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Electricity Connections and Firm Performance in 183 Countries

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Abstract

This paper presents new data on electricity connections for businesses in 183 economies. The data cover information on procedures, time, and cost that a small or medium size business with a moderate electricity need has to invest to obtain a new electricity connection. The study finds significant variation in the time and cost to obtain such an electricity connection across countries. In low-income countries, for instance, it takes on average nearly twice as long as in high-income countries to connect a new customer to electricity, while the cost associated with a comparable connection is 70 times higher. The study finds that the poor performance of distribution utilities in low-income countries cannot only be explained by differences in income levels. The overall level of bureaucracy appears to be another important factor. The study also finds the data to be correlated with existing measures of the effectiveness of the electricity sector, suggesting that the hurdles related to obtaining an electricity connection mirror other problems in the sector, such as the quality of electricity supply and the incidence of bribe payments. Finally, the study finds that electricity connections affect firm performance. Simpler and less costly electricity connection processes are associated with better firm performance, in particular in industries with high electricity needs, such as manufacturing motor vehicles.

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Electricity Connections and Firm Performance in 183 Countries

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I. Introduction

Infrastructure services such as roads, water, electricity and telecommunications matter for private businesses. Where the quality and accessibility of infrastructure services are poor, companies' productivity and growth suffer. World Bank Enterprise Surveys, conducted in 108 economies from 2006 to 2010, report that, globally, managers consider electricity the most serious obstacle to their business[2]. Moreover, poor electricity supply has been shown to have adverse effects on firms' productivity and the investments they make in their productive capacity, thereby hindering the local economy (Calderon and Serven (2003), Dollar et al. (2005), Reinikka and Svensson (1999), Eiffert (2007)). For instance, Iimi (2008), using firm level data, estimates that in Eastern Europe and Central Asia eliminating existing electricity outages could lead to an increase of the gross domestic product by 0.5 to 6 percent.

Given the link between the quality of the electricity supply and firm performance, many enterprises in developing countries counter outages by relying on self-supply through a generator. This solution has been shown to be significantly more expensive than if the electricity is supplied by any utility (Foster and Steinbuks, 2009). This holds especially true for small firms for which the cost of self-supply can be prohibitively high (Lee et al. 1996)[3].

This paper provides new data that help understand the challenges faced by utilities as they help firms connect to power. More specifically, we present data on the process of obtaining an electricity connection for distribution utilities in 183 economies, detailing the required associated procedures along with their time and cost. The new indicators follow a methodology similar to the one developed in the seminal paper by Djankov et al (2002) on the "Regulation of Entry" that was then expanded into several indicators within the World Bank's Doing Business report to measure the efficiency of different public service providers. As La Porta et al (1999) and Djankov et al (2002) before us, we find that low-income countries are less efficient at providing public services, including in the particular case of electricity connections.

This paper adds to the literature on enterprise performance and business regulation – in addition to complementing existing research on electricity regulation by providing new data and analysis on the service quality of distribution utilities. In recent years, numerous studies have tried to establish the effectiveness and determinants of success of different electricity sector reforms (see Jamasb et al. (2005) for an overview of the literature). One reform aspect that has received

[2] According to World Bank Enterprise Survey data for 108 economies, 22% of managers consider electricity the most serious constraint to their business before competition from the informal sector (13%) and access to finance (12%) (see Table 15a).

[3] One of the consequences of these prohibitively high costs of self-supply is that new firms in countries with weak infrastructure services are more likely to locate near the city center or in an old industrial area with easy access to good utilities and other essential services (Lee (1985,1989)).

particular attention by researchers and policy makers is whether better sector performance for infrastructure services can be linked to the quality of regulatory institutions (Kirkpatrick et al. (2002), Cubbin and Stern (2006), Andres et al. (2008)). For example, Cubbin and Stern (2006) show how the existence of a regulatory law and high quality of regulatory governance are associated with higher per capita electricity generation in a sample of 28 developing countries. And Andres et al. (2008) construct an Electricity Regulatory Governance Index to illustrate how the existence and quality of regulatory agencies has an effect on the performance of utilities in Latin America. We add to this literature by proposing an indicator set that measures some aspects of electricity regulation as they apply to distribution utilities. Some studies (Estache and Rossi (2004), Gassner et al. (2009), Kumbhakara and Hjalmarsson (1998)) have found private electricity utilities to be more efficient than public utilities. Our data show that privately owned utilities do not necessarily deliver connections faster, but they do so at a lower cost than their publicly owned counterparts.

The new data presented here complement existing electricity data in important ways. Our data set significantly surpasses the country coverage for even the most broadly available indicators such as electrification rates, value lost due to electrical outages and electrical power transmission and distribution losses (country coverage for these indicators varies from 84 countries to 129 observations compared to 183 for our data set – see Table 6). Also, our data are updated annually, which is a higher frequency than for most other data sets. Unlike other data, the methodology also allows for important insights into the drivers of strong or weak utility performance. By measuring the different procedures involved in getting an electricity connection and the associated delays and costs, the indicators can help identify specific bottlenecks and cost drivers in individual connection processes. The data also offer insights into selected regulatory issues around connection processes by recording procedures. Lastly, our data set is the first of its kind to provide policy makers across countries with detailed comparable information on connection costs.

We examine the data set in view of three questions:

(i) First, we examine if the new data can reasonably be used as a proxy for the overall performance of the electricity sector in different countries. To test this hypothesis we look at whether a more efficient connection process is associated with better electricity sector outcomes. In particular, we look at the relationship with a country's electrification rate, losses in the electricity system, the value lost due to outages as reported by firms through the World Bank's Enterprise Surveys, and the perceived quality of the electricity supply and the frequency of bribe payments to utilities as reported by the experts surveyed by the World Economic Forum. We find that one additional procedure in the process for obtaining an electricity connection is not only associated with a 13 percentage point decrease in the perceived quality of the electricity supply, but also an 18 percentage point increase in the frequency of bribe payments to utilities. Furthermore, we find that a 1 percentage point increase in connection costs (as a % of GNI per capita) is associated with an increase of 3.2 percentage points in the transmission and distribution losses as percentage of

output. We also find that an improvement of one position on the Getting Electricity index is associated with half a percentage point of sales lost by firms due to outages, and that a country's income per capita has greater predictive power for its electrification rate than the efficiency of the electricity connection process.

(ii) Second, we examine if the overall bureaucratic environment in individual economies influences the efficiency of connection processes. To that end, we compare the new indicators with other measures of government efficiency such as the procedures, time and cost associated with starting a business, registering a property title or dealing with construction permits. With that we add to the business regulation literature by providing new results on how the overall regulatory environment in a country is related to provision of electricity services. We find that connection processes tend to be more lengthy and cumbersome in countries where other administrative processes are also burdensome. On whether majority publicly owned[4] or majority privately owned utilities are more likely to be affected by the general bureaucratic environment are not conclusive.

(iii) Third, we use firm level data from the Enterprise Survey data set to test whether the measures developed here are associated with firm performance. We find that total sales and sales per worker are higher where the provision of electricity connections is more efficient controlling for several firm and industry characteristics.

The next section describes the data sample. Section III presents descriptive statistics on the new data collected. Section IV presents the basic results on the relationship of the new data with other measures of public service efficiency and sector outcome indicators. Section IV discusses the firm level data and its relationship with the electricity variables. Finally, section V concludes.

II. Data

Constructing the new indicators

This paper is based on a new data set which summarizes the process of obtaining electricity connections for small-and medium sized companies across 183 economies[5] in 2010/2011. We are interested in all the procedures that an entrepreneur needs to carry out to legally connect to electricity. We also calculate the official costs and the time necessary for the completion of each procedure. The methodology developed in this paper follows closely the methodology for the Doing Business Starting a Business Indicators which, in turn, are based on the paper by Djankov et al (2002). The data set used here is the original data set developed for the getting electricity

[4] For the rest of the paper we refer to utilities that are more than 50% government owned as public utilities and to utilities that are more than 50% privately owned as private utilities.

[5] The unit of observation is an economy which in most cases is equivalent to the territory of a country. However, there are a few exceptions, such as, Puerto Rico and Hong Kong SAR, China.

indicator set. The data have evolved as countries have improved their electricity connection processes over time.

We collect our data from distribution utilities and independent professionals such as electricians, electrical engineers and construction companies in the main business city of each economy. In total close to 600 respondents contributed to the data for 183 economies. Our economies span a wide range of income levels and geographic regions. The sample includes 47 high income, 50 upper-middle income, 54 lower-middle income, and 32 low-income economies. Following the World Bank regional classifications, the data cover 46 economies in Sub-Saharan Africa, 18 in the Middle East and North Africa region, 24 in East Asia and the Pacific, 8 in South Asia, 32 in Latin America and the Caribbean, 24 in Europe and Central Asia and 31 in OECD high-income economies.

To ensure that the data are comparable across economies, respondents in the 183 economies covered were presented with a standard case study. Based on the case study, distribution utilities in the main business city of each economy were asked to describe the procedures for obtaining an electricity connection, along with the time and cost of completing them (see appendix I for a description of the case study used). The electricity distribution utility surveyed was the one serving the area (or areas) in which commercial warehouses are most commonly located. If there was a choice between several distribution utilities, the one serving the largest number of customers was selected. From the responses of each utility, a list of procedures was drawn up and verified through e-mail and telephone interviews with independent professionals such as electricians, electrical engineers, electrical contractors and construction companies. In some cases, regulatory agencies were also contacted.

The data are constructed using a standardized case study of a small to medium enterprise seeking an electricity connection for its newly built warehouse that will be used to store refrigerated goods. We assume that the warehouse is located in the country's most populous city, within the official city limits and near other similar warehouses. Furthermore, it is assumed that the warehouse is not located in a special economic or investment zone, so that the electricity connection is not subject to subsidization or a faster service under a special investment promotion regime. If several options are available in terms of location, the location where electricity is most easily available is selected.

The electricity connection that is needed for the new warehouse is a 3-phase, 4-wire Y, 140 kVA connection. This connection type is representative of that of an electricity-intensive small or medium size firm. Indeed, it is about seven times the needs of a one-family household in a relatively rich country - but it is significantly smaller than that of a large manufacturing or industrial firm. The connection is done either via an overhead or an underground connection; depending on what is more common in the country, and the area in question. We assume that the internal wiring of the warehouse (which is done by a private electrician and not the utility) is completed and we record only the procedures, time and cost associated with realizing the external

part of the connection works. The connection works end at the electricity meter. Lastly, the monthly electricity consumption for the warehouse is estimated at 0.07GWh.

The new "Getting Electricity" variables

The "Getting Electricity" Indicator is composed of three sub-indicators: the number of procedures, the time and the cost of obtaining an electricity connection. Table 2 lists the distribution utilities that were surveyed in each country. The table also indicates their ownership structure and details the procedures, time and cost indicators for each one of them.

A procedure is defined as any interaction between the company employees - or the company's main electrician (that is, the one who did the internal wiring) – and with external parties, such as the electricity distribution utility, electricity supply utilities, government agencies, other electricians and electrical firms. 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 study assumes that the information needed to understand the process is readily available (thereby not leading to unnecessary delays) and that no bribes are paid to speed up the process. 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 only recorded if they are commonly done. For all procedures, we only count the most likely cases[6] and those often followed in practice for connecting a warehouse to electricity.

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 bribe payments. It is also assumed that the minimum time required for each procedure is 1 day. Although procedures may take place simultaneously, it is assumed that they cannot start on the same day (that is, simultaneous procedures start on consecutive days). In a few extreme cases (Guinea-Bissau, Liberia and Madagascar), where connection requests are denied - or de facto not carried out because only generators are used in the country 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.

Cost is recorded as a percentage of the economy's income per capita. We use the 2010 gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the

[6] For example, if respondents report that necessary material is provided in 50 percent of all cases by the utility and not purchased by the customer, no additional procedure to purchase the material is recorded.

midyear population according to the World Bank's World Development Indicators 2011. Costs are recorded exclusive of value added tax and only include the fees associated with completing the procedures to connect a warehouse to electricity. This includes the costs in 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[7]. Costs associated with electricity consumption are not included. 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.

Cost estimates for 86 economies also include the present value of the lost interest earnings on the security deposits that utilities require as a guarantee against the possible failure of customers to pay their consumption bills. Instead of recording the full amount of the guarantee, we record 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 this is until the end of the contract (assumed to be after 5 years)[8]. To calculate the present value of the lost interest earnings, the end-2010 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 wherein 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 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. In any case, we assume that the best possible credit standing and thus the lowest possible commission. Where a bond can be put up, 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.

We also use, as an aggregate indicator, the relative rank of a given country on the process of obtaining an electricity connection. In order to calculate the rank, we aggregate the three sub-

[7] Connection costs can be broadly divided into the following categories: often utilities charge a fixed connection fee that spreads the fixed costs of operating a distribution grid over all customers; in addition, customers are required to pay for the variable costs for each connection, including labor and material costs. Sometimes the costs also include fees for inspections that the utility or outside contractors are legally required to carry out. In many economies costs also include payments to other agencies for permits, inspections and approvals.

[8] In the few cases in which the security deposit is used to cover the first monthly consumption bills, it is not recorded at all.

indicators – number of procedures, time and cost – in line with the methodology for other Doing Business indicators by averaging the percentile rankings on the component indicators.

Because we examine how far the process of obtaining an electricity connection differs depending on whether the responsible distribution utility is majority privately or publicly owned, we also collected data from the publicly available sources such as the websites of the surveyed utilities on the ownership composition of each utility in November 2011. We created a dummy variable for ownership which is 0 in the cases where more than 50% of the utility is government owned (this includes ownership by local government such as municipalities) and is 1 in those cases where more than 50% of the ownership of the utility is in private hands. As per this definition, 133 utilities in our sample are considered government owned and 50 are privately owned.

Other variables

We are interested in the relationship between the new getting electricity indicators and three sets of variables.

First, we look at the relationship of the new indicator with outcome variables for the electricity sector. As outcome variables, we use data on the number of people with electricity access as a percentage of total population ("Electrification rate") as collected by the International Energy Agency. We also examine the relationship with the percentage of electric power transmission and distribution losses as percentage of output[9] as collected by the International Energy Agency from the Energy Statistics and Balances of Non-OECD Countries and Energy Statistics of OECD Countries, and the United Nations' Energy Statistics Yearbook. A substantial amount of energy is lost in the electricity transmission and distribution system by way of technical and non-technical losses such as electricity theft. In addition, shutdowns and breakdowns in the system also prevent the delivery of energy to end-consumers causing revenue loss. Successful utilities manage revenue by minimizing loss and maximizing energy delivery to end-consumers. Transmission and distribution losses are hence a useful measure of the technical efficiency of the electricity system. We also test the relationship between the new data and the "Perception of the Quality of Electricity" and the "Frequency of Bribe Payments to Public Utilities" as of the World Economic Forum's Global Competitiveness Indicators. Lastly, we use data from the World Bank's Enterprise Surveys on the percentage of sales lost due to power outages reported by managers. We also compare the new data with other data on the relative strength of regulatory institutions for

[9] Technical loss is inherent in electrical systems, as all electrical devices have some resistance and the flow of currents causes a power loss. Every element in a power system (a line or a transformer) offers resistance to power flow and, thus, consumes some energy while performing the duty expected of it. The cumulative energy consumed by all these elements is classified as "Technical Loss." Technical losses are due to energy dissipated in the conductors and equipment used for Transmission, Transformation, Sub-transmission and Distribution of Power. These occur at many places in a distribution and transmission system − in lines, mid-span joints and terminations transformers, service cables and connections, etc.

infrastructure services such as the "Electricity Regulatory Governance Index" developed by Andres et al. (2008) or the data on the degree of autonomy of different electricity regulators collected by Cubbin and Stern (2006). But the number of available observations for both data sets is so small (19 countries in the case of the "Electricity Regulatory Governance Index" and 28 in the case of the "Regulatory Autonomy" data) that we do not present the results here.

Second, we examine the relationship of the new indicator with other measures of government bureaucracy as reflected in a set of three Doing Business time and motion indicators: the number of procedures, time and cost to start a business, register a property and to deal with construction permits. For this analysis, we use the Doing Business data as of the Doing Business Report 2012 for all three indicators. The data cover 183 countries and the period from July 2010 to June 2011, just like for the Getting Electricity data. The Dealing with Construction Permits indicator records not only the process of obtaining construction permits and registering a new building, it also includes procedures, time and cost estimates related to connecting a new construction to utilities such as water, telecommunications and electricity. In order to avoid multi-collinearity with the Getting Electricity data, we adjust the data for the Dealing with Construction permits indicator by excluding all procedures, time and cost estimates related to utility connections from the original data set.

Third, we test the relationship of the new indicator with measures of enterprise performance. All data for this part of the analysis come from the Enterprise Surveys data set. This data set provides firms level data on firms' characteristics and several measures of the business environment (for instance, trade, infrastructure and finance). The data is collected on a 3-year rotation, meaning that each developing country is visited every 3 years, but the cycle varies country by country (so the data collected for different countries is done in different years). For each country only one year of data was kept (the most recently available year). No data before 2006 were included since the new electricity data is as of 2010/11. Furthermore, only 108 countries of Enterprise Surveys match our sample of 183 economies. The 108 countries surveyed include 38 countries from Sub-Saharan Africa, 30 from Eastern Europe and Central Asia, 25 from Latin America and the Caribbean, 10 from East Asia and the Pacific, 4 from South Asia and one from the Middle East and North Africa region (i.e. Yemen). The richest countries in the Enterprise Survey sample are Slovenia and the Bahamas (as measured by real GDP per capita), the country with the lowest income is the Democratic Republic of Congo.

As outcome variables we use total sales and sales per worker. Nominal values are deflated using the GDP deflator from the World Development Indicators database. All values are presented in 2000 constant US dollars and the exchange rate is taken from the International Monetary Fund's International Financial Statistics database. As dependent variables, we use past sales, average labor input (measured by the number of employees), capital input (proxied by investment), average international trade engagement (measured by the percentage of firms that export directly at least 10% of their sales, import directly at least 10% of their inputs or both of these in industry j country

c), average usage of bank finance (measured by the percentage of firms in industry j and country j that have a bank loan), and the average number of power outages reported by firms for a typical month.

Table 1 describes all the variables used in this study.

III. Summary statistics

There is a large variability in the number of procedures, the time and the cost for getting electricity (see Table 2). For instance, in order to get his business connected to electricity in 2010/2011, an entrepreneur in Ukraine had to go through 11 different procedures, which take at least 285 days and the connection will cost him a total of US$7,705.5 (equivalent to 275.2% of Ukraine's GNI per capita). To do the same in Germany, an entrepreneur needs only 3 procedures, less than three weeks and the connection will cost him the equivalent of 51.9% of the GNI per capita. Appendix II details for illustration purposes the procedures, cost and time to obtain a new electricity connection in Baku, Azerbaijan.

Table 3 and 4 present the means in terms of the number of procedures, time and cost to get connected to electricity. In addition, the means for other Doing Business variables are provided, such as the procedure, time and cost to start a business, register a property or deal with construction permits by income group and region. Tables 5a, 5b and 5c compare the procedures, time and cost to obtain an electricity connection by the ownership structure of the utility connecting the new customer. Table 6 provides descriptive statistics for outcome variables such as the share of the population connected to electricity, transmission and distribution losses as a % of output and the value lost due to power outages as a percentage of sales by income group and region. Table 7 provides a correlation matrix between the new electricity data and the outcome variables. Several interesting findings emerge, as illustrated below.

Procedures to get connected to electricity

The number of procedures to obtain an electricity connection in 2010/2011 varied from 3 procedures in countries like Germany, Japan, Sweden and Switzerland to 11 procedures in Ukraine. The average number of procedures required to obtain an electricity connection did not vary much across income groups and regions. A review drawn up for each country reveals that there tends to be fewer procedures in economies where[10]:

- Approvals that customers have to obtain from other agencies 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

[10] For a detailed review of the content of procedures and typical trends see (World Bank, 2010).

both Serbia and Montenegro the same construction license can be obtained from the municipality together with the main construction permit.

- The responsibility for safety compliance of the building's internal wiring is transferred to private electricians and it is not customers who have to go through inspection procedures. In Denmark, Germany, Japan and Mauritius the customer's electrician is required to submit an installation wiring certificate with the service application. In other economies, like Ukraine, clients have to obtain multiple approvals from different agencies to comply with the same safety standards. In countries where responsibility for safety compliance are transferred to private electricians, a well regulated industry for electricians is usually in place, with a national accreditation system and professional licenses for electrical engineers.
- Utilities have the necessary material to connect customers in stock and readily available and they are not asked to obtain the required materials themselves. The latter is the case in countries like Bangladesh, Benin and the Central African Republic where customers are asked to provide the utility with such materials as poles, meter boxes or transformers because the utility does not have them in stock.

Time to get connected to electricity

Although there is no significant variation in the number of procedures across regions and income groups, the number of interactions customers have with the utility and other agencies is clearly associated with longer connection delays. In economies where businesses have to go through 7–11 procedures to get connected, the process takes 141 days on average. In economies with 3–6 procedures, it takes only 104 days on average. It takes 66 days on average to get connected in the 8 economies with the smallest number of procedures (3 procedures), and 185 days in the 7 economies with the highest number of procedures (from 9 to 11 procedures).

The average number of days needed to obtain an electricity connection clearly decreases from the lowest income to the highest income countries with 163 days in low-income economies, 101 in lower-middle income economies, 107 days in upper-middle income economies and 92 days in high-income economies. Key observations also emerged depending on the regional classifications of countries, but they did not necessarily mirror the observations made across income groups. For instance, average connection delays are the longest in Eastern Europe and Central Asia, even though countries in the region fall mostly in the middle-income group category.

Furthermore, there can be striking differences within regions. For instance, within Sub-Saharan Africa, Mauritius makes it easy for businesses to get connected to electricity. It takes a total of 3 procedures and 91 days to get connected in Port Louis, the country's capital. In the same region, the time it takes to obtain an electricity connection can range up to 450 days in Madagascar and 455 days in Guinea-Bissau.

For a few countries in the sample, connection delays are particularly long because a) connections are not granted at all or b) because once a connection has been granted the availability of electricity cannot be guaranteed afterwards.

Cost to get connected to electricity

Average connection costs as % of income per capita across income groups show a clear trend of decreasing costs from low to high-income countries. While an electricity connection costs on average 7,903 percent of a low-income country's income per capita, it costs only 108 percent in high-income countries and 620 percent in upper-middle income countries. The two regions with the lowest income, Sub-Saharan Africa and South Asia are also the regions where average connection costs are the highest with 6,099 percent and 2,115 percent of the income per capita, respectively.

But connection costs also vary significantly within income groups, suggesting room to reduce costs. In the 10 lowest-cost economies (all high-income economies except Panama), the average cost for a connection is no more than 8.3% of income per capita, which is 13 times lower than the average for all high-income economies (108% of income per capita). In contrast, in the 10 highest-cost economies (all low-income economies), the average is 17,071% of income per capita, more than twice the average for the low-income group (7,903% of income per capita).

Ownership of utilities

Tables 5a and 5b and 5c present the data for the new Getting Electricity Indicator by ownership of the respective utility surveyed. The sample contains 133 utilities that are majority-publicly owned and 50 utilities that are majority-privately owned. Public ownership of distribution utilities is still the most common ownership model around the world. Moreover, in 2011, distribution utilities in 72 percent of all 183 countries surveyed were in public hands in 2011. Private ownership is most common in lower-middle and upper-middle income countries. Regionally, the share of private ownership is highest in Latin America and the Caribbean (Table 5b). Table 5a shows that the average number of procedures and the time utilities take to connect a customer to electricity differ little by ownership, nor do absolute connection costs. However, when connection costs are normalized by the average income per capita, majority publicly owned utilities charge their customers more than twice what the average private utility charges. Table 5c shows that connection costs as a share of income per capita are significantly lower in countries where utilities are privately owned and that these results are valid after controlling for income. The coefficient suggests that an increase in the connection cost equal to the income per capita is associated with a 7 times smaller cost increase when the utility is privately owned.

Comparing the new data with other measures of bureaucracy

Noteworthy observations emerge when comparing the data for the new Getting Electricity indicators with Doing Business Indicators that measure the complexity of bureaucratic processes such as Starting a Business, Registering Property and Dealing with Licenses.

First, the maximum number of procedures required to obtain an electricity connection is relatively small with 11 procedures compared to 18 for Starting a Business, 15 for Registering Property and 50 for Dealing with Construction Permits (table 3). Compared to the procedures number for other Doing Business indicators, the new indicator exhibits a much smaller standard variation in the number of procedures.

Second, the average cost for a new electricity connection is naturally much higher than the cost for starting a business, registering a property or obtaining a construction permit (table 3). While costs for these three indicators only include official processing fees and sometimes one-off taxes (like property transfer taxes), the cost for an electricity connection often includes significant material and labor costs (see section II on Data for a description of cost items covered). The average cost of an electricity connection is 2,158 percent of the income per capita, versus 42 percent for starting a company, 6 percent for registering property and 486 percent for obtaining a construction permit. The standard deviation for connection costs is highest in the low-income and lower-middle income group and average connection costs as % of income per capita across income groups show – like the other Doing Business indicators – a clear trend of decreasing costs from low to high income countries.

Other electricity measures

Table 6 describes the outcome indicators used in the next section to analyze the relationship between the new electricity data and other variables of electricity sector performance, such as the share of the population connected to electricity ("electrification rate"), transmission and distribution losses as a % of output and the value lost due to electricity interruptions. In addition, we are using two perception based indicators from the World Economic Forum's Global Competitive Indicator set, which capture the expert perceptions of the quality of electricity and the perceived incidence of bribe payments in connection with electricity. The sample size for all five indicators is smaller than the one for the new Getting Electricity Indicators. The sample for the electrification rate is by far the smallest with just 84 observations. As one would expect, electrification rates and the perceived quality of electricity increase with the income level of a country. Conversely for the transmission and distribution losses, the value lost of sales due to electricity interruptions, and the incidence of bribe payments; they all decrease with the income level of a country. Electrification rates range from an average of 23 percent in low-income countries to 99 percent in high income countries. The ratio of transmission and distribution losses averages 7 percent in high income countries and 20 percent in low and 18 percent in lower-middle income countries. And, the value lost due to power outages ranges from 1 percent of the sales of an average company in high income countries to 8 percent in low-income countries.

Table 7 details correlations between the new Getting Electricity variables and the five outcome indicators. Correlations are positive and statistically significant between the cost to get a connection as of income per capita and distribution and transmission losses and the % of sales lost due to electrical outages. The time and cost to obtain an electricity connection are also negatively correlated with the electrification rate and the perception of electricity quality and bribes in electricity indicator. The procedures to obtain an electricity connection are positively correlated with the time and cost to obtain a connection and negatively correlated with the perception of electricity quality and bribes in electricity indicator. The highest correlation coefficients can be found between the Quality of Electricity score and the Bribes in Electricity score (0.83), the Quality of Electricity score and the electrification rate (0.65) the electrification rate and the cost to get an electricity connection (0.56), the value lost due to outages variable and the quality of electricity score (-0.57) and the Bribes in Electricity Score and the electrification rate (0.52).

IV. Results

In order to establish the explanatory value of the new indicators, we examine the newly collected data in view of three questions. First, we examine how much explanatory power our new aggregated Getting Electricity index has for the general performance of the electricity sector. Second, we try to understand to what extent it moves in similar ways as other indicators of government regulation. To that end we compare the new indicator with other Doing Business measures of government regulation. And third, we look to establish if a less cumbersome and less costly process of obtaining an electricity connection is associated with better firm performance.

IV.1. Are electricity connections easier where the electricity sector performs better overall?

In low-income countries where only 22 percent of the population is connected to electricity (Table 6), obtaining an electricity connection remains an important barrier for individuals and firms. But even where connections are accessible, the quality of electricity supply can weigh down on business activity. 41 percent of firms surveyed by the World Bank's Enterprise surveys consider electricity either a very severe or major obstacle to the operations of their business (Table 15a). This is, especially true, for firms in South Asia and Sub-Saharan Africa, where firms are also more likely to own a generator and report the greatest number of power outages per month (Tables 15b to 15c).

To assess whether connection and other electricity sector problems go hand in hand, we regress our new measures of connection procedures, time and cost on various indicators that measure the overall performance of the electricity sector. Tables 8 to 12 present our main findings.

We use the share of the population connected to electricity as the dependent variable and the number of procedures, time and cost of obtaining an electricity connection as independent variables (Table 8). In an additional specification, we use the aggregated "Getting Electricity" indicator as independent variable. With only 84 observations for the electrification rate, the sample

is relatively small. The results show that the time and cost to obtain an electricity connection are negatively correlated with the electrification rate and statistically significant at the 1-5% level. The same is true for the aggregate Getting Electricity ranking that combines all three variables into one aggregate index. However, once we control for income levels, all specifications lose their statistical significance and the coefficients become significantly smaller suggesting that differences in electrification rates are much more driven by income levels of countries than by the complexity of the process for connecting new customers.

Second, we use transmission and distribution losses as a % of output as the dependent variable (Table 9). Here the results show that a greater number of procedures to obtain an electricity connection are associated with a higher percentage of losses in the distribution and transmission system. This result is statistically significant at the 1% level, but like for the electrification rate the result loses its significance once we control for income. The results for the relationship between the cost of obtaining a connection and the transmission and distribution loss ratio are the only ones that retain their statistical significance. This correlation might be driven by utilities having to recuperate losses through higher costs on customers.

Third, we use values lost due to outages (as % of sales) as reported by the World Bank's enterprise surveys as the dependent variable (Table 10). We find a positive association of the variable with both the number of procedures and the cost associated with obtaining an electricity connection. However, only the positive correlation with procedures remains statistically significant after we control for income. We also find the aggregate rank on the ease of getting electricity is positively and statistically significantly correlated with the Value lost due to outages variable. In fact, the results show that a 10-position improvement on the ease of getting electricity is associated with a 4-percentage point increase of the value lost due to outages as a percentage of annual sales.

We obtain similar results in our specification with the WEF's Perceived Quality of Electricity Supply variable as the dependent variable (Table 11). As in the previous specification out of the three new variables, the number of procedures to obtain a new electricity connection has the greatest predictive power for the dependent variable. While greater procedures, time and cost are associated with a lower quality of electricity supply in the specification without the income control, only the specification with procedures remains statistically significant after controlling for the income effect. And, again like in the previous specification, a better rank on the overall ease of getting electricity is associated with greater quality of electricity supply.

To test whether the ownership structure of utilities plays a role, we have also included in each one of the four specifications a dummy for the ownership structure of the utility, which does not enter significantly in any of the four specifications. Also, the inclusion of ownership dummy affects the significance level of the coefficients for our new Getting Electricity variables only marginally.

Last, we use the Frequency of Bribe Payments to Public Utilities as a dependent variable (Table 12). This specification yields the strongest results so far. A greater number of procedures, as well as a longer connection time and greater cost are associated with a higher frequency of bribe payments to utilities and the results for procedures and cost both remain statistically significant after controlling for income. The most robust results are yielded for the procedures variable. A 10-position improvement on the rank of the ease of getting electricity is associated with a 5 percentage-point decrease in the reported frequency of bribe payments. This finding is consistent with similar findings by Djankov et al. (2002) for the number of start-up procedures and corruption. More procedural complexity, i.e. bureaucracy, seems to precipitate or at least come hand in hand with corruption.

IV.2. Are electricity connections more cumbersome in more bureaucratic countries?

Next, we examine whether complexities in electricity connection processes are merely a result of a general bureaucratic culture in the country. In order to answer this question, we look at how the new data on the process of obtaining an electricity connection relates to other indicators of regulatory efficiency. We use the Doing Business data on the number of procedures and the time for starting a business, for registering a property and for obtaining a construction permit as proxies of the bureaucracy in a given country.

Specification with procedures

Table 13 presents our main findings for the specification focusing on the procedural complexity of different branches of the government bureaucracy. We use the number of procedures to obtain an electricity connection as the dependent variable and the three measures of number of procedures for starting a business, the number of procedures for registering property and for dealing with construction permits as independent variables separately. Our sample contains 180 to 182 observations. In this first simple specification, the procedures to transfer property and to deal with construction permits are positively correlated with the procedures for obtaining an electricity connection and the results are statistically significant at 1%. The results for the procedures to start a business are not. It is possible that the relationship with the Starting a Business procedures is less significant because of the greater convergence to international best practice in this particular area of business regulation (see World Bank, 2014). We then add the log of the GNI per capita as a control variable. The inclusion of the control variable does not lead to a sizeable change in the coefficients of the independent variables, but the significance level of the dealing with construction permits variable goes down to 5%.

Specification with time

In a second set of specifications, we use the time component of the same Doing Business indicators instead of the number of procedures (Table 14). The first specification includes no controls. All time variables (starting, property, construction permits) are positively correlated with the time

needed to obtain a new electricity connection. However, only the coefficients for the time to register property and obtain a construction permit are statistically significant. The coefficient for the time to start a business is not; possibly for the same reason that the procedures were not correlated, due to a significant convergence to best practice. Once we control for income per capita, only the positive association between the time to obtain an electricity connection and the time to obtain a construction permit remains statically significant. This result seems intuitive given the obvious connection between the electricity connection and the construction permitting process. A review of individual procedure lists (see Appendix II for an example) for Getting Electricity reveals that the building office is the public office most likely to be involved in the connection process (e.g. to obtain right of ways for underground and overhead connections).

IV.3. Do firms perform better in countries with better electricity connection processes?

As a last step, we examine to which degree the procedures, time and cost of obtaining an electricity connection matter for firm performance. In this paper we look at one major measure of firm performance: total sales as a measure of output. We do this analysis both at the firm level and aggregated to the industry level. It is important to note that the specifications analyzed here are based on cross section data and therefore no causal inferences can be made. We can only identify how the variables commove, but we are not able to affirm for sure that efficiency in the electricity connection process leads to better firm performance. In some specifications we include country fixed effects to address this issue.

The different specifications we use in the firm level analysis can be summarized in the following formula:

$$y_{ijc} = \beta_0 + \beta_1 e_c + \beta_2 X_{ijc} + \beta_3 I_j + \beta_5 C_c + \beta_6 I_j * e_c + \varepsilon_{ijc} \qquad (1)$$

Here y_{ijc} represents either total sales in firm i, industry j and country c. e stands for the electricity connection measure that is our variable of interest and varies at the country level. Here we use the overall percentile rank calculated using the average of the percentile ranks of procedures, time and cost to obtain an electricity connection. $Xijc$ represent firm characteristics which are as follows: log of past sales as a proxy for production capacity, log of firm labor input (measured by the number of employees), capital input (proxied by investment), firm's international trade engagement (measured by either the firm exports directly at least 10% of its sales, imports directly at least 10% of its inputs or either the firms does both of these), firm's usage of bank finance (measured by either the firm has a bank loan), and number of power outages in a typical month. I_j stands for industry characteristics. They are captured with dummies defined at the 2-digit ISIC code. C_c represents country specific characteristics, which here are proxied by income per capita. Cc stands for country fixed effected and both our electricity connection measure and GDP per capita are excluded. However, to separate the income effect from the general country fixed effect we include dummies for four income groups (low, lower middle, upper middle and high). Finally

*Ij*ec* represent the interaction term between industry and our electricity measure. The coefficients of these interactions are also variables of interest and measure whether firm performance in certain industries is more affected by the process of connecting to electricity. E_{jc} is the residual term.

Output (in this case proxied by sales) is a function of the existing production capacity (proxied by past sales), variable inputs (labor and capital) plus other factors that can affect productivity levels. Identifying these determining factors has been the focus of a vast literature. Here we try to test if the efficiency in the electricity connection process can be one of these factors. To do so we use similar specifications to the ones used in papers such as Seker (2009) and Hallward-Driemeier, Wallsten and Xu (2003).

Given that our variables of interest vary at the country and industry level, the more appropriate specification is at the industry level. The firm level regression is more likely to produce statistically significant results just because the number of observations is much larger. Therefore, it is important to verify if the results hold once the data are collapsed at the industry level.

$$y_{jc} = \beta_0 + \beta_1 e_c + \beta_2 X_{jc} + \beta_3 I_j + \beta_5 C_c + \beta_6 I_j * e_c + \varepsilon_{jc} \quad (2)$$

Here y_{jc} represents either total sales on average in industry j and country c. The other variables remain as in (1) except for *Xjc* which now represent average industry characteristics. These are as follows: average past sales, average labor input (measured by the number of employees), capital input (proxied by investment), average international trade engagement (measured by the percentage of firms that export directly at least 10% of their sales, import directly at least 10% of their inputs or both of these in industry j country c), average usage of bank finance (measured by the percentage of firms in industry j and country j that have a bank loan), and average number of power outages in a typical month.

Here we follow a variation of the specification used by Klapper, Laeven and Rajan (2004). These authors study the effect of the business environment on firm creation by interacting industry characteristics with country characteristics. We adapt their specification by changing the dependent variable from firm entry to firm performance and consequently also altering the industry and country level controls. We also add the past sales variable as a proxy of existing production capacity, which would not apply to the question of firm entry. In these specifications, all the data except for *e* (percentile rank of getting an electricity connection) come from the Enterprise Surveys data set.

Firm Level Specifications Results

The firm level regression results are presented in tables 16a and b. We first describe table 16a which is based on the full sample. Column 1 shows the results under the basic specification where the covariates are kept to a minimum. We control for country characteristics, industry characteristics and some firm level characteristics (past sales, labor and capital inputs and power

outages). The coefficient of interest (Beta 1) is negative and significantly different from zero at the one percent level. That is, firms have lower sales where electricity connections are more difficult to obtain. Sales are also higher where labor input is higher. Once usage of bank financing is included (column 2), these results remain significant. The same is true when the trade variables are included (column 3). This specification also shows that sales are higher among firms that import at least parts of their production inputs. Finally, column 4 shows the specification with all the covariates included, plus the interaction terms between industry fixed effects and the electricity variable. These interactions identify which industries are more affected by the electricity connection process. When the interaction terms are included, it stands out the vast majority of the interaction terms are negative in particular for industries such as manufacturing refined petroleum, manufacture of tanning and dressing of leather and manufacturing of motor vehicles, indicating that these industries are more likely affected by an inefficient electricity connection process. These results are presented in Table 16b. We include only the industries that have enough observations for the estimation of coefficients to be possible.

The Enterprise Survey database covers many cities within a country while the Getting Electricity database covers only the major business city in the country. In countries where the ease of obtaining an electricity connection varies considerably across cities, including all the firms covered in each country in Enterprise Surveys can lead to imprecise estimates of the relationship between firm performance and the electricity connection process. We therefore try to improve the fit of our model by restricting the sample of firms to only those located in the major business city of the country. The results for the restricted sample are presented in Table 17a. The same coefficients are significant as in the full sample specifications but the coefficient of our new Getting Electricity variable become more negative and the overall R-squared increases.

Industry Level Specifications Results

In a next step we collapse the firm data at the industry level as shown in every other column of Tables 16a and 17a. The industry level specifications use the same sets of covariates as in the firm level regressions. Compared to the firm level regressions, the same variables remain significant but the coefficients for past sales decrease slightly and those for labor input and the import dummy increase. The coefficient of our new Getting Electricity variable turns positive in all specification of the full sample. But once we restrict the sample to the Doing Business city only, the coefficient become negative again once enough controls are added to the regression (columns 2, 3 and 4). Moving up one position in the ranking from a more complex electricity connection process to a less complex one is associated with an increase of 0.2 in the log of firm sales and a 0.1 increase in the log of industry sales. Once the interaction terms are included in the restricted sample, as in the firm level regressions, there remain industries such as manufacture of tanning and dressing of leather and manufacturing of motor vehicles that also show a negative relation between the ranking in the ease of electricity connection and industry sales. These results are presented in Table 17b.

Only the industries with enough observations for the estimation of coefficients to be possible are included.

In general the results at the firm and industry levels are similar. The differences emerge when we compare the full sample and the restricted sample to the Doing Business city only. The significance of results increases with the restricted sample because the two data sets (Doing Business and Enterprise Surveys) become more comparable.

V. Conclusion

This paper presents basic statistical relationships between the number of procedures, time and cost to obtain an electricity connection and other variables using a new data set on the process of obtaining an electricity connection for 183 economies. The statistical relationships presented in this paper suggest that the new indicators not only add value by providing high-frequency data for a wide range of countries on connection processes and costs, but that they could also serve as a useful proxy for the performance of the electricity sector overall. Using the new data, we find electricity to be of greater quality and bribe payments to electric utilities to be less frequent in countries where it is easier and less costly to obtain an electricity connection. We also find that connection costs are higher in countries where technical and non-technical losses in the transmission and distribution system are high, and that privately owned utilities provide new connections at a lower cost than publicly owned utilities. Our analysis also suggests that the general procedural environment in a country influences the complexity of connection processes; they tend to involve more procedures in countries where other regulatory processes are also procedure-intensive. Last, the analysis indicates that firms perform better in terms of sales in countries where it is easier and less costly to get an electricity connection. This seems to be especially true for firms in the manufacture of tanning and dressing of leather industry and in the manufacturing of motor vehicles industry.

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VII. Tables

Table 1: Description of variables used

Variable	Source	Year	Definition
Procedures Getting Electricity	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of procedures required to complete a connection to electricity of a newly built construction with a 140 kVA load demand.
Time Getting Electricity	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Time in days required to connect a newly built construction to electricity starting from the first procedure required for the connection and until electricity starts flowing.
Cost in USD Getting Electricity	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Cost in USD paid to a utility, electrical contractors and other agencies for completion of an external electricity connection of a newly built construction with a 140 kVA load demand.
Cost as % of GNI per capita Getting Electricity	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Cost as % of GNI per capita paid to utility, electrical contractors and other agencies for completion of an external electricity connection of a newly built construction with a 140 kVA load demand. 2008 GNI in local currency units from the World Development Indicators is used as a denominator.
Country rank on the ease of getting electricity	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Rank of countries based on the procedures, time and cost of obtaining an electricity connection where 1 indicates the highest rank.
GNI per capita 2008	World Bank (World Development Indicators 2009)	2011	The gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.
Private/public utility	Author's classification: review of utility's web-sites and other sources on the structure of the electricity sector	2011	A dummy variable that identifies the ownership of a utility providing the electricity connection. The ownership is classified as public if more than 50% of a utility is government owned.
Procedures Starting a Business	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of procedures that entrepreneur needs to carry out to begin legally operating a firm involved in industrial or commercial activity.
Time Starting a Business	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of days it takes an entrepreneur to carry out all the procedures necessary to begin legally operating a firm involved in industrial or commercial activity.
Cost as % of GNI per capita Starting a Business	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Cost of starting a business includes all official fees and fees for legal or professional services which have to be paid to start up and formally operate an industrial or commercial business..

Procedures Registering Property	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of procedures necessary for a business (buyer) to purchase a property from another business (seller) and to transfer the property title to the buyer's name.
Time Registering Property	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of days it takes to complete all the procedures necessary for a business (buyer) to purchase a property from another business (seller) and to transfer the property title to the buyer's name.
Cost as % of property value Registering Property	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Cost of registering property includes official costs required by law to transfer the property title, including fees, transfer taxes, stamp duties and any other payment to the property registry, notaries, public agencies or lawyers.
Procedures Construction Permits (net of procedures related to utility connections)	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of procedures required for a business in the construction industry to build a standardized warehouse. These procedures include submitting all relevant project-specific documents (for example, building plans and site maps) to the authorities; obtaining all necessary clearances, licenses, permits and certificates; completing all required notifications; and receiving all necessary inspections.
Time Construction Permits (net of time related to utility connections)	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Number of days necessary for a business in the construction industry to complete all the formalities to build a standardized house.
Cost as % of GNI per capita Construction Permits	Doing Business Report 2011 (www.doingbusiness.org)	2009-2010	Cost of obtaining construction permits includes all the fees associated with completing the procedures to legally build a warehouse, including those associated with obtaining land use approvals and preconstruction design clearances; receiving inspections before, during and after construction; getting utility connections; and registering the warehouse property.
Electric power transmission and distribution losses (% of output)	International Energy Agency, Energy Statistics and Balances of Non-OECD Countries and Energy Statistics of OECD Countries, and United Nations, Energy Statistics Yearbook.	2010	Electric power transmission and distribution losses as percentage of output include losses in transmission between sources of supply and points of distribution and in the distribution to consumers, including pilferage.
Electrification rate (% of population)	International Energy Agency	2009	Number of people with electricity access as a percentage of total population.
Value lost due to electrical outages (% of sales)	World Bank, Enterprise Surveys	2006-2010	Value lost due to electrical outages is the percentage of sales lost due to power outages.

Quality of Electricity Supply Score	World Economic Forum – Executive Opinion Survey, Global Competitiveness Indicators	2010 and 2011 weighted average	How would you assess the quality of the electricity supply in your country (lack of interruptions and lack of voltage fluctuations)? [1 = insufficient and suffers frequent interruptions; 7 = sufficient and reliable]
Frequency of Bribes to Public Utilities Score	World Economic Forum – Executive Opinion Survey, Global Competitiveness Indicators	2011	In your country, how common is it for firms to make undocumented extra payments or bribes connected with public utilities? Answers ranges from 1 (very common) to 7 (never occurs).
Firms' current sales	World Bank, Enterprise Surveys	2006-2010	Firm total annual sales in local currency in 2000 constant US dollars.
Firms' labor input	World Bank, Enterprise Surveys	2006-2010	Number of firms' full time workers.
Firms' productivity	World Bank, Enterprise Surveys	2006-2010	Total annual sales in 2000 constant US dollars per full time worker.
Firms' capital input (investment)	World Bank, Enterprise Surveys	2006-2010	Total annual expenditure in 2000 constant US dollars for purchases of machines, equipment and buildings.
Direct Export 10%	World Bank, Enterprise Surveys	2006-2010	Measure of firms' international trade engagement: Dummy variable equal to 1 if the firm exports directly at least 10% of its sales.
Direct Import	World Bank, Enterprise Surveys	2006-2010	Measure of firms' international trade engagement: Dummy variable equal to 1 if the firm imports at least a part of its inputs.
Two-way Trader 10%	World Bank, Enterprise Surveys	2006-2010	Measure of firms' international trade engagement: Dummy variable equal to 1 if the firm exported at least 10% of its inputs AND exports at least 10% of its sales.
Firms' usage of bank finance	World Bank, Enterprise Surveys	2006-2010	Dummy variable equal to one if the firm uses banks or other financial institutions to finance its investments or working capital.
Number of power outages per month experienced by firms	World Bank, Enterprise Surveys	2006-2010	Average number of power outages observed by the firm in a typical month.

Table 2: Getting Electricity indicator data (2010/2011)

Economy	City	Name of the Utility	Private or Public	Procedures Getting Electricity	Time Getting Electricity	Cost in USD Getting Electricity	Cost as % of GNI per capita Getting Electricity
Afghanistan	Kabul	Kabul Electricity Department, Da Afghanistan Breshna Sherket (DABS)	Public	4	191	18,040.0	3,711.1
Albania	Tirana	CEZ Shperndarje	Private	6	177	24,290.4	615.0
Algeria	Algiers	SONELGAZ (via filiale Société de Distribution de l'électricité et gaz d'Alger (SDA))	Public	6	159	78,431.8	1,774.5
Angola	Luanda	Empresa de Distribuicao de electricidade (EDEL)	Public	9	69	44,618.7	1,278.5
Antigua and Barbuda	St. John's	Antigua Public Utilities Authority	Public	4	42	16,037.5	132.2
Argentina	Buenos Aires (Ciudad autonoma de)	EDESUR	Private	6	91	3,567.1	46.9
Armenia	Yerevan	Electric Networks of Armenia (ENA) CJSC	Private	6	242	8,645.8	278.9
Australia	Sydney	EnergyAustralia	Public	5	75	4,317.5	9.9
Austria	Vienna	Wien Energie Stromnetz GmbH	Public	5	23	52,955.2	113.0
Azerbaijan	Baku	Bakielektrikshebeke OJSC	Public	9	241	37,732.3	779.6
Bahamas, The	Nassau	Bahamas Electricity Corporation	Public	5	67	24,645.8	114.5
Bahrain	Manama	Ministry of Electricity and Water (MEW) (Electricity Distribution Directorate, EDD at the MEW)	Public	5	90	13,031.9	67.0
Bangladesh	Dhaka	Dhaka Electric Supply Company Ltd. (DESCO)	Public	8	142	32,898.7	5,576.1
Belarus	Minsk	Minskenergo	Public	7	179	76,619.7	1,383.0
Belgium	Brussels	Sibelga	Public	6	88	43,803.3	96.7
Belize	Belize City	Belize Electricity Ltd (BEL)	Private	5	66	14,941.5	369.4
Benin	Cotonou	Société béninoise d'énergie électrique (SBEE)	Public	4	172	115,890.3	15,452.0
Bhutan	Thimphu	Bhutan Power Corporation Ltd	Public	6	101	25,473.3	1,261.1
Bolivia	La Paz	Electropaz	Private	8	42	21,146.1	1,297.3
Bosnia and Herzegovina	Sarajevo	Elektroprivreda BiH	Public	8	125	24,271.6	516.4
Botswana	Gaborone	Botswana Power Corporation	Public	5	121	31,005.9	495.3
Brazil	São Paulo	AES Eletropaulo	Private	6	57	12,192.8	151.1
Brunei Darussalam	Bandar Seri Begawan	Department of Electrical Services (at the Ministry of Energy)	Public	5	79	12,891.4	49.0

Bulgaria	Sofia	CEZ Distribution Bulgaria AD	Private	6	137	22,915.0	397.1
Burkina Faso	Ouagadougou	Société Nationale d'Electricité du Burkina (SONABEL)	Public	4	158	75,996.8	14,901.3
Burundi	Bujumbura	Régie de Production et Distribution d'Eau et d'Electricité (Regideso)	Public	5	188	55,045.1	36,696.7
Cambodia	Phnom Penh	Electricité du Cambodge	Public	4	183	23,279.9	3,581.5
Cameroon	Douala	AES SONEL	Private	4	64	21,598.8	1,846.1
Canada	Toronto	Toronto Hydro	Public	8	168	64,084.2	153.0
Cape Verde	Praia	Empresa de Electricidade E Agua (Electra)	Public	6	58	36,646.0	1,217.5
Central African Republic	Bangui	Enerca	Public	7	210	59,842.1	13,298.3
Chad	N'Djamena	Société Tchadienne d'Eau et d'Electricité (STEE)	Public	6	67	91,262.9	14,719.8
Chile	Santiago	Chilectra	Private	6	31	7,808.9	82.6
China	Shanghai	Shanghai Municipal Electric Power Company	Public	5	145	27,339.0	755.2
Colombia	Bogota	CODENSA	Public	5	165	58,542.4	1,182.7
Comoros	Moroni	MaMWE	Public	3	120	20,476.7	2,353.6
Congo, Dem. Rep.	Kinshasa	Société Nationale d'Electricité (SNEL)	Public	6	58	51,894.5	32,434.1
Congo, Rep.	Brazzaville	Société Nationale d'Electricité (SNE)	Public	6	135	140,902.4	7,699.6
Costa Rica	San José	Compania Nacional de Fuerza y Luz	Public	5	62	19,822.8	316.7
Côte d'Ivoire	Abidjan	Compagnie Ivoirienne d'Electricité (CIE)	Private	8	55	43,851.8	4,137.0
Croatia	Zagreb	HEP ODS	Public	5	70	45,227.1	327.5
Cyprus	Nicosia	Electricity Authority of Cyprus (EAC)	Public	5	247	26,339.9	88.9
Czech Republic	Prague	(PRE) / PREdistribuce a.s.	Private	6	279	32,408.7	187.2
Denmark	Copenhagen	Dong Energy	Public	4	38	75,559.1	128.2
Djibouti	Djibouti Ville	Electricité de Djibouti (EDD)	Public	4	180	112,853.9	8,816.7
Dominica	Roseau	Dominica Electricity Services Ltd. (DOMLEC)	Private	5	61	43,801.6	893.9
Dominican Republic	Santo Domingo	EdeSur	Public	7	87	18,359.5	405.3
Ecuador	Quito	Empresa Electrica Quito	Public	7	89	35,436.6	899.4
Egypt, Arab Rep.	Cairo	South Cairo Electricity Distribution Company (SCEDC)	Public	7	54	10,555.0	509.9
El Salvador	San Salvador	AES El Salvador	Private	7	78	18,199.5	540.0
Equatorial Guinea	Malabo	Segesa	Public	5	106	103,492.1	833.3

Eritrea	Asmara	Eritrean Electricity Authority	Public	5	59	15,084.5	4,156.7
Estonia	Tallinn	Eesti Energia	Public	4	111	32,208.0	229.1
Ethiopia	Addis Ababa	Ethiopia Electric Power Corporation	Public	4	75	12,083.7	3,661.7
Fiji	Suva	Fiji Electricity Authority	Public	4	81	80,416.0	2,035.9
Finland	Helsinki	Helsinki Energy	Public	5	47	15,495.0	33.9
France	Paris	Electricité de France (EDF)	Public	5	79	17,436.7	39.6
Gabon	Libreville	Société d'Energie et d'Eau du Gabon (SEEG)	Private	6	160	38,326.1	520.0
Gambia, The	Banjul	National Water and Electricity Company (NAWEC)	Private	4	178	28,715.7	6,526.3
Georgia	Tbilisi	Telasi JSC	Private	5	96	21,783.4	861.0
Germany	Berlin	Vattenfall Europe Distribution Berlin GmbH	Private	3	17	22,107.5	51.9
Ghana	Accra	Electricity Company of Ghana	Public	4	78	16,964.2	1,425.6
Greece	Athens	Dimosia Epicheirisi Ilektrismou (DEI) (also known as the Public Power Corporation (PPC) of Greece)	Public	6	62	16,450.2	57.5
Grenada	St. George's	Grenada Electricity Services Ltd.	Private	6	49	20,659.3	370.2
Guatemala	Guatemala City	Empresa Electrica de Guatemala, S.A	Private	4	39	17,239.7	655.5
Guinea	Conakry	Electricite de Guinee (EDG)	Public	5	69	49,119.0	13,275.4
Guinea-Bissau	Bissau	Electricidade e Águas de Guinea-Bissau (EAGB)	Public	7	455	10,880.7	2,133.5
Guyana	Georgetown	Guyana Power and Light Inc. (GPL)	Public	7	109	14,623.0	556.2
Haiti	Port au Prince	Electricité d'Haiti (EdH)	Public	4	66	24,527.1	3,345.3
Honduras	Tegucigalpa	Empresa Nacional de Energia Electrica (ENEE)	Public	8	33	20,206.4	1,110.2
Hong Kong SAR, China	Hong Kong	CLP Power Hong Kong Ltd.	Private	4	93	556.6	1.9
Hungary	Budapest	Budapesti Elektromos Művek Rt. (ELMű Rt)	Private	5	252	16,421.3	126.5
Iceland	Reykjavik	Orkuveita Reykjavíkur	Public	4	22	2,837.8	6.6
India	Mumbai	Bhrihan Mumbai Electricity & Transport Undertaking	Public	7	67	4,687.0	400.6
Indonesia	Jakarta	PT PLN	Public	7	101	30,105.8	1,350.0
Iran, Islamic Rep.	Tehran	Tehran Regional Electric Company (TREC)	Public	7	140	50,210.0	1,108.4
Iraq	Baghdad	Ministry of Electricity	Public	5	47	14,599.9	660.6
Ireland	Dublin	Electricity Supply Board (ESB)	Public	5	205	38,387.0	86.6
Israel	Tel Aviv	The Israel Electric Corporation Ltd.	Public	6	132	3,252.8	12.6

Italy	Rome	Acea	Private	5	185	116,772.1	332.9
Jamaica	Kingston	Jamaica Public Service Co. Ltd.	Private	6	96	22,333.3	444.9
Japan	Tokyo	Tokyo Electric Power Company (TEPCO)	Private	3	105	-	0.0
Jordan	Amman	The Jordanian Electric Power Co., Ltd. (JEPCO)	Private	5	47	12,109.5	323.8
Kazakhstan	Almaty	Alatau Zharyk	Public	6	88	7,504.4	111.3
Kenya	Nairobi	Kenya Power and Lighting Co. Ltd	Public	6	163	11,258.9	1,462.2
Kiribati	Tarawa	Public Utilities Board	Public	6	97	100,547.1	5,320.0
Korea, Rep.	Seoul	Korea Electric Power Corp	Public	4	28	8,387.5	42.3
Kosovo	Pristina	Kosovo Energy Corporation (KEK)	Public	7	60	33,566.6	1,036.0
Kuwait	Kuwait City	Ministry of Electricity and Water (MEW)	Public	7	42	19,969.8	63.4
Kyrgyz Republic	Bishkek	Severelectro	Public	7	247	18,364.5	2,110.9
Lao PDR	Vientiane	Elictricite du Laos	Public	5	134	24,061.9	2,734.3
Latvia	Riga	Sadales Tikls	Public	5	193	50,203.1	405.2
Lebanon	Beirut	Electricité du Liban (EDL)	Public	5	75	10,281.0	129.0
Lesotho	Maseru	Lesotho Electricity Company (Pty) Ltd	Private	5	140	27,173.3	2,664.1
Liberia	Monrovia	Liberia Electricity Corporation (LEC)	Public	4	585	8,470.5	5,294.1
Lithuania	Vilnius	AB Lesto	Public	5	128	7,305.2	64.0
Luxembourg	Luxembourg	Creos Luxembourg S.A.	Public	5	120	49,209.5	66.1
Macedonia, FYR	Skopje	EVN Macedonia	Private	5	151	39,078.8	888.2
Madagascar	Antananarivo	Jiro sy rano malagasy (JIRAMA)	Public	6	450	38,055.4	9,236.4
Malawi	Blantyre	Electricity Supply Corporation of Malawi (ESCOM)	Public	6	222	32,771.0	11,703.9
Malaysia	Kuala Lumpur	Tenaga Nasional Berhad	Public	5	46	4,678.5	64.7
Maldives	Malé	State Electric Co. Ltd	Public	6	101	22,290.3	576.0
Mali	Bamako	Energie du Mali (EDM)	Private	4	120	26,369.7	3,877.9
Marshall Islands	Majuro	Marshalls Energy Company	Public	5	67	30,200.0	986.9
Mauritania	Nouakchott	Société Mauritanienne d'Electricité (SOMELEC)	Public	5	75	86,370.7	8,997.0
Mauritius	Port Louis	Central Electricity Board (C.E.B.)	Public	4	91	25,169.4	347.6
Mexico	Mexico City	CFE	Public	9	114	39,068.9	436.0
Micronesia, Fed. Sts.	Island of Pohnpei	Pohnpei Utilities Corporation (PUC)	Public	3	105	11,542.3	519.9

	(Palikir/Kolonia)						
Moldova	Chisinau	ICS RED Union Fenosa S.A.	Private	7	140	12,655.9	796.0
Mongolia	Ulan Bator	Ulaanbaatar Electricity Distribution Network (UBEDN)	Public	8	126	21,101.5	1,294.6
Montenegro	Podgorica	Elektroprivreda Crne Gore (EPCG)	Public	5	71	35,551.2	542.8
Morocco	Casablanca	Lydec	Private	5	62	76,040.2	2,725.5
Mozambique	Maputo	Electricidade de Mozambique	Public	7	87	11,105.0	2,523.9
Namibia	Windhoek	City of Windhoek	Public	7	55	24,849.9	576.6
Nepal	Kathmandu	Nepal Electricity Authority	Public	5	74	10,431.2	2,370.7
Netherlands	Amsterdam	Liander	Public	5	143	14,544.9	29.5
New Zealand	Auckland	Vector Limited	Public	5	50	22,025.0	80.8
Nicaragua	Managua	DISNORTE - DISSUR	Private	6	70	17,861.3	1,768.4
Niger	Niamey	Société Nigérienne d'Electricité (NIGELEC)	Public	4	120	26,814.6	7,886.7
Nigeria	Lagos	Eko Distribution Company	Public	8	260	13,455.3	1,180.3
Norway	Oslo	Hafslund	Public	4	66	6,300.7	7.3
Oman	Muscat	Muscat Electricity Distribution Company (MEDC)	Public	6	62	11,941.6	66.3
Pakistan	Karachi	Karachi Electricity Supply Company Ltd	Private	6	266	13,826.5	1,355.5
Palau	Koror	Palau Public Utilities Corporation	Public	5	125	11,864.5	190.8
Panama	Panama City	Unión FENOSA	Private	5	35	1,078.6	16.0
Papua New Guinea	Port Moresby	PNG Power Ltd	Public	4	66	875.5	74.2
Paraguay	Asuncion	Administracion Nacional de Electricidad (ANDE)	Public	4	53	6,554.3	287.5
Peru	Lima	Luz del Sur	Private	5	100	20,800.0	500.0
Philippines	Quezon City	MERALCO	Private	5	50	16,023.0	895.1
Poland	Warsaw	RWE Stoen	Private	6	186	26,000.0	212.1
Portugal	Lisbon	Energias de Portugal (EDP) - Distribuicao	Private	5	64	12,002.1	57.3
Puerto Rico	San Juan	Puerto Rico Electric Power Authority (PREPA)	Public	5	32	67,800.0	428.6
Qatar	Doha	Qatar General Electricity and Water Corporation (Kahramaa)	Public	4	90	4,066.3	5.8
Romania	Bucharest	ENEL (former Electrica Muntenia Sud (EMS))	Private	7	228	44,865.6	538.6
Russian Federation	Moscow	MOESK	Private	10	281	386,548.9	4,125.4

Rwanda	Kigali	EWSA	Public	4	30	25,362.5	5,513.6
Samoa	Apia	EPC	Public	4	34	25,044.6	881.9
São Tomé and Principe	São Tomé	Empresa de Agua e Electricidade (EMAE)	Public	4	89	16,383.6	1,437.2
Saudi Arabia	Riyadh	Saudi Electricity Company (SEC)	Public	4	61	3,494.7	21.5
Senegal	Dakar	Société Nationale d'Électricité du Sénégal (SENELEC)	Public	8	125	62,378.0	5,997.9
Serbia	Belgrade	Elektroprivreda Srbije (EPS): Elektrodistribucija Beograd plc	Public	4	131	33,821.6	564.6
Seychelles	Victoria	Public Utilities Corporation	Public	6	147	47,962.1	565.6
Sierra Leone	Freetown	National Power Authority	Public	8	137	9,907.8	2,914.1
Singapore	Singapore	SP PowerGrid Ltd.	Public	4	36	12,585.3	33.8
Slovak Republic	Bratislava	Zapadoslovenska Energetika	Public	5	177	31,858.8	197.5
Slovenia	Ljubljana	Elektro Ljubljana, d.d.	Public	5	38	28,910.0	122.9
Solomon Islands	Honiara	Solomon Islands Electricity Authority	Public	4	160	23,432.3	2,575.0
South Africa	Johannesburg	ESKOM	Public	5	214	102,727.1	1,780.4
Spain	Madrid	Iberdrola	Private	5	101	75,513.8	236.9
Sri Lanka	Colombo	Ceylon Electricity Board	Public	4	132	33,207.0	1,668.7
St. Kitts and Nevis	Basseterre	St. Kitts Electricity Department	Public	4	18	38,275.4	377.1
St. Lucia	Castries	St. Lucia Electricity Services Ltd. (Lucelec)	Private	4	25	11,032.3	212.6
St. Vincent and the Grenadines	Kingstown	St. Vincent Electricity Services Ltd. (VINLEC)	Public	3	52	14,399.6	280.7
Sudan	Khartoum	National Electricity Corporation	Public	5	70	50,319.8	4,091.0
Suriname	Paramaribo	N.V. Energiebedrijven	Private	4	58	45,134.9	795.3
Swaziland	Mbabane	Swaziland Electricity Board (SEC)	Public	6	137	34,596.4	1,472.2
Sweden	Stockholm	Vattenfall	Public	3	52	10,653.5	21.8
Switzerland	Zurich	EKZ	Public	3	39	47,794.5	70.7
Syrian Arab Republic	Damascus	Public Establishment for Distribution and Exploitation of Electrical Energy (PEDEEE)	Public	5	71	25,205.9	1,045.9
Taiwan, China	Taipei	Taiwan Power Company	Public	4	24	9,798.1	55.1
Tajikistan	Dushanbe	Barki Tojik	Public	9	193	10,232.5	1,461.8
Tanzania	Dar es Salaam	Tanesco	Public	4	109	12,014.5	2,402.9

Thailand	Bangkok	Metropolitan Electricity Authority	Public	4	35	3,245.1	86.3
Timor-Leste	Dili	Electricidade de Timor-Leste	Private	3	39	23,416.3	1,159.2
Togo	Lomé	Togo Electricité	Private	4	74	26,491.0	6,020.7
Tonga	Nukualofa	Tonga Power Ltd.	Public	5	50	3,753.3	115.1
Trinidad and Tobago	Port of Spain	Trinidad and Tobago Electricity Commission	Public	4	61	1,214.8	7.3
Tunisia	Tunis	Societe Tunisienne de l'Electricite et du Gaz (STEG)	Public	4	65	39,535.7	1,062.8
Turkey	Istanbul	Boğaziçi Elektrik Dağıtım A.Ş. (BEDAŞ)	Private	5	70	62,357.5	714.3
Uganda	Kampala	Umeme	Private	5	91	26,520.9	5,765.4
Ukraine	Kiev	JSC Kievenergo	Public	11	285	7,705.5	275.2
United Arab Emirates	Dubai	Dubai Electricity And Water Authority (DEWA)	Public	4	55	9,270.4	22.1
United Kingdom	London	UK Power Networks	Private	5	109	17,966.2	43.3
United States	New York City	Con Edison	Private	4	68	7,966.4	16.9
Uruguay	Montevideo	Administración Nacional de Usinas y Transmisiones Eléctricas (UTE)	Public	5	48	1,447.6	15.4
Uzbekistan	Tashkent	Uzbekenergo	Public	9	117	24,808.1	2,255.3
Vanuatu	Port Vila	Unelco	Private	5	257	33,170.7	1,266.1
Venezuela, R.B.	Caracas	Electricidad de Caracas (ELECAR)	Public	6	158	148,938.1	1,460.2
Vietnam	Ho Chi Minh City	Ho Chi Minh City Power Company	Public	6	115	30,141.2	2,984.3
West Bank and Gaza	Ramallah	Jerusalem District Electricity Company (JDECo)	Private	5	63	24,251.3	1,560.6
Yemen, Rep.	Sanaa	Public Electricity Corporation (PEC)	Public	4	35	52,718.3	4,973.4
Zambia	Lusaka	Zambia Electricity Supply Corporation Ltd. (ZESCO)	Public	6	117	12,130.2	1,250.5
Zimbabwe	Harare	Zimbabwe Electricity Supply Authority (ZESA)	Public	6	125	24,405.5	6,511.9

Table 3: Number of Procedures, Time and Cost by Income Group

	Procedures				Time				Cost as % of GNI per capita			
	Getting Electricity	Starting a Business	Registering Property	Construction Permits	Getting Electricity	Starting a Business	Registering Property	Construction Permits	Getting Electricity	Starting a Business	Registering Property	Construction Permits
Entire Sample												
Obs	183.0	183.0	180.0	182.0	183.0	183.0	180.0	182.0	183.0	183.0	180.0	182.0
Mean	5.4	7.8	5.9	15.7	111.4	34.0	57.9	192.7	2,158.0	42.2	6.0	486.0
Std.	1.5	3.3	2.3	6.5	80.0	58.7	64.9	130.1	4,514.7	74.3	4.9	1,073.1
Min	3.0	1.0	1.0	6.0	17.0	1.0	1.0	26.0	0.0	-	-	0.9
Max	11.0	18.0	15.0	50.0	585.0	694.0	513.0	1,179.0	36,696.7	735.1	27.9	7,553.7
Low-Income												
Obs	32.0	32.0	32.0	31.0	32.0	32.0	32.0	31.0	32.0	32.0	32.0	31.0
Mean	5.3	8.5	6.5	14.8	163.1	40.4	87.1	252.3	7,902.5	128.4	8.5	1,354.3
Std.	1.5	3.7	2.3	5.0	123.7	43.3	80.4	218.7	8,206.8	132.4	4.9	2,078.5
Min	3.0	2.0	3.0	8.0	30.0	3.0	5.0	75.0	1,461.8	3.7	0.4	47.9
Max	9.0	17.0	12.0	29.0	585.0	216.0	301.0	1,179.0	36,696.7	735.1	18.5	7,553.7
Lower Middle Income												
Obs	54.0	54.0	51.0	54.0	54.0	54.0	51.0	54.0	54.0	54.0	51.0	54.0
Mean	5.7	8.3	6.1	16.4	101.1	37.5	70.4	177.8	1,962.1	46.0	6.2	545.5
Std.	1.7	2.8	2.4	5.9	62.6	31.5	75.9	85.3	2,061.5	43.4	6.0	830.3
Min	3.0	3.0	1.0	6.0	33.0	3.0	2.0	51.0	74.2	3.1	-	22.4
Max	11.0	17.0	15.0	34.0	285.0	161.0	513.0	475.0	8,997.0	169.9	27.9	3,758.4
Upper Middle Income												
Obs	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Mean	5.6	8.0	6.3	17.0	107.3	40.6	38.8	201.9	620.4	15.6	5.7	257.9
Std.	1.4	3.2	2.0	7.8	61.2	98.3	30.5	103.1	664.6	19.9	4.3	397.4
Min	3.0	3.0	2.0	7.0	18.0	3.0	2.0	46.0	15.4	1.0	-	5.4
Max	10.0	17.0	13.0	50.0	281.0	694.0	197.0	483.0	4,125.4	119.9	16.9	1,690.0
High Income												
Obs	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
Mean	4.8	6.4	4.9	14.2	92.4	18.5	44.7	160.8	107.6	7.3	4.4	87.6
Std.	1.0	3.5	2.3	6.3	64.3	24.1	58.7	109.2	144.1	15.0	3.6	141.9
Min	3.0	1.0	1.0	6.0	17.0	1.0	1.0	26.0	0.0	-	-	0.9
Max	8.0	18.0	11.0	33.0	279.0	135.0	298.0	677.0	833.3	100.9	12.7	589.4

Table 4: Number of Procedures, Time and Cost by Region

	Procedures				Time				Cost as % of GNI per capita			
	Getting Electricity	Starting a Business	Registering Property	Construction Permits	Getting Electricity	Starting a Business	Registering Property	Construction Permits	Getting Electricity	Starting a Business	Registering Property	Construction Permits
East Asia and Pacific												
Obs	24.0	24.0	21.0	24.0	24.0	24.0	21.0	24.0	24.0	24.0	21.0	24.0
Mean	4.8	8.0	5.0	17.8	93.7	40.3	86.8	158.8	1,208.8	26.5	3.9	96.3
Std. Dev.	1.2	3.5	1.8	7.6	56.0	30.6	120.6	126.3	1,369.4	38.8	3.3	118.8
Min	3.0	3.0	2.0	6.0	24.0	3.0	2.0	26.0	1.9	0.7	-	4.8
Max	8.0	17.0	10.0	33.0	257.0	110.0	513.0	652.0	5,320.0	150.5	12.9	518.2
Europe and Central Asia												
Obs	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Mean	6.6	6.3	5.9	20.1	162.4	17.0	38.6	249.5	880.7	9.1	2.9	636.3
Std. Dev.	1.9	2.3	2.8	8.6	70.8	15.5	33.2	130.8	897.0	10.2	3.3	887.9
Min	4.0	2.0	1.0	9.0	60.0	3.0	2.0	74.0	64.0	1.0	-	19.0
Max	11.0	12.0	15.0	50.0	285.0	64.0	118.0	677.0	4,125.4	36.9	13.9	3,758.4
High Income: OECD												
Obs	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
Mean	4.8	5.6	4.7	13.5	100.9	13.1	32.5	154.5	92.6	5.2	4.4	78.3
Std. Dev.	1.1	2.9	2.3	6.1	69.3	9.9	39.0	73.3	83.0	6.0	3.3	118.8
Min	3.0	1.0	1.0	6.0	17.0	1.0	1.0	26.0	0.0	-	-	3.3
Max	8.0	15.0	11.0	33.0	279.0	47.0	152.0	301.0	332.9	20.7	12.7	589.4
Latin America and Caribbean												
Obs	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Mean	5.5	9.2	6.9	14.0	67.3	56.4	65.6	225.0	609.4	37.3	5.9	169.3
Std. Dev.	1.4	3.2	1.7	6.1	34.9	120.8	63.8	201.5	670.2	49.4	3.9	166.4
Min	3.0	5.0	4.0	7.0	18.0	7.0	7.0	46.0	7.3	0.7	0.9	4.0
Max	9.0	17.0	13.0	33.0	165.0	694.0	301.0	1,179.0	3,345.3	250.9	13.8	587.3
Middle East and North Africa												
Obs	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Mean	5.1	8.4	6.0	16.3	77.7	20.8	35.6	140.5	1,385.4	36.6	5.7	325.7
Std. Dev.	1.1	2.7	2.4	4.0	41.0	18.3	21.2	80.9	2,238.9	48.5	6.6	456.4
Min	4.0	5.0	2.0	10.0	35.0	7.0	8.0	43.0	5.8	0.8	-	0.9
Max	7.0	14.0	10.0	24.0	180.0	77.0	75.0	320.0	8,816.7	169.9	27.9	1,828.1
South Asia												
Obs	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Mean	5.8	7.3	6.0	16.1	134.3	24.8	103.3	205.0	2,115.0	27.0	7.5	1,094.2
Std. Dev.	1.4	2.7	2.3	8.5	66.6	13.3	92.8	65.1	1,748.7	18.0	4.1	1,790.9
Min	4.0	4.0	3.0	8.0	67.0	7.0	5.0	115.0	400.6	7.2	4.8	13.6
Max	8.0	12.0	9.0	34.0	266.0	46.0	250.0	334.0	5,576.1	56.5	16.9	5,183.9
Sub-Saharan Africa												
Obs	46.0	46.0	46.0	45.0	46.0	46.0	46.0	45.0	46.0	46.0	46.0	45.0
Mean	5.4	8.8	6.5	14.8	141.0	44.8	67.3	202.6	6,098.6	100.7	9.6	1,075.7
Std. Dev.	1.4	3.4	2.2	4.1	109.0	44.9	51.8	107.0	7,501.6	116.7	5.2	1,726.0
Min	3.0	2.0	4.0	8.0	30.0	3.0	9.0	75.0	347.6	2.2	0.4	23.1
Max	9.0	18.0	13.0	29.0	585.0	216.0	295.0	614.0	36,696.7	735.1	20.9	7,553.7

Table 5a: Getting Electricity Indicators by Utility Ownership

	Public Utility					Private Utility					T-test
Variable Name	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Public vs. Private
Procedures Getting Electricity	133	5	2	3	11	50	5	1	3	10	0.4670
Time Getting Electricity	133	112	82	18	585	50	111	74	17	281	0.0527
Cost as % of GNI pc Getting Electricity	133	2,524	5,161	6	36,697	50	1,185	1,622	0	6,526	1.7978
Cost in USD Getting Electricity	133	32,131	28,683	876	148,938	50	33,331	55,124	0	386,549	-0.1917

Table 5b: Number of Observations for Getting Electricity Indicators by Utility Ownership, Income Group and Region

		Income Group				Region						
Utility Ownership	Entire Sample	Low-Income	Lower Middle Income	Upper Middle Income	High Income	East Asia &Pacific	Europe & Central Asia	High Income: OECD	Latin America &Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Public	133	28	37	32	36	20	15	21	17	15	7	38
% of total	73%	88%	69%	64%	77%	83%	63%	68%	53%	83%	88%	83%
Private	50	4	17	18	11	4	9	10	15	3	1	8
% of total	27%	13%	31%	36%	23%	17%	38%	32%	47%	17%	13%	17%

Table 5c: Time and Cost of Getting Electricity controlling for income

	Time Getting Electricity		Cost as % of GNI pc Getting Electricity	
Private utility	-0.702	1.798	-1338.251**	-1039.477**
	(12.6)	(12.5)	(503.1)	(381.0)
Ln GNI per capita		-13.914**		-1662.882***
		(4.9)		(320.2)
Constant	111.602***	226.523***	2523.627***	16257.891***
	(7.2)	(44.3)	(448.3)	(2,975.1)
Degrees of Freedom	181	180	181	180
R-squared	0.00 0.07	0.07	0.02	0.33
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 6: Electricity Sector Outcome Variables by Income Group

Variable Name	Sample	Obs.	Mean	Std. Dev.	Min	Max
Electric power transmission and distribution losses (% of output)	**Entire Sample**	**129**	**13**	**11**	**2**	**83**
	Low Income	13	20	15	2	58
	Lower Middle Income	33	18	14	6	83
	Upper Middle Income	39	15	8	6	56
	High Income	44	7	3	3	17
Value lost due to electrical outages (% of sales)	**Entire Sample**	**125**	**5**	**5**	**0**	**27**
	Low Income	28	8	6	0	27
	Lower Middle Income	44	5	4	0	18
	Upper Middle Income	44	3	3	0	14
	High Income	9	1	1	0	2
Electrification rate (% of population)	**Entire Sample**	**84**	**67**	**33**	**9**	**100**
	Low Income	18	22	12	9	44
	Lower Middle Income	30	63	25	16	100
	Upper Middle Income	25	89	20	34	100
	High Income	11	99	1	98	100
GCI Quality of Electricity Score (1="insufficient and suffers frequent interruptions" to 7= "sufficient and reliable")	**Entire Sample**	**139**	**5**	**2**	**1**	**7**
	Low Income	21	3	1	1	4
	Lower Middle Income	34	3	1	1	5
	Upper Middle Income	39	5	1	1	6
	High Income	45	6	1	5	7
GCI Bribes in Electricity Score (1= "very common" to 7 = "never occurs")	**Entire Sample**	**139**	**5**	**1**	**3**	**7**
	Low Income	21	4	1	3	6
	Lower Middle Income	34	4	1	3	6
	Upper Middle Income	39	5	1	3	6
	High Income	45	6	1	4	7

Table 7: Correlation Matrix for Getting Electricity Indicators and other measures of the performance of the electricity sector

Variable/Variable	No. of Procedures Getting Electricity	Time Getting Electricity (in days)	Cost Getting Electricity in USD	Cost Getting Electricity (% of GNIpc)	Electric power transmission and distribution losses (% of output)	Value lost due to electrical outages (% of sales)	Electrification rate (% of population)	GCI Quality of Electricity Score (1="insufficient and suffers frequent interruptions" to 7= "sufficient and reliable")	GCI Bribes in Electricity Score (1= "very common" to 7 = "never occurs")
No. of Procedures Getting Electricity	**1**								
Time Getting Electricity (in days)	**0.2857*** (0.0001)	**1**							
Cost Getting Electricity in USD	**0.2003*** (0.0066)	**0.1999*** (0.0067)	**1**						
Cost Getting Electricity (% of GNIpc)	**0.0129** (0.8619)	**0.1738*** (0.0186)	**0.2744*** (0.0002)	**1**					
Electric power transmission and distribution losses (% of output)	**0.1155** (0.1923)	**0.0633** (0.4763)	**0.1311** (0.1386)	**0.1896*** (0.0314)	**1**				
Value lost due to electrical outages (% of sales)	**0.1135** (0.2074)	**0.0178** (0.844)	**0.0409** (0.6508)	**0.4231*** (0)	**0.3698*** (0.0005)	**1**			
Electrification rate (% of population)	**-0.0319** (0.7735)	**-0.3512*** (0.0011)	**-0.1864** (0.0896)	**-0.5611*** (0)	**-0.3634*** (0.0016)	**-0.3892*** (0.0014)	**1**		
GCI Quality of Electricity Score (1="insufficient and suffers frequent interruptions" to 7= "sufficient and reliable")	**-0.3116*** (0.0002)	**-0.2212*** (0.0089)	**-0.1271** (0.136)	**-0.4569*** (0)	**-0.4968*** (0)	**-0.5663*** (0)	**0.6524*** (0)	**1**	
GCI Bribes in Electricity Score (1= "very common" to 7 = "never occurs")	**-0.4133*** (0)	**-0.2692*** (0.0014)	**-0.2143*** (0.0113)	**-0.3860*** (0)	**-0.3826*** (0)	**-0.3346*** (0.0009)	**0.5204*** (0)	**0.8269*** (0)	**1**

P-values in parentheses

Table 8: Regression Results: Electrification Rate (as % of population)

	Electrification Rate (as % of population)			
Procedures Getting Electricity	-0.791	-0.793	0.996	0.993
	(2.568)	(2.588)	(1.917)	(1.926)
Private utility		1.581		3.271
		(8.057)		(5.503)
Ln GNI per capita			19.362***	19.393***
			(1.44)	(1.43)
Constant	71.002***	70.621***	-90.646***	-91.687***
	(15.135)	(15.238)	(16.611)	(16.485)
R-squared	0.001	0.001	0.612	0.614
Observations	84	84	84	84
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Electrification Rate (as % of population)			
Time Getting Electricity (Log)	-21.030***	-21.665***	-7.335	-7.098
	(5.107)	(5.239)	(3.843)	(4.112)
Private utility		-4.134		1.323
		(7.655)		(5.716)
Ln GNI per capita			18.273***	18.317***
			(1.55)	(1.57)
Constant	159.813***	163.656***	-44.177	-45.905
	(22.514)	(23.587)	(24.925)	(26.684)
R-squared	0.132	0.135	0.625	0.625
Observations	84	84	84	84
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Electrification Rate (as % of population)			
Cost as % of GNI pc	-12.342***	-12.340***	-2.395	-2.297
Getting Electricity (Log)	(1.042)	(1.045)	(2.151)	(2.210)
Private utility		1.119		2.938
		(5.900)		(5.596)
Ln GNI per capita			16.253***	16.404***
			(3.33)	(3.41)
Constant	148.059***	147.765***	-45.02	-47.585
	(6.726)	(6.963)	(38.900)	(40.304)
R-squared	0.516	0.516	0.615	0.617
Observations	84	84	84	84
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Electrification Rate (as % of population)			
Country rank on the ease of getting	-0.329***	-0.331***	-0.062	-0.058
electricity	(0.051)	(0.049)	(0.055)	(0.057)
Private utility		-2.014		2.532
		(7.132)		(5.565)
Ln GNI per capita			17.888***	17.989***
			(2.01)	(2.04)
Constant	98.245***	98.896***	-67.735***	-69.493***
	(4.737)	(4.546)	(19.577)	(20.064)
R-squared	0.267	0.268	0.617	0.618
Observations	84	84	84	84
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 9: Regression Results: Transmission and Distribution Losses (% of output)

	Log of Transmission and Distribution Losses			
Procedures Getting Electricity	0.095**	0.095**	0.020	0.020
	(0.032)	(0.033)	(0.030)	(0.030)
Private utility		0.015		0.038
		(0.105)		(0.086)
Ln GNI per capita			-0.234***	-0.234***
			(0.04)	(0.04)
Constant	1.850***	1.845***	4.300***	4.293***
	(0.197)	(0.206)	(0.427)	(0.435)
R-squared	0.052	0.052	0.311	0.311
Observations	129	129	129	129
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Transmission and Distribution Losses			
Time Getting Electricity (Log)	0.168	0.168	0.079	0.077
	(0.089)	(0.090)	(0.068)	(0.069)
Private utility		-0.006		0.03
		(0.112)		(0.088)
Ln GNI per capita			-0.235***	-0.236***
			(0.04)	(0.04)
Constant	1.632***	1.633***	4.077***	4.080***
	(0.399)	(0.400)	(0.492)	(0.493)
R-squared	0.027	0.027	0.314	0.315
Observations	129	129	129	129
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Transmission and Distribution Losses			
Cost as % of GNI pc	0.104**	0.106**	0.030*	0.032*
Getting Electricity (Log)	(0.036)	(0.035)	(0.013)	(0.013)
Private utility		0.079		0.054
		(0.100)		(0.088)
Ln GNI per capita			-0.204***	-0.203***
			(0.04)	(0.04)
Constant	1.796***	1.765***	3.991***	3.958***
	(0.213)	(0.207)	(0.387)	(0.402)
R-squared	0.191	0.194	0.318	0.319
Observations	129	129	129	129
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Transmission and Distribution Losses			
Country rank on the ease of getting	0.005***	0.005***	0.001	0.001
electricity	(0.001)	(0.001)	(0.001)	(0.001)
Private utility		0.001		0.032
		(0.102)		(0.087)
Ln GNI per capita			-0.215***	-0.216***
			(0.04)	(0.04)
Constant	1.974***	1.974***	4.148***	4.146***
	(0.089)	(0.094)	(0.428)	(0.432)
R-squared	0.151	0.151	0.315	0.316
Observations	129	129	129	129
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 10: Regression Results: Value lost due to outages (% of sales)

	Log of Value lost due to outages			
Procedures Getting Electricity	0.116*	0.112*	0.121**	0.120**
	(0.056)	(0.056)	(0.045)	(0.045)
Private utility		-0.272		-0.078
		(0.224)		(0.186)
Ln GNI per capita			-0.502***	-0.497***
			(0.07)	(0.07)
Constant	0.4	0.513	4.281***	4.277***
	(0.353)	(0.362)	(0.660)	(0.666)
R-squared	0.025	0.038	0.309	0.31
Observations	124	124	124	124
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Value lost due to outages			
Time Getting Electricity (Log)	0.200	0.193	0.026	0.026
	(0.146)	(0.144)	(0.122)	(0.123)
Private utility		-0.28		-0.098
		(0.223)		(0.187)
Ln GNI per capita			-0.498***	-0.492***
			(0.08)	(0.08)
Constant	0.137	0.265	4.807***	4.798***
	(0.698)	(0.704)	(0.974)	(0.979)
R-squared	0.013	0.027	0.282	0.284
Observations	124	124	124	124
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Value lost due to outages			
Cost as % of GNI pc	0.373***	0.367***	0.162	0.162
Getting Electricity (Log)	(0.051)	(0.051)	(0.087)	(0.088)
Private utility		-0.134		-0.095
		(0.200)		(0.188)
Ln GNI per capita			-0.332*	-0.327*
			(0.13)	(0.13)
Constant	-1.502***	-1.421***	2.525	2.521
	(0.362)	(0.370)	(1.540)	(1.548)
R-squared	0.256	0.259	0.299	0.3
Observations	124	124	124	124
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Log of Value lost due to outages			
Country rank on the ease of getting	0.009***	0.008***	0.004*	0.004*
electricity	(0.002)	(0.002)	(0.002)	(0.002)
Private utility		-0.21		-0.087
		(0.214)		(0.185)
Ln GNI per capita			-0.427***	-0.423***
			(0.09)	(0.09)
Constant	0.149	0.237	3.937***	3.932***
	(0.228)	(0.243)	(0.822)	(0.827)
R-squared	0.14	0.148	0.31	0.311
Observations	124	124	124	124
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 11: Regression Results: Perceived Quality of Electricity Supply

	Perceived Quality of Electricity Supply			
Procedures Getting Electricity	-0.333***	-0.330***	-0.135*	-0.130*
	(0.089)	(0.089)	(0.058)	(0.058)
Private utility		0.17		0.266
		(0.252)		(0.148)
Ln GNI per capita			0.828***	0.831***
			(0.04)	(0.04)
Constant	6.361***	6.291***	-1.818**	-1.956**
	(0.518)	(0.527)	(0.607)	(0.600)
R-squared	0.097	0.1	0.694	0.699
Observations	139	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Perceived Quality of Electricity Supply			
Time Getting Electricity (Log)	-0.687***	-0.690***	-0.149	-0.152
	(0.188)	(0.189)	(0.114)	(0.116)
Private utility		0.253		0.296
		(0.262)		(0.152)
Ln GNI per capita			0.843***	0.844***
			(0.04)	(0.04)
Constant	7.624***	7.563***	-2.012*	-2.101**
	(0.849)	(0.855)	(0.783)	(0.795)
R-squared	0.075	0.08	0.682	0.689
Observations	139	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Perceived Quality of Electricity Supply			
Cost as % of GNI pc	-0.367**	-0.366**	-0.053	-0.046
Getting Electricity (Log)	(0.137)	(0.137)	(0.037)	(0.038)
Private utility		0.083		0.27
		(0.210)		(0.152)
Ln GNI per capita			0.794***	0.805***
			(0.06)	(0.06)
Constant	6.664***	6.633***	-1.954**	-2.176**
	(0.841)	(0.821)	(0.688)	(0.713)
R-squared	0.381	0.382	0.683	0.689
Observations	139	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Perceived Quality of Electricity Supply			
Country rank on the ease of getting	-0.018***	-0.018***	-0.005*	-0.005*
electricity	(0.002)	(0.002)	(0.002)	(0.002)
Private utility		0.208		0.279
		(0.228)		(0.150)
Ln GNI per capita			0.756***	0.760***
			(0.07)	(0.07)
Constant	6.153***	6.086***	-1.511*	-1.639*
	(0.185)	(0.195)	(0.727)	(0.726)
R-squared	0.367	0.371	0.695	0.701
Observations	139	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 12: Regression Results: Frequency of Bribe Payments to Public Utilities

	Frequency of Bribe Payments		
Procedures Getting Electricity	-0.281***		-0.176***
	(0.050)		(0.040)
Ln GNI per capita		0.479***	0.439***
		(0.039)	(0.040)
Constant	6.398***	0.762*	2.066***
	(0.30)	(0.35)	(0.50)
R-squared	0.171	0.523	0.586
Observations	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Frequency of Bribe Payments		
Time Getting Electricity (Log)	-0.494***		-0.203
	(0.115)		(0.103)
Ln GNI per capita		0.479***	0.456***
		(0.039)	(0.043)
Constant	7.085***	0.762*	1.866*
	(0.54)	(0.35)	(0.72)
R-squared	0.096	0.523	0.538
Observations	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Frequency of Bribe Payments		
Cost as % of GNI pc Getting Electricity (Log)	-0.220**		-0.060*
	(0.075)		(0.029)
Ln GNI per capita		0.479***	0.406***
		(0.039)	(0.053)
Constant	6.138***	0.762*	1.728**
	(0.47)	(0.35)	(0.58)
R-squared	0.340	0.523	0.536
Observations	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Frequency of Bribe Payments		
Country rank on the ease of getting electricity	-0.012***		-0.005***
	(0.001)		(0.002)
Ln GNI per capita		0.479***	0.365***
		(0.039)	(0.055)
Constant	5.909***	0.762*	2.209***
	(0.13)	(0.35)	(0.59)
R-squared	0.382	0.523	0.572
Observations	139	139	139
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Table 13: Regression Results: Procedural Complexity

	Procedures Getting Electricity			
		Full Sample	Public Utilities only	Private Utilities only
Procedures Starting a Business	0.060	0.046	0.052	0.033
	(0.032)	(0.028)	(0.034)	(0.051)
Ln GNI per capita		-0.125	-0.136	-0.068
		(0.066)	(0.072)	(0.162)
Constant	4.918***	6.066***	6.130***	5.610***
	(0.274)	(0.673)	(0.756)	(1.505)
R-squared	0.018	0.035	0.042	0.014
Observations	183	183	133	50
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Procedures Getting Electricity			
		Full Sample	Public Utilities only	Private Utilities only
Procedures Transfer Property	0.185***	0.169***	0.195***	0.089
	(0.045)	(0.047)	(0.057)	(0.053)
Ln GNI per capita		-0.095	-0.092	-0.086
		(0.064)	(0.070)	(0.162)
Constant	4.316***	5.196***	5.042***	5.549***
	(0.287)	(0.647)	(0.726)	(1.517)
R-squared	0.086	0.095	0.118	0.035
Observations	180	180	131	49
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Procedures Getting Electricity			
		Full Sample	Public Utilities only	Private Utilities only
Procedures Dealing with Construction Permits	0.063***	0.060**	0.04	0.085***
	(0.016)	(0.018)	(0.023)	(0.023)
Ln GNI per capita		-0.131*	-0.146*	-0.105
		(0.064)	(0.071)	(0.131)
Constant	4.397***	5.529***	6.005***	4.785***
	(0.275)	(0.648)	(0.742)	(1.209)
R-squared	0.078	0.096	0.052	0.304
Observations	182	182	132	50
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 14: Time to deal with public service providers

	Time Getting Electricity (Log)			
		Full Sample	Public Utilities only	Private Utilities only
Time to Start a Business (Log)	0.034	-0.030	0.021	-0.138*
	(0.050)	(0.051)	(0.063)	(0.064)
Ln GNI per capita		-0.124***	-0.139***	-0.032
		(0.034)	(0.039)	(0.076)
Constant	4.402***	5.622***	5.592***	5.172***
	(0.157)	(0.374)	(0.447)	(0.681)
R-squared	0.003	0.078	0.132	0.041
Observations				
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Time Getting Electricity (Log)			
		Full Sample	Public Utilities only	Private Utilities only
Time to Transfer Property (Log)	0.094*	0.035	0.056	0.001
	(0.046)	(0.045)	(0.056)	(0.080)
Ln GNI per capita		-0.110**	-0.130***	-0.01
		(0.035)	(0.038)	(0.087)
Constant	4.174***	5.300***	5.383***	4.594***
	(0.171)	(0.385)	(0.441)	(0.897)
R-squared	0.023	0.082	0.138	0
Observations	180	180	131	49
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

	Time Getting Electricity (Log)			
		Full Sample	Public Utilities only	Private Utilities only
Time to Obtain a Construction Permit (Log)	0.228**	0.166	0.173	0.152
	(0.081)	(0.087)	(0.103)	(0.159)
Ln GNI per capita		-0.107**	-0.134***	0.013
		(0.035)	(0.039)	(0.076)
Constant	3.343***	4.554***	4.741***	3.611**
	(0.418)	(0.625)	(0.744)	(1.118)
R-squared	0.042	0.102	0.162	0.018
Observations	182	182	132	50
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 15a: Percentage of firms considering X a constraint to their business operation (out of 47,179 observations)

	Type of Obstacle	no obstacle	minor obstacle	moderate obstacle	major obstacle	very severe obstacle
How much of an obstacle is… to your business operations?	Electricity	28.4	16.5	14.0	19.2	22.0
	Informal sector competitors	31.4	17.4	21.2	17.3	12.8
	Access to finance	29.1	18.4	23.1	18.0	11.5
	Crime and Theft	33.5	22.2	17.4	15.7	11.3
	Inadequately educated workforce	31.3	19.7	21.4	18.4	9.2
	Transportation	38.8	19.9	19.0	13.8	8.5
	Access to Land	49.4	14.6	14.6	13.8	7.7
	Zoning restrictions	58.8	12.6	11.7	10.0	7.0
	Customs and Trade Regulation	49.2	17.9	16.5	10.5	5.8
	Labor Regulations	45.2	20.9	19.8	9.3	4.7

Table 15b: Percentage of firms considering electricity a constraint to their business operation –by region

	no obstacle	minor obstacle	moderate obstacle	major obstacle	very severe obstacle
Sub-Saharan Africa	17.5	15.4	13.6	24.5	29.0
South Asia	8.1	9.4	16.7	38.4	27.3
Latin America and Caribbean	29.7	17.9	15.0	15.2	22.3
Eastern Europe and Central Asia	39.4	14.9	12.0	14.9	18.8
East Asia and Pacific	40.7	24.0	14.9	14.4	5.9

Table 15c: Percentage of firms owning a generator in the last fiscal year (by region)

% of firms owning a generator in last fiscal year	
South Asia	33.0
Sub-Saharan Africa	28.3
Latin America and Caribbean	26.1
East Asia and Pacific	23.1
Eastern Europe and Central Asia	6.9

Table 16a: Specification with Log of annual sales as dependent variable – Full sample

Full sample	(1)-Basic		(2) = (1) + access to finance		(3) = (2) + degree of firms' international trade engagement*		(4) = (3) plus interaction terms	
Variables	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry
Log of past sales	0.675***	0.485***	0.719***	0.490***	0.739***	0.483***	0.740***	0.482***
	(0.02)	(0.04)	(0.02)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Rank on the ease of Getting Electricity	-0.00191***	0.00604**	-0.00184**	0.00762*	-0.00143**	0.00	0.00631***	0.0102*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Number of power outages per month	-0.0001	0.0038	-0.0001	0.0059	0.0003	0.0036	0.000533*	0.0034
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Log of Labor Input	0.359***	0.601***	0.314***	0.588***	0.257***	0.508***	0.253***	0.509***
	(0.03)	(0.05)	(0.03)	(0.06)	(0.04)	(0.07)	(0.04)	(0.06)
Capital Input	-0***	-0***	-0***	-0***	-0***	-0***	-0***	-0***
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Access to finance Dummy	-	-	0.0535**	0.10	0.0685**	0.24	0.0647*	0.25
	-	-	(0.02)	(0.13)	(0.03)	(0.17)	(0.03)	(0.19)
Direct Export 10% Dummy	-	-	-	-	0.0552	0.0148	0.0477	-0.0013
	-	-	-	-	(0.05)	(0.17)	(0.05)	(0.19)
Direct Import Dummy	-	-	-	-	0.151***	0.271**	0.155***	0.265*
	-	-	-	-	(0.03)	(0.14)	(0.03)	(0.14)
Two-way Trader Dummy	-	-	-	-	(0.02)	0.10	(0.02)	0.09
	-	-	-	-	(0.05)	(0.17)	(0.05)	(0.18)
Income Group Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Terms: Industry*Getting Electricity	No	No	No	No	No	No	Yes	Yes
Constant	3.784***	5.870***	3.222***	5.791***	3.202***	6.612***	2.159***	5.984***
	(0.34)	(0.54)	(0.34)	(0.69)	(0.49)	(0.78)	(0.49)	(0.85)
Observations	8,767	1,574	7,355	1,112	3,829	816	3,829	816
R-squared	0.89	0.88	0.91	0.88	0.93	0.91	0.93	0.91

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

* measured by whether the firm exports directly at least 10% of its sales, imports directly at least 10% of its inputs or does both of these.

Table 16b: Industry interaction terms – Full sample

	Full Sample					
	Firm			Industry		
ISIC2 Code	Rank on the Ease of GE	Industry Code (ISIC2) - coefficient	Industry*Rank GE	Rank on the Ease of GE	Industry Code (ISIC2) - coefficient	Industry*Rank GE
Other mining and quarrying	0.00631***	-0.940***	0.00	0.0102*	-1.620***	0.00
Manufacture of food products and beverages	0.00631***	0.549***	-0.00776***	0.0102*	-0.59	-0.00581***
Manufacture of tobacco products	0.00631***	1.054***	-0.0117***	0.0102*	-0.10	-0.00825***
Manufacture of textiles	0.00631***	0.23	-0.00587***	0.0102*	-1.052***	-0.00365***
Manufacture of wearing apparel; dressing and	0.00631***	0.08	-0.00588***	0.0102*	-1.165***	-0.00396**
Tanning and dressing of leather; manufacture	0.00631***	0.864**	-0.0103***	0.0102*	-0.37	-0.0109***
Manufacture of wood and of products	0.00631***	0.44	-0.00881***	0.0102*	-0.884**	0.00
Manufacture of paper and paper products	0.00631***	0.390**	-0.00588***	0.0102*	0.00	-0.00882***
Publishing, printing and reproduction of recorded	0.00631***	0.386**	-0.00705***	0.0102*	-0.54	-0.00728***
Manufacture of coke, refined petroleum products	0.00631***	3.459***	-0.0170**	0.0102*	0.27	0.00
Manufacture of chemicals and chemical products	0.00631***	0.534***	-0.00706***	0.0102*	-0.29	-0.00655***
Manufacture of rubber and plastics products	0.00631***	0.461***	-0.00712***	0.0102*	-0.55	-0.00513***
Manufacture of other non-metallic mineral products	0.00631***	0.396**	-0.00746***	0.0102*	-0.35	-0.00736***
Manufacture of basic metals	0.00631***	0.571**	-0.00732***	0.0102*	-0.80	0.00
Manufacture of fabricated metal products, except	0.00631***	0.31	-0.00683***	0.0102*	-0.670*	-0.00610***
Manufacture of machinery and equipment n.e.c.	0.00631***	0.42	-0.00730***	0.0102*	-0.560*	-0.00804***
Manufacture of electrical machinery and apparatus	0.00631***	0.38	-0.00595**	0.0102*	-0.43	-0.00658***
Manufacture of radio, television and communication	0.00631***	-0.04	-0.00446**	0.0102*	-0.41	-0.01
Manufacture of medical, precision and optical	0.00631***	-0.04	0.00	0.0102*	-0.42	-0.01
Manufacture of motor vehicles, trailers and	0.00631***	0.897***	-0.0132***	0.0102*	-0.77	0.00
Manufacture of other transport equipment	0.00631***	0.47	-0.00883***	0.0102*	-0.84	0.00
Manufacture of furniture; manufacturing n.e.c.	0.00631***	0.05	-0.00471**	0.0102*	-0.811*	-0.00532***
Recycling	0.00631***	0.551**	-0.0127***	0.0102*	-0.02	-0.0114**
Construction	0.00631***	-1.045*	0.00	0.0102*	-0.57	0.00
Sale, maintenance and repair of motor	0.00631***	0.653***	-0.00955***	0.0102*	-0.35	0.00
Wholesale trade and commission trade, except	0.00631***	1.42	-0.0209**	0.0102*	-0.30	-0.00524**
Retail trade, except of motor vehicles	0.00631***	0.72	-0.00954*	0.0102*	-0.46	-0.00643**
Hotels and restaurants	0.00631***	0.565***	-0.0126***	0.0102*	-0.625**	-0.00514**
Land transport; transport via pipelines	0.00631***	0.23	0.00	0.0102*	-1.266***	0.00
Supporting and auxiliary transport activities; activities	0.00631***	1.858***	-0.0190***	0.0102*	-0.39	0.00
Post and telecommunications	0.00631***	0.210*	0.00	0.0102*	-0.908***	0.00
Computer and related activities	0.00631***	0.404***	0.00	0.0102*	-0.830***	0.00
Other business activities	0.00631***	1.464***	0.00	0.0102*	-0.31	0.00

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 17a: Specification with Log of annual sales as dependent variable – Doing Business City only

DB City only	(1)-Basic		(2) = (1) + access to finance		(3) = (2) + degree of firms' international trade engagement*		(4) = (3) plus interaction terms	
Variables	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry
Log of past sales	0.687***	0.450***	0.710***	0.410***	0.683***	0.334***	0.690***	0.328***
	(0.04)	(0.06)	(0.05)	(0.07)	(0.07)	(0.09)	(0.06)	(0.09)
Rank on the ease of Getting Electricity	-0.0307***	0.0637***	-0.0344***	-0.03	-0.218***	-0.0913***	-0.231***	-0.0908***
	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Number of power outages per month	0.0012	0.0048	0.0010	0.0068	0.0009	0.0037	0.0010	0.0051
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
Log of Labor Input	0.346***	0.676***	0.318***	0.745***	0.309***	0.790***	0.297***	0.779***
	(0.05)	(0.10)	(0.05)	(0.11)	(0.06)	(0.12)	(0.06)	(0.13)
Capital Input	0***	-0***	0***	-0***	0**	0.00	0*	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Access to finance Dummy	-	-	0.05	0.12	0.07	0.27	0.06	0.28
	-	-	(0.03)	(0.12)	(0.05)	(0.18)	(0.05)	(0.19)
Direct Export 10% Dummy	-	-	-	-	0.1260	0.3160	0.1070	0.2980
	-	-	-	-	(0.12)	(0.32)	(0.12)	(0.35)
Direct Import Dummy	-	-	-	-	0.219***	0.417***	0.237***	0.469***
	-	-	-	-	(0.06)	(0.14)	(0.06)	(0.14)
Two-way Trader Dummy	-	-	-	-	(0.13)	0.04	(0.13)	(0.02)
	-	-	-	-	(0.12)	(0.27)	(0.12)	(0.32)
Income Group Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Terms: Industry*Getting Electricity	No	No	No	No	No	No	Yes	Yes
Constant	4.873***	4.551***	4.802***	7.550***	43.70***	10.09***	45.57***	9.980***
	(0.44)	(0.54)	(0.45)	(0.73)	(2.76)	(1.21)	(2.71)	(1.40)
Observations	3,043	875	2,749	679	1,270	468	1,270	468
R-squared	0.93	0.86	0.94	0.87	0.95	0.90	0.95	0.91

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

* measured by whether the firm exports directly at least 10% of its sales, imports directly at least 10% of its inputs or does both of these.

Table 17b: Industry interaction terms – Doing Business city only

	Doing Business city only					
	Firm			Industry		
ISIC2 Code	Rank on the Ease of GE	Industry Code (ISIC2) - coefficient	Industry*Rank GE	Rank on the Ease of GE	Industry Code (ISIC2) - coefficient	Industry*Rank GE
Manufacture of tobacco products	-0.231***	0.00	0.00	-0.0908***	-0.47	0.00
Manufacture of textiles	-0.231***	-0.664***	0.00418**	-0.0908***	-0.581*	0.00
Manufacture of wearing apparel; dressing and	-0.231***	-0.746***	0.00353**	-0.0908***	-0.57	0.00
Tanning and dressing of leather; manufacture	-0.231***	0.11	-0.00322*	-0.0908***	0.36	-0.00750*
Manufacture of wood and of products	-0.231***	-0.39	0.00	-0.0908***	0.12	0.00
Manufacture of paper and paper products	-0.231***	-0.22	0.00248**	-0.0908***	0.90	-0.01
Publishing, printing and reproduction of recorded	-0.231***	-0.282**	0.00	-0.0908***	0.14	0.00
Manufacture of coke, refined petroleum products	-0.231***	0.505***	0.00	-0.0908***	0.800***	0.00
Manufacture of chemicals and chemical products	-0.231***	-0.217*	0.00179*	-0.0908***	0.12	0.00
Manufacture of rubber and plastics products	-0.231***	0.04	0.00	-0.0908***	0.04	0.00
Manufacture of other non-metallic mineral products	-0.231***	-0.39	0.00	-0.0908***	-0.42	0.01
Manufacture of basic metals	-0.231***	-0.33	0.00	-0.0908***	-0.54	0.01
Manufacture of fabricated metal products, except	-0.231***	-0.756***	0.00529***	-0.0908***	-0.50	0.00
Manufacture of machinery and equipment n.e.c.	-0.231***	-0.29	0.00	-0.0908***	-0.24	0.00
Manufacture of electrical machinery and apparatus	-0.231***	-0.25	0.00	-0.0908***	0.21	0.00
Manufacture of radio, television and communication	-0.231***	-1.512***	0.0111***	-0.0908***	-2.450***	0.0184**
Manufacture of medical, precision and optical	-0.231***	-0.993***	0.00	-0.0908***	-0.47	0.00
Manufacture of motor vehicles, trailers and	-0.231***	0.809**	-0.00897***	-0.0908***	0.29	0.00
Manufacture of other transport equipment	-0.231***	-0.537*	0.00689***	-0.0908***	-0.03	0.00
Manufacture of furniture; manufacturing n.e.c.	-0.231***	-0.41	0.00	-0.0908***	0.09	0.00
Recycling	-0.231***	-0.916**	0.01	-0.0908***	-1.14	0.02
Construction	-0.231***	-1.598***	0.0174*	-0.0908***	-0.21	0.01
Sale, maintenance and repair of motor	-0.231***	-0.292***	0.00	-0.0908***	0.60	0.00
Wholesale trade and commission trade, except	-0.231***	0.75	-0.01	-0.0908***	0.01	0.01
Retail trade, except of motor vehicles	-0.231***	-0.73	0.01	-0.0908***	0.06	0.00
Hotels and restaurants	-0.231***	-0.13	0.00	-0.0908***	0.36	0.00
Supporting and auxiliary transport activities; activities	-0.231***	-0.11	0.00	-0.0908***	-0.728***	0.00
Computer and related activities	-0.231***	-0.30	0.01	-0.0908***	-0.25	0.00754***
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Appendix I

Data on the procedures, time and cost to obtain an electricity connection is collected by presenting respondents with the following 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 electrician employed by the construction firm, and the entrepreneur would now like to obtain the final electricity connection from the local distribution utility. The electrician working for the entrepreneur estimates that the warehouse will need a 140 kVA (kiloVoltAmpere) connection.*

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

Assumptions about the warehouse:

- Is located in the country's most populous city.
- Has chosen a location within the official limits of the city where other warehouses locate (non-residential area).
- Is not located in a special economic or investment zone, i.e. the electricity connection is not subject to subsidization or a faster service under a special investment promotion regime.
- If several options are available in terms of location, the warehouse would be located where electricity is most easily available.
- Is used for storage of refrigerated goods.
- Is a new construction (i.e., there was no previous construction on the piece of land where it is located). It is being connected to electricity for the first time.

Assumptions about the electricity connection:

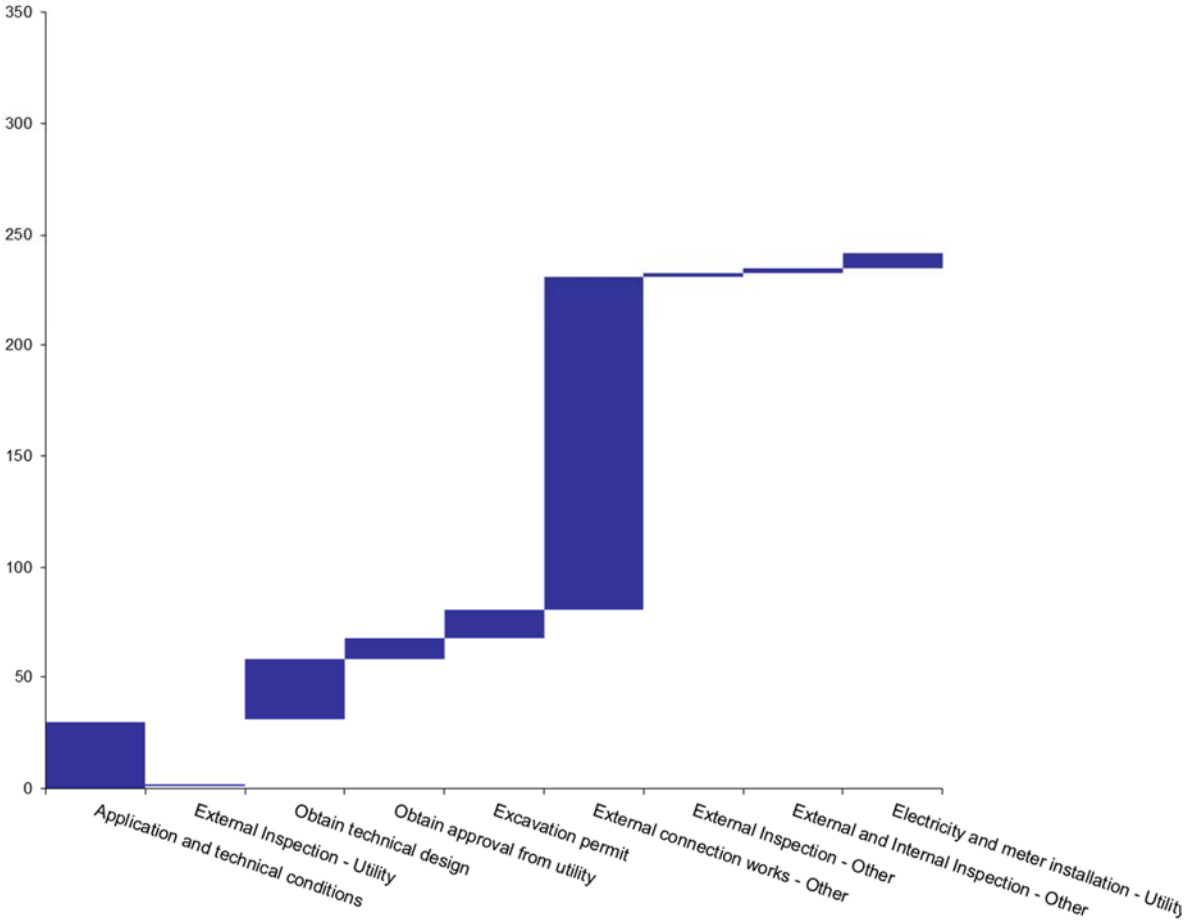
- It is a permanent connection.
- 3-phase, 4-wire Y, 140 kVA
- For the length of the connection the most likely distance is considered. The connection is overhead or underground; whatever is more common in the country, and the area in question.
- The connection involves installation of only one electricity meter.
- The monthly electricity consumption is 0.07GWh.
- The internal electrical wiring is already done.

Data was collected from both utilities and independent private professionals such as electricians, electrical engineers, construction companies, technical bodies and in some cases from regulatory agencies.

Appendix II

Example of a completed procedure list – The process for obtaining an electricity connection in Azerbaijan:

Figure: Procedures and Time to obtain an electricity connection Azerbaijan



Procedure 1:
Submit an application for an electricity connection to Bakielektrikshebeke and await issuance of technical conditions
Time to complete:
30 calendar days
Cost to complete:
AZN 9800
Name of Agency:
Bakielektrikshebeke
Comment:
Online submission is not possible. The following documents are submitted to the office of Bakielektrikshebeke in paper format:
- application;
- estimate of power/load needs provided by a licensed company
- document confirming property rights;
- construction project.

The fee for connection (technical conditions) would be 82.6 AZN (net of VAT 70 AZN) per kW. One can pay the fees at Bakielektrikshebeke or at the bank.

Procedure 2:
Bakielektrikshebeke inspects the site for preparation of technical conditions
Time to complete:
1 calendar day
Cost to complete:
no charge
Name of Agency:
Bakielektrikshebeke
Comment:
If the requested load is more than 20kW, a network engineer from Bakielektrikshebeke will visit the site to determine arrangements for an optimal connection. Someone from the applicant's party must be present during the inspection.

Procedure 3:
Await completion of the external connection project design by a private electrical design company
Time to complete:
27 calendar days
Cost to complete:
AZN 1750
Name of Agency:
Project planning organization
Comment:
Based on the technical conditions issued by Bakielektrikshebeke the customer requests from a project planning organization a design of the external electrical connection. The fee for the design is normally 5 to 8 percent of the cost of external connection works.

Procedure 4:
Submit the project design to Bakielektrikshebeke and await approval of the design
Time to complete:
10 calendar days
Cost to complete:
no charge
Name of Agency:
Bakielektrikshebeke
Comment:
The applicant submits the completed project to Bakielektrikshebeke for concurrence.

Procedure 5:
Obtain an excavation permit at the Ministry of Transport
Time to complete:
13 calendar days
Cost to complete:
no charge
Name of Agency:
Ministry of Transport
Comment:
Depending on the connection contract or agreement either the utility or electrical contractor obtains an excavation permit. In addition depending on where the road is it might be required to get permits from the municipality (if in the center of the city), communal services, gas, water, etc.

Procedure 6:
Bakielektrikshebeke or private electrical contractor complete the external connection works
Time to complete:
150 calendar days
Cost to complete:
AZN 12680
Name of Agency:

Bakielektrikshebeke/Electrical contractor

Comment:

Bakielektrikshebeke can carry out the external connection works or the customer can sign a contract with a licensed electrical installation organization.

Procedure 7:

Ministry of Emergency Situations inspects the external connection works

Time to complete:

2 calendar days

Cost to complete:

no charge

Name of Agency:

Ministry for Emergency Situations

Comment:

After the external connection works are completed the Ministry for Emergency Situations (Министерство Чрезвычайных Ситуаций) checks if the completed external connection works are in compliance with fire protection standards.

Procedure 8:

Energy Inspectorate inspects the external connection works and internal wiring and issues an operation permit (разрешение на эксплуатацию)

Time to complete:

2 calendar days

Cost to complete:

no charge

Name of Agency:

Energonadzor (State Energy Inspectorate)

Comment:

After the completion of the external connection works there is a final inspection by Energonadzor (State Energy Inspectorate) which issues an operation permit. Energonadzor checks compliance with the technical conditions.

Procedure 9:

Conclude a supply contract with Bakielektrikshebeke and await final connection

Time to complete:

7 calendar days

Cost to complete:

no charge

Name of Agency:

Bakielektrikshebeke

Comment:

After the operation permit is submitted to Bakielektrikshebeke the customer can conclude a supply countract and be connected to the electrical network and the electricity starts flowing.