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EPIC
ENERGY POLICY INSTITUTE
AT THE UNIVERSITY OF CHICAGO

International Growth Centre

Electricity is not a right: How social norms constrain access to electricity

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The norm that electricity is a right, as opposed to a private good, constrains access to energy and leads to widespread rationing in developing countries.

Many developing countries suffer from low electricity access and frequent outages that restrict economic growth. These conditions arise from two primary factors: The norm that electricity is a right guaranteed by the government and the technological constraint that non-payers cannot easily be excluded from electricity access. To fix this problem, energy distributors should consider reforming subsidies, incentivising bill payment, and using technology to facilitate excludability.

Virtually everyone in the developed world has access to 24-hour electricity, which powers everything from reading lamps to smartphones. This widespread use of electricity is a key ingredient for economic growth. A growing body of economic literature demonstrates this link: reliable electricity can boost employment (especially among women), long-run labour productivity, educational outcomes, and household income (Dinkelman, 2011; Lipscomb et al., 2013).

A recent International Growth Centre (IGC) study in Ethiopia suggests that electrification can help catalyse structural changes in village economies by increasing agricultural yields and lowering rural-urban migration rates (Fried and Lagakos, 2017). Another IGC study in Indonesia finds that grid rollout can stimulate industrial development by encouraging firm entry and exit and increasing average productivity (Kassem, 2018).

Unfortunately, many developing countries are missing this critical ingredient for growth. The poorest 25% of countries consume a negligible 1% of the electricity consumed in the United States, while their GDP is 3% of that of the United States. Thus, inequality in electricity consumption is much more pronounced than inequality in income. While all consumers in rich countries have electricity access, the number falls to 35% in the poorest countries (bottom quartile).

This brief presents a key reason for poor electricity access in the developing world: the widespread social norm that electricity is a right. It explains how this public perception ultimately translates into limited electricity access and proposes some potential policy solutions, based on work undertaken by the Energy Policy Institute at the University of Chicago (EPIC) in collaboration with the IGC in a number of developing countries (Burgess et al., 2019).

KEY MESSAGES:

1 **Electricity access is seen as a right in developing countries.**

Data from across the world show power priced consistently below cost and low revenue recovery. Evidence from Bihar shows that consumers believe that power non-payment or theft is unlikely to attract penalties and bigger consumers of electricity are just as likely to not pay as smaller ones. These observations are all consistent with electricity being viewed as a right, and losses being a feature of the entire market not a result of redistribution towards the poor.

2 **Electricity distributors incur large losses due to non-payment, compelling them to limit access and ration electricity.**

Heavily subsidised tariffs, theft, and delinquent bill payments cause power utilities to lose money on every unit sold and make large losses. Distributors respond with rationing, despite sufficient capacity – causing outages and limited grid access.

3 **Delinking electricity supply and payment results in rationing for non-market reasons.**

The lack of relationship between bill payment rates and the quality of electricity supply creates a vicious cycle of poor access to power. Instead, rationing is determined by non-market reasons such as political considerations, weather conditions, and public pressure, as illustrated by microdata from Bihar.

4 **Developing countries need innovative policy solutions**

The challenge for developing countries is to ensure that the poor receive lifeline amounts of electricity without causing markets to fail. To do this, policymakers must shift public perception on electricity from a right towards a private good, for example through: tariff reform to reduce subsidies, incentive schemes and social trust mechanisms to improve collection, and technology to make electricity excludable to non-payers.

KEY MESSAGE 1

Electricity access is seen as a right in developing countries

In much of the developing world, electricity is perceived as a right. In other words, there is a widespread belief that everyone deserves power regardless of whether they are willing or able to pay for it. Understanding how to remove this perception, while at the same time ensuring the poor can access lifeline supplies, requires gathering detailed data on consumer perceptions.

For example, surveys carried out by EPIC and IGC researchers in Bihar, India (see Figure 1), show the vast majority of customers do not believe they will be penalised for not paying their bills, tampering with meters, stealing electricity, or bribing bill collectors – all of which are illegal activities. These attitudes stand in contrast to how consumers in developing countries view payment for private goods, such as cell phones. While it is up for debate whether cell phones are as important as electricity, we find that the poor spend **three times more** on cell phones than on electricity, 1.7% versus 0.6% of total expenditures. These small shares suggest the gap between electricity usage and payment is driven by the norm of non-payment rather than budget constraints.

When governments discuss electricity in terms of being a right, and tolerate widespread non-payment, theft, or bribery, they risk cementing this social norm within citizens at **all income levels**, rendering it impossible to recover the costs of power, and thus impossible to supply energy.

A look at electricity tariff structures around the world reveals the size of subsidies provided to customers. Across all income ranges, prices follow a "step" function, with distributors charging less for consumers who use small amounts of power and marginal price increases corresponding to the amount of electricity used.

The first step in this tariff structure is often called the 'lifeline' tariff, which provides low-quantity consumers with power at only a fraction of the cost of production. Unfortunately, because most consumers in low-income countries are low-quantity consumers, electricity distribution companies are thus destined to lose money even if consumers pay all their bills. This makes it challenging for these companies to buy and supply more power, predictably resulting in widespread outages.

The perception that electricity is a right affects payment rates for both poor and rich consumers. As an example, Figure 2 utilises administrative billing data from Bihar and plots the collection rate against monthly electricity consumed, averaged across each month in 2018 for the subset of households that actually receive bills. Bill collection rates in Bihar were generally under 50% across all consumers and roughly flat across the income distribution, suggesting that bigger consumers are just as delinquent on their electricity bills as smaller ones.

More than half of losses come from households using more than 100 KwH per month, despite them making up a small share of domestic consumers in Bihar. This finding suggests there are large customers who are administratively known to the utility, but who neglect payment and perpetually accumulate debt. This points to the conclusion that de facto low prices (due to subsidies, theft, and non-payment) are available to all and are the accepted and agreed upon policy of the state underscoring that this is not a matter of an expensive redistribution program but a feature of the entire electricity market. This has far-reaching consequences for electricity access and the quality of supply in developing countries.

Figure 1: Local revenue sources

Responses to: If you did X, how likely would it be that you would incur any penalty from the distribution company?			
	Likely	Neutral	Unlikely
Paying your bill late	10.1%	13.6%	76.3%
Modifying your meter	7.9%	18.2%	73.9%
Having an informal hooked connection	7.6%	14.2%	78.0%
Bribing electricity officials	12.2%	24.5%	63.3%

Source: Burgess et al., 2019.

KEY MESSAGE 2

Electricity distributors incur large losses due to non-payment, compelling them to limit access and ration electricity

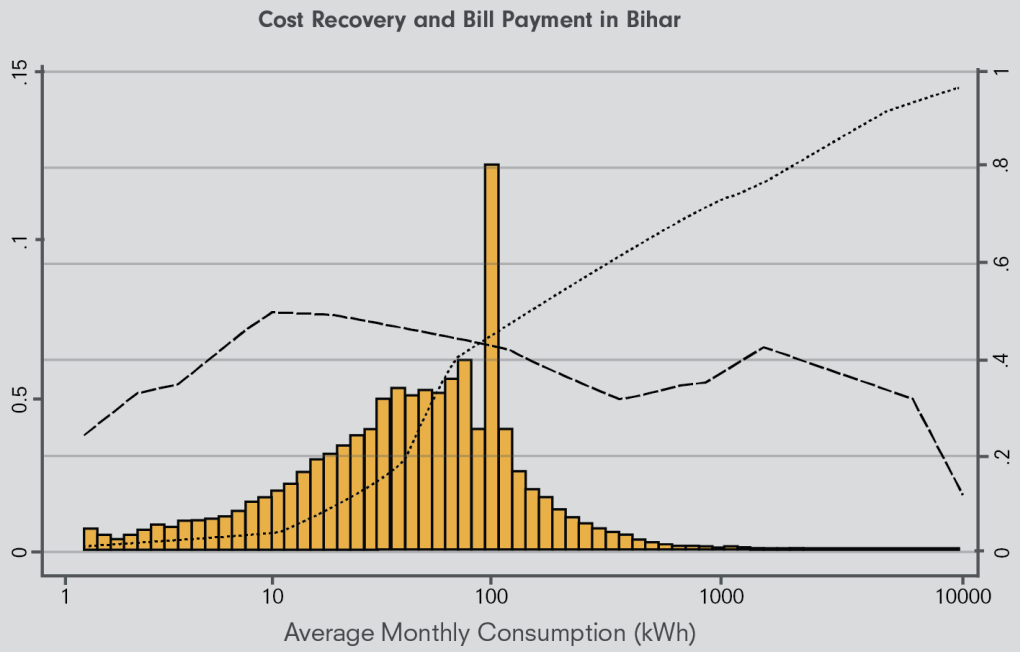
Subsidies and non-payment often lead to crippling losses for state utility companies. Figure 3 illustrates the road to insolvency for the electricity utility in Bihar, India, from the official rate down to actual revenue collected. Strikingly, the power authority is only able to collect an average revenue of 30% of the cost of supply and less than 20% of the official rate. Thus, the distribution companies lose 70 INR for every 100 INR of electricity supplied.

A large component of these losses comes from steep government subsidies, a common feature of developing country policy (see Figure 3). However, a similarly large fraction of losses come from theft (power that isused but not paid for) and non-payment (power that is billed but not paid for).

Technical losses of 5 - 10% due to electricity being lost as it flows down electricity lines affect utilities in developed and developing countries, but account for a relatively small portion of losses in developing countries. What divides utilities in developed and developing countries is the much higher prevalence of subsidies, theft, and non-payment in the latter. In Data from power utilities around the world reflects this picture: transmission and distribution (T&D) losses move from 23% in the poorest quartile of countries to just 6% in the richest quartile.

The consequences of mounting power debts for developing country government finances are severe enough to have macroeconomic consequences. Electricity debt in Pakistan recently grew to as large as 4% of gross domestic product (GDP) (Babar, 2018). Likewise, India's distribution companies required bailouts in 2001, 2011, 2016, and 2017, and power debts in India reached US$ 62.5 billion (2.4% of GDP) in mid-2018, threatening to instigate a financial crisis (TFE, 2018). These large losses also make remedies more difficult: In Nigeria, power sector debt has discouraged private investment in generation (Akwagyriram and Carsten, 2018). When losses become crippling, utilities must take action to limit them in order to continue operations.

Figure 2: Cost recovery and bill payment in Bihar, India



Source: Burgess et al., 2019.

THE PARADOX OF ELECTRICITY AS A RIGHT

Utilities typically respond to mounting losses by rationing supply. This accounts for the deliberately opaque name of 'load shedding', which amounts to a company choosing to provide less of its product - even though some customers are willing to pay more than the cost of supply. Distributors that fail to recoup costs lack incentives to expand access beyond the minimum required by their agreements with governments.

National power supply data from India illustrates the extent of rationing. In 2011-12, for example, virtually no households enjoyed uninterrupted 24-hour electricity. The median urban household received 19 hours of power per day, while its rural counterpart received only ten hours per day. In other words, rationing results in the disruptive outages to which much of the developing has become accustomed.

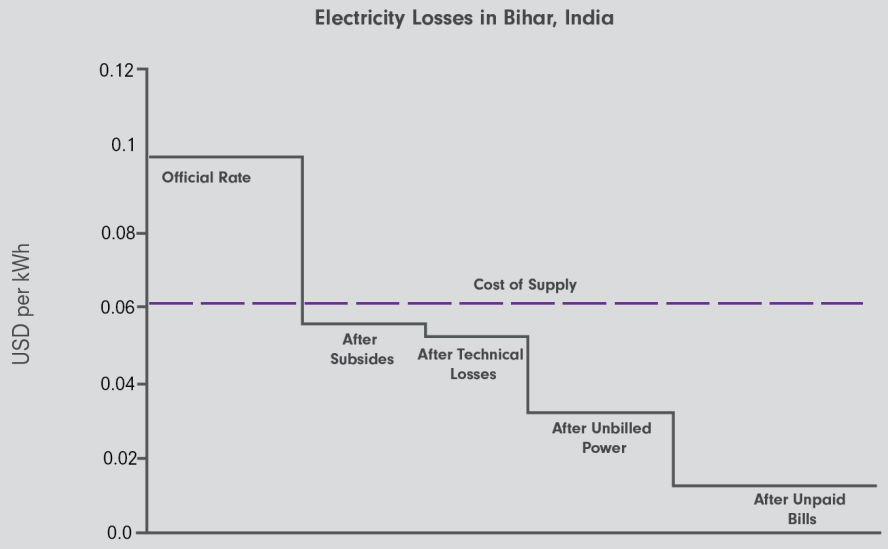
The paradox then is that treating electricity as a right ultimately limits people's access to it. Facing large losses, utilities have a disincentive to invest in expanding access, maintaining infrastructure, or building generation capacity. A study of power supply in Colombia supports the notion that subsidies and low repayment rates deter investment in modernising electricity distribution infrastructure (McRae, 2015).

In turn, the resulting poor energy supply can discourage bill payments, creating a vicious feedback loop between poor supply and non-payment. A recent IGC study uses data from households in Ghana during and after a power crisis to show that households facing rolling blackouts accumulate larger unpaid balances, which is consistent with such a negative feedback loop (Dzansi et al., 2018).

Crucially, utilities ration because of the disincentive to supply all customers, not due to scarcity of generation capacity. In 2012, India only utilised 70% of its coal plant capacity, falling to 55% in 2018. Similarly, Pakistan has significant unused coal plant capacity, while Ethiopia does not employ its full hydropower resources. Therefore, at its heart, rationing is a demand issue driven by the norm that electricity is a right, not a capacity issue.

Across the developing world, customers either lack access or receive a patchy power supply, with frequent outages and voltage fluctuations. This is particularly problematic because there are many consumers willing to pay more to secure a 24-hour electricity connection (of the type that is enjoyed across the developed world) but are unable to do so. This situation severely constrains economic growth and development.

Figure 3: Electricity losses in Bihar, India



Source: Burgess et al., 2019.

KEY MESSAGE 3

Delinking electricity supply and payment results in rationing for non-market reasons

High enforcement costs, technological constraints, and the ease of theft prevent distributors from cutting off access only to households that fail to pay for consumption. Current technology does not allow for easy targeting of supply, which means that individual households can't be excluded. Power distribution companies thus face the option of rationing supply at a higher level (e.g., at the feeder level in Bihar, which comprises about 2,500 households and businesses). The surprising result from the EPIC-IGC study in Bihar, is that the distributors do not do so: Feeder-level data shows no relationship between payment rates and the amount of electricity supplied.

This finding indicates that non-economic factors are at play. Electric utilities in developing countries are not behaving like profit-maximising firms. Even if a utility is physically able to cut off a group of delinquent customers, the perceived right to electricity for all citizens may render it unwilling to do so. Under the social norm that energy is a right, the allocation of power is no longer performed on economic grounds, just as the pricing of power is not.

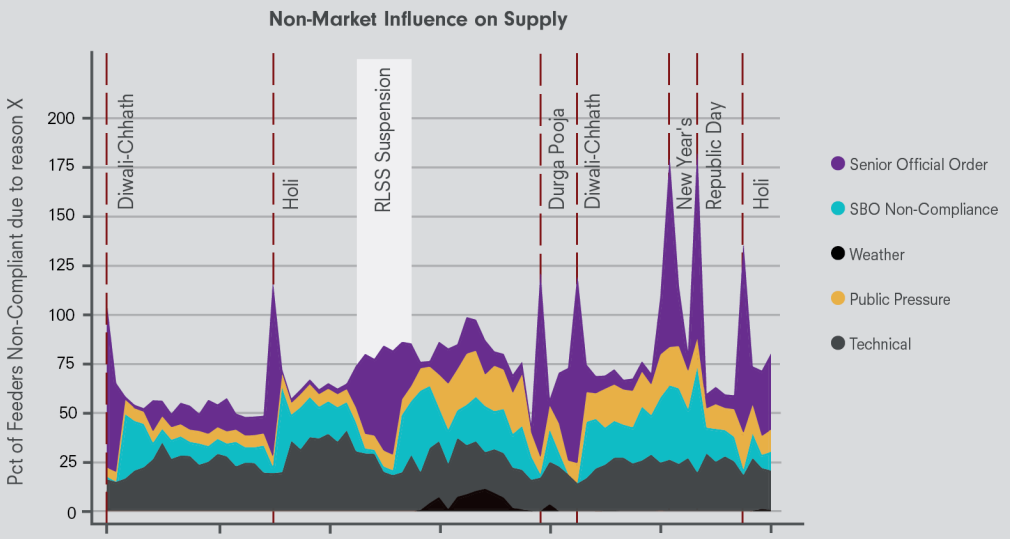
The right to electricity also politicises allocation: If citizens engage in protests regarding electricity received, or equivalently, if politicians promise to deliver more power in exchange for votes, the right to electricity can feed directly into the supply decisions of utilities through politics. Governments that ultimately have to bail out the utilities end up dictating where electricity flows to.

Data collected in the EPIC-IGC study in Bihar illustrates the non-economic factors behind electricity allocation. Figure 4 shows deviation from mandated production schedules over the course of 1.5 years. Operators have significant discretion to deviate from the production schedule and researchers disaggregate those deviations using administrative data. Weather and technical constraints play some role, but the majority of deviations are political or bureaucratic in nature. The biggest spikes in deviation, when many areas get more power, are during widely celebrated public holidays. This evidence adds to a growing literature on the connection between politics and electricity supply (Mahadevan, 2019; Asher and Novosad, 2017; Baskaran, Min and Uppal, 2015; Shaukat, 2018).

The fact that electric utilities allocate supply based on non-economic factors further strengthens the idea that electricity is not a commodity that must be paid for like other services. If protesting for power yields results, consumers are even less likely to pay for electricity in the future. Thus, this vicious cycle leads to supply of electricity and payment becoming delinked.

As a result, developing countries face large welfare losses since customers willing to pay for electricity supply are not able to purchase it. The value created from businesses that require reliable power, or just the simple enjoyment of watching a film uninterrupted by a sudden blackout, is foregone in societies where electricity is viewed as a right.

Figure 4: Non-market influences on supply in Bihar, India



KEY MESSAGE 4

Developing countries need innovative policy solutions

To break this vicious cycle and transition towards universal, 24-hour electricity access, utilities in developing countries need to break the norm of electricity as a right.

EPIC and IGC researchers offer a group of solutions that individually address the problems of subsidies, theft, and non-payment – all with the goal of changing the way people think about power. Ultimately, the aim is to switch people to thinking about electricity as a private good that needs to be paid for (like cell phones) rather than as a right. Taken together, these policy measures could play powerful roles in preventing electricity distribution companies from descending into insolvency.

TARIFF REFORM

The first major policy lever is tariff reform. Specifically, governments could eliminate explicit subsidies for electricity. This requires divorcing the goal of redistribution from the goal of providing electricity at full cost. This is especially attractive because, as discussed above, large subsidies are enjoyed along the entire income distribution, which makes them both regressive and implicitly supportive of the social norm that electricity is a right. For example, electricity subsidies could be replaced by a system of unconditional, direct benefit cash transfers targeted at the poorest. These transfers could be calibrated to match current tariff schedules but would be much more difficult for rich households to receive. An IGC paper shows how a direct benefit transfer programme that replaced subsidies for LPG in India led to decreased household fuel purchases by 11-14%, suggesting that it was effective at reducing leakages (Barnwal, 2018).

SOCIAL AND PERFORMANCE INCENTIVES

The second policy tool is to tackle low repayment rates through social incentives or more effective payment collection. By enforcing a system that explicitly links feeder supply to neighbourhood payment rates, policymakers could shift the perception of electricity from a public good to a private good.

In Bihar, an ongoing EPIC-IGC study has instituted a group payment incentive scheme covering 28 million people, in which communities that pay more for power receive more power. This scheme explicitly links hours of grid electricity enjoyed by a community to bill collection rates via a transparent and heavily publicised schedule. Preliminary evidence shows that such a system leads to increases in both revenue and energy supply, making it a win-win for the customer and electricity distribution company (Burgess et al., 2019). A second policy option in this space is to introduce performance incentives for bill collectors to increase their collections. This could help stimulate collection efforts and reduce collusion (e.g., bribes) between collectors and customers. Another EPIC-IGC study in Bihar is examining the effects of such an incentive scheme (Burgess et al., 2019).

SOCIAL TRUST

A third policy reform might be to harness social trust to finance expansion. Rural grid expansion in the United States was driven by the use of rural electrification cooperatives (RECs) made up of groups of farmers who maintained the grid and collected bills (Lewis and Severnini, 2017; Kitchens and Fishback, 2015). If collection agents are your neighbours, it may be more difficult to avoid repayment. Electrification efforts in China were aided by similar local engagement with the electricity sector, through the hiring of farmers as part-time bill collectors (Aklin et al., 2018). Given the dire state of electricity distribution across the developing world, thinking about how trust within communities can be harnessed to increase the reach and quality of grid electricity is an important policy direction for governments to consider.

TECHNOLOGY: SMART METERS

Finally, policymakers can use technology to ease payment and restrict access for non-paying customers. Prepaid smart meters, which are becoming increasingly available, allow utilities to make electricity excludable at the household or business level, which can erode the perception of electricity as a right. In an IGC study in South Africa, prepaid meters led to a 13% drop in electricity usage and boosted profitability for the utility, indicating that the technology was successful in forcing consumers to pay for the electricity they used (Jack and Smith, forthcoming).

An EPIC-IGC study is currently being designed to see how smart meters can help break the non-payment problem for rural and urban consumers in Bihar (Burgess et al., 2019). Nevertheless, smart meters will be of limited use if consumers can hook directly onto power lines or wire around meters. Policymakers will need to use a combination of policy instruments and tailor approaches to their local context.

Policy Recomendations

This brief has laid out the implications of the norm that electricity is a right on access to power in developing countries. Ironically, insisting that all consumers should have equal access to electricity regardless of payment leads to limited, unreliable supply for most, including those who are willing to pay more than they are charged.

While it is critical to provide lifeline style electricity to the poorest, doing so in a way that causes electricity markets to fail harms everyone and stifles economic growth. This suggests that there is an important role for policy to "break" the norm that electricity is a right and re-link supply and demand for power. Several complementary policy options stand out:

- In general, policymakers in developing countries should seek to tackle electricity non-payment issues in addition to traditional generation capacity concerns.
- Refining electricity subsidies to only target the poorest citizens can help break the norm that electricity is a right for all.
- Incentivising bill payment, either by cutting off non-paying communities or by properly incentivising bill collectors, can also restore the link between electricity supply and demand.
- New technologies such as affordable prepaid meters can improve distributors' ability to exclude non-paying households and ease payment issues for customers.
- Privatisation, though appealing in principle, requires addressing non-payment norms first before it can have real impact.

Photo: iStock

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Note: Purple text denotes IGC-funded studies

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