

Financially solvent utilities for improved energy access

Rishu Garg

Key messages



Electricity distribution utilities drive the expansion of energy access and the transition to clean energy. With the COVID-19 pandemic deteriorating the financial health of utilities, measures at operational, institutional, financial, and commercial levels should be initiated to make utilities economically sound and future-ready.



Utilities must strive to become decarbonised, decentralised, and digitalised with a paradigm shift in their operations, particularly in planning, load forecasting, and energy utilisation in the grid. This can be accomplished by creating smaller profit and loss units within the distribution utilities to make operational-level officials more commercially inclined to the overall goal.



Technical and commercial losses damage the operational and financial health of a utility. Given that COVID-19 has aggravated these losses further, investments in smart technologies must be improved and expedited to aid in reducing losses and assist utilities in making the transformation to a digitalised world.



Reducing regional disparity in fund disbursements and introducing homogeneity of investment in the power sub-sectors can help utilities ensure system efficiency, grid extension, and renewable energy integration. Furthermore, bridging the investment gap through proper routing of funds for solar-based mini-grids can resolve the energy access problem, especially in rural and remote areas.



Utilities should be able to earn enough to recover the cost of supplying power. Precise targeting of subsidies for consumers and ensuring cost-reflective tariffs can be instrumental in building self-sustaining utilities.

■ Financially solvent utilities for improved energy access

Energy is at the heart of human development. Universal access to energy can be a key driver in socio-economic development in emerging economies, alleviating poverty, contributing to gender equality and raising the overall standard of living.

The importance of access to electricity is recognised through the adoption of the United Nations Sustainable Development Goals (SDGs). SDG 7 aims to “ensure access to affordable, reliable, sustainable, and modern energy for all” (United Nations, 2019). One of the indicators to measure progress on SDG 7 is identifying the proportion of the population with access to electricity. A household is considered to have access to electricity when it can power basic services such as a light bulb, a fan, a phone charger, and a television (International Energy Agency [IEA], 2020a).

■ Our Common Agenda report

To mark the 75th anniversary of the UN, member states asked the Secretary-General to prepare “recommendations to advance Our Common Agenda and respond to current and future challenges” (United Nations, 2020a). Thereby, the Our Common Agenda (OCA) report is an agenda of action designed to accelerate the implementation of existing agreements, including the SDGs. The OCA report outlines key proposals for the 12 commitments agreed upon by member states in the UN declaration signed in commemoration of its 75th anniversary. Energy is a key factor underpinning these commitments, and utilities are a key aspect to ensuring the availability of energy that is clean and accessible. This policy brief seeks to accelerate progress on two commitments, namely: 1) leave no one behind, and 2) build trust (United Nations, 2021). The financial health of utilities greatly impacts States’ abilities to implement transitions to cleaner and more environmentally friendly sources of energy and achieve net-zero emissions by 2050, as outlined in the OCA report. The policy recommendations suggest ways to provide universal energy access—moving one step closer to achieving SDG 7—and also propose the development of transparent and accountable institutions to improve long-term public experience with these utilities.

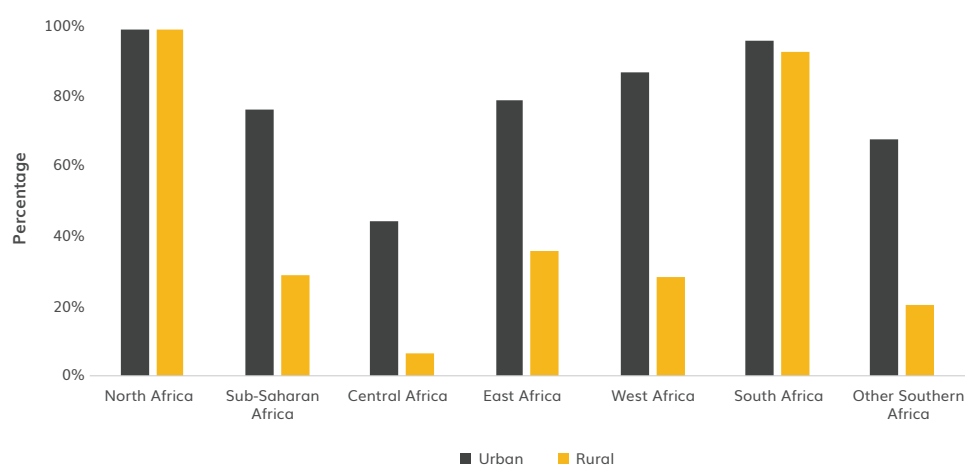
■ Current status in the Global South

According to the International Energy Agency’s World Energy Outlook 2020, 90% of the world’s population in 2019 had access to electricity as compared to 80% in 2010. The progress was mainly dependent on increased access in Latin America and Asia, with access levels reaching

97% and 96%, respectively, by 2019 (International Energy Agency, 2021). Also, by 2019 over 99% of India's population had access to electricity, which contributed in large part to Asia's progress. As per IEA estimates, Asia is on track to achieving universal access by 2030.

However, 771 million people worldwide are still without electricity, with most situated in Sub-Saharan Africa. While North Africa has been successful in achieving 97% access to electricity, around 52% (578 million) of the population in Sub-Saharan Africa is still without electricity. Another important characteristic of this metric is the urban-rural divide. While 76% of the urban population in Sub-Saharan Africa has access to electricity, the proportion decreases substantially to only 29% in rural areas (Figure 1). Central Africa is the region most affected, with only 6% of the rural population having access to electricity, compared to 44% of the urban population, resulting in a total population connectivity rate of 24% (IEA, 2020).

■ **Figure 1. Proportion of the population with access to electricity (2019)**



Note. Reconstructed from 'IEA World Energy Outlook' by International Energy Agency (2020b).

■ Challenges in expanding access

Efforts to expand energy access are commonly deterred by high connection costs, low population density (especially in rural areas), high revenue leakage, high operational costs, and low demand from productive users, among other factors. Connecting an additional household in most African countries is unprofitable. For instance, in Uganda, most users are unable to pay the USD 165-per-household grid connection fees and additional home wiring charges (United States Agency for International Development, 2020). In such cases, it is difficult for utility companies to recover costs without raising tariffs.

Although the cost of extending access is high, the cost of continued lack of electricity access is even higher. According to recent World Bank estimates, USD 35 billion is required to attain universal access (United Nations, 2020b). However, the lack of electricity can result in major economic losses by suppressing investment in income-generating electrical appliances, as well as by hindering entrepreneurship and job creation. 41.7% and 46.1% of firms in Sub-Saharan Africa and South Asia, respectively, see electricity as a major constraint to entrepreneurship and job creation (Energy and Economic Growth, 2021). Besides reducing employment opportunities, lack of access to electricity can also inhibit the participation of women and youth in the workforce such as by making domestic chores more labour-intensive.

■ Impact of COVID-19 on utility revenue

The advent of COVID-19 in 2019 upended the world with its far-reaching impacts on global health and other sectors. Many governments across the world resorted to stringent lockdown measures to contain the spread, resulting in a reduction of business activities.

The global financial effects of the pandemic did not spare the energy sector, as utility revenues across the globe saw considerable decreases. This also slowed the progress made in electrification, and in some cases (such as utilities in Africa), even reversed the progress already accomplished. One major reason for revenue loss was reduced consumption from the industrial and commercial sectors (one of the high-paying consumer categories) due to enforced lockdowns. In Sub-Saharan Africa, the decline in energy sales to this consumer category led to a loss of 70% of electric utilities' revenues, creating a liquidity crunch (Apfalter, Holmes, Pereira Mendes, & Toba, 2020). The loss was severe in India and Nepal as well, as industrial and commercial consumers cross-subsidised residential and agricultural consumers. In one state in India, the decline in energy consumption by commercial and industrial consumers resulted in a revenue loss of INR 380 crores (USD 51.2 million) generated via cross-subsidy from March to April 2020 (Garg & EV, 2020).

The losses were not limited to industrial and commercial consumers. Residential consumers delayed bill payments due to reduced income or loss of livelihood. Consequently, in 2020, electricity distribution companies in India and South Africa incurred revenue losses of USD 400 million and USD 240 million (PTI, 2020; Apfalter et al., 2020), respectively. Suspended meter-reading and physical delivery of bills during the lockdown also resulted in revenue loss in many countries. For instance, in Nepal, the electricity bill collection rate dropped to less than 10% from the average of 95% (Apfalter et al., 2020). Government measures allowing for

non- or reduced payments by consumers, payment deferrals, and prohibiting disconnections for non-payment of dues also affected the financial health of utilities. However, universal energy access can only be achieved if utilities become self-sustaining.

■ Challenges in expanding access

Operational recommendations

Utilities should become future-ready

The power sector is at the cusp of a major transformation. The rapid evolution of disruptive technologies—electric vehicle ecosystems, storage (short- and long-term), smart grid elements, new types of loads, decentralised generation, and integration of variable renewable energy—are leading to an energy future that is decarbonised, decentralised, and digitalised. However, existing utilities are not acting as catalysts of this transformation by only focusing on day-to-day crisis management. For a smooth transition to a future-ready mechanism, a paradigm shift in utilities' operations such as optimised planning, accurate load forecasting, and energy utilisation in the grid is required. The future growth of utilities must be envisaged through the structuring of service delivery either through a centralised model, decentralised model, or an enmeshing network of micro-utilities. Creating future-ready utilities also aligns with the requirement under the UN Secretary-General's OCA report of having "solidarity with future generations" (United Nations, 2021). Future-ready utilities should be built in a way that fosters long-term, progressive action, and adaptability.

Reduce technical and commercial losses

Electricity loss (the difference between the amount of electricity entering the network and delivered to the end-consumer) is a key indicator for measuring the operational efficiency and financial sustainability of a distribution utility. Non-technical losses or commercial losses (non-payment of bills and electricity theft) alone cost utilities an estimated USD 25 billion per year worldwide (Energy and Economic Growth, 2021). In India, 1% of technical and commercial loss is equal to INR 4000 crores (USD 544 million) of revenue lost (Ministry of Power of India, 2015). Thus, the lower the electricity losses, the greater the financial sustainability of utilities will be. The additional revenues gained from reducing electricity loss can increase cost recovery, improve utilities' capacity to invest, and enhance infrastructure maintenance, modernisation, and technical upgrades. Utilities are accountable to the consumers and are required to adopt financial integrity as one of their business values, as outlined in the OCA report.

Only then can a culture of transparency and accountability be fostered, which can help in combating illicit financial flows. Reducing technical and commercial losses can, thus, pave the way for creating efficient and responsible utilities, thereby providing universal access to electricity. Technical losses can be cut down by upgrading old distribution infrastructure with aerial bundled cables, network reconfiguration, and high voltage distribution systems (HVDS). For reduction in commercial losses, measures should be employed such as effective metering of consumption, accurate billing, 100% bill issuance, and efficient collection mechanisms to recover dues from consumers. Initiating consumer awareness programmes and establishing 'vigilance squads' to detect theft will help reduce losses further.

Use of smart metering and prepaid metering

To avoid losses related to theft, revenue leakage, and non-payment of bills, investments should be made in smart metering and prepaid metering initiatives. By monitoring energy consumption in real-time, smart metering can help utilities take action through remote disconnection in case of non-payment of dues. Thus, smart

metering assists with improving consumer billing while reducing manual meter reading costs for utilities. Prepaid metering can also assist in advance revenue collection and deter illegal consumption (Das & Stern, 2020). Many African utilities are under-metered and suffer high non-technical and collection loss rates. The African Development Bank forecasts an increase in revenue collection by USD 187 million annually in the residential sector alone due to prepaid metering (United States Agency for International Development [USAID], 2020). In India, the installation of 25 crores of smart prepaid meters has been mandated recently to reduce revenue leakage and improve bill collection (Ministry of Power of India, 2021). However, before a large-scale roll-out of such initiatives, an impact assessment study must be conducted. This is a critical step as it would aid in understanding the incremental benefits that a programme can provide vis-à-vis with the cost that has been/will be incurred. The success achieved in pilot studies may not yield the same result when implemented on a large scale because of the changes in consumer behaviour, geography, policies, etc. In such events, a cost-benefit analysis is an integral step. Also, building trust between people and institutions has been considered a significant challenge by the UN. Turning traditional utilities into digital utilities will enhance transparency and accessibility for consumers, leading to enhanced levels of trust between the two stakeholders. Therefore, there is a need to bridge the investment gap for digital technologies (smart and



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prepaid metering), especially in emerging markets. It has been observed that most advanced economies invest more in smart meters than do developing economies. For instance, only USD 2 billion was invested in smart meters in emerging markets and developing economies between 2016 and 2020 as compared to USD 10 billion in advanced economies. Therefore, there is a need to monitor and improve the total investment made in smart technologies in developing nations.

Digital payment platforms

The pandemic affected many utilities' face-to-face revenue collection models, raising major concerns around non-technical losses and cost recovery. Meter readers in most developing countries visit consumers to read meters, record consumption, and deliver bills. Consumers pay their bills either at utility offices or other payment locations. However, restricted movement due to the pandemic has impacted this model of revenue recovery. Electronic payment of bills is impractical for those without an internet connection, a computer, or a smartphone. Therefore, there is an urgent need to focus on the expansion of the mobile payment market to achieve a more effective recovery during unforeseen situations such as lockdowns, and for ensuring the self-sustainability of utilities in the long term.

Increase agricultural productivity through the use of solar energy

Around 23% of Sub-Saharan Africa's gross domestic product (GDP) comes from agriculture, with 60% of the population being smallholder farmers (Goedde et al., 2019). There is a need to put a concerted effort into increasing productivity at the agricultural level by utilising low-cost renewable energy. Investments must be made in expanding the use of solar-based agriculture for better yield. For instance, in India, the central government launched a similar scheme in March 2019, wherein individual farmers with grid-connected agriculture pumps were supported to solarise pumps, with the central and state governments contributing 30% of the benchmark cost and a 30% subsidy, respectively, with the remaining 40% cost being borne by the individual farmer (Ministry of New and Renewable Energy of India, 2019). Under the scheme, farmers are able to use the generated solar power to meet their irrigation needs and are allowed to sell the excess solar power to electricity distribution companies (DISCOMs) at a pre-determined tariff. Governments in the Global South should support such schemes to ensure better access as well as a reliable and quality power supply.

Create strategic business units (SBUs) at the operational level

There is a dire need to establish increased accountability in the distribution sector. Officials at all levels of a distribution utility should understand the value of revenue realisation commensurate with the energy supplied. Institutional restructuring, in terms of making smaller profit and loss units within the distribution utilities, could assist in making officials at the operational level more commercially inclined to the overall goal. Furthermore, a performance monitoring mechanism should be developed for officials. Officials should be evaluated on key performance indicators (such as percentage of loss reduction, number of consumers/transformers metered, the percentage reduction in transformer failure rate, etc.) and incentivised on the targets achieved and penalised for any deviations. This would assist in developing more accountability related to the implementation and monitoring of initiatives.

Unbundling of utilities

Most of the utilities in the Global South are vertically integrated, with the generation, transmission, and distribution being operated by a single entity. A vertically unbundled utility would be better able to focus on its core objective. The general wisdom is that the increased focus could lead to an improvement in performance. Vertical unbundling allows for greater transparency on matters of financial management and cost accounting within the system. Equally important, it is a fundamental requirement for good governance and to maintain accountability between the energy sector and the society it serves. Transparency and good governance create a more attractive environment for lenders and investors, contributing to lower costs associated with capital investment and financing. Horizontal unbundling often accompanies vertical unbundling, promoting competition with the entry of new players into the sector. Horizontal unbundling of utilities can prepare the way for a decentralised model of the functioning and add more value with enhanced business opportunities. Multi-player avenues can also help in decoupling modern energy services such as cooling, cold storage, and electric vehicle charging infrastructure through decentralised renewable energy service providers. Competition between actors providing the same goods or services is seen as desirable because it supports greater efficiency, aids in alleviating energy poverty through modern energy services, and enables least-cost service provision. Reducing costs can decrease consumers' price for electricity services or the rate at which prices increase over time. Horizontal unbundling also increases the resilience of the electricity sector, which needs to be taken into account while developing business models for utilities. If one company has a

power shortage due to poor management or supplier issues, another company can compensate for this change in availability.

Make data available

If you can't measure, you can't manage. The role and demonstration of data are important to monitor and reduce system losses. It is the key to improving the quality and reliability of power for the end-user. The OCA report also identifies quality data as a vital factor for better anticipation and preparedness with regard to large-scale global crises. However, the absence of data for analysis remains a major hurdle in the success of most programmes. There is a severe data shortage on household electrification and electrical loss levels. Also, wherever data is available, authenticity is lacking. The classification of electrical loss into technical and non-technical loss is still not available, which makes it even more difficult for utilities to take corrective measures to reduce losses. Utilities need to either be involved at the field level or engage third-party agencies to gather authentic and reliable data. Reliable information could assist in identifying electricity access gaps and aid in strategising universal electrification programmes. Data also helps in understanding the impact of an initiative already being implemented. The IEA was recently awarded a USD 1.5 million grant to implement Power Africa's Data-Driven Electrification Planning Program (USAID, 2020). The programme is expected to improve data collection on electricity access in Sub-Saharan Africa and enhance geospatial analysis to formulate more effective electricity access policies. There is a need to replicate such efforts in other parts of the world for better data and quality information.

Grid-tied solar mini-grids

The solar-based mini-grid is being promoted as a key player in resolving the energy access problem, especially in rural and remote areas. Mini-grids are independent, decentralised electricity networks that can function on their own. Therefore, in places with topographical challenges, mini-grids are the ideal solution (Mishra and Bharadwaj, 2019). Although mini-grids are said to have high upfront infrastructure costs, they would still be less than the costs incurred in expanding the traditional grid. Upon realising the potential of mini-grids in expanding energy access, sizeable funding is being invested by private and impact investors, donors, non-governmental organisations and development finance institutions in various parts of the world. However, there is a sizeable gap between the availability of funding and its utilisation. Since 2012, Sub-Saharan Africa has received up to USD 1.6 billion in funding for mini-grids. However, according to the Africa Mini-grid Developers Association (AMDA), only 13% of the approved funding had been

distributed up to September 2020 (Adegoke, 2020). With the continent needing as many as 140,000 mini-grids to achieve universal energy access, any significant achievement may take time without the proper routing of funds and a favourable regulatory environment. The investment gap needs to be bridged through innovative public, private, and blended financing arrangements. Typically, the choice of finance tools depends on the stage of the mini-grid project and the associated investment risk. Public finance tools can include grants and subsidies for mini-grid projects. The government can provide subsidies to incentivise private mini-grid developers who can then bid for additional project funding from development banks. Private investors may offer equity or debt financing. Further, getting the right investment arrangement depends on getting the right policies and regulations in place.

Utilities orientation for renewable energy

Utilities in Sub-Saharan Africa have been marred by debts due to the excessive signing of power purchase agreements (PPAs) with large-scale conventional plants. Most of these power purchase agreements come under a take-or-pay condition (the cost for idle capacity has to be passed to consumers). As a result, most of the commercial entities have started on-site generation. This trend needs to be reflected upon by utilities in terms of retaining their high-paying consumers and modifying their business models. Power sector utilities need to be re-oriented towards renewable energy through the utilisation of distributed renewable energy sources. The regulator should also be supported to not view distributed renewable energy as a competitor but develop policies to integrate renewable energy into utilities' least-cost business models. The OCA report highlights the need for a healthy planet for all. Making utilities renewable and energy-friendly can assist countries to transition smoothly to an era of net-zero emissions, improving the health of the planet and its inhabitants.

Commercial recommendations

Target subsidies

National governments have always been more than willing to assist utilities in recovering their costs. Governments provide subsidies so that distribution utilities recover the costs incurred in setting up the infrastructure and supplying power to consumers at an affordable cost. However, these subsidies are mostly misused, with consumers tending to consume more electricity. In such cases, while the utility supplies more electricity, it receives subsidies only for the allocated power and not for actual consumption. Therefore, subsidies must be targeted in such a way that only the deserving benefit from them. Precise targeting of subsidies

tailored to each household is required (Sharma et al., 2019). More effective targeting ensures less financial leakage and higher efficacy of funding outflow from the government. The subsidies should be given directly to the consumer based on their economic condition (providing for the vulnerable) and actual consumption. Therefore, national, state, and regional level datasets on income, assets, and consumption should be made available before formulating subsidy allocation so that it reaches the desired consumer. Alternatively, subsidies can also be provided in the form of capital assistance, as is the case in India's PM-KUSUM Scheme,¹ wherein the government provides a 60% subsidy to farmers. 30% of the cost is accounted for by the government in the form of loans, with farmers bearing only 10% of the total project cost.

Cost-reflective tariffs

The large revenue gap in most utilities is mainly due to the fact that consumer tariffs do not reflect or attempt to recover the overall costs incurred by the utilities. In other words, the tariffs are not cost-reflective. There are two ways to make tariffs cost-reflective: 1) by increasing the consumer tariffs, or 2) by lowering the cost of generation. Increased tariffs will make electricity prohibitively expensive and unaffordable for most consumers in developing countries. Therefore, the focus should be on lowering the cost of generation by developing least-cost business models. Grid-scale renewables should be adopted instead of heavy and costly fossil/conventional fuels in order to reduce costs. Large fossil fuel-based plants with low utilisation and high-capacity payments add to the average cost of power generation. Developing nations must abandon these large plants and focus instead on small to medium-sized projects. There is also a need to deal with the issue of over-optimistic demand estimates resulting in the development of over-capacity of supply. More realistic demand forecasts are needed to resolve the problem of over-capacity. The financial sustainability of utilities is linked to cost recovery (capital expenditure, operating expenses, and a 'profit margin'). There is no alternative method to attain sustainability other than a good business model.

Financial recommendations

Consolidation of debt

Over the years, various forms of funding have fuelled the power sector across the world. However, proper utilisation of funds on the ground is yet to be actualised. Therefore, there is a need to properly account for and

¹ Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Scheme

consolidate all debts on utilities' balance sheets. This is critical as funding to the power sector is displacing funds for infrastructure development and the acceleration of socio-economic and human development. Furthermore, there is a need to improve transparency and the timely reporting of data and accounts so that utilities' finances and institutions lending to the power sector can be properly monitored and evaluated. During the COVID-19 pandemic, sound fiscal management is more important than ever because a lack of revenue will force governments to borrow more or reduce expenditures, impacting the socio-economic development of the countries involved.

Homogeneity of investment

There is a need for homogeneity of investment in all power sub-sectors while considering future prospects. At present, various countries in Africa are investing a significant portion of credit in a generation rather than in transmission and distribution. The investments in power distribution need to intensify to ensure system efficiency, grid extension, and renewable energy integration. Given the high renewable energy target to achieve net-zero emissions, strengthening distribution utilities is important as they are the 'off-takers' of this renewable energy. There is also a need to reduce the regional disparity in fund disbursements. One way to achieve that is to utilise the lessons learned from countries that were able to attract high private investments.

Mandate environment, social and governance reporting

Environment, social and governance (ESG) is a matrix for assessing the positive impact of financial performance and operations of a business on social and environmental practices. Funders, investors, and lending institutions should mandate ESG reporting for utilities and link the disbursement of funds to it. Companies with high ESG rankings and ratings should benefit from a lower cost of capital for both debt and equity. This would send a strong signal to utilities that funds will be allocated only to those who are committed to conducting their business in a manner that takes ESG factors into account (Paramo et al., 2020).

■ Way forward

Although efforts to achieve universal access are underway, the COVID-19 pandemic has had a wide-scale impact, with around 660 million people expected to be without access to electricity in 2030. On the other hand, to achieve net-zero emissions by 2050, a clear shift to low-carbon energy sources is an unavoidable next step. Thus, the utilities that can drive both access expansion and clean energy transition need to be commercially sound and earn sufficient revenue to recover the costs. The above-

recommended measures should be implemented by keeping in mind the region-specific and localised environment rather than a universal approach. Further, urgent collective efforts by national governments, regional organisations, development actors, international financial institutions, and other relevant multilateral institutions would need to be expedited. Only then can a self-sustaining and future-ready utility be created, which can help in advancing the commitments under the Our Common Agenda report.

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