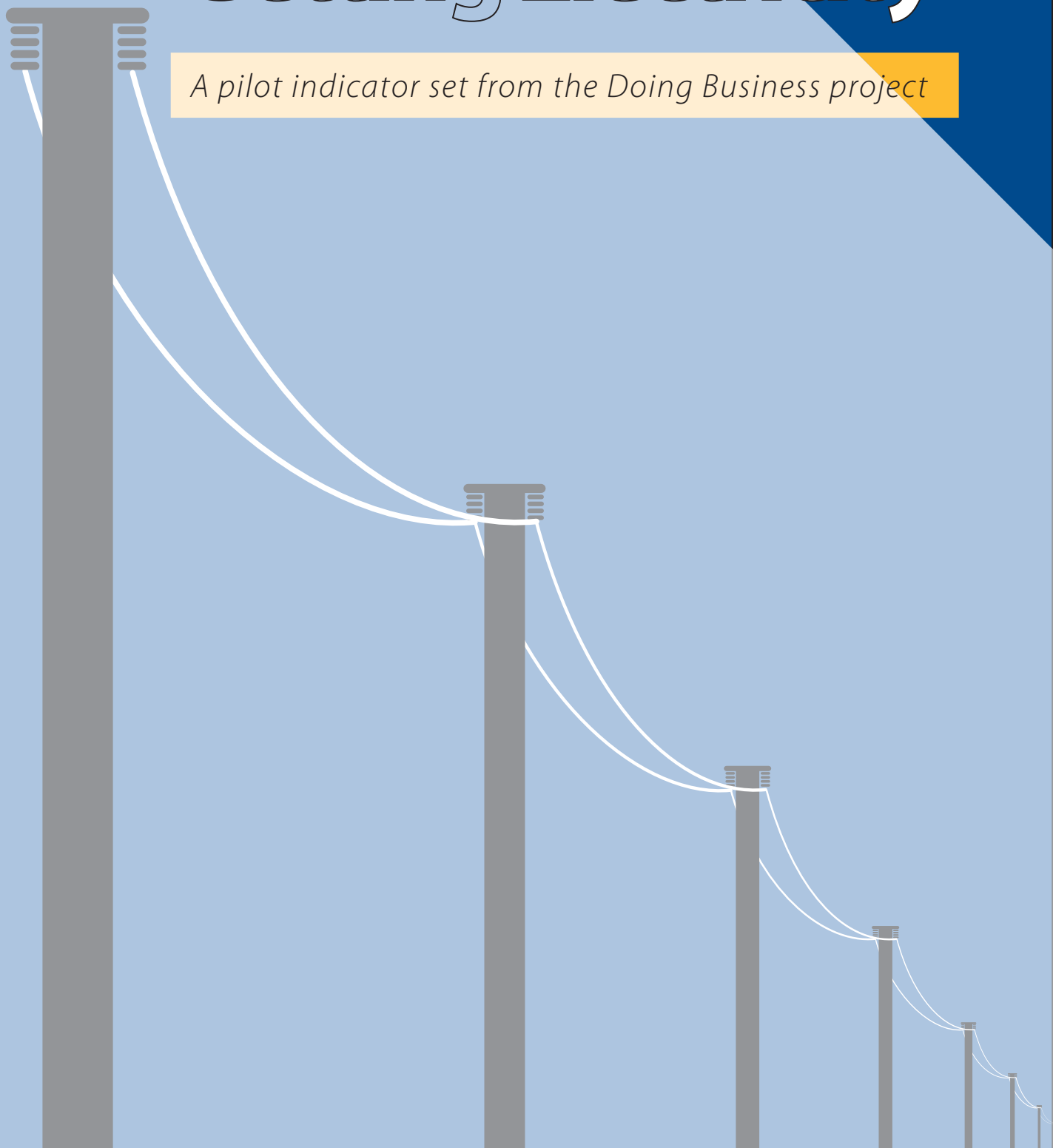


# Getting Electricity

*A pilot indicator set from the Doing Business project*

A PILOT INDICATOR SET COMPARING ACCESS TO ELECTRICITY FOR 140 ECONOMIES





# Getting Electricity

*A pilot indicator set from the Doing Business project*

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## Introduction

A young entrepreneur in Lagos is under pressure. The first in her family to finish college, she has big hopes of taking her family's shirt-making business to the next level by exporting to Europe and the United States. That means setting up a larger garment manufacturing unit. The entrepreneur has negotiated financing with the bank, spent weeks dealing with the authorities to get building and operating permits and invested in a new building and new machinery. She has new employees lined up, and she is ready to get started.

But the young Nigerian entrepreneur will have to wait. Even though she took great care to build where access to the electricity grid would not be a problem, electricity is still an obstacle. She has just learned from her electrical contractor that obtaining an electricity connection from the local utility will probably take a few more months. Indeed, on average in Nigeria, obtaining an electricity connection takes more than 8.5 months and costs the equivalent of more than 10 times income per capita.

Compare the experience of a similar entrepreneur in Germany. He is constructing a warehouse in Berlin-Westhafen and is surprised to find out how easy it is to obtain an electricity connection. All he needs to do is sign a supply contract with a retailer for electricity. His electrical contractor takes care of the electricity application process, and the utility then completes the external connection works. The warehouse is hooked up to electricity in less than 3 weeks, for a total connection cost of \$2,151 (equivalent to 5.1% of income per capita). Germany's process for obtaining a new commercial electricity connection is among the fastest and most efficient: it takes 3 interactions with the utility and 17 days from signing the supply contract to having the electricity turned on.

*Doing Business* has 6 years of experience in analyzing the real implications of the interactions of private businesses with government agencies. Over the years the project has expanded the set of indicators measuring such transactions.<sup>1</sup> Using the *Doing Business* methodology, *Getting Electricity* has developed a pilot set of indicators on the process a private business must go through to obtain an electricity connection. By applying the standard *Doing Business* methodology to the question of electricity provision, *Getting Electricity* aims to illustrate the implications for entrepreneurs of weak commercial services by distribution companies and to complement existing data sets. Consistent and objective data on connection services can inform utilities, regulators and governments seeking to strengthen sector performance, and serve as an input for research on links to economic outcomes.

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1. *Doing Business* provides indicators of government regulation of business across 183 economies. The project currently covers 10 areas of regulation—from starting to closing a business. The set of indicators has been expanded over time, and the team continues to develop new indicators of regulations that help or hinder businesses in investing, in creating jobs and in achieving growth. *Doing Business*, in capturing some key dimensions of regulatory regimes, has been found useful for benchmarking, which can expose potential challenges and identify where policy makers might look for lessons and good practices.

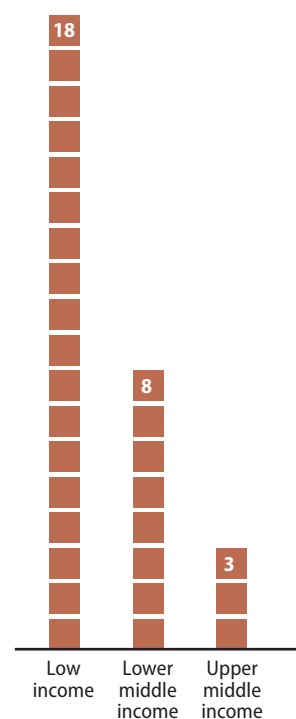
## How electricity services matter for businesses

Electricity matters for private businesses, along with other infrastructure services such as roads, water and telecommunications. Where the quality and accessibility of infrastructure services are good, they encourage investment, productivity and growth. But where they are poor, companies' productivity and growth suffer. World Bank Enterprise Surveys in 89 economies show that firms consider electricity one of the biggest constraints to their business.<sup>1</sup> The constraints stem from inadequacies in several aspects of electricity service—access to electricity, availability of electricity and reliability of supply—as well as from cost.

FIGURE 1

### Interruptions in electricity service plague companies in low-income economies

Average number of power outages for a firm in a typical month



Note: Data include 66 economies in East Asia and the Pacific, Eastern Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia and Sub-Saharan Africa. No comparable data available for high-income economies.

Source: World Bank Enterprise Surveys.

Many businesses lack access to electricity connections and so are prevented from moving into higher-value-added activities that rely on electricity-based technologies.<sup>2</sup> In 2005, according to the International Energy Agency, more than a quarter of the world's population lacked access to electricity.<sup>3</sup> Sub-Saharan Africa and South Asia have the lowest electrification rates. With nearly 1 billion people, Africa accounts for more than a sixth of the world's population but generates only 4% of the world's electricity. Seen from space, Africa appears unlit at night.<sup>4</sup>

Whether businesses can gain access to an electricity connection depends largely on the availability of electricity supply. In the Kyrgyz Republic and Tajikistan, the research team found, connection requests were denied in the winter of 2008 because low water levels in the reservoirs supplying the hydropower generation plants led to energy shortages. Similarly, in Afghanistan, Guinea-Bissau and Sierra Leone electricity shortages are so chronic that when new customers with moderately high electricity needs (such as the commercial customer assumed by the case study underlying this report) request a connection, utilities instead advise them to buy their own generator.<sup>5</sup>

Once electricity is available, the reliability of supply over time becomes critical. Businesses need reliable supply to operate efficiently. But according to World Bank Enterprise Survey data, firms in low-income economies see their electricity supply interrupted an average of 18 times in a typical month (figure 1). Frequent drops in voltage levels damage electronic equipment such as computers, shortening their lifespan. And service interruptions force staff to adjust their workflow. Managers responding to World Bank Enterprise Surveys estimated losses due to electricity outages at an average 3.2% of annual sales. In Malawi losses run as high as 22.6%. To counter such reliability problems, firms can install backup generators. It has been estimated that generators owned by firms account for about 6% of total installed generation capacity in Sub-Saharan Africa.<sup>6</sup>



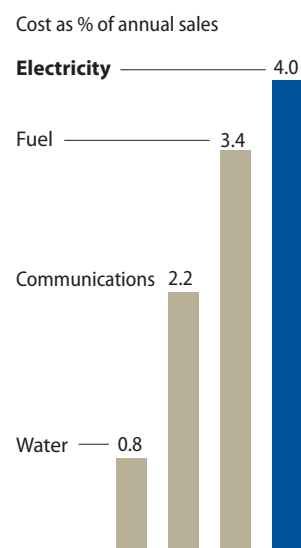
Businesses also care about the cost of both the electricity connection and the electricity supply—because electricity-related expenditures eat up a significant share of their revenue. Managers responding to World Bank Enterprise Surveys estimated that on average their spending on electricity amounts to 4% of their annual sales—while that on all other infrastructure services (fuel, communication services and water) combined accounts for 6.4% (figure 2).

To understand the efficiency of power supply to businesses, good data on all these aspects are needed. National and global data sets cover different aspects to varying degrees. Collecting these data is cumbersome and costly, especially when done so as to ensure the availability and reliability of the data over time. This is why few data sets achieve global coverage. The new *Getting Electricity* data set does not provide a direct measure of such important issues as access levels and the availability and reliability of electricity supply. But this report shows that the new indicators can give useful insights into the regulatory aspects surrounding electricity connections and might even serve as a proxy for some aspects of the quality of the electricity system.

While *Doing Business* does not have a solution to all data challenges, its methodology might help address some of the sustainability problems that other data sets face. The *Doing Business* methodology looks at a standardized domestic small to medium-size firm and measures the standard regulations applying to that firm by interviewing practitioners in each economy. This methodology offers several advantages. It is transparent. It allows multiple interactions with the respondents, ensuring accuracy by clarifying possible misinterpretations of the survey questions. And importantly, it is inexpensive, so data can be collected in a large sample of economies.

FIGURE 2

### Firms spend more on electricity than on any other infrastructure service



Note: Data include 64 economies in Eastern Europe and Central Asia, Latin America and the Caribbean and Sub-Saharan Africa.  
Source: World Bank Enterprise Surveys.

1. According to World Bank Enterprise Survey data for the 89 economies, 15.6% of managers consider electricity the most serious constraint, while 15.68% consider access to finance the most serious. Other constraints are tax rates (considered the most serious by 12.2%); practices of informal sector competitors (11.5%); political instability (8.5%); corruption (7.1%); crime, theft and disorder (5.6%); inadequately educated workforce (5.5%); access to land (3.3%); tax administration (3.3%); business licensing and permits (3%); transport of goods, supplies and inputs (2.7%); customs and trade regulations (2.5%); labor regulations (2.2%); and courts (1.2%) (<http://www.enterprisesurveys.org>).
2. Shaw (2004).
3. International Energy Agency (2006).
4. “The Dark Continent,” *The Economist*, August 18, 2007, p. 39.
5. Some utilities remedy acute supply shortages by renting generation capacity. In 2002–07 Sub-Saharan Africa had more signed rental contracts for mobile power plants, and more rented generation capacity, than any other region. But such solutions are costly and therefore tend to be temporary (World Bank and Public-Private Infrastructure Advisory Facility, PPI Project Database; and Izaguirre 2008).
6. Foster and Steinbuks (2009).

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## Building a new indicator set

*Getting Electricity* tracks all the procedures, the time and the cost required for a business to obtain an electricity connection for a newly constructed building, including an extension or expansion of the existing infrastructure.<sup>1</sup> To ensure that the data are comparable across the 140 economies covered, respondents were presented with a standard case study:

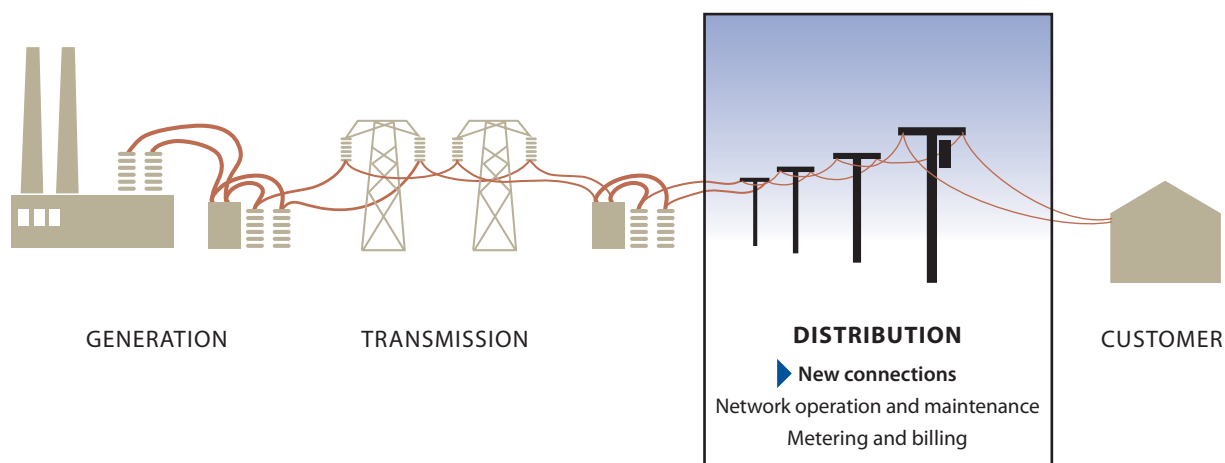
An entrepreneur would like to connect his newly built warehouse for cold meat storage to electricity. The internal wiring up to the metering point has already been completed by the electrical contractor employed by the construction firm, and the entrepreneur would now like to obtain the final electricity connection from the local distribution utility. The electrical contractor working for the entrepreneur estimates that the warehouse will need a 140-kVA (kilovolt-ampere) connection. The future monthly electricity consumption of the warehouse is estimated at 0.07 gigawatt-hour (GWh).

The case study was carefully chosen to reflect the electricity needs of a relatively electricity-intensive small to medium-size enterprise. The estimated load of 140 kVA is consistent with the electricity needs of a small warehouse that relies on refrigeration and therefore depends on a relatively modest yet nontrivial electricity supply.<sup>2</sup>

For each economy, using information collected between June 2008 and June 2009, *Getting Electricity* summarizes the process of obtaining an electricity connection in an area where warehouses usually locate in the main business city. Based on the case study, distribution utilities providing electricity connections in the main business city were asked to describe the procedures for obtaining an electricity connection, along with the time and cost of completing them. Because utilities might have an incentive to represent their own performance too positively, the information gathered was submitted to a rigorous cross-check with independent private practitioners. From the utilities' responses a list of procedures was drawn up and verified through e-mail and telephone interviews with independent professionals such as electrical technicians, electricians and electrical engineers as well as construction companies.<sup>3</sup> Detailed lists of procedures for each economy are published on the *Doing Business* website.<sup>4</sup>

The *Getting Electricity* indicator set sheds light on the interactions of businesses with distribution utilities. In doing so it covers only a small part of electricity service (figure 3). Yet it provides information on a number of issues for which data previously did not exist for such a large number of countries, including the efficiency and cost of the services provided to commercial customers by distribution utilities, the complexity of procedures and the resources expended by businesses in obtaining a connection.<sup>5</sup>

FIGURE 3

**Getting Electricity measures the connection process at the level of electricity distribution**

By measuring the time required to obtain a connection, the new indicator set shows how long a specific distribution utility takes to turn around a typical request from a commercial customer. By also measuring the procedures involved, the indicator set can help identify the bottlenecks in a connection process. Recording procedures also offers insights into some regulatory issues around connection processes.

In addition, the time indicator highlights cases in which utilities deal with weaknesses in the availability of electricity by rationing new connections. In some economies where the electricity supply cannot be guaranteed, connection requests are denied. In other economies requests for connections are not explicitly denied but new customers are advised to get their own generator instead. Rationing electricity by denying requests for new connections rather than rationing the availability of supply for all users, existing and new, especially penalize small enterprises in the process of scaling up their business by moving for the first time to production methods that require electricity. *Getting Electricity* reflects such forms of rationing by recording time estimates for the connection process that include the wait until new connections are again being granted.<sup>6</sup>

*Getting Electricity* also provides important information on the components of connection costs, data not previously available for a broad sample of economies. The report discusses how connection costs in most economies can be divided into 2 main categories: fixed and variable. Most customers will pay a one-time standard connection fee that should reflect a cost model on how to spread the fixed costs of operating a distribution grid over all customers.<sup>7</sup> Customers also face a variety of other costs that are usually calculated case by case, such as payments for labor and material and for inspections.

But the methodology also has limitations that should be considered when interpreting the data. First, the collected data refer to businesses in the economy's largest business city and may not be representative of experience in other parts of the economy. Second, the measures of time involve an element of judgment by the expert respondents. When sources provide different time estimates, the time measure reported represents the median values of several responses given under the assumptions of the standardized case. Finally, the methodology assumes that the entrepreneur has full information on what is required and does not waste time when completing procedures.

- 
1. An *extension* involves extending the network by laying low-voltage underground cables or installing low-voltage overhead wires from the metering point to the closest substation. An *expansion* involves installing a pole- or pad-mounted distribution transformer and connecting it between the customer's metering point and the utility's medium-voltage network.
  2. By comparison, a residential customer would need 20–40 kVA.
  3. For the sake of simplicity, the paper uses *electrical contractors* throughout the rest of the text to refer to electrical professionals of varying qualifications. Depending on the economy, this term may include electricians, electrical technicians or electrical engineers.
  4. <http://www.doingbusiness.org>.
  5. Other studies (such as McCotter and Academy for Educational Development 2005, Nexant 2004 and CEER 2008) have benchmarked commercial services of distribution utilities in smaller numbers of countries.
  6. The time estimates recorded for economies where new connections are rationed reflect connection moratoriums by including the wait time until connections will again be granted. For example, for the Kyrgyz Republic, where a 6-month moratorium on new connections is in effect for the winter months, the time for the usual connection process was recorded plus 3 months of wait time due to the connection moratorium (3 rather than 6 additional months were recorded because 3 months is the average wait time for the year as a whole). Where the connection moratorium is considered indefinite and the utility cannot give a clear time frame for connections, a full additional year of wait time (365 days) is recorded to reflect the fact that a new time estimate can be provided only when the indicator is updated in the next annual round of data collection.
  7. This one-time fee is not the only way utilities spread fixed costs over their customers. Utilities may also do so by charging customers a monthly fixed fee as part of their consumption bills. However, *Getting Electricity* records only the one-time costs associated with obtaining a connection.

## Who makes it easy to get an electricity connection and how?

An entrepreneur in Ukraine is starting a small cold-storage business. To get her business connected to electricity, she submits a service application to the local distribution utility. The utility instructs her to obtain a project design from a specialized private design firm. Once the project design is ready, the customer's electrical contractor installs the external connection works. Then the contractor must prepare a package of more than 20 technical documents for submission to different agencies. The submission will trigger 3 rounds of external inspections—by the State Energy Inspectorate, by the utility and by the State Inspectorate for the Protection of Workers. Finally, the entrepreneur signs a supply contract with the utility, after which the utility conducts yet another inspection.

But even that won't be enough to start the electricity flowing. The entrepreneur's electrical contractor still has to obtain signatures from 14–15 different departments of the distribution utility to get permission to turn the electricity on. To make matters worse, the departments are all located in different parts of Kiev. By the time the entrepreneur can finally switch on his refrigerators, 306 days have passed and the connection has cost \$8,419, or 262% of Ukraine's income per capita (figure 4).

FIGURE 4

### Procedures for getting an electricity connection in Ukraine add up to a 10-month process

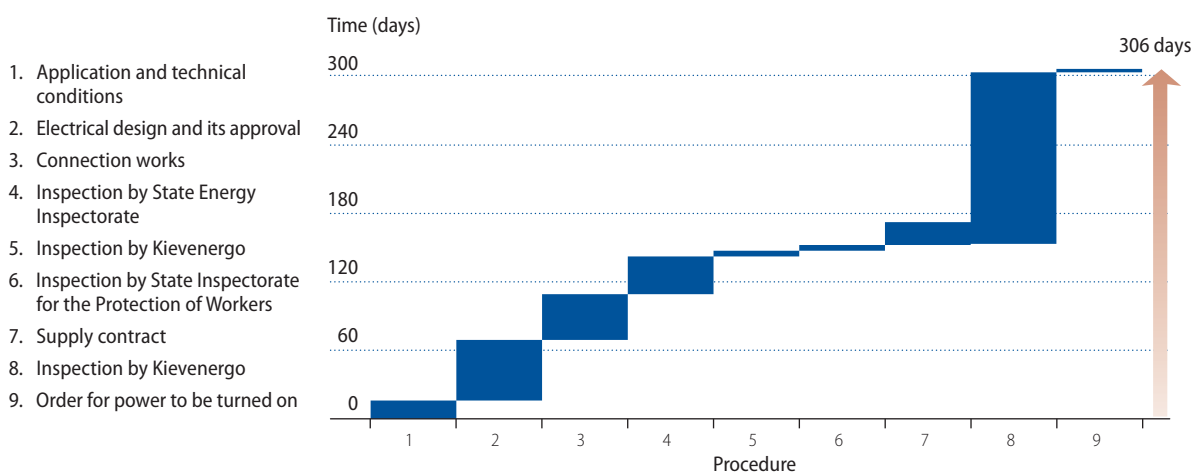


TABLE 1

**Who makes it easy to get electricity—  
and who does not?**

<b>Procedures</b> (number per connection)			
<b>Fewest</b>		<b>Most</b>	
Denmark	3	Angola	8
Germany	3	Armenia	8
Japan	3	Azerbaijan	8
Mauritius	3	Guinea-Bissau	8
Qatar	3	Honduras	8
Saudi Arabia	3	Nigeria	8
St. Vincent and the Grenadines	3	Russian Federation	8
Sweden	3	Tajikistan	8
Switzerland	3	Ukraine	9
Antigua and Barbuda	4	Bosnia and Herzegovina	10

<b>Time</b> (days)			
<b>Fastest</b>		<b>Slowest</b>	
Germany	17	Russian Federation	272
St. Kitts and Nevis	18	Czech Republic	279
Iceland	22	Cyprus	306
Austria	23	Ukraine	306
St. Lucia	25	Kyrgyz Republic	325
Fiji	29	Tanzania	382
Grenada	30	Madagascar	419
Chile	31	Afghanistan	424
Puerto Rico	32	Guinea-Bissau	437
Honduras	33	Sierra Leone	441

Source: Getting Electricity database.

Among the 140 economies surveyed, Ukraine ranks in the bottom 10 on the number of procedures required to connect a new customer to electricity (table 1). Economies such as Denmark, Germany, Japan and Mauritius make it much easier for businesses to connect to electricity. Procedures tend to be few in economies where:

■ **APPROVALS THAT CUSTOMERS MUST OBTAIN FOR THE CONNECTION ARE CONSOLIDATED WITH OTHER APPROVALS.** In Romania the private contractor hired to complete the connection works must get a separate construction license for the distribution transformer needed for the connection. In both Montenegro and Serbia this construction license can be obtained from the municipality together with the main construction permit.

■ **RESPONSIBILITY FOR THE SAFETY COMPLIANCE OF THE BUILDING'S INTERNAL WIRING IS TRANSFERRED TO PRIVATE ELECTRICAL CONTRACTORS, AND CUSTOMERS DO NOT HAVE TO GO THROUGH INSPECTION PROCEDURES INSTEAD.** In Denmark, Germany, Japan and Mauritius the customer's electrical contractor is required to submit an electrical installation certificate with the service application. But in such economies as Ukraine customers must obtain multiple approvals from different agencies to comply with safety standards. Economies in which responsibility for safety compliance is transferred to private

electrical contractors usually have a well-regulated industry of electrical contractors and electrical engineers with a national accreditation system and professional licensing.

■ **UTILITIES HAVE THE MATERIALS NEEDED TO CONNECT CUSTOMERS READILY AVAILABLE, AND CUSTOMERS ARE NOT ASKED TO OBTAIN MATERIALS THEMSELVES.** In economies like Bangladesh, the Central African Republic and Tanzania customers may be asked to provide such materials as poles, meter boxes or transformers because the utility does not have them in stock.

Mauritius is one country that makes it easy for businesses to get connected to electricity. Getting connected in Port Louis, the country's capital, takes only 3 procedures and 44 days. The customer interacts only with the utility, and no prior clearances from other agencies are required. The responsibility for the internal wiring is transferred to the customer's electrical contractor, who is required

to submit an electrical installation certificate with the service application. All external works are completed by the utility, which can guarantee that the materials needed are generally available.

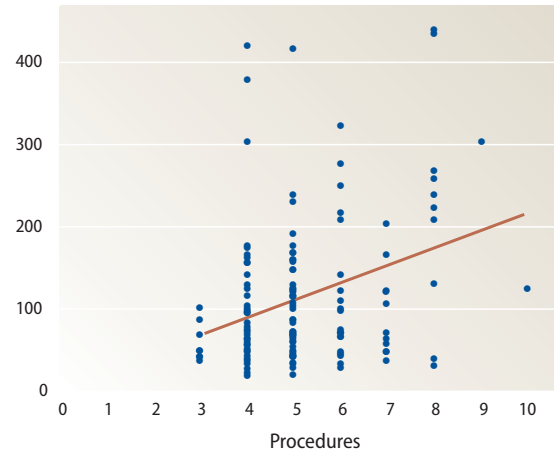
The number of interactions customers have with the utility and other agencies is the biggest determinant of connection delays (figure 5). In economies where businesses have to go through 6–10 procedures to get connected, the process takes 144 days on average. In economies with 3–5 procedures, it takes 104 days on average. In the 10 economies with the fewest procedures, the average is only 56 days. In the 10 economies with the most, it is 215.

Because connection times are more likely to be long where entrepreneurs must go through many procedures, it is important to understand why particular procedures are needed and how they can delay connections.

FIGURE 5

### The more procedures required, the longer the wait

Average time to obtain an electricity connection (days)



Note: Relationships are significant at the 5% level and remain significant when controlling for income per capita.  
Source: Getting Electricity database.

## Dealing with the public service environment

No matter where in the world entrepreneurs are seeking an electricity connection, they will always have to go through certain procedures, such as submitting an application, receiving connection works and getting a meter installed. But the process does not always end there. Why do entrepreneurs face 9 procedures in some economies but just 3 in others? As the next 2 sections point out, important differences arise from how economies choose to deal with safety requirements and how well utilities do in having materials available. But beyond this, additional procedures can arise where utilities cannot rely on a strong public service environment.

Connection delays increase where opportunities are missed to streamline approvals with other public agencies. In Antigua and Barbuda, the Arab Republic of Egypt, the Democratic Republic of Congo and Oman customers seeking a new electricity connection must get their electricity application cleared by the building authority, which certifies that the building was constructed with a valid building permit. Why can't customers simply submit a copy of the building permit to the utility?

In another common procedure customers have to apply to the municipality for an excavation permit so that the utility can lay the cables for the connection. The team found such procedures in Jordan, Luxembourg, Tajikistan and West Bank and Gaza. In Egypt customers even have to contact 2 agencies to obtain an excavation permit: the district office and the Greater Cairo Utility Data Center.

In most other economies utilities deal with excavation permits themselves. But while this sometimes means fewer procedures for customers, it leads to delays within the utility. Take Cyprus. Before the utility can issue an estimate to a new customer, it must contact several government authorities, including the telecommunications authority, sewerage authority, public works department, municipality, archeological department and fire brigade. This clearance process alone takes 3–6 months.

Sometimes customers have to obtain separate construction permits just for the connection works. These too could be consolidated. In Romania the private contractor charged with undertaking the connection works needs to get a separate construction license for the distribution transformers that the utility requires him to install. Obtaining this construction license at the municipality can take 1–2 months. In Montenegro and Serbia there would be no wait, because this license could already have been obtained from the municipality together with the main construction permit for the warehouse.

Customers also lose time where utilities cannot rely on such basic public services as a functioning system of addressing.<sup>1</sup> Utilities must be able to locate buildings to identify the corresponding connection point in their distribution network. They also have to know the exact location to ensure efficient billing later on. In Sub-Saharan Africa 87% of electricity utilities invest in creating their own mail delivery system because they cannot rely on a proper addressing system to ensure that bills reach their customers.<sup>2</sup> Because of less-than-reliable street addressing in Lebanon and the Republic of Yemen, applicants there must obtain an electricity bill from a neighbor to help the utility identify the location of the nearest connection point.

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## **Dealing with safety concerns and electrical efficiency**

In Pakistan fires caused by poor-quality wiring are becoming a major concern. In the past few years several such fires have broken out in shopping centers and plazas, leading to losses of billions of rupees.<sup>3</sup> There is no system of checks for electrical wiring in Pakistan, nor is there an established licensing system for electrical contractors. Entrepreneurs seeking to get their business connected to electricity must take their own measures to ensure that the connection is installed in a way that minimizes safety risks for their workers.

Electrical fires due to substandard internal wiring are not a concern only in low- and lower-middle-income economies. In the United States during a typical year, home electrical problems account for 67,800 fires, 485 deaths and \$868 million in property losses.<sup>4</sup> In urban areas faulty wiring accounts for 33% of residential electrical fires.



The quality of internal wiring is a concern not only for those using a building but also for utilities. One customer's faulty internal wiring can lead to power outages, affecting a utility's other customers connected to the same distribution line.<sup>5</sup> Badly designed internal wiring can also have financial implications for the utility.<sup>6</sup> Because of the importance of the quality of the internal installation for the customer and the utility, and because of public safety considerations (relating to electrical fires), in most economies customers seeking an electricity connection for their business need to go through some sort of procedure dealing with the quality of their internal wiring.

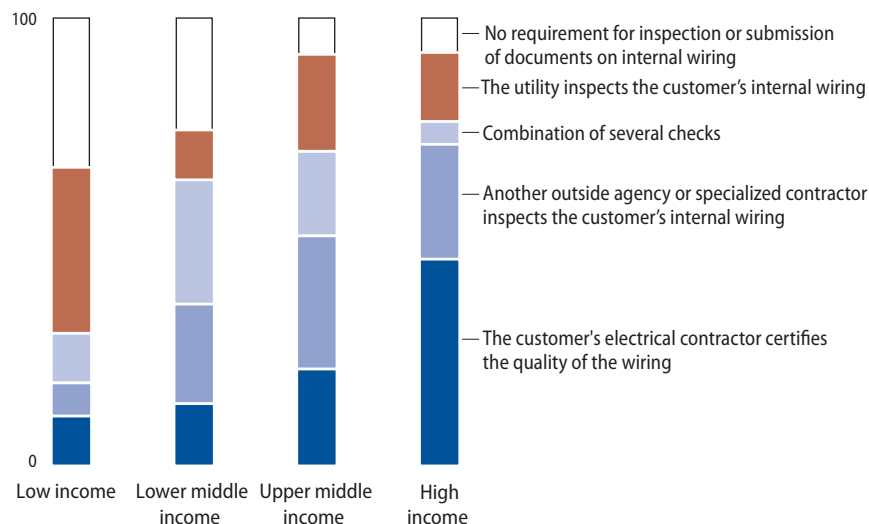
In addressing safety issues, policy makers have 2 main choices: They can regulate each transaction that has safety implications (that is, each connection). Or they can regulate the profession that regularly deals with these transactions (the electrical profession). The implications for customers are obvious: Regulating the transaction means that they need to get involved. Regulating the profession instead can minimize their involvement. The difference between these approaches can be illustrated by how different groups of economies deal with the internal wiring question.

In 46% of high-income economies the quality of the internal wiring is the sole responsibility of the electrical contractor carrying it out (figure 6). In these economies utilities tend to simply request some form of notification from the electrical contractor certifying that the internal wiring was executed in accordance with the prevailing standards, usually established by the relevant professional bodies.<sup>7</sup> Such arrangements are customer friendly, adding little time to the process of obtaining a new connection. But they also depend on the existence of a clear legal framework and a well-trained and well-organized electrical profession.

FIGURE 6

### Who is responsible for enforcing safety standards?

Economies by type of safety certification for internal wiring (%)



Source: Getting Electricity database.

In other economies customers are required to obtain a certification that quality standards were met from the utility or an outside agency. Using specialized outside agencies or specifically licensed electrical contractors to carry out inspections is popular in high- and upper-middle-income economies. In 13 of the 27 Latin American and Caribbean economies surveyed, customers are required to contact an outside agency to obtain an inspection of the internal wiring. Such agencies often are regulatory agencies—as in Chile (Superintendencia de Electricidad y Combustibles) and Colombia (Superintendencia de Industria y Comercio)—or municipalities or fire departments—as in Nicaragua or Panama.

Many middle-income economies combine the 2 approaches, regulating both the profession and the transaction. This leaves room to streamline procedures for the benefit of the customers. In these economies electrical contractors need to submit certifications of the quality of the internal wiring, but the utility or another agency will also conduct an inspection. And in some economies customers face the burden of additional inspections by other agencies. In Ukraine, for example, customers can count on an inspection by the State Inspectorate for the Protection of Workers. The inspectorate checks the quality of the external connection to ensure the safety of workers, even though 2 other state agencies have already inspected the same works.

In 25 of the 140 economies surveyed, the research team could not determine whether there were any procedures related to the quality of the internal wiring. These economies are mainly in the low- and lower-middle-income group. Whether the lack of such procedures suggests that these economies suffer from “underregulation” could not be determined within the scope of the pilot project and remains to be established by research in the coming year.

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## Ensuring availability of material and equipment

Connecting a new customer to an electricity network requires material and equipment. If the new connection is through an overhead line, wires have to be extended; if it is through an underground connection, cables must be laid. Often the utility will also have to install new electricity poles, meters and such heavy equipment as distribution transformers. *Getting Electricity* records the cost of such materials where they are charged directly to the customer. But investments in materials not only translate into costs; they can also lead to longer wait times.

In low- and lower-middle-income economies especially, utilities sometimes lack the materials needed to establish a new connection (figure 7). In 25 economies survey respondents reported additional wait times of up to 150 days because, when new connections were requested, in more than 50% of cases the utility did not have such critical materials as distribution transformers or meters in stock and had to order them specially. In Tanzania lack of materials in stock adds an entire year to the time required to get a new connection.

Where materials are not available, customers usually have to wait because the utility must issue a tender. Utilities do not buy one new distribution transformer at a time. This is neither economical nor consistent with good procurement practices.<sup>8</sup> A good procurement planning system projects needs well into the future, ensuring that materials are available when needed. Not all utilities have such procurement systems. But utilities can also experience disruptions in the procurement process for other reasons:

- Tenders may have to be annulled because the financing needed does not materialize.
- Tenders may have to be annulled because too few bidders submit a bid or because of allegations of irregularities in the tender process. In these cases the utility will have to start a new tender process, naturally leading to delays in procurement.
- Sometimes the organization of the tender process is so inefficient that unnecessary delays occur.<sup>9</sup>

Even in the absence of these constraints, delays relating to materials can still happen because of inventory management practices. One notable example is Canada, where obtaining the materials for a new connection takes about 45 days. Respondents reported that customers have to wait because the supply contract negotiated by the local utility is designed to keep the inventory of distribution transformers very small. As a result, orders have to be submitted for each new customer. The utility issues tenders for “blanket orders,” which allow it to request distribution transformers on an as-needed basis from the winning bidder for a preset price over a period of 2–3 years.

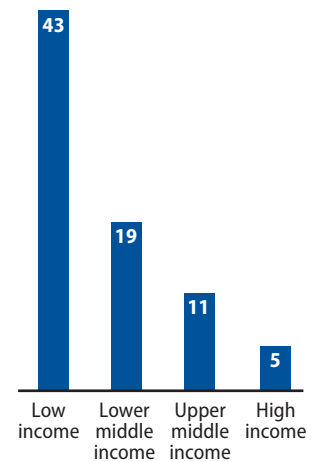
Utilities that cannot provide the necessary materials in time sometimes resort to shifting the burden of obtaining them to the customer. Customers in 12 economies<sup>10</sup> were asked to provide the utility with such materials as poles, meter boxes or transformers because the utility did not have them in stock.<sup>11</sup> Transferring the responsibility for obtaining the materials to customers is certainly an indicator of financial or management constraints within the utility, but as a second-best solution it can lower inventory costs and shorten connection times substantially. In Malawi, for example, customers purchasing the materials themselves reduce the time required for obtaining a connection from 3 years to 6 months on average.

But where utilities shift the responsibility for sourcing materials to their customers, they should aim to avoid burdening them with additional procedures. In some economies customers not only have to deal with the hassle of buying materials; they may also have to meet additional requirements imposed by the utility to ensure that the materials comply with its standards. In Nepal and Senegal, for example, customers must present the privately sourced material for testing at the utility. In El Salvador the utility requires customers to simply submit a receipt for the purchase of the transformer to ensure that it has been sourced from a reputable supplier.

FIGURE 7

**Lack of materials causes delays for more than 40% of utilities in low income economies**

Share of utilities with connection delays due to lack of materials (%)



Source: Getting Electricity database.

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## Setting legal time limits

In the hope of disciplining utilities, regulators in many economies set legal time limits for connecting customers. The Council of European Energy Regulators, in its latest benchmarking report, records that 10 of 20 European energy regulators set such time limits in their regulatory frameworks.<sup>12</sup> In collecting data for *Getting Electricity*, the team researched publicly available information on the websites of utilities and regulators and in electricity laws to establish how common this practice is around the world. In this initial study the team found legal time limits in 37 economies—from Angola to West Bank and Gaza, from Bolivia to the United States.

The preliminary data collected in the pilot study suggest 3 things: First, even where there are no legal time limits, many utilities connect their customers to electricity quickly. Of the 10 utilities with the fastest times for connecting a new business to electricity, not one is subject to such regulations.<sup>13</sup> Second, of the utilities operating in economies that do have legal time limits, less than half are meeting them. Third, legal limits vary widely across economies—and not surprisingly, noncompliance is greater where limits are relatively tight. The research on this issue will be expanded in the coming year.

Some time limits relate to the usual first step for a new customer seeking an electricity connection: to submit a service request to the utility, which will then carry out a feasibility study and prepare a cost estimate. The pilot study found legal limits for the time from the application until the utility issues a cost estimate in 27 economies (table 2). The compliance results are mixed—and suggest that getting the legal time limit right is no easy task.

Time limits for quotations range from 3 days to 84, and in half the economies with such time limits, utilities do not comply with them. The reason may be that the time limits are too ambitious. In the 13 economies where utilities fail to comply, the average legal time limit is less than half as long as in the 14 economies where utilities do comply. And in 9 of the 13 economies, the utilities could manage to comply if the legal time limit were as long as the average set in the 14 economies where utilities do comply.

A similar picture emerges for legal time limits set for the time from the quotation until the connection works are completed and the electricity is turned on. *Getting Electricity* found such time limits in 26 economies (table 3). Just as for the time limits for quotations, less than half the utilities in the sample comply, and many of those that do not comply could manage to do so if time limits were closer to the average used in the group of “compliant” economies.

What are the repercussions of not complying with legal time limits? *Getting Electricity* found penalty payments stipulated in the relevant regulatory sources in only 6 economies (see tables 2 and 3).<sup>14</sup> In India, for example, the Maharash-

TABLE 2

**Economies with legal time limits for quotations**

<b>Economies in which utilities comply</b>			
Economy	Legal time limit (days)	Actual time recorded (days)	Penalty levied
Angola	40	14	
Belgium	30	21	
Canada	60	22	
Czech Republic	30	20	
Egypt, Arab Rep.	21	14	
Estonia	30	23	
Gambia, The	30	25	
Georgia	30	16	
Jordan	15	14	
Kyrgyz Republic	28	15	
Namibia	42	13	N\$100 per week of delay, paid to customer upon complaint
Oman	14	10	
Spain	84	22	
West Bank and Gaza	28	20	
<b>Average</b>	<b>34</b>	<b>18</b>	

<b>Economies in which utilities do not comply</b>			
Economy	Legal time limit (days)	Actual time recorded (days)	Penalty levied
Cambodia	15	30	
Ethiopia	3	21	
Ireland	14	15	€135 for delay in quotation per instance of delay, paid to customer upon complaint
Jamaica	10	14	J\$8,400 per instance of delay, paid automatically to customer
Kazakhstan	5	14	
Lesotho	40	53	
Nigeria	5	151	
Russian Federation	30	45	
Senegal	14	30	
Singapore	14	21	
United Kingdom	15	37	£40 per instance of delay, paid automatically to customer
Uzbekistan	3	16	
Yemen, Rep.	10	14	
<b>Average</b>	<b>14</b>	<b>36</b>	
<b>Overall average</b>	<b>24</b>	<b>27</b>	

*Note:* Legal time limits usually differ depending on the type of customer. Legal time limits in this table refer to commercial customers with the profile of the customer assumed by the *Getting Electricity* case study only.

*Source:* *Getting Electricity* database.

TABLE 3

**Economies with legal time limits from quotation to final connection**

<b>Economies in which utilities comply</b>			
Economy	Legal time limit (days)	Actual time recorded (days)	Penalty levied
Angola	60	27	
Bolivia	10	7	
Côte d'Ivoire	30	18	
Egypt, Arab Rep.	94	23	
Jamaica	30	19	J\$8,400 per instance of delay, paid automatically to customer
Lesotho	60	33	
Namibia	180	29	N\$100 per week of delay, paid to customer upon complaint
Oman	90	55	
Russian Federation	365	272	
St. Lucia	29	8	
Turkey	30	25	
Average	89	47	
<b>Economies in which utilities do not comply</b>			
Economy	Legal time limit (days)	Actual time recorded (days)	Penalty levied
Ethiopia	13	54	
Gambia, The	60	153	
India	30	52	Rs 100 per week of delay, paid upon complaint to customer
Ireland	90	93	€65 for delay in connection; €50 for delay in meter installation per instance of delay, paid automatically to customer
Netherlands	84	96	
Nigeria	10	109	
Pakistan	73	233	
Romania	62	207	
Senegal	30	88	
Serbia	15	49	
Singapore	11	55	
St. Kitts and Nevis	7	18	
United States	10	48	
West Bank and Gaza	30	48	
Yemen, Rep.	10	20	
Average	36	88	
<b>Overall average</b>	<b>62</b>	<b>68</b>	

Note: Legal time limits usually differ depending on the type of customer. Legal time limits in this table refer to commercial customers with the profile of the customer assumed by the *Getting Electricity* case study only.

Source: *Getting Electricity* database.

tra Electricity Regulatory Commission establishes a penalty in its performance standards: for every week of delay beyond the legal time limit for connecting a new customer, the utility has to pay the customer the equivalent of \$2 (100 rupees).<sup>15</sup> In Pakistan the penalty is a flat fee equivalent to \$123 (10,000 rupees) for every breach of the standard, and the utility pays the regulatory authority, not the customer.<sup>16</sup> In The Gambia the Public Utilities Regulatory Authority will just “seek an explanation” if the utility fails to provide a connection within 60 working days after the customer has accepted the quotation.<sup>17</sup>

Are penalty payments effective? Results in the small number of economies using them suggest not. In the 6 cases in which penalty payments were found, only the utility in Namibia complies with the legal time limit, set at a generous 220 days from the submission of the application to the final connection.<sup>18</sup> One reason that penalty payments might not be an effective tool is that monitoring service quality outcomes is no easy task—because regulators usually have to rely on information provided voluntarily by utilities. As the Council of European Energy Regulators points out in its most recent benchmarking report, the monitoring of such outcomes is not widespread in Europe. For other regions such benchmarking studies do not even exist.

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## Delegating connection works

Many utilities delegate completion of the connection works at least in part to private contractors, sometimes hired by the customer and sometimes by the utility. Only 60% of the utilities surveyed still complete the external connection works themselves. In 39 economies the work is done by a private contractor hired by the customer. In 17 economies the utility shares the work with a privately hired contractor. The practice of outsourcing the connection works is particularly prevalent in lower-middle-income economies. Among regions, the practice is most common in Eastern Europe and Central Asia, where 17 of 26 utilities ask the customer to hire a private firm to complete at least part of the external connection works (figure 8).

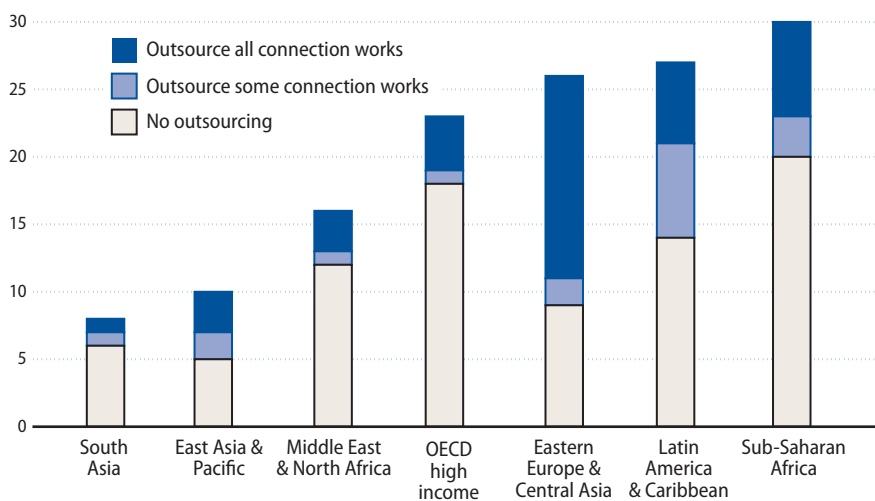
Utilities may prefer to delegate work to private contractors for several reasons, including to shed the overhead costs of employing technical staff in response to financing constraints or to increase the efficiency of the connection process through competition. Efficiency could be increased by either lowering the costs for connections or speeding up the process.

But the initial data collected for *Getting Electricity* suggest that delegating work does not shorten connection times. Indeed, regardless of the type of work that needs to be done, outsourcing it to private contractors does not guarantee speedier service (figure 9). Only in South Asia and the Middle East and North Africa are connection times faster when private contractors are involved. One reason might be that the contractors have to obtain additional permits for each connection contract.

FIGURE 8

**More utilities outsource connection works in Eastern Europe and Central Asia**

Number of utilities

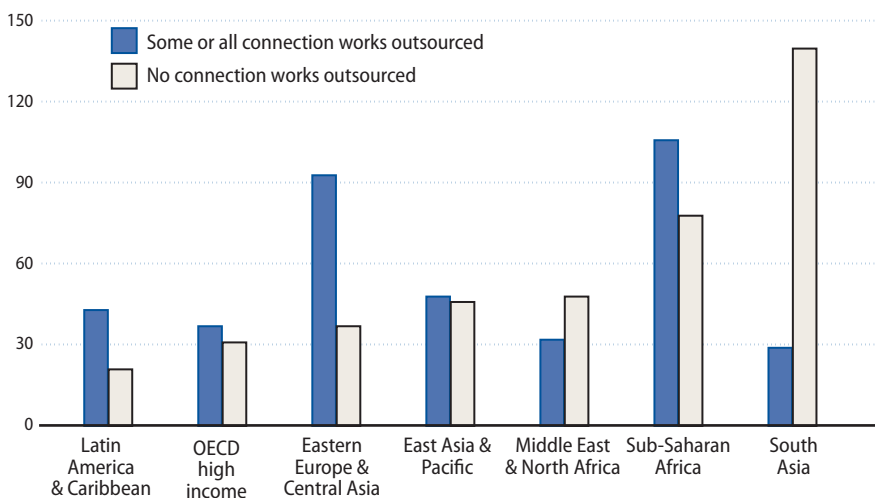


Source: Getting Electricity database.

FIGURE 9

**Outsourcing connection works to private contractors does not guarantee speedier service**

Average time spent on connection works (days)



Source: Getting Electricity database.

Take the example of Belarus. The customer must first hire a private design firm to design the external connection. But before delivering the design, the design firm must obtain permits from various state agencies. A different specialized agency completes the connection works, but not before obtaining yet another set of permits. In Burkina Faso the outsourcing of work also leads to delay. Each time the utility must issue a tender for companies to bid on before it can choose the firm that will do the work. This delays the connection process by 2–3 months.



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1. Farvacque-Vitkovic and others (2005).
  2. Toledano and Ansón (2008).
  3. Pakistan Housing (2009).
  4. U.S. Fire Administration (2008).
  5. For example, an electrical fire could require the utility to shut down the line to which other customers are also connected, either because of damage to the line or to make necessary repairs at the affected customer's site.
  6. For example, a bad power factor, leading to the use of excessive current to operate machinery, could lead to financial losses for the utility if the customer is billed for only the active (real) power (kilowatt-hours). (One way to deal with this problem is to measure the customer's power factor or reactive energy consumption.) Utilities are not otherwise particularly affected by a customer's faulty internal wiring as long as their network is well equipped with protective devices (at the customer's end, such devices as a feeder and distribution transformer) ensuring that failures of a customer's internal installation usually do not propagate too far in the system. It could therefore be argued that internal wiring inspections are only to some degree in the interest of the utility and required mainly for the customer's safety.
  7. With this certification the electrical contractor assumes responsibility for any problems arising from the internal wiring installation up to the meter box.
  8. Utilities are especially likely to be subject to public procurement rules in low- and lower-middle-income economies, where many are still government owned. These rules usually require utilities or other government agencies to have an annual procurement plan and to tender contracts for large quantities of distribution transformers at a time, following certain steps and procedures with corresponding time limits.
  9. For example, the duration of each stage of the tender process and the interval between the stages—such as between bid opening and contract award, or between contract award and contract signature—may be unnecessarily prolonged. Ultimately a balance needs to be struck between transparent and competitive tender processes allowing enough time to prepare and evaluate tenders and to appeal decisions, and efficient processes creating burdensome layers of administration and bureaucracy that give room for corruption and fraud.
  10. Bangladesh, Bolivia, Bulgaria, Burundi, Finland, the Islamic Republic of Iran, Madagascar, Malawi, Maldives, Nepal, the Seychelles and Sierra Leone.
  11. *Getting Electricity* records such purchasing procedures only when the customer must purchase materials to help the utility out because it does not have those materials in stock.
  12. CEER (2008).
  13. The data refer only to regulations that are publicly available, not to utilities' own rules, which are beyond the scope of the study.
  14. India, Ireland, Jamaica, Namibia, Pakistan and the United Kingdom.
  15. Maharashtra Electricity Regulatory Commission (2005).
  16. Pakistan National Electric Power Regulatory Authority (2005).
  17. The Gambia Public Utilities Regulatory Authority (2008).
  18. Namibia Electricity Control Board (2004).

## What does it cost to get connected?

Differences in the voltage level to which customers need to connect are the biggest driver of differences in the absolute connection cost across economies. In some economies the *Getting Electricity* customer requesting a 140-kVA connection would simply be connected to an existing distribution transformer through an overhead line or underground cable connection. But in most of the economies surveyed the customer's warehouse would have to be connected to higher-voltage lines, a more complicated connection effectively leading to an expansion of the distribution network. Because this means installing distribution transformers, the connection requires significant capital investments, often incurred by the new customer.

All this drives up the connection cost. A 140-kVA connection could be provided through a simple line or cable extension in only 41 of the 140 economies surveyed. The average cost for these simple connections was \$14,504. Where the more complicated connection was needed, the average was \$35,876.

Because the absolute connection cost differs so significantly between simple and more complicated connections, the team collecting the data put particular care into establishing which type of connection would be required in each economy. Both the utility and at least 2 private practitioners were asked which would be more likely for the case study. Where answers diverged significantly, the research team sought additional private opinions and followed up by e-mail and phone with all those interviewed to find out whether views diverged because of differences in interpretation of the case study. In the few cases in which no agreement could be found or all parties considered both types of connection equally likely, a median case between a simple and a more complicated connection was recorded.

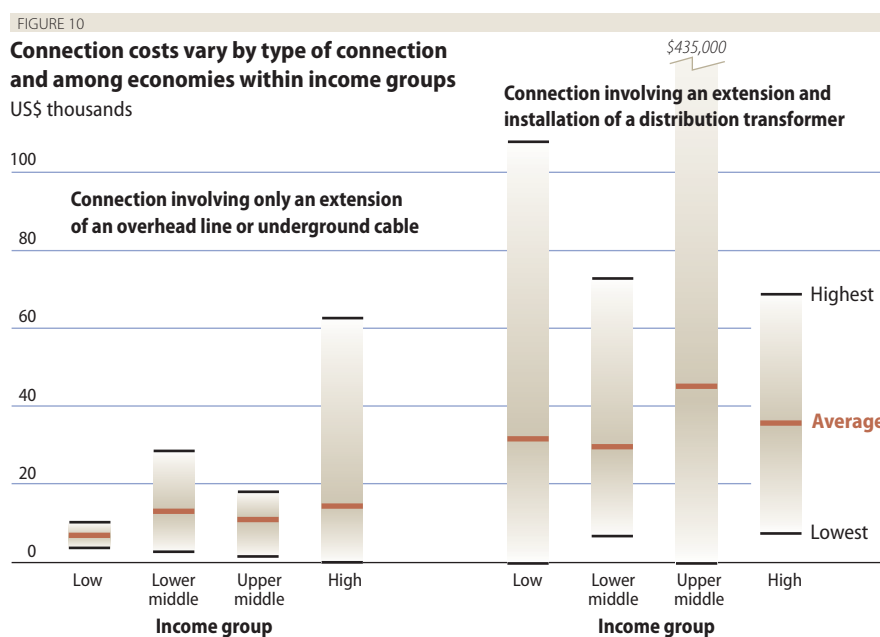
TABLE 4

### Who makes it least costly to get electricity—and who most costly?

Cost to obtain an electricity connection (% of income per capita)			
Least		Most	
Japan	0	Ethiopia	6,967
Hong Kong, China	2	Gambia, The	6,975
Qatar	4	Senegal	7,007
Germany	5	Madagascar	8,466
Iceland	9	Malawi	11,655
Panama	11	Central African Republic	14,378
Israel	13	Burkina Faso	15,443
Norway	14	Benin	15,817
Australia	15	Congo, Dem. Rep.	28,304
United Arab Emirates	16	Burundi	43,020

Source: *Getting Electricity* database.

Not surprisingly, the *Getting Electricity* data show that accommodating the additional demand of the case study customer is more likely to require additional capital investment in low- and lower-middle-income economies. That drives up the absolute connection cost and has a big effect on the cost as a share of income per capita, the terms in which *Getting Electricity* records it. The 10 lowest-cost economies are all high-income economies except Panama.<sup>1</sup> The 10 highest-cost cases are all low-income economies (table 4).



Yet the connection cost varies significantly among economies within income groups, suggesting room to reduce the cost regardless of existing infrastructure (figure 10). In the 10 lowest-cost economies the average cost for a connection is \$4,065, only about a fifth of the average for all high-income economies (\$21,385). In the 10 highest-cost economies the average is \$52,560, 1.8 times the average for the low-income group (\$29,335).

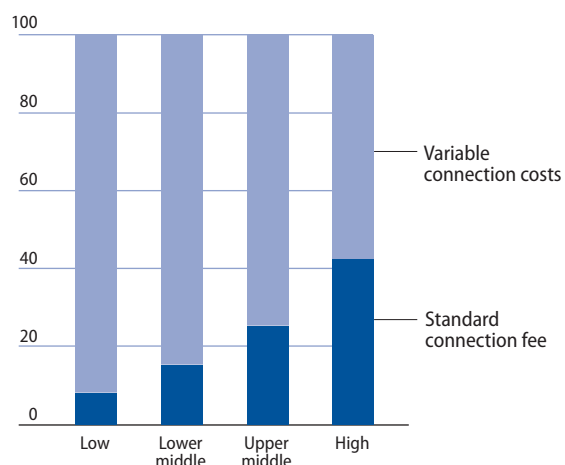
Building and maintaining a distribution network and connecting customers to electricity are a costly enterprise with significant fixed costs. Because fixed costs are high, creating and operating an electricity grid is most cost-effective in densely populated areas with customers that can afford to consume a lot of energy. This is the main reason that rural areas in lower-income economies often remain unconnected if economic criteria are the main drivers of connection policy. To recoup these fixed costs across its entire service area, a utility seeks to spread them across all its customers, usually through standard connection fees set for groups of comparable customers.<sup>2</sup> *Getting Electricity* found such standard connection fees in 77 of the 140 economies surveyed.<sup>3</sup>

Besides the standard connection fee, most customers seeking an electricity connection also have to shoulder variable costs, the costs for labor and material that vary with each connection. Customers pay these costs to the utility or to a private contractor, depending on who is completing the connection works. In many economies the bill also includes the costs of a security deposit and payments to other public agencies for inspections, permits and approvals.

FIGURE 11

**Connection cost breakdown by income group**

Share of total connection cost (%)



Source: Getting Electricity database.

The variable costs a customer must pay account for a larger share of the total in economies with less developed distribution systems (figure 11). While fixed costs represent an average 49% of the total cost in the 10 lowest-cost economies, they amount to only 8% of the total in the 10 highest-cost ones. Where variable costs are a large share of the total, that can leave room for corruption. By contrast, fixed costs increase the transparency of connection costs and the accountability of utilities to customers.

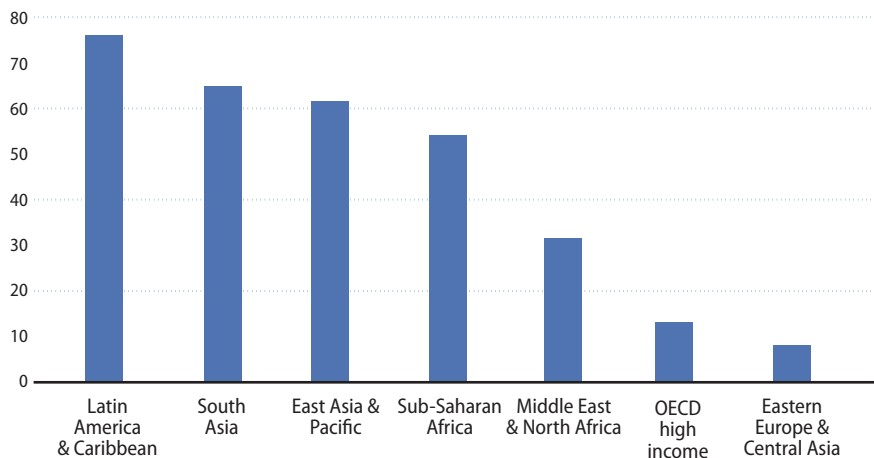
The security deposit is a common component of the variable costs that entrepreneurs face. Utilities in 57 of the 140 economies surveyed charge customers security deposits as a guarantee against nonpayment of future electricity bills.<sup>4</sup> Because most utilities hold the deposit until the end of the contract and repay it without interest, this requirement can impose a big financial burden.<sup>5</sup> In Ethiopia a medium-size company requesting an electricity connection will lose an amount equivalent to 148% of income per capita because it cannot put the money required as a guarantee to a more productive use.<sup>6</sup>

Security deposits are particularly common in Latin America and the Caribbean and in East and South Asia (figure 12). They are rare in Eastern Europe and Central Asia. Of the 26 utilities surveyed in this region, only those in Cyprus and Turkey charge a security deposit. Of the 23 utilities surveyed in OECD high-income economies, only those in Australia, Greece and New Zealand require a security deposit.

FIGURE 12

**Security deposits are common in Latin America, rare in Eastern Europe and Central Asia**

Share of utilities that require a security deposit (%)



Source: Getting Electricity database.

TABLE 5

**How common—and how costly—are security deposits?**

Income group	Utilities charging a security deposit (%)	Average present value of interest lost		Utilities allowing customers to use a bond (%)
		in US\$	as % of total connection cost	
Low income	39.3	1,629.1	5.6	0.0
Lower middle income	47.2	1,948.5	14.4	23.5
Upper middle income	48.7	5,148.5	23.2	27.8
High income	28.2	727.0	14.7	45.5
World	40.7	2,661.6	15.5	24.6

Source: *Getting Electricity* database.

The 57 utilities in the sample that charge a security deposit require \$6,818 on average. In St. Lucia the security deposit for a small to medium-size enterprise like the *Getting Electricity* customer is as high as \$63,701. Although *Getting Electricity* records only the present value of the interest lost on the security deposit, even those amounts can be high—in Puerto Rico, as high as \$26,334. On average, the present value of the interest lost on the security deposit accounts for 16% of the entire connection cost for the customer. The present value of the interest lost represents on average 23% of the cost in upper-middle-income economies and 14% in lower-middle-income economies—the 2 income groups where requirements for security deposits are most prevalent (table 5).

That security deposits are charged as a guarantee against nonpayment suggests that they might be used most by utilities that are unsuccessful in collecting on electricity bills. But the collection ratio—the ratio of revenues from bills collected to the electricity billed—is not necessarily lower in economies where security deposits are charged (table 6). That raises an obvious question: Are security deposits charged for reasons other than to secure payment—for example, to improve the financial position of the utility? Because security deposits are usually returned to customers only when they cancel their contract with the utility, and rarely with interest, the deposits effectively represent a free credit granted to the utility over the life of a supply contract.

TABLE 6

**Problems with bill collection do not make requirements for security deposits more likely**

Economy	Average collection ratio (%)	Security deposit charged?
Azerbaijan	30	No
Georgia	55	No
India	71	Yes
Uganda	74	Yes
Kenya	75	No
Colombia	77	Yes
Moldova	80	No
Peru	80	No
Argentina	81	No
Malaysia	82	Yes
Niger	84	No
Cameroon	85	No
Brazil	87	No
Ghana	89	No
Tanzania	89	Yes
Ukraine	95	No
Russian Federation	96	No
Mauritius	100	Yes

Note: Collection ratio is ratio of revenues collected to total electricity billed.

Source: *Getting Electricity* database; Pushak (2009); Public-Private Infrastructure Advisory Facility (PPIAF), Private Participation in Infrastructure Services database.

Some utilities apply security deposits more selectively or at least lessen the financial burden of the deposit for customers. Utilities in Austria ask only customers with a weak credit history to put up a security deposit. Those in Argentina require security deposits only from customers that do not own the property being connected. In 14 economies utilities allow customers to settle the security deposit with a bank guarantee rather than deposit the entire security amount with the utility. The service cost for such bank guarantees is usually lower than the interest that customers lose on the deposit.<sup>7</sup> Even more important, the customers keep control of their assets.

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1. The World Bank classifies Panama as an upper-middle-income economy.
  2. In most cases this effectively leads to cross-subsidization from low- to high-cost areas and from high- to low-income customers.
  3. Where connection fees are fixed, they are usually calculated as a function of the peak electricity demand of the facility that is to be connected. These connection fees can often be found on the website of the utility or the regulator.
  4. Some utilities also justify security deposits as a necessary guarantee of the return of material that the utility “lends” to the customer (such as meters). The count of economies charging security deposits does not include those where security deposits are rolled over into consumption bills for the first 3 months (Malaysia, Tunisia and the United States).
  5. In only 10 economies (The Bahamas, Grenada, India, Jamaica, Malawi, Nicaragua, Panama, the Philippines, St. Lucia and St. Vincent and the Grenadines) do the utilities surveyed return the deposit with interest in the case of a commercial customer like that assumed by *Getting Electricity*. And in only 3 of 57 economies is the security deposit returned before the end of the contract (Australia, Nicaragua and Panama).
  6. *Getting Electricity* assumes a contract length of 5 years. For more details on the coding rules for security deposits, see the data notes.
  7. The annual service cost for a bank guarantee in the economies surveyed is in the range of 1.5–5% of the security amount.

## What to expect next?

Data reflecting the interactions between utility service providers and businesses as customers are still few and remain cumbersome and costly to collect. This is unfortunate, because while electricity sector reforms in developing economies have increased the operating efficiency of utilities, the efficiency gains have not always been passed on to customers (such as through lower costs).<sup>1</sup> More data on the services provided by utilities could inform research and support future reform efforts. And such benchmarking exercises can particularly benefit the distribution utilities providing electricity connections, as they retain monopolistic positions even in otherwise liberalized electricity markets.

By measuring the procedures, time and cost for obtaining a new electricity connection, *Getting Electricity* allows objective comparison across a wide range of economies from the perspective of businesses. And it provides insights into the efficiency of distribution utilities and the sector environment in which they operate. The connection process is only part of the electricity services that matter to businesses, though it is a critical one. But initial analysis of the pilot data shows correlations between measures of the connection process and available measures of broader sector performance. There is a positive correlation, for example, between the efficiency of the connection process as measured by *Getting Electricity* and the efficiency of the electricity system as measured by technical losses in the distribution and transmission system as a percentage of output (figure 13).

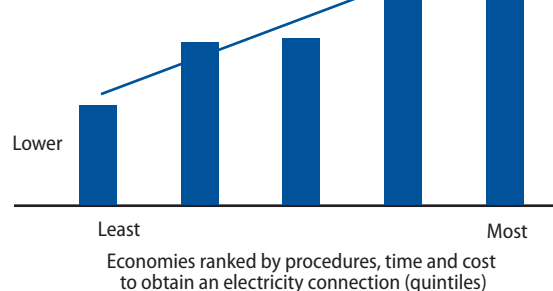
FIGURE 13

### Easier connection is associated with a more efficient electricity system

Transmission and distribution losses  
(% of electricity output)

Higher

Lower



Note: Relationships are significant at the 1% level and remain significant when controlling for income per capita.

Source: *Getting Electricity* database; World Bank, World Development Indicators database.

This paper presents findings on the kinds of constraints entrepreneurs face around the world in getting access to electricity and illustrates patterns in connection processes. It highlights economies where this process is efficient and others where it could be made simpler and more efficient. Feedback from governments and utilities on the new *Getting Electricity* indicators and the findings presented is welcome and will be used to further refine the methodology.

This report contains data for 140 economies—and research is continuing.

1. Jamasb and others (2005).

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## References

- CEER (Council of European Energy Regulators). 2008. *4th Benchmarking Report on Quality of Electricity Supply 2008*. Brussels. <http://www.energy-regulators.eu/>.
- Farvacque-Vitkovic, Catherine, Lucien Godin, Hugues Leroux, Florence Verdet and Roberto Chavez. 2005. *Street Addressing and the Management of Cities*. Washington, DC: World Bank.
- Foster, Vivien, and Jevgenijs Steinbuks. 2009. "Paying the Price for Unreliable Power Supplies: In-House Generation of Electricity by Firms in Africa." Policy Research Working Paper 4913, World Bank, Washington, DC.
- The Gambia Public Utilities Regulatory Authority (PURA). 2008. "Guidelines for Minimum Quality of Service and Reliability Standards for Electricity, Section 3.5.1." Kololi. [http://pura.gm/index.php?option=com\\_content&task=view&id=92&Itemid=146](http://pura.gm/index.php?option=com_content&task=view&id=92&Itemid=146).
- International Energy Agency. 2006. *World Energy Outlook*. Paris.
- Izaguirre, Ada Karina. 2008. "PPI in Energy in Developing Countries, 1990–2007: Recent Trends." World Bank and Public-Private Infrastructure Advisory Facility (PPIAF), Washington, DC. [http://www.ppiaf.org/documents/Presentations/BBL\\_PPI\\_Energy11-04-08.pdf](http://www.ppiaf.org/documents/Presentations/BBL_PPI_Energy11-04-08.pdf).
- Jamasb, Tooraj, Raffaella Mota, David Newbery and Michael Pollitt. 2005. "Electricity Sector Reform in Developing Countries: A Survey of Empirical Evidence on Determinants and Performance." Policy Research Working Paper 3549, World Bank, Washington, DC.
- Maharashtra Electricity Regulatory Commission. 2005. *Maharashtra Electricity Regulatory Commission (Standards of Performance of Distribution Licensees, Period for Giving Supply and Determination of Compensation) Regulations*. Mumbai.
- McCotter, Brian, and Academy for Educational Development. 2005. "Best Practices in Consumer Services: A Comparative Study." Report prepared for U.S. Agency for International Development, Washington, DC.
- Namibia Electricity Control Board. 2004. "Namibia Electricity Supply Industry: Quality of Supply and Service Standards—Quality of Service Standard." Windhoek. [http://www.ecb.org.na/download.php?fl\\_id=22](http://www.ecb.org.na/download.php?fl_id=22).
- Nexant. 2004. "Performance Benchmarks for Electricity Distribution Companies in South Asia." Concept paper prepared for U.S. Agency for International Development SARI/Energy Program, Washington, DC.
- Pakistan Housing. 2009. "Rawalpindi: Commercial Buildings Fire Risk Looming Large." January 3. <http://www.pakistanhousing.pk/News/index.php/rawalpindi-commercial-buildings-fire-risk-looming-large/>.
- Pakistan National Electric Power Regulatory Authority. 2005. "Statutory Notification." Islamabad. <http://www.nepra.org.pk/Standards/PSD%202004.pdf>.
- Pushak, Nataliya. 2009. "Describing and Exploring Private Participation in Infrastructure Services (PPIS) Database." World Bank and Public-Private Infrastructure Advisory Facility (PPIAF), Washington, DC.
- Shaw, Judith. 2004. "Microenterprise Occupation and Poverty Reduction in Microfinance Programs: Evidence from Sri Lanka." *World Development* 32 (7): 1247–64.
- Toledano, Joëlle, and José Ansón, eds. 2008. *Postal Economics in Developing Countries: Posts, Infrastructure of the 21st Century?*. Berne: Universal Postal Union.
- U.S. Fire Administration. 2008. "Electrical Fire Safety: A Factsheet on Home Electrical Fire Prevention." [http://www.usfa.dhs.gov/citizens/all\\_citizens/home\\_fire\\_prev/electrical.shtm](http://www.usfa.dhs.gov/citizens/all_citizens/home_fire_prev/electrical.shtm).
- World Bank. 2009. *World Development Indicators 2009*. Washington, DC: World Bank Group.



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## Data notes

*Getting Electricity* records all procedures that are officially required for a business to obtain a permanent electricity connection and supply for a standardized warehouse. These procedures include applications and contracts with electricity utilities, all necessary clearances from other agencies and the external and final connection works.

Data are collected from the electricity distribution utility, then completed and verified by independent professionals such as electricians, electrical engineers and electrical contractors as well as construction companies. In some cases regulatory agencies are also contacted. The electricity distribution utility surveyed is the one serving the area (or areas) where the warehouse is located. If a choice of distribution utilities is available, the one serving the largest number of customers is selected. The data presented in this report reflect contributions by 567 respondents in 140 economies.

To make the data comparable across economies, several assumptions about the warehouse and the electricity connection are used.

### Assumptions about the warehouse

The warehouse:

- Is located in the economy's largest business city.
- Is located within the official limits of the city where other warehouses are located (a nonresidential area).
- Is not located in a special economic or investment zone; that is, the electricity connection is not eligible for subsidization or faster service under a special investment promotion regime. If several options for location are available, the warehouse is located where electricity is most easily available.
- Is used for storage of refrigerated goods.
- Is a new construction (that is, there was no previous construction on the land where it is located). It is being connected to electricity for the first time.

### Assumptions about the electricity connection

The electricity connection:

- Is a permanent connection.
- Is a 3-phase, 4-wire Y, 140 kVA (kilovolt-ampere) connection.
- Is the length considered to be the most likely. The connection is overhead or underground, whichever is more common in the economy and in the area where the warehouse is located.
- Involves the installation of only one electricity meter. The monthly electricity consumption will be 0.07 gigawatt-hour (GWh).

The internal electrical wiring has already been completed.

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## Procedures

A procedure is defined as any interaction of the company employees or the company's main electrical contractor (that is, the one who did the internal wiring) with external parties, such as the electricity distribution utility, electricity supply utilities, government agencies and other electrical contractors. Interactions between company employees and steps related to the internal electrical wiring, such as the design and execution of the internal electrical installation plans, are not counted as procedures. Procedures that must be completed with the same utility but with different departments are counted as separate procedures. The list of procedures starts only after the internal wiring of the building has been completed and ends when the electricity is flowing.

The company employees are assumed to complete all procedures themselves unless the use of a third party is mandated (for example, only an electrical contractor registered with the utility is allowed to submit an application). If the company can, but is not required to, request the services of professionals (such as a private firm rather than the utility for the external works), these procedures are recorded if they are commonly done. For all procedures, only the most likely cases (for example, more than 50% of the time the utility has the material in stock) and those often followed in practice for connecting a warehouse to electricity are counted (for example, connection works are more commonly completed by private contractors than by the utility).

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## Time

Time is recorded in calendar days. The measure captures the median duration that the electricity utility and experts indicate is necessary in practice, rather than required by law, to complete a procedure with minimum follow-up and no extra payments. It is also assumed that the minimum time required for each procedure is 1 day. Although procedures may take place simultaneously, they cannot start on the same day (that is, simultaneous procedures start on consecutive days). In extreme cases, where connection requests are denied or not carried out because only generators are used in the economy, additional wait times of up to one year are added. It is assumed that the company does not waste time and commits to completing each remaining procedure without delay. The time that the company spends on gathering information is ignored. It is assumed that the company is aware of all electricity connection requirements and their sequence from the beginning.

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## Cost

Cost is recorded as a percentage of the economy's income per capita. Costs are recorded exclusive of value added tax. All the fees associated with completing the procedures to connect a warehouse to electricity are recorded, including those related to obtaining clearances from government agencies, applying for the connection, receiving inspections of both the site and the internal wiring, purchasing material, getting the actual connection works and paying a security deposit. Information from local experts and specific regulations and fee schedules are used as sources for costs. If several local partners provide different estimates, the median reported value is used. In all cases the cost excludes bribes.

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## Security deposit

Utilities charge security deposits as a guarantee against the possible failure of customers to pay their consumption bills. For this reason security deposits are most often calculated as a function of the estimated consumption of the new customer.

*Getting Electricity* does not record the full amount of the security deposit. Instead, it records the present value of the losses in interest earnings experienced by the customer because the utility holds the security deposit over a prolonged period, in most cases until the end of the contract (assumed to be after 5 years). In cases in which the security deposit is used to cover the first monthly consumption bills, it is not recorded. To calculate the present value of the lost interest earnings, the end-2008 lending rates from the International Monetary Fund's International Financial Statistics are used. In cases in which the security deposit is returned with interest, the difference between the lending rate and the interest paid by the utility is used to calculate the present value.

In some economies the security deposit can be put up in the form of a bond: the company can obtain from a bank or an insurance company a guarantee issued on the assets it holds with that financial institution. In contrast to the scenario in which the customer pays the deposit in cash to the utility, in this scenario the company does not lose ownership control over the full amount and can continue using it. In return the company will pay the bank a commission for obtaining the bond. The commission charged may vary depending on the credit standing of the company. The best possible credit standing and thus the lowest possible commission are assumed. Where a bond can be used, the value recorded for the deposit is the annual commission times the 5 years assumed to be the length of the contract. If both options exist, the cheaper alternative is recorded.

In Belize in June 2009, a customer asking for a 140-kVA electricity connection would have had to put up a security deposit of 22,662 Belize dollars in cash or check, and the deposit would be returned only at the end of the contract. The customer could instead have invested this money at the prevailing lending rate of 14.4%. Over the 5 years of the contract this would imply a present value of lost interest earnings of BZ\$11,073. In contrast, if the customer had been allowed to settle the deposit with a bank guarantee at an annual rate of 1.75%, the amount lost over the 5 years would have been just BZ\$1,983.

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## Limits to what is measured

The methodology has limitations that should be considered when interpreting the data. First, the collected data refer to businesses in the economy's largest business city and may not be representative of regulation in other parts of the economy. Second, the measures of time involve an element of judgment by the expert respondents. When sources indicate different time estimates, the time indicators reported represent the median values of several responses given under the assumptions of the standardized case. Finally, the methodology assumes that the business has full information on what is required and does not waste

time when completing procedures. In practice, a procedure may take longer if the business lacks information or is unable to follow up promptly. Alternatively, the business may choose to disregard some burdensome procedures. For both reasons the time delays reported could differ from the perceptions of entrepreneurs reported in the World Bank Enterprise Surveys.

The data also differ in important ways from other electricity data sets. The *Getting Electricity* data do not reflect the costs associated with electricity consumption. They do not measure the percentage of households or businesses connected to electricity in each economy. And while the data are correlated with other measures of the quality of electricity services, they cannot be used as a direct measure of the quality of the electricity connection obtained. Quality problems such as the frequency of service interruptions, energy losses and voltage drops—all of which represent a significant burden on businesses—are not directly reflected in the data set.

### **Economy characteristics**

The *Getting Electricity* study uses the World Bank regional and income groupings, available at <http://www.worldbank.org/data/countryclass/countryclass.html>.

The study uses 2008 income per capita numbers, calculated using the Atlas method (current US\$), as published in the World Bank's World Development Indicators 2009. For the cost indicator expressed as a percentage of income per capita, 2008 gross national income (GNI) in local currency units is used as the denominator. GNI data were not available from the World Bank for Afghanistan, The Bahamas, Bahrain, Cyprus, the Islamic Republic of Iran, Oman, Puerto Rico, Qatar, Saudi Arabia and the United Arab Emirates. In these cases GDP or GNP per capita data from the International Monetary Fund's World Economic Outlook database and the Economist Intelligence Unit were used.

## Getting Electricity indicators

Procedures, time and cost to obtain an electricity connection

	Procedures (number)	Time (days)	Cost (% of income per capita)		Procedures (number)	Time (days)	Cost (% of income per capita)
Afghanistan	4	424	618.2	Finland	5	53	20.9
Albania	5	162	614.5	France	5	123	27.9
Angola	8	41	1,102.3	Gabon	5	160	256.9
Antigua and Barbuda	4	42	140	Gambia, The	4	178	6,975.1
Argentina	6	74	25.2	Georgia	4	71	666.3
Armenia	8	242	673	Germany	3	17	5.1
Australia	5	46	15.4	Ghana	4	78	2,240.5
Austria	5	23	110.7	Greece	6	77	35.6
Azerbaijan	8	225	624.4	Grenada	4	30	244.6
Bahamas, The	7	73	45	Guatemala	4	39	677.4
Bahrain	5	72	47.8	Guinea-Bissau	8	437	4,125.8
Bangladesh	7	109	3,171.4	Honduras	8	33	963.4
Belarus	6	218	1,291.4	Hong Kong, China	4	101	1.8
Belgium	4	50	44.2	Hungary	6	252	98.3
Belize	5	106	341.9	Iceland	4	22	8.7
Benin	5	172	15,816.9	India	7	67	504.9
Bhutan	5	241	1,675.4	Iran, Islamic Rep.	6	143	1,050.3
Bolivia	7	51	1,484.4	Ireland	4	106	21.3
Bosnia and Herzegovina	10	127	276.7	Israel	6	113	12.7
Botswana	5	117	465.4	Jamaica	6	48	80.1
Brazil	6	36	163.2	Japan	3	105	0.0
Bulgaria	6	102	295.1	Jordan	5	43	525.2
Burkina Faso	4	158	15,443	Kazakhstan	5	103	300.5
Burundi	4	158	43,020.5	Kenya	5	162	1,405.3
Cambodia	4	169	3,854.1	Kyrgyz Republic	6	325	2,478.4
Cameroon	4	67	1,735.3	Lao PDR	5	127	3,245.2
Canada	8	133	164.4	Latvia	5	193	335.1
Cape Verde	4	46	1,112.9	Lebanon	5	75	29.9
Central African Republic	6	210	14,377.7	Lesotho	5	86	2,675.7
Chile	6	31	88.4	Lithuania	4	98	62.3
China	4	118	835.7	Luxembourg	5	120	51.5
Colombia	5	150	1,243.6	Macedonia, FYR	5	90	924.9
Congo, Dem. Rep.	6	73	28,304	Madagascar	5	419	8,466.2
Costa Rica	5	62	329	Malawi	5	179	11,654.8
Côte d'Ivoire	5	43	4,303.7	Malaysia	6	51	42.6
Croatia	5	70	319.8	Maldives	6	101	823.1
Cyprus	4	306	99.2	Mauritius	3	44	262.8
Czech Republic	6	279	184.9	Mexico	7	169	577.1
Denmark	3	43	106.2	Moldova	7	126	650.7
Djibouti	4	180	6,473.4	Montenegro	4	67	409.3
Dominica	5	73	1,188.1	Morocco	5	71	2,295
Ecuador	5	89	973.5	Namibia	7	40	403.9
Egypt, Arab Rep.	7	50	453.5	Nepal	6	73	2,890
El Salvador	7	74	467.3	Netherlands	5	125	38.9
Estonia	4	99	206.1	New Zealand	5	47	73.3
Ethiopia	4	75	6,967.3	Nicaragua	6	70	1,695.3
Fiji	6	29	794.8	Niger	4	165	4,295.9

## Procedures, time and cost to obtain an electricity connection

	Procedures (number)	Time (days)	Cost (% of income per capita)
Nigeria	8	260	1,146.8
Norway	4	59	14.1
Oman	5	66	70.8
Pakistan	5	233	2,334.7
Panama	5	35	10.7
Paraguay	4	53	409.8
Peru	5	118	521.8
Philippines	5	63	466.5
Poland	4	143	233.2
Puerto Rico	5	32	433.8
Qatar	3	90	3.8
Romania	7	207	312.8
Russian Federation	8	272	4,521.6
Saudi Arabia	3	71	78
Senegal	6	125	7,007
Serbia	4	81	513.4
Seychelles	5	132	479.5
Sierra Leone	8	441	1,279.1
Singapore	5	76	34.2
Slovenia	5	38	115.4
South Africa	5	171	443.2
Spain	4	85	169.6
Sri Lanka	4	132	1,548.5
St. Kitts and Nevis	4	18	377.3
St. Lucia	4	25	469.9
St. Vincent and the Grenadines	3	52	459.6
Suriname	5	128	745.7
Sweden	3	52	21.1
Switzerland	3	39	68.8
Syrian Arab Republic	5	71	994.2
Tajikistan	8	211	1,456.8
Tanzania	4	382	251.4
Tonga	5	50	128.8
Trinidad and Tobago	5	56	53.6
Tunisia	4	58	1,136.1
Turkey	4	62	812.6
Uganda	5	151	5,209.9
Ukraine	9	306	262
United Arab Emirates	4	55	15.9
United Kingdom	5	111	42.2
United States	5	48	16.8
Uzbekistan	7	123	2,532.8
Vietnam	4	127	1,685.1
West Bank and Gaza	6	70	1,567.1
Yemen, Rep.	4	35	6,926.1
Zambia	4	103	1,042.7

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