45 every month per household. |
| 4. Young people Building the Future <i>(Jóvenes construyendo el futuro)</i> | Conditional cash transfer requiring attendance at place of work and completion of reports. | Aims to create employment training opportunities for young unemployed people who are not enrolled in school. | Young people aged 18 to 29; priority is given to young people living in indigenous communities, extreme poverty or regions with high rates of violence. | USD 200 every month for up to 12 months. |
| 5. Young People Writing the Future <i>(Jóvenes escribiendo el futuro)</i> | Conditional cash transfer requires attendance at a higher education institution. | Aims to support young people who are enrolled in a higher education institution. | Young people aged 29 years or below. | USD 270 every two months. |
| 6. Sowing Life <i>(Sembrando vida)</i> | Conditional cash transfer requires attendance at a workplace. | Aims to improve the living conditions of agricultural workers. | Agricultural workers whose income is below the minimum welfare line, who live in rural locations and who own 2.5 hectares of land that can be developed as an agroforestry project. | USD 280 every month. |
| 7. Welfare for the Children of Working Mothers <i>(Bienestar de las niñas y niños, hijos de madres trabajadoras)</i> | Conditional cash transfer requires mother's proof of employment. | Aims to provide childcare support for working mothers. | Employed mothers with children aged 1 to 3 or with children with permanent disabilities aged 1 to 6. | USD 85 every two months for up to 3 children; USD 200 every two months for up to 3 children with a disability. |

Source: Bienestar 2019

ENERGY SAFETY NETS IN MEXICO



This section analyzes four measures deployed by the Mexican Government to promote energy access and consumption by the poorest and most vulnerable people.

DIFFERENTIATED ELECTRICITY TARIFFS

The most important ongoing measure supporting electricity consumption for poor households in Mexico is the electricity tariff structure. This is a complex measure that has changed over time to include both volume-differentiated tariffs (VDT) and increasing block tariffs (IBT) that vary according to geographical location, average temperature and season. Historically, the tariffs were also discretionally differentiated to favor administrative districts ruled by the governing party.

Background, aims and implementing agencies

Mexico's overarching energy policy since the 1970s has sought to ensure that every household

can afford to consume a basic amount of electricity. To this end, the state-owned electricity sector has provided a lifeline tariff to enable grid-connected households to consume a basic amount of electricity every month at a heavily discounted rate.

In the 1970s, there were only two residential tariffs, 1 and 1A. Over time, the tariff system evolved and the prices and threshold consumption levels for the lifeline and subsequent blocks now vary depending on climatic factors to account for varying electricity needs (cooling during summer and heating during the winter). There are now eight tariffs (1, 1A, 1B, 1C, 1D, 1E, 1F and the unsubsidized DAC or high-consumption tariff) based on geographical zone, average temperature of the region, and the season. The most recent tariff, 1F, was created in 2002 to benefit communities enduring extreme weather conditions.

The cost of the electricity subsidy is largely covered by the Finance Ministry (*Secretaría de Hacienda y Crédito Público* (SHCP)). At the end of

Box 4: Increasing block tariffs and volume-differentiated tariffs

Two types of electricity tariff are commonly used for quantitative targeting, increasing block tariffs (IBT) and volume-differentiated tariffs (VDT).

In a block tariff structure, a different price per unit (USD per kWh) is charged for different blocks of electricity consumption. In an IBT, the unit price increases with each successive consumption block. All consumers benefit when the price of the first one or two blocks is subsidized, because those initial increments of consumption are charged at a lower kWh price.

A VDT has a different price per unit depending on the total quantity consumed. Consumption levels are divided into blocks, with a different unit price attached. The higher the quantity consumed, the higher the unit price for all the electricity consumed. When the unit price for low quantity consumption is subsidized, consumers whose consumption is above the quantity threshold do not benefit.

In some countries, including Mexico, tariff structures are hybrids including IBT and VDT for different blocks.

Sources: Komives et al. 2005; Beylis and Cunha 2017; Siyambalapitiya 2018

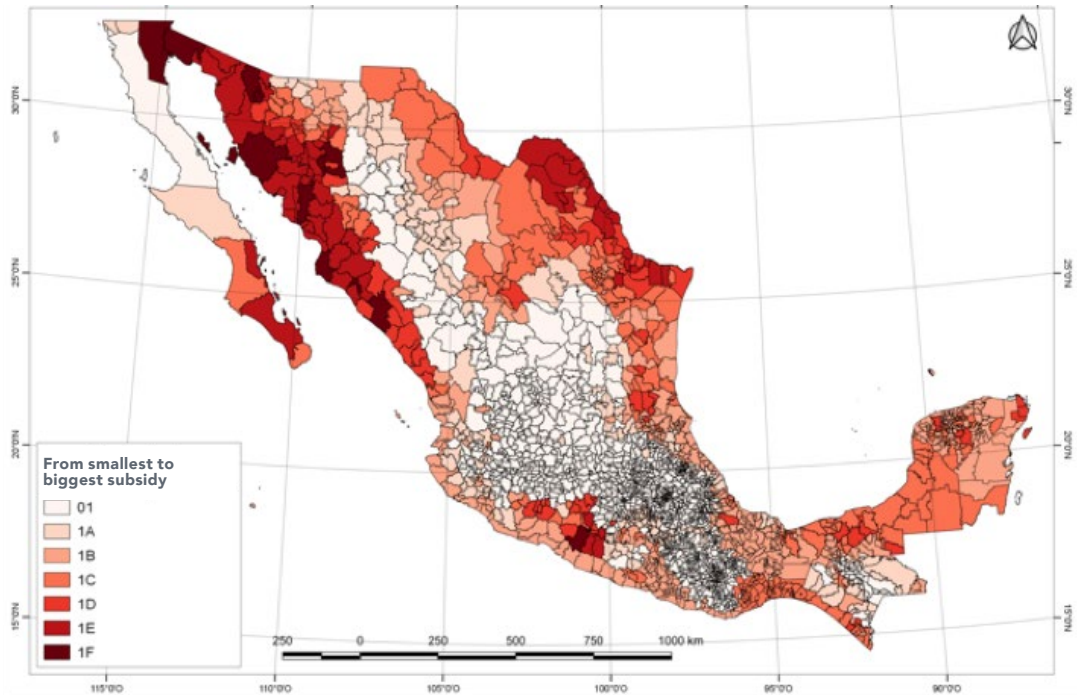
every fiscal year, during the budgeting process for the year ahead, CFE requests a transfer to compensate for losses from tariff insufficiency in the next fiscal year. In 2018, CFE received a USD 2.5 billion cash transfer for the 2019 fiscal year. This amount was insufficient to cover the total cost to CFE, which must use its own resources to cover the shortfall. This recovery includes revenue from consumers under the DAC tariff who pay on average 58 percent more than the supply cost (Hancevic et al. 2019).

The subsidy system was supposed to be discontinued in 2018, per the 2013 Energy Reform that aimed to end state-monopolization of the electricity industry. However, 2018 was an election year and consideration was given to the potential social turmoil in response to removing subsidies. The Peña Nieto Administration decided to extend the life of the tariff structure. The

new López Obrador Administration, which came into power in 2018, has decided that existing tariff schemes will continue largely unchanged for residential users while a new mechanism is developed.

One option for reform may arise from the Electric Industry Law, *Ley de la Industria Eléctrica*, (LIE) enacted in 2014 and currently on hold. Article 116 states that the Secretariat of Energy (*Secretaría de Energía* (SENER)) will establish policies and mechanisms to supply electricity to rural communities and marginalized urban zones at the lowest cost possible for the state. The law instructs SENER, SHCP and *Bienestar*, with the help of CRE and CONEVAL, to deploy a targeted social assistance program to support timely and adequate access to energy at affordable prices for vulnerable groups of users (DOF 2019).

Figure 6
Electricity tariff distribution by municipality



Source: CFE 2019

Modalities of the tariff system

There are eight different tariff categories for residential electricity customers. Seven of these include a partly subsidized IBT structure with a different unit price (USD per kWh) for successive levels of consumption (Tables 6 and 7). The tariff thresholds and unit prices depend on the geographical zone, the average temperature of the region, and the season (Figure 6). For most tariff categories, the kWh threshold increases in summer (April-September) to reflect the increase in demand for electricity for cooling (Table 6). During the winter (October-May), the lifeline block covers the first 75 kWh of electricity each month for a price of USD 0.04 (MXN 0.796) per kWh for all categories (Table 7). Unit costs are constant at USD 0.048 (MXN 0.960) per kWh for the second block, but the upper limit consumption thresholds vary between 140 and 200 kWh/month. In summer, both prices and thresholds vary significantly between tariffs.

If a household's average consumption over the previous year is more than the VDT threshold (the threshold of the third or fourth block—ranging from 250 to 2500 kWh/month)—the household is moved to the unsubsidized domestic high-consumption tariff, (*Servicio Doméstico de Alto Consumo* (DAC)). Only an estimated 1-2 percent of utility customers pay the DAC.

The electricity tariffs are set by the SHCP, but how the tariffs have changed over time has depended on how they were managed by the central administration. For example:

- During President Calderón's tenure (2006–2012) tariffs were indexed to fuel inputs for electricity generators and increased by a few cents/kWh every month.
- During the last three years of Peña Nieto's government, residential tariffs remained at the same level.
- President López Obrador's Administration has indexed tariffs to the inflation rate.

Table 6
Summer residential electricity tariffs, June 2019

| TARIFF | 1st BLOCK | | | 2nd BLOCK | | | 3rd BLOCK | | | 4th BLOCK | | | AVERAGE TEMP. |
|--------|-----------|-----|-------|-----------|-----|-------|-----------|------|-------|-----------|------|-------|---------------|
| | kWh | US¢ | \$MXN | kWh | US¢ | \$MXN | kWh | US¢ | \$MXN | kWh | US¢ | \$MXN | |
| 1 | 0-75 | 4.1 | 0.811 | 76-140 | 4.9 | 0.980 | 141-250 | 14.3 | 2.868 | | | | <25°C |
| 1A | 0-100 | 3.6 | 0.715 | 101-150 | 4.2 | 0.840 | 151-300 | 14.3 | 2.868 | | | | 25°C |
| 1B | 0-125 | 3.6 | 0.715 | 126-225 | 4.2 | 0.840 | 226-400 | 14.3 | 2.868 | | | | 28°C |
| 1C | 0-150 | 3.6 | 0.715 | 151-300 | 4.2 | 0.840 | 301-450 | 5.4 | 1.074 | 451-950 | 14.3 | 2.868 | 30°C |
| 1D | 0-175 | 3.6 | 0.715 | 176-400 | 4.2 | 0.840 | 401-600 | 5.4 | 1.074 | 601-1000 | 14.3 | 2.868 | 31°C |
| 1E | 0-300 | 3.0 | 0.595 | 301-750 | 3.7 | 0.744 | 751-900 | 4.9 | 0.972 | 901-2000 | 14.3 | 2.868 | 32°C |
| 1F | 0-300 | 3.0 | 0.595 | 301-1200 | 3.7 | 0.744 | 1201-2500 | 9.1 | 1.810 | | 14.3 | 2.868 | 33°C |

Source: CFE 2019

Table 7

Winter residential electricity tariffs, January 2019

| TARIFF | 1st BLOCK | | | 2nd BLOCK | | | 3rd BLOCK | | | AVERAGE TEMP. |
|--------|-----------|------|-------|-----------|--------|-------|-----------|---------|-------|---------------|
| | kWh | US¢ | \$MXN | kWh | US¢ | \$MXN | kWh | US¢ | \$MXN | |
| | 1 | 0-75 | 4.0 | 0.796 | 76-140 | 4.8 | 0.960 | 141-250 | 14.1 | |
| 1A | 0-75 | 4.0 | 0.796 | 76-150 | 4.8 | 0.960 | 151-300 | 14.1 | 2.813 | 25°C |
| 1B | 0-75 | 4.0 | 0.796 | 76-175 | 4.8 | 0.960 | 176-400 | 14.1 | 2.813 | 28°C |
| 1C | 0-75 | 4.0 | 0.796 | 76-200 | 4.8 | 0.960 | 201-650 | 14.1 | 2.813 | 30°C |
| 1D | 0-75 | 4.0 | 0.796 | 76-200 | 4.8 | 0.960 | 201-1000 | 14.1 | 2.813 | 31°C |
| 1E | 0-75 | 4.0 | 0.796 | 76-200 | 4.8 | 0.960 | 201-2000 | 14.1 | 2.813 | 32°C |
| 1F | 0-75 | 4.0 | 0.796 | 76-200 | 4.8 | 0.960 | 201-2500 | 14.1 | 2.813 | 33°C |

Source: CFE 2019

Impacts

Between 2002 and 2016, the number of households that benefited from the subsidized IBT blocks increased from 22 million to 36 million, excluding high-consumption residential users on the unsubsidized VDT structure (CFE 2019).

This differentiated tariff structure is not, however, specifically targeted to poor or vulnerable households and may be economically inefficient because it subsidizes low-consuming households, regardless of income level. Nonetheless, electricity consumption is subsidized, and poorer households who consume less electricity have a larger portion of their energy needs subsidized than richer households who tend to consume more (Hancevic et al. 2019).

The government’s reasoning for tariff design based on climatic variation suggests that the average temperature should be a key factor in setting a different type of tariff in every munic-

ipality. Tariffs may also be correlated to political affiliations. No comprehensive analysis has been carried out to determine the degree to which negotiations between municipalities and CFE/SHCP have resulted in a greater level of subsidy, but there are a number of public declarations by politicians promising to deliver this, which suggests this is a common practice (El Universal 2019; El Economista 2019; Reforma 2019).

OPORTUNIDADES ENERGÉTICAS

Background, aims and implementing agencies

For a period of five years (2007–2011), *Oportunidades*, the broadest and most important social safety net operating in Mexico, included an energy component, *Oportunidades Energéticas*. In 2007, under the Calderón Administration, *Oportunidades* added a new cash transfer component to support household energy costs, in addition to ongoing support for nutrition, education, and for

elderly citizens. The transfer was designed to help households to pay for part of their fuel (LPG) or energy service (electricity) costs and compensate for the negative impacts that increasing energy prices would have on households living in poverty. The driver for including an energy component was to promote access to modern energy services and reduce the use of polluting fuels—such as firewood, diesel and coal—thereby reducing the associated health risks for households living in poverty. The energy-specific component ended when *Oportunidades* was rebranded as *Prospera* following the change of administration in 2012.

Modalities of *Oportunidades Energéticas*

In order to be an *Oportunidades Energéticas* beneficiary, a household had first to participate in the general *Oportunidades* program, which required it to be registered in the Sedesol unified beneficiary register (*Padrón Único de Beneficiarios*). Registration of beneficiaries was initially only available to communities selected by a government-led, geographically based targeting mechanism.

The geographical selection was based on the marginalization index of the National Population Council of Mexico (*Consejo Nacional de Población* (CONAPO)), which used the following criteria (aggregated at community level): literacy rate, highest educational level, access to sanitation, electricity access, piped water access, level of overcrowding, existence of concrete floors in houses and the household income level. Once the poorest and most marginalized communities were selected, a second filter was applied to ensure that those communities selected as beneficiaries had local schools and medical clinics (those that did not have these facilities were removed from the register). The rationale for this exclusion was that beneficiaries would need to go to a school or clinic to collect the *Oportunidades* benefit, since most individuals lacked access to the formal banking system.^v

According to Sedesol, individual households were identified as beneficiaries of *Oportunidades* within the geographically-selected communities using a points system. There is no information available regarding how this points system worked nor any evaluation of how – or how successfully - it was implemented. Sedesol only stated that it was not based on household income but on a local socioeconomic survey that sought to identify those families living in extreme poverty. Throughout the lifetime of the program the *Oportunidades* operating guidelines required that its means-testing mechanisms be modified, and that CONEVAL find a more suitable mechanism to better target beneficiary households.^{vi} Starting in 2009, CONEVAL's social backwardness index was used in the *Oportunidades* program. This used data from the ENIGH to identify communities and households lacking access to education, health and other basic services and with poor living standards.

Oportunidades Energéticas, as part of *Oportunidades*, was initially envisioned as a conditional cash transfer that required beneficiaries to attend scheduled medical check-ups and periodic community workshops to promote health practices. However, after the first year the requirements changed, and it became an unconditional cash transfer with only one requirement: presentation of an electricity bill.

Impacts

According to Sedesol, *Oportunidades* supported 5 million households in 2007, increasing to almost 5.8 million in 2011. Approximately 90 percent of households enrolled in *Oportunidades* also benefited from *Oportunidades Energéticas*, i.e., between 4.5 million and 5.2 million households received the energy safety net (ESN) throughout the lifetime of the program. No data are available on why only this proportion of *Oportunidades* beneficiaries received *Oportunidades Energéticas*. However, the design of the community tar-

getting and the requirement to show an electricity bill may be part of the explanation.

The requirement to present an electricity bill prevented many households from accessing *Oportunidades Energéticas*. This included households who could not prove legal possession of their house (including those who were renting or borrowing a house with no legal paperwork); those with an illegal electricity connection; and those with no electricity connection at all.

The exclusion of households in these cases suggests that *Oportunidades* did not reach the most marginalized communities (i.e. remote communities without local health and education services and/or electricity connections).

One of the most important characteristics of *Oportunidades Energéticas* was that it only covered a share of the total energy spending of the household mainly aiming to compensate the beneficiaries for price increases of LPG and electricity. Depending on the year, the total amount of *Oportunidades Energéticas* amounted to between 21

percent and 25 percent of a household’s energy spending (Table 8). However, although it was intended to help families acquire any energy-related good or service, no analysis was undertaken to establish whether households in fact used the support for energy-related consumption. As the benefit was a cash transfer, households could use it for any purpose they deemed necessary.

There has been no official evaluation of the impacts of *Oportunidades Energéticas*. In addition, there are no disaggregated data available that could be used to understand the program’s contribution to reducing energy poverty. However, Sedesol carried out a one-time *ex-ante* external evaluation of the energy component of *Oportunidades* (Gertler et al. 2007). Although by its nature such analysis is not conclusive, this econometric analysis found the following:

- the amount of support offered by *Oportunidades Energéticas* did not have a significant impact on the adoption of cleaner energy technologies or fuels to replace firewood, diesel or coal by domestic users

Table 8

Estimated contribution from *Oportunidades Energéticas* to monthly household energy costs

| | | 2007 | 2008 | 2009 | 2010 | 2011 |
|--|-----|-------|-------|-------|-------|-------|
| <i>Oportunidades Energéticas</i> contribution | MXN | 50 | 55 | 55 | 60 | 60 |
| | USD | 4.22 | 4.73 | 3.88 | 4.60 | 4.83 |
| LPG price (20 kg) | MXN | 186 | 191 | 206 | 188 | 201 |
| | USD | 16 | 16 | 15 | 14 | 14 |
| Electricity price (75 kWh) | MXN | 46.58 | 47.93 | 49.73 | 51.53 | 53.33 |
| | USD | 3.93 | 4.12 | 3.51 | 3.95 | 4.29 |
| Percentage contribution | | 21% | 23% | 22% | 25% | 24% |

Source: DOF 2019a; DOF 2019b; CFE 2019b

Note: USD values calculated for 2011.

- the amount of support did not have a significant impact on the households' direct spending on energy products and services
- the targeting mechanism countered the regressive aspect of universal energy subsidies
- the ESN had a small impact on helping households to redistribute their spending to other areas such as nutrition or transport, in addition to energy.

Over the five years the program operated, its burden on government resources was much smaller than that of previous general energy subsidies. As Table 9 shows, the estimated annual cost of *Oportunidades Energéticas* (not including administrative costs) averaged USD 259 million.^{vii}

FONDO DE SERVICIO UNIVERSAL ELÉCTRICO (FSUE)

Background, aims and implementing agencies

Under Mexico's Energy Reform of 2013, the electricity sector was opened to competition and the wholesale electricity market was created within the framework of a new electricity law, *Ley de*

la Industria Eléctrica (LIE). The LIE stated that the federal government will support connection to the electricity grid for marginalized rural and urban communities and mandated the creation of a Universal Electricity Service Fund (*Fondo de Servicio Universal Eléctrico* (FSUE)) to deliver this objective.

Specific aims and guidelines for the FSUE were issued in February 2017. These were as follows:

1. Promote electricity access for marginalized rural and urban communities at lowest cost using clean energy technologies for lighting, communication and food preservation and provide electricity infrastructure for basic healthcare and education services, economic activities, outdoor cultural and recreational public spaces, and community kitchens.
2. Ensure the sustainability of basic electricity supply infrastructure.
3. Utilize fund resources with efficiency, efficacy, economy and transparency, and seek other co-funding mechanisms for electrification projects in marginalized rural and urban communities.
4. Fund resources are not to be used for street lighting, except in the case of outdoor public cultural and recreational spaces.

Table 9

Estimated annual cost of *Oportunidades Energéticas*

| | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|-----------|-----------|-----------|-----------|-----------|
| <i>Oportunidades Energéticas</i> (USD per household, monthly) | 4.22 | 4.73 | 3.88 | 4.6 | 4.83 |
| Number of families benefiting | 4,500,000 | 4,544,285 | 4,688,423 | 5,237,058 | 5,244,586 |
| Total estimated cash transfer (USD million) | 228 | 258 | 218 | 289 | 304 |

Source: Gertler et al. 2007

Note: USD values calculated for 2011.

When the FSUE was created in 2016, CFE estimated the number of communities without electricity to be 41,697, equivalent to 440,000 households or approximately 1.8 million people. Almost 31,000 of these communities consisted of one or two households, thus it would not be cost effective to extend the electricity grid to connect them. The main regions with communities without electricity access were identified as Chiapas, Chihuahua, Durango, Guerrero, Nayarit, Oaxaca, and San Luis Potosí (Figure 7).

To manage the fund, the SHCP contracted the National Bank for Public Infrastructure Works (BANOBAS) and allocated MXN 3 million (approximately USD 150,000 in 2019 prices) to cover managing the program for five years. SENER also stated that the FSUE could generate more resources than the CFE budget for electrification. This meant the FSUE could use funds generated from the management of losses and differences in transactions carried out in the wholesale electricity market.

Modalities of the FSUE

The FSUE was to be implemented according to the following guidelines:

- Use of transparent and competitive mechanisms to implement electrification projects
- Active involvement of targeted marginalized rural and urban communities, taking into account the legal frameworks for land ownership
- Use of indicators and monitoring frameworks to assess the progress of electrification in relation to goals established in the 2013–2018 Energy Sector Program
- Development of implementation schedule with up-to-date and timely information on progress
- Projects should promote scale-up of infrastructure
- Projects should use the operating rules' priority criteria for granting support, including number of homes and degree of marginalization.

Figure 7

Locations of communities without access to electricity



Source: SENER 2016a

The operating rules required an annual list of target communities to be created using information provided by local government, the CFE, or those companies interested in obtaining FSUE resources for carrying out specified projects. This was to include the total number of houses in the target community, the number without access to electricity, their approximate distance to the electricity grid, the socioeconomic and geographic characteristics of the target area, and access, climatic or geological risk factors that could impact electrification works.

Both grid extension and off-grid, stand-alone electrification projects could be funded by the FSUE. Between 2016 and 2018 three rounds of tenders were issued for grid extension and three for off-grid schemes (SENER 2018b).

Impacts of the FSUE

By mid-2018, the FSUE had provided 42,085 connections through the first tender round of tenders, benefiting 172,349 people. An additional 48,630 connections were authorized in the second round, and the 2018 tenders were expected to provide a further 47,878 connections (SENER 2018b). However, there is no conclusive or rigorous analysis of the impacts of the FSUE in terms of reaching poor and marginalized households. For the grid extension projects, resources were allocated to the state distribution company *CFE Distribución* and used to fund the annual grid expansion plan. There is no evidence that this plan changed to include or prioritize electricity access for poor and marginalized communities, as the LIE intended, and it is very difficult to assess the effectiveness of the FSUE resources in promoting grid access for isolated communities. A further constraint is that CFE requires that a community must be a *maximum* of five kilometers from the existing grid as a pre-condition for any grid extension project, potentially excluding the most marginalized rural communities.

In terms of decentralized solutions, the FSUE issued three tenders for off-grid electrification projects by 2018, totalling almost MXN 2 billion (or approximately USD 100 Million in 2019). Thirteen contractors were approved to develop the projects. The funds have been used to create credit schemes whereby the communities pay for the electricity at a discounted rate or the same rate as on-grid customers, usually for rooftop or stand-alone solar home systems. However, in some communities even the subsidized prices are too high, and it appears from the very limited data in media reports that affordability is still a barrier to electricity access for some communities gaining connections via the FSUE.

In summary, despite the FSUE's aim of providing an ESN to connect users to electricity, there appear to be challenges to delivering the program's intended impact, not least a lack of data. The López Obrador Administration is re-evaluating the FSUE and its operations are currently on hold.

PROVISION OF SUBSIDIZED LPG FOR HOUSEHOLD COOKING

Background, aims and implementing parties

In July 2017, during the Peña Nieto Administration, *Sedesol* and *SENER* launched a pilot initiative to sell LPG at reduced prices through the *Diconsa* network of state-owned distribution centers operating in rural and poor communities. These stores supply a basic range of goods at controlled prices to improve the nutrition and health of the communities. *Sedesol* stated that the subsidized LPG program was introduced to reduce firewood and coal usage in homes by promoting the use of efficient stoves. However, the pilot ended a year later in 2018. Analysis of the program is hampered by a complete lack of publicly available information regarding its design, implementation, evaluation and the reasons for its termination. Nonetheless,

the following summarizes what is known about this short-lived program.

Modalities

Under the program, *Sedesol* donated more than 13,000 sets of LPG stoves and 10 kg LPG cylinders to marginalized families in 15 municipalities across 12 states at a cost of MXN 12 million (USD 600,000 in 2019 prices) (*Sedesol* 2017b, 2017c). During the pilot, *Diconsa* shopkeepers provided space for LPG distributors in exchange for a share of the profits from the sale of replacement LPG cylinders (CFCE 2018). No information is available about which federal entities or municipalities benefited from this scheme, how they were selected or whether the beneficiaries were households living in poverty.

The LPG program had an indirect primary targeting mechanism. *Diconsa* stores (Box 5) are located in communities that are classified as marginalized, vulnerable or poor and that are typically small, rural settlements with fewer than 15,000 inhabitants. The stores cover a beneficiary population of 20.7 million people and are found nationwide (*Diconsa* 2018). However, the stores are concentrated in the

five states where 62 percent of the Mexican population living in poverty are located: Chiapas (3,376 stores); Guerrero (1,921); México (1,892); Oaxaca (2,637); and Veracruz (3,910) (*Diconsa* 2018).

The subsidized price of a 10 kg LPG cylinder was set at USD 7.94 (MXN 150) nationally. The amount of subsidy depended on the public price approved by the regulator and varied depending on the state. Nonetheless, the subsidy was considerably lower than that for the other 23 goods because LPG was considered a non-basic good.

Impact

The only three sources of information about this program are a 2017 report from *Sedesol* (*Sedesol* 2017c), news articles and statements from *Sedesol* and *SENER* Ministers (*Sedesol* 2017b), and interviews with key informants. The first two sources of information give no additional details to those already provided. Key informant interviewees for this case study remembered the program but were unable to provide more detailed information about its implementation. Thus, it is unknown how much LPG was sold under the program or what its cost or impacts were.

Box 5: *Diconsa*

Diconsa functions as a general social safety net that focuses on improving nutrition and health conditions for families living in poverty. It coordinates the sale of subsidized basic goods using a 27,000-strong state-owned grocery store network located in rural and marginalized communities. There are 23 reduced-price basic goods that can be purchased at less than half market price, with an overall 35 percent subsidy of those goods in 2018, compared to a commercial retail store.

Diconsa stores sell goods such as cotton, tortillas, phone cards, toys and clothing in addition to energy-related goods like firewood, charcoal, matches, lighters, light bulbs, flashlights and candles (*Diconsa* 2019). The sale of these goods may reflect the energy consumption needs of the communities where the shops are located, but further research would be required to confirm this assumption.

In summary, the program used the geographical targeting of an existing social safety net and attempted to provide support for marginalized,

poor, and vulnerable households to access cleaner cooking energy sources. However, little is known about its actual operation and effectiveness.

Figure 8

Distribution of Diconsa stores



Source: Diconsa 2016

Table 10

LPG subsidies through Diconsa stores by state

| STATE ^{viii} | AVERAGE PRICE | | DISCOUNTED PRICE | | BENEFIT | | BENEFIT PERCENTAGE |
|-----------------------|---------------|-----|------------------|-----|---------|-----|--------------------|
| | USD | MXN | USD | MXN | USD | MXN | |
| Guerrero | 9.10 | 172 | 7.94 | 150 | 1.16 | 22 | 12.9% |
| Michoacán | 9.10 | 172 | 7.94 | 150 | 1.16 | 22 | 12.9% |
| Veracruz | 8.99 | 170 | 7.94 | 150 | 1.06 | 20 | 11.8% |
| Jalisco | 8.94 | 169 | 7.94 | 150 | 1.01 | 19 | 11.5% |
| Yucatán | 9.05 | 171 | 7.94 | 150 | 1.11 | 21 | 12.3% |
| Morelos | 8.73 | 165 | 7.94 | 150 | 0.79 | 15 | 9.1% |
| Chiapas | 8.73 | 165 | 7.94 | 150 | 0.79 | 15 | 9.0% |
| Campeche | 8.62 | 163 | 7.94 | 150 | 0.69 | 13 | 8.0% |
| Hidalgo | 8.62 | 163 | 7.94 | 150 | 0.69 | 13 | 7.9% |
| México | 8.62 | 163 | 7.94 | 150 | 0.69 | 13 | 7.8% |
| Oaxaca | 8.52 | 161 | 7.94 | 150 | 0.58 | 11 | 6.8% |
| Ciudad de México | 8.52 | 161 | 7.94 | 150 | 0.58 | 11 | 6.8% |
| Tabasco | 8.41 | 159 | 7.94 | 150 | 0.48 | 9 | 5.2% |

Source: Sedesol 2017b, 2017c

CONCLUSIONS



This case study aimed to answer four overarching questions that steered this research and informed the data collection methods used. The conclusions below are therefore structured around these four questions.

Policy Measures

Energy access and energy poverty are becoming more important as concepts discussed in Mexican energy policy. Recently, energy poverty and marginalization were referenced in the López Obrador Administration's central planning document, *Plan Nacional de Desarrollo* (National Development Plan). Nevertheless, the concepts rarely not defined or accompanied by any specific criteria or metrics to facilitate their comprehension and measurement. Energy Safety Net (ESN) is a new concept that requires further explanation in order to be understood by stakeholders.

Notwithstanding these conceptual issues, this research highlighted four different measures in Mexico that fit the definition of an ESN: **differentiated electricity tariffs**, **Oportunidades Energéticas**, the **Fondo de Servicio Universal Eléctrico (FSUE)**, and **reduced-price LPG**. To summarize the findings on each ESN:

1. Differentiated electricity tariffs are a broad subsidy with a self-targeting mechanism that only subsidizes a basic amount of electricity, thus promoting access to a minimal level of consumption. Nevertheless, there is no clear rationale for why this minimum level has been set at 75 kWh per month and there has been no evaluation to determine how effective the subsidized tariff is in reducing energy poverty.
2. *Oportunidades Energéticas* was a five-year program that operated as an energy component of a wider social safety net. Reducing energy poverty was not the only driver for the program; it was also aimed at substituting polluting fuels with cleaner fuels. Despite

a rigorous targeting mechanism, there has been little published analysis of the program's effectiveness.

3. The FSUE was set up in 2013 to provide subsidies for electrification projects providing access to isolated rural and urban communities. It used an income poverty and remoteness-based targeting mechanism. Both grid extension and off-grid projects were included, with the latter providing consumer credit and in some cases subsidized electricity prices. There has been little analysis of its effectiveness and it is currently on hold pending review.
4. A short-lived provision of reduced-price LPG used a geographically based poverty targeting mechanism, as part of a wider program of subsidized goods provision using the Diconsa store network. Unfortunately, there is no evidence about the modalities and effectiveness of implementation, impacts, operating cost or beneficiaries. The program was a pilot and only lasted 18 months, from July 2017 to December 2018. Although a report of the *Comisión Federal de Competencia Económica* (2018) recommended expanding the scheme to all Diconsa stores, this has not taken place and the reasons it was terminated are unclear.

Effectiveness Of Energy Safety Nets

The four ESNs analyzed are similar in that they are not programs that fully support households' spending in energy goods and services. They are designed to cover only a portion of the cost of energy goods and services for those who most need support. The LPG distribution through Diconsa subsidized an average of 9 percent of the total cost of the LPG cylinder. *Oportunidades Energéticas* supported around 25 percent of families' total expenditure on energy goods and services. FSUE subsidized grid or electricity access for the target households but to an unknown extent. On average, the subsidized tariff structure meant

that Mexican households paid 46 percent of the full cost of their electricity consumption in 2015, with subsidies covering the remaining 54 percent. This support was more significant for the poorest households. For households in the lowest expenditure decile the electricity subsidy was equivalent to 4.2 percent of their total expenditure, compared with 0.3 percent for the highest decile (Hancevic et al. 2019).

In terms of their success in effectively enabling the poorest social groups to access and use modern energy services, the four ESNs have had different results.

Regarding discounted electricity tariffs, the electrification program in the 1970s and the IBT and VDT might have a positive impact in enabling the poorest social group to access and use modern energy services. However, this is an appropriate moment for the Mexican authorities to review the methodology used to set the lifeline block of consumption per household—which dates from the 1970s—and potentially change the level at which minimum consumption is set. Despite the availability of more energy-efficient appliances and lighting equipment, minimum energy consumption has grown in real terms due to an increase in the ownership of electronic devices per capita. There is a need to identify an acceptable minimum threshold for household electricity consumption and explain clearly how this relates to satisfying households' basic needs.

It is difficult to evaluate how well *Oportunidades Energéticas* contributed to improving energy access for poor and vulnerable households because no impact evaluations were conducted. A one-off report found that the program did not have a significant impact on alleviating energy poverty, nor did it help to promote the substitution of coal, diesel or firewood with cleaner cooking fuels because the cash transfer was insufficient to incentivize households to shift to cleaner energy sources. In addition, by design

the program excluded households who were not connected to the electricity grid who were likely to be less well off.

There is little analysis of the FSUE's impacts, but it seems to have had mixed results. On the one hand, it does not appear to have promoted access via grid extension because its resources were simply added to the budget of the state electricity utility whose plans were not amended to prioritize access for poor and marginalized communities. On the other hand, off-grid electrification projects have increased access by poor and remote communities with subsidized electricity access, although affordability remains a barrier in some cases. One repeated comment made by stakeholders during interviews was that any new FSUE initiative should be widened to support not only access to electricity but to clean cooking for the poorest and most vulnerable in rural and urban areas.

It is not possible to evaluate the impacts of the fourth ESN, the reduced-price LPG program, in terms of enabling the poorest social groups to access and use modern energy services and replace coal, firewood and diesel for cooking. There is not enough evidence to know if the pilot program in the 12 communities to which it was introduced was successful nor any factors that may have impact its success. In addition, as it was terminated for unknown reasons in 2018, it is difficult to understand if the program could be scalable.

Linkages to Social Assistance Programs

The discounted electricity tariff and FSUE ESNs were not linked to other social assistance programs. The former is a SHCP–CFE budget allocation mechanism that is negotiated every year and is a universally available subsidy not currently tied to an existing social assistance program. The FSUE was also not linked to any wider social assistance program but a specific income poverty and remoteness targeting mechanism was used.

The other two ESNs have close linkages to other social assistance programs. *Oportunidades Energéticas* was a component of a bigger social safety net, *Oportunidades*. To be eligible for *Oportunidades Energéticas*, households had to be part of the *Oportunidades* program. Registration was initially only available to communities selected through a government-led, geographically based targeting mechanism. Subsequently the program was made available across the whole country with every new applicant undergoing means testing.

In the same manner, the sale of LPG at a reduced price through Diconsa stores took advantage of a wider program that geographically targeted the poorest and most marginalized communities to distribute subsidized basic goods needed mainly for nutrition and health purposes.

Improving Energy Safety Nets

It is difficult to judge how effectively the four measures supported energy access because there has been little assessment of their impact. There is an absence of evidence to support proposals for changes in their design or operation to improve support for energy access for the poorest and most marginalized people in Mexico. Previous changes to these measures were driven more by political expediency than empirical evidence.

The energy policy reforms in 2013 mandated SENER, SHCP and Sedesol with the help of CRE and CONEVAL to deploy a targeted social assistance program to support timely and adequate access to energy at affordable prices for vulnerable groups of users. Further analysis would be needed on the specific policies and measures that could most effectively implement such a program. This would include further research on the four schemes examined in this case study, analysis of the as-yet-unimplemented tariff reforms proposed in 2013, and international best practice for ESNs.

ESNs in Mexico currently support access to electricity. Subsidized tariffs enable the poorest to consume electricity and FSUE supports connections in unconnected isolated communities. While the current discounted tariffs support the consumption of electricity by poor households, they are also regressive and improved targeting could substantially reduce the drain on public finances. One suggestion to reduce the fiscal burden is to extend coverage of the DAC tariff to the top quintile of electricity consumers in each tariff category (Sánchez et al. 2018). Another suggestion for tariff reform that might improve targeting is to apply VDTs at all consumption levels (IEA 2016). Adjusting the monthly consumption threshold to a level that matches the consumption of poor households or limiting subsidized tariffs to households eligible for social assistance could better target this support to those who need it most.

RECOMMENDATIONS



Mexico has a new political climate following the 2018 election of the López Obrador Administration. The electricity sector continues to operate under the previous, pre-2013 reform framework and it is unclear if, how or when the framework might change. Although further research and analysis are needed to improve understanding of the differential impacts on energy access and use of energy subsidies, energy safety nets (ESNs) and social assistance programs in Mexico, several recommendations emerge from this study:

- **Electricity tariff subsidies should be targeted to poor households.** To assist this, the Ministries of Energy (SENER) and Welfare (*Bienestar*) should collaborate to design a method that determines minimum consumption levels for electricity and cooking fuels. This could be used to revise the threshold level for DAC tariffs or determine eligibility for subsidized tariffs. Energy consumption should be measured in national surveys (e.g. ENCEVI and ENIGH) to support the implementation of targeted tariff subsidies.
- **The scope of the FSUE should be widened to support access to clean cooking technologies for the poorest and most vulnera-**

ble households. The promotion of access to off-grid electricity through the FSUE focuses on isolated communities. Access to clean cooking in rural and urban areas remains a challenge for low-income households, which could be addressed through the modalities of the FSUE.

- **Subnational governments and agencies should be involved in the design of ESNs.** Energy poverty is more visible in some states and municipalities than others, and regional differences in energy poverty need to be better understood. Subnational governments should be encouraged to measure and periodically evaluate levels of energy poverty in their jurisdictions and be involved in the targeting of beneficiaries for ESNs.
- **Further research should be undertaken to inform energy policy reforms and the design of ESNs.** This should include research on the impacts of ESNs and social assistance on energy access and use, the energy-poverty-gender nexus in Mexico and how energy access and ESNs can be integrated in other energy-related mechanisms and policies (e.g. FIDE, *Hipoteca Verde* and *Solar Bonus*).

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Endnotes

- i ENIGH is conducted every two years. At the time of writing, the 2018 survey had been conducted, but its results had not yet been published. The most recent results available are from ENIGH 2016.
- ii ENCEVI was published for the first time in 2018. There is no information on what its periodicity will be.
- iii A society that scores 0.0 on the Gini scale has perfect equality in income distribution. The higher the number over 0, the higher the inequality. A score of 1.0 indicates total inequality, where only one person in a community has an income.
- iv The United States by comparison has a Gini coefficient of 0.391; Canada scores 0.307, indicating less disparity between the wealthiest and the poorest.
- v One of the main criticisms of the targeting of beneficiaries under the *Oportunidades* system was that it excluded communities without health and education facilities. See: http://archivos.diputados.gob.mx/Centros_Estudio/Cesop/ISSSTE_2.pdf.
- vi Prior to the creation of CONEVAL, CONAPO, as the public institution that measured poverty in Mexico, did not use the INEGI national survey of income and expenditure (ENIGH) but its own methodology using data from the Population and Housing General Census.
- vii Calculations made using data from *Sedesol* (2017a), Banco de México (2019) and Gertler et al. (2007). These are not official figures.

GLOSSARY

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| <i>Centro Latinoamericano de Administración para el Desarrollo</i> | International organization created to promote the modernization of public administration and state reform in Latin-American countries. |
| <i>Comisión Federal de Electricidad</i> | State-owned electricity company. Until 2014 CFE enjoyed a legal monopoly. It remains the sole operator of the national transmission and distribution lines and the only company that operates as a residential supplier. |
| <i>Consejo Nacional de Evaluación de la Política de Desarrollo Social</i> | Independent government body responsible for measuring poverty and the evaluation of welfare policies and programs. |
| <i>Compañía Nacional de Subsistencias Populares</i> | State-owned company created in 1961 to regulate and control prices of basic goods. In 1999 it became part of Diconsa. |
| <i>Consejo Nacional para el Uso Eficiente de la Energía</i> | Government agency responsible for the promotion of efficient use of energy. It depends entirely on the Ministry of Energy (SENER). |
| <i>Distribuidora y comercializadora S.A.</i> | State-owned retail store network established to sell basic goods in rural and poor communities. |
| <i>Encuesta Nacional Ingreso – Gasto de los Hogares</i> | National survey launched in 1992 by INEGI to collect data about the income sources and expenditure of Mexican households. It is carried out every two years and the results are presented the following year. |
| <i>Encuesta Nacional sobre Consumo de Energéticos en Viviendas Particulares</i> | National survey launched in 2018 by CONUEE to obtain more in-depth information regarding energy consumption patterns in Mexican households. |
| <i>Fideicomiso para el Ahorro de Energía Eléctrica</i> | Created as a trust to promote access to efficient electric appliances for households through credits that were recovered using CFE bills, it later became an autonomous organization. |
| <i>Fondo de Servicio Universal Eléctrico</i> | Fund created to promote electrification for unconnected communities. |
| <i>Impuesto Especial sobre Producción y Servicios</i> | Tax that levies substantial federal excise rates on the sale of certain taxable items, such as gasoline, beer and tobacco. |

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|--|---|
| Instituto Federal Electoral (IFE) | Autonomous, public organization responsible for organizing federal elections in Mexico. It was replaced by the INE in 2014 as a result of a series of reforms. |
| Instituto Nacional Electoral (INE) | Autonomous, public organization responsible for organizing federal elections in Mexico. It replaced the IFE in 2014 as a result of a series of reforms. |
| Instituto Nacional de Estadística y Geografía (INEGI) | Autonomous government agency dedicated to coordinating the National System of Statistical and Geographical Information. It is responsible for performing several censuses and surveys and for gathering and processing other statistical information. |
| Ley de la Industria Eléctrica | Legal framework for the Mexican electricity sector after the energy reform. It was enacted in August 2014. |
| Movimiento de Regeneración Nacional | Mexican political party founded by Andrés Manuel López Obrador, the current President of Mexico. In 2018 it became the country's ruling political party. |
| Partido Acción Nacional | Mexican political party that governed under two administrations between 2000 and 2012. |
| Partido Revolucionario Institucional | Mexican political party in power from the 1930s until 2000 when it lost the elections. Returned to power in 2012 under Enrique Peña Nieto. |
| Petróleos Mexicanos (PEMEX) | State-owned oil & gas company. Until 2014 the company enjoyed a legal monopoly. |
| Secretaría del Bienestar | Formerly known as <i>Sedesol</i> , <i>Bienestar</i> is the Ministry of Welfare, the government body responsible for the oversight of welfare programs and poverty reduction strategies. |
| Secretaría de Energía | Ministry of Energy |
| Secretaría de Hacienda y Crédito Público | Ministry of Finance |
| Tarifa Doméstica de Alto Consumo (DAC) | Most expensive electricity tariff in Mexico. It penalizes households that consume more than regionally-defined thresholds. |

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