



Responses of the Electricity Sector in 120 Economies to the COVID-19 Pandemic

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This Brief provides descriptive evidence of the operational and policy responses of the electricity sector in 120 economies to the early stages of the COVID-19 pandemic. In addition, to assess the intensity of operational and regulatory actions taken in response to the pandemic, the Brief proposes a COVID-19 electricity sector response measure. This measure comprises seven equally weighted variables that capture either utilities' or utility regulators' responses to the pandemic as well as domestic lockdown measures. Data show that most utilities continued issuing new electricity connections for businesses amid the pandemic. In most cases, utilities that continued issuing new electricity connections despite national lockdowns were able to do so due to well-established electronic and automated processes. In general, maintenance works and planned outages continued during the onset of the pandemic, although with some delays and exceptions. Increasingly, delayed electricity payments and defaults became more prevalent, especially among developing economies. Hence, numerous utilities modified tariff and payment schedules to provide economic relief to clients.

The COVID-19 pandemic has disrupted power sectors worldwide

The COVID-19 pandemic has led to severe economic crises and a deterioration in public welfare, especially in developing countries with limited resources and acute challenges. The pandemic has also caused more disruptions to the energy sector than any other event in recent history since the Great Depression. The 2020 economic downturn in the electricity sector was eight times larger than that of the global financial crisis of 2009 and the disruptive impact is expected to be felt for years to come, the International Energy Agency (IEA) reports (IEA 2020a).

According to the IEA's December 2020 *Electricity Market Report* (IEA 2020b), in that year, global demand for energy dropped by 2 percent. In response to the rapid spread of COVID-19 during the first half of 2020, many economies imposed strict lockdown measures, resulting in business closures and suspension of nonessential activities. These measures disrupted operations of businesses across economic sectors, including power utilities, which provide essential services to businesses and households.

This Brief uses novel research data on measures undertaken by electricity distribution utilities in the 120 most populous economies to study electricity sector responses to the early stages of the COVID-19 pandemic (Box 1).

The data (collected as of May 1, 2020) focus on electricity connection processes and time frames, maintenance and upgrade work, planned outage schedules, changes in payment schedule and defaults, electricity tariffs, and subsidies. These measures range in scope and intensity across different economies. Power utilities continued issuing new connections and conducting electricity infrastructure maintenance and upgrades in more than 60 percent of the covered economies, as

electricity was one of the essential sectors allowed to continue operations despite the prevalence of the pandemic.

A deterioration in household welfare led to defaults and late payments of electricity bills in nearly 60 percent of the measured economies, with South Asia and Latin America reporting the highest average levels. To mitigate the impact of the crisis, governments around the world introduced measures to reduce or "freeze" tariffs and postpone electricity payments. Overall, high-income economies introduced more COVID-19 response measures in their electricity sectors than other income groups.

Low-income economies introduced relatively fewer COVID-19 response measures in the electricity sector compared to high-income ones

To assess the intensity of operational and/or regulatory actions taken in response to the pandemic, this Brief proposes a COVID-19 electricity sector response measure. The measure comprises seven equally weighted variables that capture either utilities' or utility regulators' responses to the pandemic and domestic lockdowns. The measure's components include the issuance of new connections; postponement of grid infrastructure maintenance projects; modifications of planned outages; extension of electricity service provision time frames; changes to electricity tariffs; changes to payment schedules; and the issuance of electricity subsidies. The measure is calculated as the share of these categories that were implemented in the country.

The measure merely captures the intensity of electricity sectors' responses to the pandemic and hence should not be interpreted as either positive or negative, since different countries face different

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Objective and disclaimer: This Brief uses novel and unique data collected by the Development Economics Indicators Group to provide descriptive evidence of the operational and policy responses of the electricity sector in 120 economies to the COVID-19 pandemic. These Briefs carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions are entirely those of the authors. They do not necessarily represent the views of the World Bank Group, its Executive Directors, or the governments they represent. All Briefs in the series can be accessed via: <https://www.worldbank.org/en/research/brief/global-indicators-briefs-series>.

Box 1 Data collection and composition

For the world's most populous economies, the World Bank's Development Economics Indicators Group conducted research on economy-wide effects of the COVID-19 pandemic and subsequent government response measures. In the case of the electricity sector, the data were collected by administering questionnaires to all the major utilities in 120 economies. In addition, the data on interruption of services at the electricity utilities were collected for the main business city in 191 economies, as well as for the second largest business city in 11 economies: Bangladesh, Brazil, China,

India, Indonesia, Japan, Mexico, Nigeria, Pakistan, the Russian Federation, and the United States.

The collected data are limited to the early stages of the pandemic—data collection commenced in February 2020 and finished by June 2020. Considering the unpredictable nature of COVID-19, the same economy could go into lockdown several times. Hence, these data give only a preliminary picture of the impact of COVID-19 on utilities' services and operations.

The following are the ten main questions administered to the utilities (excluding more detailed sub-questions):

1. Amid the COVID-19 outbreak, have there been any government-issued regulatory restrictions that impacted provision of nonemergency new electricity connections for businesses?
2. Is the utility doing nonessential new commercial electricity connections during the quarantine period or are such connections postponed?
3. What are considered to be essential electricity services?
4. Have infrastructure maintenance and upgrade projects been postponed? If yes, for how long?
5. Have the schedules for planned outages been modified?
6. Have the time frames to provide services related to electricity connection processes been extended?
7. Has there been a higher incidence of defaults/late payments than usual due to COVID-19?
8. Have electricity tariffs for commercial customers been affected?
9. Is the utility taking any measures to change/postpone electricity tariff payment schedules for commercial customers?
10. Is the utility receiving any short-term government subsidies to be able to continue steady operations?

When responses to questions were unclear or contradictory, the data collection team conducted extensive follow-up by email or over the phone. In cases where answers could not be clarified/reconciled,

they were treated as missing data. The response rate to the questionnaire was 96 percent. All the economies covered by the data collection exercise are listed in table 1 at the end of the Brief.

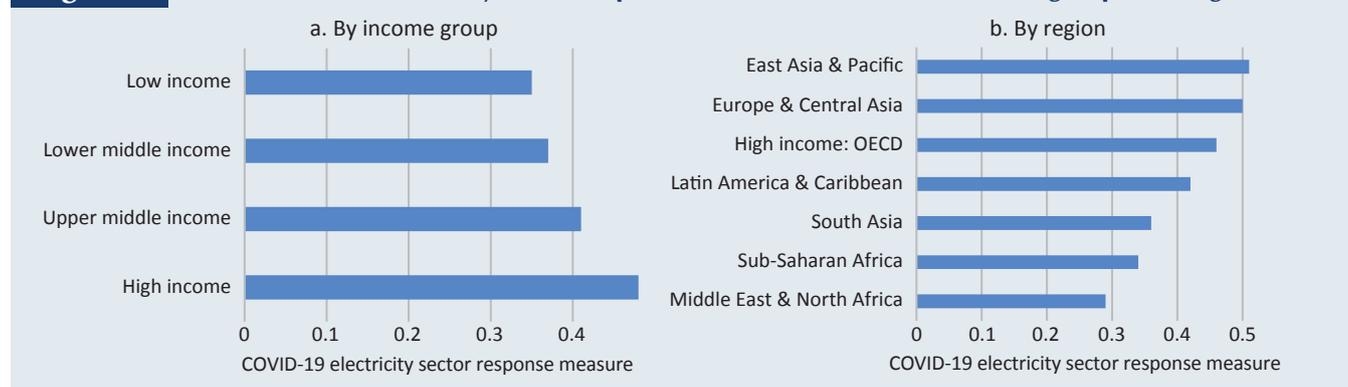
regulatory and operational challenges. For example, in a high-income country, with modern and robust electricity infrastructure, postponement of grid infrastructure maintenance projects in response to COVID-19 should not pose any problems. Conversely, in a country with an already unreliable electricity supply and dilapidated infrastructure, postponement of maintenance works might cause further structural damage and power cuts. Extension of timeframes to provide services related to electricity connection processes can also be more feasible in countries with sound electricity infrastructure where power supply emergencies and power grid malfunction are less frequent. Similar reasoning can be applied to modifications of planned outages as well as other components of the measure. Low-income economies also tend to be more vulnerable to COVID 19-induced power supply disruptions due to staff shortages, limited electronic service penetration and lack of financial liquidity. Such challenges may constrain the ability to enact the needed policy response measures and shift priorities within a short timeframe.

An analysis with the COVID-19 electricity sector response measure shows that high-income economies had a relatively stronger

operational and regulatory response to the pandemic within electricity sectors than low-income ones (Figure 1, panel a). Similarly, regional results demonstrate that utilities and utility regulators in East Asia and the Pacific, Europe and Central Asia, and the Organisation for Economic Co-operation and Development (OECD) high-income group took more measures in response to the pandemic's impact on the electricity sector than elsewhere in the world. By region, the index ranges from the lowest in the Middle East and North Africa region to the highest in East Asia and the Pacific (Figure 1, panel b).

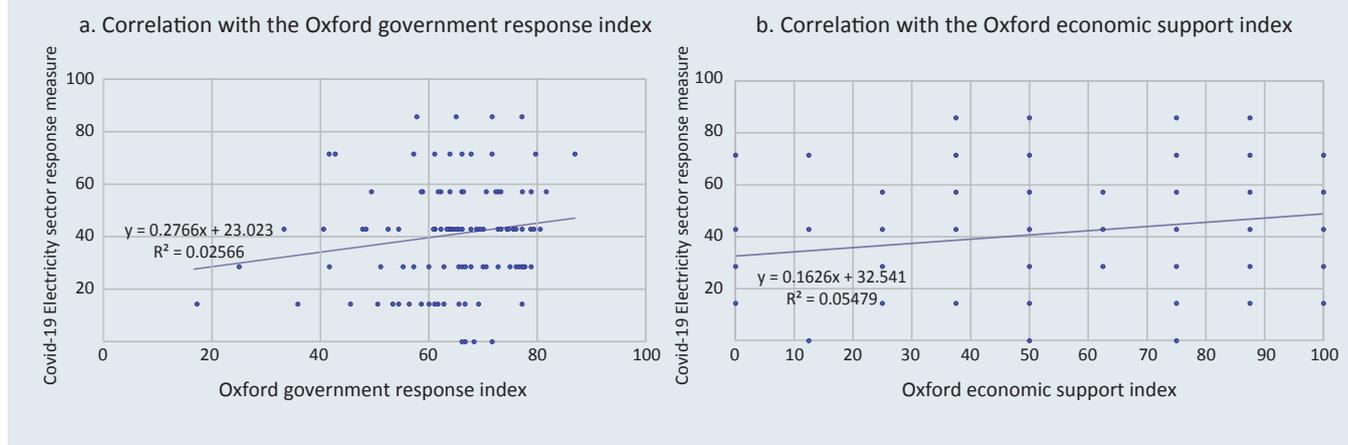
As implied by the pattern across income groups, the COVID-19 electricity sector response measure has a positive relationship with economies' GDP per capita in purchasing power parity (PPP) terms, indicating that electricity utilities and policy makers in wealthier economies demonstrated a stronger response to the pandemic's impact on the electricity sector. Furthermore, the response to the pandemic in the electricity sector measure is positively correlated with the Oxford COVID-19 government response index (Figure 2, panel a). The government response index includes policies such as government income support to the unemployed, debt/contract relief for households,

Figure 1 The COVID-19 electricity sector response measure varies across income groups and regions



Source: World Bank, Global Indicators research database.

Note: Higher scores on the index indicate a greater response in more areas. OECD = Organisation for Economic Co-operation and Development.

Figure 2**The COVID-19 electricity sector response measure is correlated with the OXFORD COVID-19 indexes**

Source: World Bank, Global Indicators research database.

Note: Higher scores on the index indicate a greater response in more areas. OECD = Organisation for Economic Co-operation and Development.

school and workplace closures, stay at home requirements, and international travel controls. The COVID-19 electricity sector response measure is also correlated with the Oxford economic support index (Oxford COVID-19 Government Response Tracker) (Hale et al. 2021). Therefore, it is reasonable to assume that the information captured by the COVID-19 electricity sector response measure is aligned with other measures of government responses to the pandemic.

Most utilities continued issuing new electricity connections for businesses amid the pandemic

With the onset of the pandemic, one challenge faced by electricity sector across the world was to continue the uninterrupted issuance of new electricity connections. The process of receiving a new connection includes submission of applications, signing contracts with electricity utilities, all necessary inspections, clearances from the distribution utility as well as from other agencies, and the external and final connection works. In the first half of 2020, however, new electricity connections continued to be issued in the majority of economies and across different income groups: in 80 percent of surveyed low-income economies; in nearly 70 percent of upper-middle-income and low-income and in more than 60 percent of lower-middle-income.

In many such economies, the continuity of issuing new electricity connections was less affected by the pandemic because the electricity sector provides essential services to different sectors of the economy. As a result, power distributors continued to operate near full capacity and provided new connections without any major disruptions. For instance, the Czech Republic continued rendering full services despite social distancing measures and a national lockdown, although some customers experienced delays in receiving new connections due to limited personnel. In fact, public utilities in the country were able to provide 90 percent of their services, except the metering of smaller customers and households as well as physical operation of customer service centers.

Many utilities that continued issuing new electricity connections despite national lockdowns were able to do so due to well-established electronic and automated processes. For example, in Azerbaijan, ASAN service centers, a state agency making public services more accessible to citizens using modern technologies, never stopped processing new online applications, and regular connection services were granted without any major delays or disruptions. Likewise, during initial surges of COVID-19, electricity grid companies in Ukraine were issuing new commercial electricity connections in nearly the same way as before the pandemic. DTEK Kyiv Electric Networks ceased receiving in-person customers at service centers but continued providing services remotely through online platforms and electronic communication.

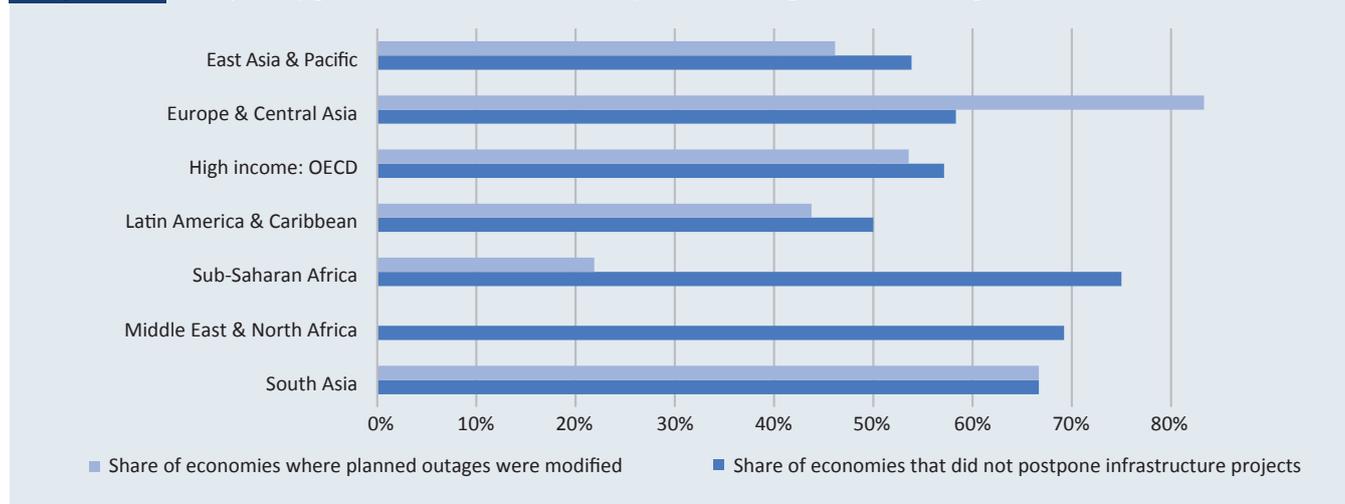
Some developing economies fully stopped the issuance of new electricity connections, or they allowed new connections only for essential sectors such as health care or food supply. For example, among economies in the Latin America and Caribbean region, the Dominican Republic and Peru provided only high-priority connections, including those to hospital centers, national security agencies, emergency services, armed forces, national police, civil defense, food trade, sewage and water services, telecommunications, ports, and airports.

With many nationwide full and partial lockdowns, about one-quarter of utilities worldwide extended the time frames for providing electricity connection services due to pandemic-induced delays. Across income groups, the extension of connection time frames was most prevalent in upper-middle and high-income economies. At the same time, extensions and delays ranged from 20–30 days in Rwanda to several months in Pakistan.

Maintenance works and planned outages continued globally in most economies, although to a lesser extent

In contrast to the provision of new electricity connections, a large share of utilities worldwide postponed grid upgrade and maintenance work, following regulatory guidelines to limit nonessential services. A notable exception by region is Sub-Saharan Africa, where 75 percent of utilities in the surveyed economies continued with their routine operations (Figure 3). Electricity-related services in the region were largely considered essential during the pandemic, though at the time of the surveys most economies were not in lockdowns. In contrast, half of the economies in the Latin America and Caribbean region halted grid upgrade and electricity infrastructure maintenance projects.

In the first months of the pandemic, schedules for planned outages (such as outages to perform maintenance, repairs, and installation works on the electricity network) remained completely unchanged in the Middle East and North Africa region. Further, power utilities in less than 50 percent of economies in Sub-Saharan Africa, Latin America and Caribbean, and East Asia and Pacific modified planned outage schedules. For example, in Colombia planned outages that did not have any direct impact on customers were carried forward, while those that required substantial system interruptions were put on hold. Many more utilities in high-income economies (53 percent) modified outage schedules, especially nonessential ones, than in low-income ones (21 percent). In particular, Turkey made changes to power shutdown schedules, postponing repair work of electric networks, such as cable power lines, transformer stations, and substations. Also, in Ireland, no planned outages during the quarantine period were permitted as more emphasis was placed on avoiding widespread domestic outages due to home working and schooling.

Figure 3 Project upgrades and modification of planned outages varied by region

Source: World Bank, Global Indicators research database.

Note: OECD = Organisation for Economic Co-operation and Development.

Delayed payments and defaults increased for electricity utilities during the early stage of the pandemic

Amid the COVID-19 outbreak, delays in electricity payments and even defaults have been widespread across all regions. Among the economies in the sample, those in the South Asia region recorded the highest incidence of delayed payments and defaults. In Bangladesh, for example, even financially viable customers were not able to pay electricity bills because most commercial bank branches remained closed. As a result, the monthly revenues of the Dhaka Electric Supply Company (DESCO) plummeted, which adversely affected DESCO's ability to pay the bulk electricity supplier, the Bangladesh Power Development Board. At the same time, more than 85 percent of economies in the Latin America and Caribbean region experienced higher incidences of defaults and nonpayments by all types of customers. This was largely driven by a general slowdown of economic activity, social distancing measures, and curfews, coupled with rising levels of unemployment.

As some economies adopted regulations to allow customers to defer electricity bill payments, the number of delayed payments naturally increased. In Honduras, the Empresa de Energía de Honduras (EEH) reported a 30 percent decline year-on-year in bill collection revenues between March and May 2020. Likewise, higher incidences of defaults and delayed payments were reported in around 60 percent of economies in Europe and Central Asia and among the OECD members. In the case of a Kazakhstan's power supply company, overdue payments increased by almost 29 percent compared to a corresponding period of the previous year. In Serbia, the total bill collection rate was reported to be 30 percent lower than before the pandemic.

Electricity tariffs and payment schedules were modified to offer economic relief to businesses and households in many economies

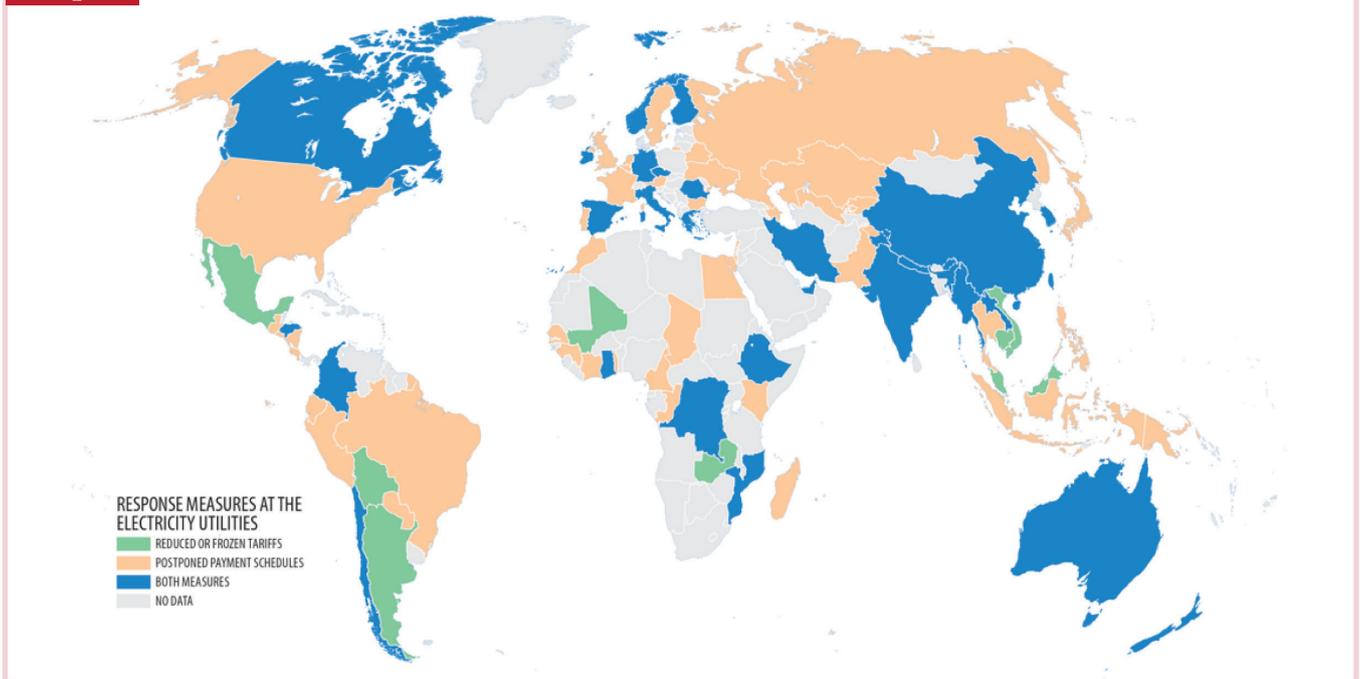
During the first wave of the pandemic governments worldwide took measures to either reduce or avoid increases in electricity tariffs to mitigate financial burdens on businesses and households. About 70 percent of economies in East Asia and the Pacific implemented measures affecting electricity tariffs at least during lockdown periods (map 1). In Cambodia and Lao PDR, residential electricity tariffs have been reduced by 10 percent. Utilities in other economies in the region—including China; Hong Kong SAR, China; and Malaysia—have also reduced tariffs for business customers. Likewise, almost half of the OECD high-income economies either reduced or froze electricity charges.

Around 30 percent of economies in South Asia and Latin America and Caribbean regions also implemented measures affecting electricity tariffs. Utilities in India and Nepal waived parts of electricity tariffs for the duration of lockdowns. In Honduras, in the first half of 2020, electricity tariffs for commercial customers were reduced by more than 15 percent. Conversely, electricity tariff reductions were the exception in Europe and Central Asia. Only Serbia reduced electricity tariffs during the pandemic and did so by 16 to 23 percent, while Romania issued a regulation prohibiting suppliers from increasing electricity tariffs (Military Ordinance no. 4/2020, published in the Official Gazette Part I, No. 257 of 29 March 2020).

Across all income groups, policy measures related to electricity tariffs were most heavily implemented in higher-income economies, whereas in lower-income ones such measures were considerably less widespread (Figure 4). A possible explanation for this could be that utilities in low-income economies have less liquidity and financial reserves to offset tariff rate reductions during the crisis. Before the pandemic, energy subsidies already amounted to 5–10 percent of GDP in some economies, accounting for a significant share of fiscal deficits and exacerbating public indebtedness (Rzeczpospolita 2014). In general, governments in lower-income economies have limited fiscal resources and hence are less likely to offer tariff reduction or postponement, which was also the case during the COVID-19 pandemic (Clements and Parry 2018).

Before the pandemic, many economies had already been indirectly subsidizing electricity supply and power generation. According to a World Bank study on Sub-Saharan Africa, official electricity tariffs in many African economies often did not even cover operational costs (Kojima, Bacon, and Trimble 2014). While energy price subsidies can provide financial relief to households and businesses, they do not discriminate recipients based on financial need and social status. A study of 32 developing countries found that energy price subsidies tend to largely benefit high-income households: the richest 20 percent of households benefit over six times more from tariff reductions than the poorest 20 percent (Coady, Flamini, and Sears 2015). Instead, utilities could take more targeted measures to lower the financial burden for certain customers, including poor households, households in informal settlements, or those that use little electricity, through preferential subsidies (Komives et al. 2005).

As of May 1, 2020, only 17 economies offered short-term, pandemic-driven government subsidies to electricity utilities. None of the OECD member states, for example, introduced financial support packages for electricity utilities. Conversely, in Europe and Central Asia and Sub-Saharan Africa about one-quarter of electricity utilities received at least some short-term government subsidies to be able to continue steady operations amid the pandemic. For example,

Map 1 Many economies modified electricity tariffs or postponed bill payment schedules, or did both

Source: World Bank, Global Indicators research database. Question on whether electricity tariffs were affected; Question on whether the utility was taking any measures to change/postpone electricity tariff payment schedules for commercial customers.

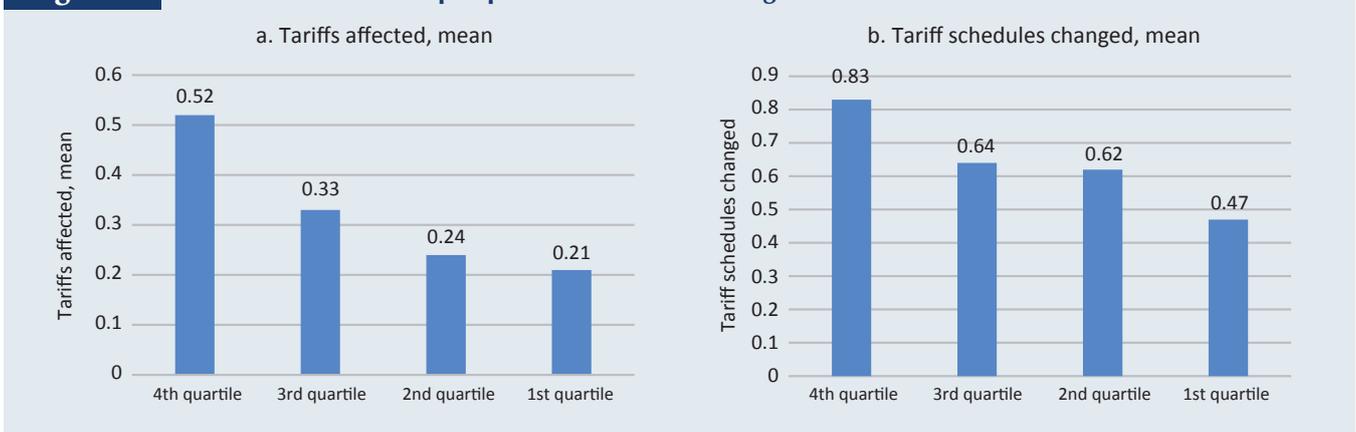
Azerbaijan's utility, Azerishiq OJSC, received subsidies as compensation for discounted prices provided to customers during the pandemic. Notably, in terms of income level, short-term subsidies to the electricity utilities were mostly provided in low-income economies.

Some governments provided direct financial support to utilities during the pandemic. According to the IFC's research, in eight out of 67 sampled countries - Brazil, Colombia, India, Mexico, Pakistan, Peru, South Africa and South Korea – governments provided either direct or indirect liquidity support to utilities. In addition, in 29 economies (43 percent of the sample) governments offered budget support to utilities, mostly targeting consumer tariffs (Apfalter et al. 2020). In 2020, the Pakistani federal government introduced a relief package equivalent to 2.9 percent of GDP with one of the key measures being electricity bill payment relief. In Afghanistan, the government waived electricity bills of less than Af 1,000 (US\$ 13) for Kabul's households for a two-month period, which benefited more than 1.5

million residents (IMF). India's government provided a financial relief package for the power sector with a three-month moratorium on state-owned electricity distribution companies to make payments for bought electricity (Mint 2020). The government in Ghana took a decision to absorb most of the electricity costs during the lockdown periods (BBC 2020). And in Burkina Faso, the government introduced a 50% reduction in electricity bills and canceled penalties on invoices by the country's major utility companies (Présidence du Faso 2020).

Conclusion

During the first months of the pandemic, different countries faced different economic and social realities and regulatory policy responses within electricity sectors varied considerably across regions and income groups. Despite this heterogeneity, the new data do reveal some notable trends and conclusions. Not surprisingly, electricity connection services were less distorted in economies with

Figure 4 Tariff reductions and postponements benefited high-income customers the most

Source: World Bank, Global Indicators research database. Question on whether electricity tariffs were affected; Question on whether the utility was taking any measures to change/postpone electricity tariff payment schedules for commercial customers; World Development Indicators: GNI per capita (Atlas method) for 2019

Table 1 The 120 economies that responded to the COVID-19 electricity sector regulatory response questionnaire

Afghanistan	Congo, Rep.	Iran, Islamic Rep.	New Zealand	Spain
Algeria	Costa Rica	Iraq	Nicaragua	Sri Lanka
Angola	Côte d'Ivoire	Ireland	Niger	Sudan
Argentina	Czech Republic	Israel	Nigeria	Sweden
Australia	Denmark	Italy	Norway	Switzerland
Austria	Dominican Republic	Japan	Pakistan	Syrian Arab Republic
Azerbaijan	Ecuador	Jordan	Papua New Guinea	Taiwan, China
Bangladesh	Egypt, Arab Rep.	Kazakhstan	Paraguay	Tajikistan
Belarus	El Salvador	Kenya	Peru	Tanzania
Belgium	Eritrea	Korea, Rep.	Philippines	Thailand
Benin	Ethiopia	Kyrgyz Republic	Poland	Togo
Bolivia	Finland	Lao PDR	Portugal	Tunisia
Brazil	France	Lebanon	Romania	Turkey
Bulgaria	Germany	Libya	Russian Federation	Uganda
Burkina Faso	Ghana	Madagascar	Rwanda	Ukraine
Burundi	Greece	Malawi	Saudi Arabia	United Arab Emirates
Cambodia	Guatemala	Malaysia	Senegal	United Kingdom
Cameroon	Guinea	Mali	Serbia	United States
Canada	Haiti	Mexico	Sierra Leone	Uzbekistan
Chad	Honduras	Morocco	Singapore	Venezuela, RB
Chile	Hong Kong SAR, China	Mozambique	Slovak Republic	Vietnam
China	Hungary	Myanmar	Somalia	Yemen, Rep.
Colombia	India	Nepal	South Africa	Zambia
Congo, Dem. Rep.	Indonesia	Netherlands	South Sudan	Zimbabwe

well-functioning and advanced electronic platforms. Maintenance work and planned outages were put on hold in most middle- and high-income economies, while the majority of low-income economies could not afford to delay these processes significantly. Measures to modify electricity tariffs and postpone bill payment schedules were pursued mostly in the richest quartile of global economies during the first wave of the pandemic. Overall, due to better resilience of their

electricity distribution and generation networks, high-income economies with stronger electricity market fundamentals were able to offset the impact of the pandemic and national lockdown measures on the electricity sector more effectively than the middle- and low-income ones. Follow-up rounds of data collection could be implemented to gain a better understanding of how power sectors worldwide have adapted to operating during the pandemic as it has proceeded.

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