

Connecting Businesses to the Electrical Grid in 140 Economies

Second Draft, December 2009

Carolyn Geginat and Rita Ramalho¹

Abstract

We present new data on the regulation of the process for electricity connections in 140 economies. The data cover the number of procedures, official time and official cost that a small- and medium size business must go through to obtain a new electricity connection. We find significant variation in the time and cost for small to medium size businesses to obtain an electricity connection across countries. In low income countries it takes on average more than double the time than in high income countries to connect a new customer to electricity. These large differences can in part be explained by the overall level of bureaucracy in the country, especially in those countries where utilities are majority state-owned. We also find the new data to be correlated with existing measures of efficiency of the electricity sector, suggesting that the hurdles related to obtaining an electricity connection can mirror other problems in the sector. Finally, we find that simpler electricity connection processes are associated with better firm performance in particular in industries with high electricity needs such as manufacturing.

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. The World Bank's Enterprise Surveys conducted across 89 economies report that most managers consider electricity together with access to finance the

¹ 2121 Pennsylvania Avenue NW, Washington, DC 20433, cgeginat@worldbank.org, rramalho@ifc.org. This paper would not have been possible without the extensive research of the team who collected the data for the new indicators on the process of obtaining an electricity connection. The team included Maya Choueiri, Nadia Ram, Jayashree Srinivasan, Susanne Szymanski and Marina Turlakova, who also provided extensive research assistance. The full data set for each country can be found at www.doingbusiness.org. We would like to thank -- without implication -- Penelope Brook, Sylvia Solf, Jorge Luis Rodriguez Meza and Murat Seker for helpful discussions. The views expressed here are the authors' and do not reflect those of the World Bank, its Executive Directors, or the countries they represent.

most serious obstacle to their business operation². Poor electricity supply has been shown to have adverse effects on firms' productivity and the investments they make in their productive capacity (Calderon and Serven (2003), Dollar et al. (2005), Reinikka and Svensson (1999), Eiffert (2007)). For instance, Iimi (2008), using firm level data, finds that in Eastern Europe and Central Asia eliminating the existing electricity outages can increase gross domestic product by 0.5 to 6 percent). To counter weak electricity supply, many firms in developing countries have to rely on self-supply through a generator, which tends to be more expensive than electricity supplied by a utility (Foster and Steinbuks, 2009). Especially, for small firms the cost of self-supply is often prohibitively high (Lee et al. 1996)³. This underlines the importance of the provision of reliable and affordable electricity by utilities to businesses.

To understand the efficiency of power supply by utilities to businesses good data on sector outcomes such as access levels, availability and reliability of supply and detailed cost structures is desirable. In this paper we present new data on the process of obtaining an electricity connection, detailing the required procedures governing the process for obtaining electricity connections, as well as the time and cost associated with each of these procedures for distribution utilities in 140 economies. The new indicators follow a methodology similar to the one developed in the seminal paper by Djankov et al (2002) that was then expanded to several indicators within the Doing Business report of the World Bank to produce the indicators that measure the efficiency of different public service providers. As in La Porta et al (1999), we find that low income countries are less efficient at providing public services, in the particular case of electricity connections.

This paper adds not only to the enterprise performance and business regulation literature, it also complements the existing electricity regulation literature by providing new data and new analysis. In recent years, numerous studies have tried to establish the effectiveness and determinants of different electricity sector reforms (see Jamasb et al. (2005) for an overview of the literature). One reform aspect that has received 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

² According to World Bank Enterprise Survey data for the 89 economies, 15.6% of managers consider electricity the most serious constraint and a similar share of managers (15.68%) consider access to finance the most serious constraint (<http://www.enterprisesurveys.org>).

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)).

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. Research that focuses on the particular regulatory aspect of consumer service quality is missing as of now⁴. We add to the literature by proposing an indicator set that measures this aspect of electricity regulation and by highlighting the actual results for the end-consumer. Consistent with other studies (Estache and Rossi (2004), Gassner et al. (2009), Kumbhakara and Hjalmarsson (1998)) that found private electricity utilities to be more efficient than public utilities, we find privately owned utilities provide new connections to the final consumer faster and at lower costs.

The new data presented here provides additional information to other electricity data already in existence. Available national and global datasets cover typical measures of electricity sector performance only to varying degrees. In the case of the most broadly available indicators such as electrification rates, value lost due to electrical outages and electrical power transmission and distribution losses the numbers of countries covered is smaller than the new dataset presented here (varying from 65 countries to 126 compared to the 140 observations for our new dataset – see Table 6). We also plan to collect data on an annual basis which is a higher frequency than most datasets available on electricity.

In order to establish the explanatory value and usefulness of the new indicators, we examine the data set in view of three questions:

First, we examine if the new data provide information can reasonably be used as a proxy for the efficiency in the electricity sector. To test this hypothesis we look at the question whether a more efficient connection process is associated with better other sector outcomes. In particular, we examine the relationship with the electrification ratio of the country and the ratio of technical losses in the distribution and transmission system. We find that ten additional days of delay in obtaining a connection are associated with a decrease of 0.9 percentage points in a country's electrification rate and that an increase in the connection cost equal to the income per capita predicts a 0.2 percentage point decrease in the electrification rate. Furthermore, we find that one extra procedure in the process of getting electricity is associated with an increase of 1.5 percentage points in the transmission and distribution losses as percentage of output.

Second, we examine if the overall bureaucratic environment in individual economies influences also the performance of distribution utilities. To that end we compare the new indicators with other measures of government regulation 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 regulatory environment is related to the public versus private provision of electricity connections. We find

⁴ Exceptions fall in the category of descriptive rather than academic research papers such as McCotter (2005) and CEER (2008).

that majority publicly owned⁵ utilities are more likely to underperform where bureaucratic processes in other government services are more cumbersome.

Third, we use firm level data from the Enterprise Survey dataset to test whether the new electricity 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 140 economies⁶ in 2008/2009. 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 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).

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, 573 respondents contributed to the data for 140 economies. Our economies span a wide range of income levels and geographic regions. The sample includes 39 high income, 37 upper-middle income, 36 lower-middle income, and 28 low income economies. Following the World Bank regional classifications the data covers 30 of the economies located in Sub-Saharan Africa, 16 in the Middle East and Africa region, 10 in East Asia and the Pacific, 8 in South Asia, 27 in Latin America and the Caribbean, 26 in Europe and Central Asia and 23 in OECD economies.

To ensure that the data are comparable across economies, respondents in the 140 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

⁵ 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.

⁶ 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, China.

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 warehouses are located. If there is a choice of 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 are 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. The warehouse is located in the country's most populous city, in a location within the official limits of the city where other warehouses commonly locate. It 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.

The electricity connection that is needed for the new warehouse is a 3-phase, 4-wire Y, 140 kVA connection and is done either via an overhead or an underground connection; whatever is more common in the country, and the area in question. We assume that the internal wiring of the warehouse is completed and 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. 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, indicates their ownership structure and details the procedures, time and cost indicators for each one of them.

A procedure is defined as any interaction of the company employees or the company's main electrician (that is, the one who did the internal wiring) 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 is readily available and that all counterparts work efficiently and that corruption plays no corruption. If the company can, but is not required to, request the services of professionals (such as a private firm rather than the utility for the external works), these procedures are recorded if

they are commonly done. For all procedures, only the most likely cases⁷ and those often followed in practice for connecting a warehouse to electricity are counted.

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, they cannot start on the same day (that is, simultaneous procedures start on consecutive days). In extreme cases, 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 2008 gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population according to the World Bank's World Development Indicators 2009. Costs are recorded exclusive of value added tax and only include the fees associated with completing the procedures to connect a warehouse to electricity are recorded, including those related to obtaining clearances from government agencies, applying for the connection, receiving inspections of both the site and the internal wiring, purchasing material, getting the actual connection works and paying a security deposit. 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.

Connection costs can be divided into 2 main categories: a fixed connection fee that spreads the fixed costs of operating a distribution grid over all customers, and the variable costs for each connection, accounting for the labor, material and inspections of the utility or outside contractors required. In many economies costs also include payments to other agencies for permits, inspections and approvals.

Cost estimates for 57 economies 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 until the end of the contract

⁷ 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.

(assumed to be after 5 years)⁸. To calculate the present value of the lost interest earnings, the end-2008 lending rates from the International Monetary Fund's International Financial Statistics are used. In cases in which the security deposit is returned with interest, the difference between the lending rate and the interest paid by the utility is used to calculate the present value.

In some economies the security deposit can be put up in the form of a bond: the company can obtain from a bank or an insurance company a guarantee issued on the assets it holds with that financial institution. In contrast to the scenario in which the customer pays the deposit in cash to the utility, in this scenario the company does not lose ownership control over the full amount and can continue using it. In return the company will pay the bank a commission for obtaining the bond. The commission charged may vary depending on the credit standing of the company. The best possible credit standing and thus the lowest possible commission are assumed. Where a bond can be 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-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 would like to examine in 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 June 2009. We created a dummy variable for ownership which is 0 in those cases where more than 50% of the utility is government owned (this includes local government ownership such as by municipalities) and is 1 in those cases where more than 50% of the ownership of the utility is in private hands.

Other variables

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

First, we would like to 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. The data cover the period from 2000-2006. We also examine the relationship with the percentage of electric power transmission and distribution losses as percentage of

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.

output⁹ as collected by the International Energy Agency for 2006 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. Last, we use data from the World Bank's Enterprise Surveys on the percentage of sales lost due to power outages reported by managers between 2003 and 2009. We also considered comparing the new data with other data on the relative strength of regulatory institutions for 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). Unfortunately, the number of available observations for both data sets is too small to allow for a meaningful comparison with our data (19 countries in the case of the "Electricity Regulatory Governance Index" and 28 in the case of the "Regulatory Autonomy" data).

Second, we would like to 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 latest Doing Business data as of the Doing Business Report 2010 for all three indicators. The data covers 183 countries and the period July 2008 to June 2009 like the Getting Electricity data. The Dealing with Licenses 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 would like to examine the relationship of the new indicator with measures of enterprise performance. All the data for this part of the analysis come from the Enterprise

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.

Surveys dataset. This dataset 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 was included since the electricity data refers to 2009. Furthermore, less than 100 countries of Enterprise Surveys match our sample of 140 economies, since Enterprise Surveys covers only developing countries.

As outcome variables we use total sales and sales per worker. Nominal values are deflated using the GDP deflator from the World Bank 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 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 its sales, import directly at least 10% of its 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 procedures, time and cost for getting electricity. For instance, in order to get his business connected to electricity an entrepreneur in Ukraine has to go through 10 different procedures taking at least 306 days and the connection will cost him a total of US\$8,419 (equivalent to 262% of Ukraine's GNI per capita). While in Germany to do the same, an entrepreneur will need only 3 procedures, less than three weeks and the connection will cost him US\$2,038 (equivalent to 5.24% of GNI per capita). Appendix II details the procedures, cost and time to obtain a new electricity connection in Kiev, Ukraine.

Table 3 presents data on procedures, time and cost to connect to electricity for the top and bottom 10 countries. Table 4 and 5 present the means of the number of procedures, time and cost to get connected to electricity and for Doing Business variables 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 6a, 6b and 6c compare the procedures, time and cost to obtain an electricity connection by the ownership structure of the utility connecting the new customer. Table 7 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 8 provides for

a correlation matrix between the new electricity data and the outcome variables. Several interesting findings emerge.

Procedures to get connected to electricity

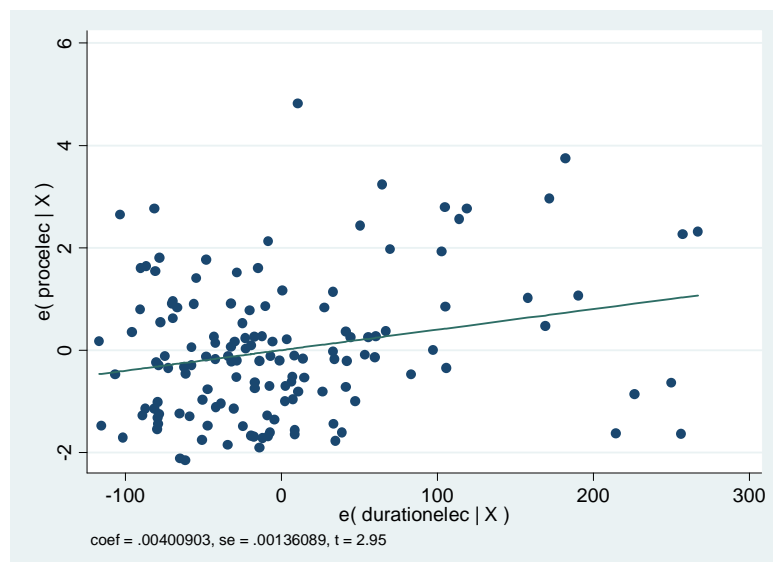
The number of procedures to obtain an electricity connection varies from 3 procedures 9 countries like Denmark, Germany and Japan to 10 procedures in Bosnia Herzegovina (table 3). The average number of procedures required to obtain an electricity connection does not vary much across income groups and regions. A review of the procedure lists drawn up for each country reveals that procedures tend to be few in economies where:

- 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 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 customers do not have to go through inspection procedures instead. In Denmark, Germany, Japan and Mauritius the customer's electrician s 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, usually a well regulated industry for electricians and electrical engineers based on a national accreditation system and professional licenses is in place.
- Utilities have the necessary material to connect customers readily available and customers are not asked to obtain needed 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 did 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 (graph 1). In economies where businesses have to go through 6–10 procedures to get connected, the process takes 144 days on average. In economies with 3–5 procedures, it takes only 104 days on average. It takes 50 days to get connected in the 10 economies with the smallest number of procedures, and 244 days in the 10 economies with the highest number of procedures.

Graph 1: Correlation between the number of procedures and the time to obtain an electricity connection (controlling for income)



The average number of days needed to obtain an electricity connection varies clearly across income groups with 192 days in low-income economies, 107 in lower-middle income economies, 98 days in upper-middle income economies and 86 days in high-income economies, suggesting that richer economies connect customers more quickly to electricity. Regional differences partially mirror those for income group differences. For instance, in Sub-Saharan Africa and South Asia it takes on average 162 and 173 days, respectively, to get an electricity connection while it takes only 71 days in OECD high income countries. However, in Eastern Europe and Central Asia, where many countries fall in the middle income group category, average delays are the second longest at 164 days.

Furthermore, there can be striking differences within regions. For instance, within Sub-Saharan Africa, Mauritius is one example of a country that makes it easy for businesses to get connected to electricity. It takes a total of 3 procedures and 44 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 441 days in Sierra Leone and 437 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. In Madagascar, connection requests have been denied for more than a year. And in the winter months of 2008 connection requests in the Kyrgyz Republic and Tajikistan have been denied because low water levels in the reservoirs supplying the hydro-power generation plants led to energy shortages. In Afghanistan, Guinea-Bissau and

Sierra Leone generation capacity is so weak that utilities advise new clients to buy their own generators instead of connecting them to the utility's distribution system.

Cost to get connected to electricity

Average connection costs as % of income per capita across income groups show – like for Doing Business indicators – a clear trend of decreasing costs from low to high income countries. While an electricity connection costs on average 7,383 percent of a low-income country's income per capita, it costs only 75 percent in high-income countries and 540 percent in upper-middle income countries. In line with this finding, the two poorest regions, Sub-Saharan Africa and South Asia are also the regions where average connection costs are the highest with 6,409 percent and 1,695 percent of the income per capita, respectively.

But connection costs also vary significantly among economies within income groups, suggesting room to reduce costs regardless of existing infrastructure. In the 10 lowest-cost economies (all high-income economies except Panama) the average cost for a connection is no more than 9% of income per capita, an eighth of the average for all high-income economies (75% of income per capita). In the 10 highest-cost economies (all low-income economies) the average is 15,803% of income per capita, more than twice the average for the low-income group (7,384% of income per capita).

Ownership of utilities

Tables 6a and 6b and 6c present the data for the new Getting Electricity Indicator by ownership of the respective utility surveyed. The sample contains 95 utilities that are majority-publicly owned and 45 utilities that are majority-privately owned. Public ownership is more common in low income countries. The share of private ownership across utilities is highest in Latin America and the Caribbean. The average number of procedures differs little by ownership, but public utilities take on average 37 days longer than private utilities to connect a new customer to electricity and the average cost as of income per capita is 4 times the average cost charged by private utilities. Controlling for income the difference reduces to a still sizeable 26 days (Table 6c). Because connection costs increase from high to low income countries and public ownership is more common in low-income countries we regress connection cost and ownership controlling for income (Table 6c). The ownership variable is statistically significant and the coefficient suggests that an increase in the connection cost equal to the income per capita is associated with a 10times smaller cost increase when the utility is privately owned. When we drop two important outliers in terms of cost (Burundi and the Congo, Dem.Rep.) the results remain significant but the cost differential drops from 10times to 7times.

Comparing the new data with other measures of bureaucracy

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 a few observations are noteworthy.

First, the maximum number of procedures required to obtain an electricity connection is relatively small with 10 procedures compared to 20 for Starting a Business, 15 for Registering Property and 46 for Dealing with Construction Permits (tables 3 and 4). Consequently, the average number of procedures to get an electricity connection also does not vary much across income groups and regions. Equally, the standard deviation within income groups and regions shows little variation. Compared to the procedures number for other Doing Business indicators, the new indicator also exhibits a much smaller variance 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 (tables 3 and 4). 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 1,965 percent of the income per capita, versus 41 for starting a company, 6 percent for registering property and 403 percent for obtaining a construction permit. Also the standard deviation for Getting Electricity sample is with 5,006 percent significantly higher than for any of the other indicator samples. Average connection costs as % of income per capita across income groups show – like the Doing Business indicators – a clear trend of decreasing costs from low to high income countries.

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 of output due to electricity interruptions. The sample size for all three 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 65 observations. As one would expect, electrification rates increase and transmission and distribution losses and the value lost of sales due to electricity interruptions decrease with the income level of a country. Electrification rates range from an average of 23 percent in low-income countries to 94 percent in high income countries. The ratio of transmission and distribution losses averages 7 percent in high income countries and 17 percent in low and 19 percent in lower-middle income countries. And, the value lost due to power outages ranges from 2 percent of the sales of an average company in high income countries to 7 percent in low income countries.

Table 8 details Correlations of Getting Electricity with the three outcome indicators. Correlations are positive and statistically significant between the number of procedures to obtain an electricity connection and transmission and distribution losses as a % of output and between the cost to get

a connection as of income per capita and the % of sales that managers report to lose due to electrical outages. The time and cost to obtain an electricity connection are also negatively correlated with the electrification rate.

IV. Results

As set out in the introduction, in order to establish the explanatory value and usefulness of the new indicators, we would like to examine the newly collected data in view of three questions. First, we want to examine how good of an indicator the new measure is for other measures of sector performance in the electricity sector. Second, we would also like to understand its relevance as an indicator of government regulation for the electricity sector. To that end we compare the new indicator with other measures of government regulation. And third, we would like establish if a less cumbersome and less costly process of obtaining an electricity connection is associated with better firm performance.

IV.1. Is a more efficient electricity connection process associated with better electricity sector outcomes?

How meaningful is an indicator on the process for obtaining an electricity connection one might ask, given that it covers just a small part of the performance of the electricity sector? In order to answer this question, we would like to establish in how far the new measures of procedures, time and cost to obtain an electricity connection can serve as an indicator for the performance of the electricity sector overall. We use the following other indicators as measures of the overall performance of the electricity sector: 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. Table 9, 10 and 11 present our main findings.

We first 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 9). In a fourth specification, we also use the aggregated “Getting Electricity” indicator as independent variable. With 65 observations the sample is now significantly smaller. 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% level. To account for country specific differences we control for income levels. In this case both the time and cost to obtain an electricity connection remain statistically significant. One additional day of delay to connection to electricity is associated with a decrease of 0.09 percentage points in the electrification rate of a country and an increase in the connection cost equal to the income per capita is associated with a 0.2 percentage point decrease in the electrification rate. The aggregated “Getting Electricity” indicator does not enter statistically significantly in either one of the specifications.

Second, we use transmission and distribution losses as a % of output as the dependent variable and the rank of country on the “ease of getting electricity” as the independent variable (table 10). The sample has 106 observations. We first examine the relationship with technical losses for each sub-indicator (number of procedures, time and cost to obtain an electricity connection) at a time. We then look at the aggregated “Getting Electricity” indicator as well. The results show that the number of procedures to obtain an electricity connection is strongly positively correlated with the percentage of losses in the system. The result is also statistically significant. In fact one extra procedure in the process of getting electricity is associated with an increase of 1.5 percentage points in the transmission and distribution losses as percentage of output. This is quite a significant increase considering that the average ratio of transmission and distribution losses worldwide is 13.6 percent. The time to obtain a connection is positively correlated with the ratio of transmission and distribution losses at the 10% significance level. The cost of obtaining a connection and the transmission and distribution loss ratio are very weakly positively correlated, but not at a statistically significant level. The specification with the aggregated index of the three sub-indicators economies shows that moving 10 positions in the ranking on the ease of obtaining an electricity connection is associated with 0.5 percentage point higher transmission and distribution losses in their electricity system overall.

We then include 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 this new variable does not affect the significance level of the coefficients for the number of procedures and the cost remain the same: the number of procedures remains statistically significant; the cost variable continues to not be statistically significant. We also add the log of income per capita to all specifications to control for general country characteristics. The income variable enters negatively and highly statistically significantly in all specifications. However, this robustness check eliminates the positive correlation for the time to obtain an electricity connection and the cost variable now enters statistically significantly and negatively in the equation, suggesting that connection cost differences across economies are not merely a function of the development level of each country as proxied by the income per capita. An increase in the connection cost equal to the income per capita is associated with a 0.07 percentage point decrease in the transmission and distribution losses ratio. The variable on procedures and the aggregated rank both remain statistically significant and positively correlated with the transmission and distribution loss ratio, although both now at the 10 instead of the 1 percent significance level.

Last, we use the value lost of output due to electricity interruptions as dependent variable (table 11). The correlations described in section III on the data showed that the cost of getting electricity and the value lost variable were strongly correlated with each other, but after controlling for the ownership of the utility and for income per capita we find no statistically significant relationships with the new indicators.

What do these results tell us? First, the fact that the new indicators correlate with the expected signs and at statistically significant level with other outcome variables for the electricity sector is heartening and not too surprising at the same time. However, this co-movement of the new and existing indicators suggests that the new indicators –despite their limited focus on the connection process for obtaining an electricity connection – could serve as useful indicators for the sector overall. We believe there are at least two good reasons.

First, the new indicators have one important advantage vis-à-vis existing ones: they cover a bigger sample than for example the existing data for the electrification rate can cover. Available national and global datasets cover different factors to varying degrees. Collecting these data is cumbersome, especially when the availability and reliability of the data is to be ensured over time. While Doing Business does not have the magic answer to all these data challenges, the Doing Business methodology offers several advantages. It is transparent. It allows multiple interactions with the respondents, ensuring accuracy by clarifying possible misinterpretations of the survey questions. It is inexpensive, so data can be collected in a large sample of economies.

Second, the new indicators also offer insights that the existing ones cannot offer. A low electrification rate points to an important problem but offers relatively little insight on how to address this problem. Indicators which detail the procedures, time and cost of the connection process can provide valuable insights for policy makers who would like to improve sector outcomes. By measuring the time it takes to obtain a connection the new indicator provides a measure of how long it takes a specific distribution utility to turn around a typical customer request. By also measuring the procedures involved, the indicator can help identify the bottlenecks in specific connection processes. Recording procedures also offers insights on selected regulatory issues around connection processes. Last, detailed data on connection costs is currently not available on a broad cross-country basis. By providing detailed data on connection costs the indicator complements existing data on consumption tariffs allowing researchers to expand their research into new areas.

IV.2. Does the overall level of bureaucracy of other public services influence how efficiently a utility connects a new customer to electricity?

In a second step, we would like to examine to which degree the overall bureaucratic environment in individual economies influences also the performance of distribution utilities. We therefore examine how the new data on the process of obtaining an electricity connection relates to Doing Business indicators that provide a measure of the degree of bureaucracy a small and medium enterprise is subjected to in a given country. We use the 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 for the efficiency of government services in a given country.

We know from the procedures lists collected on the process of obtaining an electricity connection that electric utilities interact with public service providers such as the municipality or the building department to, for example, obtain clearances to lay connection cables in public spaces. We also know that interactions are common with the same public agency that issues building permits. For this reason, we expect a particularly strong relationship with the dealing with construction permits indicator.

In contrast to the dealing with construction permits indicator, the indicators on the procedures for starting a business or registering a property provide no intuitive overlap with the procedures on getting electricity. They provide hence for a useful measure of the general bureaucratic environment in a given country. If there was to be a relationship between these two indicators and the one for obtaining an electricity connection it would be suggestive of the existence of a more pronounced “general bureaucratic culture” in some economies versus others.

Specification with procedures

Table 12 presents our main findings for the specification focusing on the procedural complexity of different public services. We use the number of procedures to obtain an electricity connection as 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 139 observations. In this first simple specification all three independent variables are positively correlated with the procedures for obtaining an electricity connection and the results are statistically significant. 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 three independent variables, but the significance level of the starting a business variable goes down to 10%. Significance levels for the procedures to register a property and deal with construction permits do not change.

We also would like to examine the degree to which a highly bureaucratic environment (as measured by the number of procedures needed to register a company or a property) affects privately and publicly owned utilities alike. To that end we split the sample into two. We have 45 majority-privately owned utilities in the sample and 95 majority-publicly owned ones. For both the Starting a Business and Registering Property variable, the coefficients lose their statistical significance for the private utility sub-sample and retain them in the public utility sample, suggesting that public utilities are more likely to have cumbersome procedures if other government services are also cumbersome in the country. Interestingly, in the case of both independent variables the log for the GNI per capita enters only statistically significantly in the private sub-sample.

The split-sample specification using the procedures of the Dealing with Construction Permits indicator yields a different result. Here, both the private and the public sub-sample show a

positive correlation between the process for obtaining an electricity connection and the process of obtaining a construction permit. This result is consistent with our initial hypothesis, based on the observation of the data that utilities often have to coordinate with those agencies that also grant construction permits in order to obtain clearances to lay cables in public spaces. This explains why the procedural complexity of obtaining a construction permit would affect both privately and publicly owned utilities.

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 13). 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.

We then exclude 6 economies from the sample where a moratorium on new connections delays connection times (Afghanistan, Guinea-Bissau, the Kyrgyz Republic, Madagascar, Tajikistan and Sierra Leone). When we restrict the sample, only the coefficient for the Dealing with Construction Permits indicator remains statistically significant. The results do not change when we add the log of GNI per capita as a control variable. Also, the income variable is strongly negatively correlated with the time it takes to obtain an electricity connection and is statistically significant at the 1% level for all three specifications.

Like in the specification with procedures before, we break the sample into private and public utilities to examine if the bureaucratic environment in the country influences private and public utilities alike. Splitting the sample does not affect the results for the starting a business and registering property variables. They remain statistically insignificant in both sub-samples. The Dealing with Construction Permits indicator loses its statistical significance in the private utility sub-sample but retains it at the 5% level in the public utility one.

IV.3. Is a more efficient electricity connection process associated with better enterprise performance?

As a last step, we would like to 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 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 unfortunately 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:

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

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. X_{ijc} represent firm characteristics which are as follows: 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. There 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. In some specifications C_c stands for country fixed effected and both our electricity connection measure and GDP per capita are excluded. Finally $I_j * e_c$ 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 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 Murat (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 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 is 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 X_{jc} which now represent average industry characteristics. These are as follows: 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 its sales, import directly at least 10% of its 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 in 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. In these specifications all the data except for e (percentile rank of getting an electricity connection) come from the Enterprise Surveys dataset.

Firm Level Specifications Results

The firm level regression results are presented in table 13. 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 (labor and capital inputs and power outages). The coefficient of interest (Beta 1) is negative and significantly different from zero at one percent level. That is, firms have lower sales where electricity connections are more difficult to obtain. Once usage of bank financing is included the result remains significant at 5 percent level. The same table shows the results for the specification with all the covariates included plus the interaction terms between industry fixed effects and the electricity variable. These interactions allow identifying which industries are more affected by the electricity connection process. Industries such as information technology seem to be affected more negatively by a complicated electricity connection process. We run the same specification excluding the trade variables to find similar results.

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. Therefore, we now restrict the sample of firms to only those located in the major business city of the country. The results for the restricted sample are also presented in Table 13. When we use the restricted sample and the interaction terms are included, it stands out that total sales in industries such as, manufacturing (ISIC codes from 15 to 33) are more likely affected by an inefficient electricity connection process.

Industry Level Specifications Results

Both results remain significant at the 10% level once the data is collapsed to industry level as shown in Table 13. The industry level specifications use the same sets of covariates as in the firm

level regressions and the magnitude of the coefficients is similar. Moving from the country with the most complex electricity connection process to the country with the least is associated with an increase of 0.02 in the log of sales. Once the interaction terms are included and the international trade engagement variables are excluded, as in the firm level regressions, industries such as information technology services are more likely to be affected by our electricity measure.

Again the results using the restricted sample (where only firms located in the major business city are included) are similar to the ones obtained using firm level data. The main change regards the levels of significance for the interaction terms with the manufacturing industries become more statistically significant.

V. Conclusion

This paper presents basic statistical relationships between the number of procedures, time and cost to obtain an electricity connection and other variables of government regulation and electricity sector outcome variables using a new dataset on the process of obtaining an electricity connection for 140 economies. The statistical relationships presented in this paper suggest that the new indicators not only add value by providing data that was formerly not available on the procedures, time and cost to obtain an electricity connection, but that they could also serve as a useful proxy for the performance of the electricity sector overall. We present cross-country evidence that the time and cost to obtain an electricity connection are associated with lower electrification rates. We also find that additional procedures to get connected are more likely to be found in countries where technical and non-technical losses in the transmission and distribution system are high. A 10 position jump on the ranking of an aggregate index based on the procedures, time and cost to obtain an electricity connection is associated with 0.5 percentage point higher transmission and distribution losses in their electricity system overall. We also find that privately owned utilities provide new connections to the final consumer faster and at lower costs than publicly owned utilities. Our analysis also suggests that the general procedural environment as measured by other measures of bureaucratic complexity in a given country also has a bearing on the number of procedures that a client has to go through to obtain a new electricity connection and that measures of the bureaucracy in the country are more likely to affect distribution utilities where they are publicly and not privately owned. Last, the analysis indicates that firm performance is correlated with the efficiency in connecting to the electricity grid.

VI. References

- Andres, Luis, Jose Luis Guasch and Sebastian Lopez Azumendi. 2008. "Regulatory Governance and Sector Performance: Methodology and Evaluation for Electricity Distribution in Latin America." Policy Research Working Paper 4494. World Bank, Washington, DC.
- Calderón, César, and Luis Servén. 2003. "The Output Cost of Latin America's Infrastructure Gap." In William R. Easterly and Luis Servén, eds., *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*. Washington, D.C.: World Bank.
- CEER (Council of European Energy Regulators). 2008. 4th Benchmarking Report on Quality of Electricity Supply 2008. Brussels. <http://www.energy-regulators.eu/>.
- Cubbin, John and Jon Stern. 2006. "The Impact of Regulatory Governance and Privatization on Electricity Industry Generation Capacity in Developing Economies." *The World Bank Economic Review Advance Access*, World Bank, Washington, DC.
- Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2002. "The Regulation of Entry", *Quarterly Journal of Economics* 117(1):1-37.
- Dollar, David, Mary Hallward-Driemeier, and Taye Mengistae. 2003a. "Investment Climate and Firm Performance in Developing Countries." In *Economic Development and Cultural Change*, 54:1–31, October 2005
- Eifert, Benjamin. 2007. "Infrastructure and Market Structure In Least-Developed Countries", <http://beifert.googlepages.com/>
- Estache, Antonio and Martin Rossi. 2004. "Have Consumers Benefited from the Reforms in the Electricity Distribution Sector in Latin America?" Policy Research Working Paper 3420. World Bank, Washington, DC.
- Foster, Vivien, and Steinbuks Jevgenijs. 2009. "Paying the Price for Unreliable Power Supplies: In-House Generation of Electricity by Firms in Africa." Policy Research Working Paper 4913, World Bank, Washington, DC.
- Gassner, Katharina, Alexander Popov and Nataliya Pushak. 2009. "Does Private Sector Participation Improve Performance in Electricity and Water Distribution? Trends and Policy Options No. 6, World Bank, PPIAF, Washington, DC.
- Getting Electricity – A pilot indicator set from the Doing Business Project.
http://www.doingbusiness.org/Documents/GettingElectricity_pilot_indicator_project.pdf

Hallward-Driemeier, Mary & Wallsten, Scott & Lixin Colin Xu, 2003. "The investment climate and the firm : firm-level evidence from China," Washington D.C.. World Bank Policy Research Working Paper Series 3003.

Imi, Atsushi. 2008. "Effects of Improving Infrastructure Quality on Business Costs: Evidence from Firm-Level Data", http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1149084.

Jamasb, T., R. Mota, D. Newbery, and M. Pollitt. 2005. "Electricity Reform in Developing Countries: A Survey of Empirical Evidence on Determinants and Performance." World Bank Policy Research Working Paper 3549. Washington, D.C.: World Bank.

Kirkpatrick, Colin, Parker, David, and Yin-Fang Zhang. 2002. "Electricity Sector Reform in Developing Countries: An Econometric Assessment of the Effects of Privatisation, Competition and Regulation." Centre on Regulation and Competition (CRC) Working paper no. 30593.

Kumbhakara, Subal C. and Lennart Hjalmarsson. 1998. "Relative performance of public and private ownership under yardstick competition: electricity retail distribution", *European Economic Review* Volume 42, Issue 1, January 1998, Pages 97-122.

Klapper, Leora, Laeven, Luc, and Raghuram Rajan. 2004. "Business Environment and Firm Entry: Evidence from International Data". World Bank Policy Research Working Paper 3232. Washington, D.C.: World Bank.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny. 1999. "The Quality of Government", *Journal of Law, Economics and Organization* 15(1): 222-279.

Lee, Kyu Sik. 1985. "An Evaluation of Decentralization Policies in Light of Changing Location Patterns of Employment in The Seoul Region." Urban Development Discussion Paper, UDD-60. The World Bank.

Lee, Kyu Sik. 1989. "The Location of Jobs in a Developing Metropolis : Patterns of Growth in Bogota and Cali, Colombia." Oxford University Press.

Lee, K.S., Anas, A. and Oh, G.T., 1996. "Cost of infrastructure deficiencies in manufacturing in Indonesia, Nigeria and Thailand," Policy Research Working Paper Series 1604, Washington DC: World Bank.

McCotter, Brian. 2005. "Best Practices in Consumer Services. A Comparative Study." USAID, Washington, DC.

Reinikka, Ritva, and Jakob Svensson. 1999. "Confronting Competition: Investment Response and Constraints in Uganda." Washington, D.C.: World Bank Policy Research Working Paper Series 2242.

Seker, Murat. 2009. "Importing, exporting and innovation in developing countries," Washington D.C.. World Bank Policy Research Working Paper Series 5156.

World Bank. 2004. World Development Report 2005. A Better Investment Climate for Everyone. Oxford: Oxford University Press.

VII. Tables

Table 1: Description of variables used

Variable	Source	Year	Definition
Procedures Getting Electricity	Getting Electricity Database (www.doingbusiness.org)	2008-2009	Number of procedures required to complete a connection to electricity of a newly built construction with a 140 kVA load demand.
Time Getting Electricity	Getting Electricity Database (www.doingbusiness.org)	2008-2009	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	Getting Electricity Database (www.doingbusiness.org)	2008-2009	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	Getting Electricity Database (www.doingbusiness.org)	2008-2009	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	Getting Electricity Database (www.doingbusiness.org)	2008-2009	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)	2008	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 websites and other sources on the structure of the electricity sector	2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	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 Database (www.doingbusiness.org)	2008-2009	Number of days necessary for a business in the construction industry to build a standardized house.
Cost as % of GNI per capita Construction Permits (net of costs related to utility connections)	Doing Business Database (www.doingbusiness.org)	2008-2009	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.	2006	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	International Energy Agency	2000-2006	Number of people with electricity access as a percentage of total population.
Value lost due to electrical outages	World Bank, Enterprise Surveys	2003-2009	Value lost due to electrical outages is the percentage of sales lost due to power outages.
Firms' current sales	World Bank, Enterprise Surveys	2007-2009	Firm total annual sales in local currency in 2000 constant US dollars.
Firms' labor input	World Bank, Enterprise Surveys	2007-2009	Number of firms' full time workers.
Firms' productivity	World Bank, Enterprise	2007-	Total annual sales in 2000 constant US dollars per full time

	Surveys	2009	worker.
Firms' capital input (investment)	World Bank, Enterprise Surveys	2007-2009	Total annual expenditure in 2000 constant US dollars for purchases of machines, equipment and buildings.
Direct Export 10%	World Bank, Enterprise Surveys	2007-2009	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	2007-2009	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	2007-2009	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	2007-2009	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	2007-2009	Average number of power outages observed by the firm in a typical month.

Table 2: New Getting Electricity indicator data

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 Directorate at the Ministry of Water and Power	Public	4	424	2,650	618
Albania	Tirana	Distribution System Operator (OSSH)	Public	5	162	23,572	615
Angola	Luanda	Empresa de Distribuicao de electricidade (EDEL)	Public	8	41	37,992	1,102
Antigua and Barbuda	St. John's	Antigua Public Utilities Authority	Public	4	42	19,058	140
Argentina	Buenos Aires	EDESUR	Private	6	74	1,816	25
Armenia	Yerevan	Electric Networks of Armenia (ENA) CJSC	Private	8	242	22,571	673
Australia	Sydney	EnergyAustralia	Public	5	46	6,212	15
Austria	Vienna	Wien Energie Stromnetz GmbH	Public	5	23	51,227	111
Azerbaijan	Baku	Bakielektrikshebeke OJSC	Public	8	225	23,908	624
Bahamas, The	Nassau	Bahamas Electricity Corporation	Public	7	73	10,301	45
Bahrain	Manama	Ministry of Electricity and Water (Electricity Distribution Directorate)	Public	5	72	13,032	48
Bangladesh	Dhaka	Dhaka Power Distribution Company Ltd	Public	7	109	16,366	3,171
Belarus	Minsk	Minskenergo	Public	6	218	69,524	1,291
Belgium	Brussels	Sibelga/ Brussels Network Operations	Private	4	50	19,586	44
Belize	Belize City	Belize Electricity Ltd (BEL)	Private	5	106	13,056	342
Benin	Cotonou	Société béninoise d'énergie électrique (SBEE)	Public	5	172	108,664	15,817
Bhutan	Thimphu	Bhutan Power Corporation Ltd	Public	5	241	31,765	1,675
Bolivia	La Paz	Electropaz	Private	7	51	21,621	1,484
Bosnia and Herzegovina	Sarajevo	Elektroprivreda BiH	Public	10	127	12,470	277
Botswana	Gaborone	Botswana Power Corporation	Public	5	117	30,116	465
Brazil	São Paulo	AES Eletropaulo	Private	6	36	11,999	163
Bulgaria	Sofia	CEZ Distribution Bulgaria AD	Private	6	102	16,191	295
Burkina Faso	Ouagadougou	Société Nationale d'Electricité du Burkina (SONABEL)	Public	4	158	73,902	15,443
Burundi	Bujumbura	Régie de Production et Distribution d'Eau et d'Electricité (Regideso)	Public	4	158	58,162	43,020
Cambodia	Phnom Penh	Electricité du Cambodge	Public	4	169	23,228	3,854
Cameroon	Douala	AES SONEL	Private	4	67	20,000	1,735
Canada	Toronto	Toronto Hydro	Public	8	133	68,607	164
Cape Verde	Praia	Empresa de Electricidade E Agua (Electra)	Private	4	46	34,847	1,113
Central African Republic	Bangui	Enerca	Public	6	210	58,635	14,378

Chile	Santiago	Chilectra	Private	6	31	8,307	88
China	Shanghai	Shanghai Municipal Electric Power Company	Public	4	118	23,190	836
Colombia	Bogota	CODENSA	Private	5	150	57,923	1,244
Congo, Dem. Rep.	Kinshasa	Société Nationale d'Electricité (SNEL)	Public	6	73	43,393	28,304
Costa Rica	San José	Compania Nacional de Fuerza y Luz	Public	5	62	19,946	329
Côte d'Ivoire	Abidjan	Compagnie Ivoirienne d'Electricité (CIE)	Public	5	43	42,338	4,304
Croatia	Zagreb	HEP ODS	Private	5	70	43,412	320
Cyprus	Nicosia	Electricity Authority of Cyprus (EAC)	Public	4	306	24,727	99
Czech Republic	Prague	(PRE) / PREdistribuce a.s.	Public	6	279	30,708	185
Denmark	Copenhagen	Dong Energy	Public	3	43	62,818	106
Djibouti	Djibouti Ville	Electricité du Djibouti	Public	4	180	73,149	6,473
Dominica	Roseau	Dominica Electricity Services Ltd. (DOMLEC)	Private	5	73	56,637	1,188
Ecuador	Quito	Empresa Electrica Quito	Public	5	89	35,466	974
Egypt, Arab Rep.	Cairo	South Cairo Electricity Distribution Company	Public	7	50	8,169	454
El Salvador	San Salvador	AES El Salvador	Private	7	74	16,272	467
Estonia	Tallinn	Eesti Energia	Public	4	99	29,405	206
Ethiopia	Addis Ababa	Ethiopia Electric Power Corporation	Public	4	75	19,631	6,967
Fiji	Suva	Fiji Electricity Authority	Public	6	29	31,270	795
Finland	Helsinki	Helsinki Energy	Private	5	53	10,061	21
France	Paris	Electricité de France (EDF)	Public	5	123	12,161	28
Gabon	Libreville	Société d'énergie et d'eau du Gabon (SEEG)	Private	5	160	18,608	257
Gambia, The	Banjul	National Water and Electricity Company (NAWEC)	Public	4	178	27,424	6,973
Georgia	Tbilisi	Telasi JSC	Private	4	71	16,471	666
Germany	Berlin	Vattenfall Europe AG	Private	3	17	2,151	5
Ghana	Accra	Electricity Company of Ghana	Public	4	78	14,599	2,165
Greece	Athens	Dimosia Epicheirisi Ilektrismou (DEI) (also known as the Public Power Corporation of Greece)	Public	6	77	10,211	36
Grenada	St. George's	Grenada Electricity Services Ltd.	Private	4	30	13,962	245
Guatemala	Guatemala City	Empresa Electrica de Guatemala, S.A	Private	4	39	18,147	677
Guinea-Bissau	Bissau	Electricidade e Águas de Guinea-Bissau (EAGB)	Public	8	437	10,117	4,126
Honduras	Tegucigalpa	Empresa Nacional de Energia Electrica (ENEE)	Public	8	33	17,330	963
Hong Kong, China	Hong Kong	CLP Power Hong Kong Ltd.	Private	4	101	564	2
Hungary	Budapest	Budapesti Elektromos Művek Rt. (ELMű Rt)	Private	6	252	12,597	98
Iceland	Reykjavik	Orkuveita Reykjavíkur	Public	4	22	3,467	9

India	Mumbai	Bhrihan Mumbai Electricity & Transport Undertaking	Public	7	67	5,401	507
Iran, Islamic Rep.	Tehran	Tehran Regional Electric Company	Public	6	143	49,700	1,050
Ireland	Dublin	Electricity Supply Board (ESB)	Public	4	106	10,571	21
Israel	Tel Aviv	The Israel Electric Corporation Ltd.	Public	6	113	3,145	13
Jamaica	Kingston	Jamaica Public Service Co. Ltd.	Private	6	48	3,904	80
Japan	Tokyo	Tokyo Electric Power Company (TEPCO)	Private	3	105	0	0
Jordan	Amman	The Jordanian Electric Power Co., Ltd. (JEPCO)	Private	5	43	17,363	525
Kazakhstan	Almaty	Almaty Power Consolidated (AO «Алматы Пауэр Консолидейтед» (АО АПК))	Public	5	103	18,449	300
Kenya	Nairobi	Kenya Power and Lighting Co. Ltd	Public	5	162	10,773	1,405
Kyrgyz Republic	Bishkek	Severelectro	Public	6	325	18,365	2,478
Lao PDR	Vientiane	Elictricite du Laos	Public	5	127	24,014	3,245
Latvia	Riga	Sadales Tikls	Public	5	193	39,760	335
Lebanon	Beirut	Electricité du Liban	Public	5	75	1,901	30
Lesotho	Maseru	Lesotho Electricity Company (Pty) Ltd	Public	5	86	28,903	2,676
Lithuania	Vilnius	Rytu Skirstomieji Tinklai AB (RST)	Public	4	98	7,391	62
Luxembourg	Luxembourg	Cegedel	Private	5	120	43,714	51
Macedonia, FYR	Skopje	EVN Macedonia	Private	5	90	38,273	925
Madagascar	Antananarivo	Jiro sy rano malagasy (JIRAMA)	Public	5	419	34,402	8,466
Malawi	Blantyre	Electricity Supply Corporation of Malawi (ESCOM)	Public	5	179	33,522	11,655
Malaysia	Kuala Lumpur	Tenaga Nasional Berhad	Public	6	51	2,969	43
Maldives	Malé	State Electric Co. Ltd	Public	6	101	29,849	823
Mauritius	Port Louis	Central Electricity Board (C.E.B.)	Public	3	44	16,824	263
Mexico	Mexico City	Luz y Fuerza del Centro	Public	7	169	57,600	577
Moldova	Chisinau	SA RED Chisinau	Private	7	126	9,560	651
Montenegro	Podgorica	Elektroprivreda Crne Gore (EPCG)	Public	4	67	26,361	409
Morocco	Casablanca	Lydec	Private	5	71	59,192	2,295
Namibia	Windhoek	City of Windhoek	Public	7	40	16,963	404
Nepal	Kathmandu	Nepal Electricity Authority	Public	6	73	11,665	2,890
Netherlands	Amsterdam	Liander	Public	5	125	19,526	39
New Zealand	Auckland	Mercury Energy	Private	5	47	20,474	73
Nicaragua	Managua	DISNORTE - DISSUR	Private	6	70	18,292	1,695
Niger	Niamey	Société Nigérienne d'Electricité (NIGELEC)	Public	4	165	14,125	4,296
Nigeria	Lagos	Eko Distribution Company	Public	8	260	13,310	1,147
Norway	Oslo	Hafslund	Public	4	59	12,244	14

Oman	Muscat	Muscat Electricity Distribution Company	Private	5	66	13,442	71
Pakistan	Karachi	Karachi Electricity Supply Company Ltd	Private	5	233	22,910	2,335
Panama	Panama City	Unión FENOSA	Private	5	35	658	11
Paraguay	Asuncion	Administracion Nacional de Electricidad (ANDE)	Public	4	53	8,934	410
Peru	Lima	Luz del Sur	Private	5	118	20,800	522
Philippines	Manila	MERALCO	Private	5	63	8,799	466
Poland	Warsaw	RWE Stoen	Private	4	143	27,718	233
Puerto Rico	San Juan	Puerto Rico Electric Power Authority (PREPA)	Public	5	32	67,800	434
Qatar	Doha	Qatar General Electricity and Water Corporation (Kahramaa)	Public	3	90	3,544	4
Romania	Bucharest	ENEL (former Electrica Muntenia Sud (EMS))	Private	7	207	24,800	313
Russian Federation	Moscow	MOESK	Public	8	272	435,090	4,522
Saudi Arabia	Riyadh	Saudi Electricity Company	Public	3	71	15,082	78
Senegal	Dakar	Société Nationale d'Électricité du Sénégal (SENELEC)	Public	6	125	67,856	7,007
Serbia	Belgrade	Elektrodistribucija Belgrad plc	Public	4	81	29,288	513
Seychelles	Victoria	Public Utilities Corporation	Public	5	132	49,350	480
Sierra Leone	Freetown	National Power Authority	Public	8	441	4,106	1,279
Singapore	Singapore	SP PowerGrid Ltd.	Public	5	76	11,881	34
Slovenia	Ljubljana	Elektro Ljubljana, d.d.	Public	5	38	27,706	115
South Africa	Johannesburg	ESKOM	Public	5	171	25,791	443
Spain	Madrid	Iberdrola	Private	4	85	54,197	170
Sri Lanka	Colombo	Ceylon Electricity Board	Public	4	132	27,694	1,548
St. Kitts and Nevis	Basseterre	St. Kitts Electricity Department	Public	4	18	41,358	377
St. Lucia	Castries	St. Lucia Electricity Services Ltd. (Lucelec)	Private	4	25	25,989	470
St. Vincent and the Grenadines	Kingstown	St. Vincent Electricity Services Ltd. (VINLEC)	Public	3	52	23,631	460
Suriname	Paramaribo	N.V. Energiebedrijven	Private	5	128	37,208	746
Sweden	Stockholm	Vattenfall	Public	3	52	10,759	21
Switzerland	Zurich	EKZ	Public	3	39	44,948	69
Syrian Arab Republic	Damascus	Public Establishment for Distribution and Exploitation of Electrical Energy (PEDEEE)	Public	5	71	20,814	994
Tajikistan	Dushanbe	Barki Tojik	Public	8	211	8,682	1,457
Tanzania	Dar es Salaam	TanESCO	Public	4	382	1,086	251
Tonga	Nukualofa	Tonga Power Ltd.	Public	5	50	3,298	129
Trinidad and Tobago	Port of Spain	Trinidad and Tobago Electricity Commission	Public	5	56	8,859	54
Tunisia	Tunis	Societe Tunisienne de l'Electricite et du Gaz (STEG)	Public	4	58	37,399	1,136
Turkey	Istanbul	BOĞAZIÇI ELEKTRİK DAĞITIM A.Ş. (BEDAŞ)	Private	4	62	75,935	813
Uganda	Kampala	Umeme	Private	5	151	21,812	5,210

Ukraine	Kiev	JSC Kievenergo	Public	9	306	8,419	262
United Arab Emirates	Dubai	DEWA	Public	4	55	8,666	16
United Kingdom	London	EDF Energy	Private	5	111	19,155	42
United States	New York City	Con Edison	Private	5	48	7,981	17
Uzbekistan	Tashkent	Uzbekenergo	Public	7	123	22,940	2,533
Vietnam	Ho Chi Minh City	Ho Chi Minh City Power Company	Public	4	127	15,037	1,685
West Bank and Gaza	Ramallah	Jerusalem District Electricity Company (JDECo)	Public	6	70	24,509	1,567
Yemen, Rep.	Sanaa	Public Electricity Corporation	Public	4	35	65,798	6,926
Zambia	Lusaka	Zambia Electricity Supply Corporation Ltd. (ZESCO)	Public	4	103	9,903	1,043

Table 3: Top and Bottom 10 on the number of procedures, time and the cost of obtaining an electricity connection

Procedures (number per connection)			
Fewest		Most	
Denmark	3	Angola	8
Germany	3	Armenia	8
Japan	3	Azerbaijan	8
Mauritius	3	Guinea-Bissau	8
Qatar	3	Honduras	8
Saudi Arabia	3	Nigeria	8
St. Vincent and the Gren	3	Russian Federation	8
Sw eden	3	Tajikistan	8
Sw itzerland	3	Ukraine	9
Antigua and Barbuda	4	Bosnia and Herzegovina	10
Time (in days)			
Least		Most	
Germany	17	Russian Federation	272
St. Kitts and Nevis	18	Czech Republic	279
Iceland	22	Cyprus	306
Austria	23	Ukraine	306
St. Lucia	25	Kyrgyz Republic	325
Grenada	30	Tanzania	382
Chile	31	Madagascar	419
Puerto Rico	32	Afghanistan	424
Honduras	33	Guinea-Bissau	437
Panama	35	Sierra Leone	441
Yemen, Rep.	35		
Total connection cost (as % of GNI per capita)			
Least		Most	
	%		%
Japan	0	Ethiopia	6,967
Hong Kong, China	2	Gambia, The	6,975
Qatar	4	Senegal	7,007
Germany	5	Madagascar	8,466
Iceland	9	Malaw i	11,655
Panama	11	Central African Republic	14,378
Israel	13	Burkina Faso	15,443
Cyprus	14	Benin	15,817
Norw ay	14	Congo, Dem. Rep.	28,304
Australia	15	Burundi	43,020

Table 4: 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	140	182	177	181	140	182	177	181	140	182	177	181
Mean	5.18	8.03	5.95	11.19	116	35	66	158	1,965	41	6	403
Std. Dev.	1.38	3.57	2.41	5.87	89	59	78	122	5,006	69	5	1,774
Min	3	1	1	2	17	1	2	12	0	0	0	0
Max	10	20	14	46	441	694	513	902	4,3020	499	28	2,2603
Low Income												
Obs	28	40	40	39	28	40	40	39	28	40	40	39
Mean	5.21	8.78	6.60	10.56	192	44	100	187	7,381	107	8	1,193
Std. Dev.	1.37	4.03	2.48	5.00	122	49	97	154	9,344	111	6	3,697
Min	4	2	3	4	35	3	5	58	251	5	0	5
Max	8	19	13	23	441	213	405	902	43,020	499	23	22,603
Lower Middle Income												
Obs	36	53	49	53	36	53	49	53	36	53	49	53
Mean	5.67	8.57	6.14	11.81	108	34	70	144	1,261	43	6	312
Std. Dev.	1.49	2.87	2.26	5.72	75	25	85	108	1,211	44	6	392
Min	4	3	2	3	33	3	2	12	129	3	0	0
Max	9	15	13	30	306	144	513	583	6,473	195	28	2,028
Upper Middle Income												
Obs	37	42	42	42	37	42	42	42	37	42	42	42
Mean	5.27	8.38	6.33	12.81	98	47	52	166	540	16	5	193
Std. Dev.	1.37	3.21	2.13	7.68	62	106	44	111	750	20	4	374
Min	3	4	2	3	18	4	3	34	11	2	0	1
Max	10	16	14	46	272	694	197	674	4,522	113	14	1,672
High Income												
Obs	39	47	46	47	39	47	46	47	39	47	46	47
Mean	4.62	6.47	4.83	9.55	87	19	43	141	75	7	4	40
Std. Dev.	1.14	3.80	2.44	4.31	65	25	68	114	90	15	3	77
Min	3	1	1	2	17	1	2	24	0	0	0	0
Max	8	20	11	24	306	136	391	677	434	100	13	481

Table 5: 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	10	10	10	10	10	10	10	10	10	10	10	10
Mean	4.80	8.30	5.20	13.30	91	42	68	174	1,109	24	4	125
Std. Dev.	0.79	4.24	2.10	8.22	44	32	46	178	1,394	41	2	187
Min	4	3	3	2	29	3	5	26	2	1	1	7
Max	6	15	9	30	169	100	144	608	3854	138	10	578
Europe and Central Asia												
Obs	28	28	28	28	28	28	28	28	28	28	28	28
Mean	5.86	6.54	5.46	16.04	164	16	60	223	760	7	3	334
Std. Dev.	1.74	2.59	2.32	8.26	87	12	79	157	971	6	3	507
Min	4	3	2	6	38	3	3	59	62	0	0	1
Max	10	12	12	46	325	60	391	677	4,522	24	11	1,672
High Income: OECD												
Obs	21	21	21	21	21	21	21	21	21	21	21	21
Mean	4.48	5.52	4.57	7.90	71	14	24	122	50	3	4	27
Std. Dev.	1.21	3.27	2.50	3.28	38	11	25	67	49	4	3	24
Min	3	1	1	3	17	1	2	25	0	0	0	0
Max	8	15	11	13	133	47	98	246	170	15	13	104
Latin America and Caribbean												
Obs	27	27	27	27	27	27	27	27	27	27	27	27
Mean	5.30	9.15	6.74	10.22	65	56	61	144	526	31	6	155
Std. Dev.	1.20	3.22	1.91	5.44	39	130	52	82	462	32	4	218
Min	3	5	4	3	18	7	14	28	11	1	1	1
Max	8	16	14	25	169	694	197	381	1,695	113	14	1,023
Middle East and North Africa												
Obs	16	16	16	16	16	16	16	16	16	16	16	16
Mean	4.81	7.00	5.69	11.81	79	16	36	93	1,355	35	6	248
Std. Dev.	1.11	2.13	2.80	3.47	38	13	34	63	2,192	51	7	310
Min	3	4	1	7	35	5	2	24	4	1	0	1
Max	7	11	10	18	180	49	144	208	6,926	195	28	903
South Asia												
Obs	8	8	7	8	8	8	7	8	8	8	7	8
Mean	5.50	7.25	6.29	11.00	173	28	106	164	1,696	27	6	321
Std. Dev.	1.20	3.11	2.14	4.99	122	15	100	58	1,026	24	3	693
Min	4	4	3	5	67	7	5	102	507	6	0	5
Max	7	13	9	20	424	46	250	289	3,171	66	10	2,028
Sub-Saharan Africa												
Obs	30	30	30	30	30	30	30	30	30	30	30	30
Mean	5.17	8.73	6.63	10.13	162	40	88	165	6,407	92	9	727
Std. Dev.	1.39	3.47	2.40	3.44	117	43	76	110	9,423	98	5	1,273
Min	3	2	4	5	40	6	16	61	251	2	1	1
Max	8	18	13	19	441	213	371	583	4,3020	391	21	6,734

Table 6a: Getting Electricity Indicators by Utility Ownership

Variable	Public Utility					Private Utility					T-test
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Public vs. Private
Procedures Getting Electricity	95	5.23	1.51	3.00	10.00	45	5.07	1.07	3.00	8.00	0.657
Time Getting Electricity	95	128	99	18	441	45	91	58	17	252	2.354
Cost in USD Getting Electricity	95	30,704	46,765	1,086	435,090	45	22,422	17,471	0	75,935	1.148
Cost as % of GNI pc Getting Electricity	95	2,591	5,951	4	43,020	45	641	922	0	5,210	2.182

Table 6b: Number of Observations for Getting Electricity Indicators by Utility Ownership, Income Group and Region

Utility Ownership	Entire Sample	Income Group				Region						
		Low Income	Lower Middle Income	Upper Middle Income	High Income	East Asia and Pacific	Europe and Central Asia	High Income: OECD	Latin America and Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
Public	95	27	22	20	26	8	18	12	11	13	7	26
Private	45	1	14	17	13	2	10	9	16	3	1	4

Table 6c: Time and Cost of Getting Electricity controlling for GNI

	Time Getting Electricity	Cost as % of GNI pc Getting Electricity
Private utility	-37.385*** (13.309)	-25.565** (12.190)
Ln GNI per capita		-1,019.309*** (375.270)
		-718.828*** (246.766)
Constant	128.27*** (10.140)	-20.383*** (5.028)
		-1605.11*** (427.372)
		-1,020.84*** (164.944)
Observations	140	140
R-squared	0.039	0.167
		15,825*** (4,003.520)
		10,369*** (1,619.234)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Electricity Sector Outcome Variables by Income Group

	Electric power transmission and distribution losses					Value lost due to electrical outages					Electrification rate				
	Entire Sample	Low Income	Lower Middle Income	Upper Middle Income	High Income	Entire Sample	Low Income	Lower Middle Income	Upper Middle Income	High Income	Entire Sample	Low Income	Lower Middle Income	Upper Middle Income	High Income
Obs.	126	19	34	31	42	104	29	34	32	9	65	18	23	15	8
Mean	14	17	19	14	7	4	7	5	3	2	63	23	71	80	94
Std. Dev.	10	11	13	6	3	4	5	3	3	1	33	20	25	23	10
Min	1	4	5	1	3	1	1	1	1	1	6	6	11	34	71
Max	64	46	64	30	16	23	23	16	15	4	100	84	100	100	100

Table 8: Correlation Matrix of Getting Electricity Indicators and other measures of the performance of the electricity sector

	Obs.	Procedures	Time	Cost in USD	Cost as % of GNI pc
Electric power transmission and distribution losses (% of output)	106	0.258 (0.01)	0.168 (0.09)	0.035 (0.73)	0.032 (0.74)
Value lost due to electrical outages	89	0.077 (0.47)	0.201 (0.06)	-0.059 (0.59)	0.315 (0.00)
Electrification rate	64	-0.024 (0.86)	-0.4846 (0.00)	-0.316 (0.013)	-0.568 (0.00)

P values in parentheses

Table 9: Regression Results: Electrification Rate

	Electrification Rate		
Procedures Getting Electricity	-0.632 (3.580)	-1.493 (3.511)	0.964 (2.922)
Private utility		18.880** (9.033)	
Ln GNI per capita			17.580*** (2.084)
Constant	65.67*** (18.930)	64.50*** (18.450)	-80.17*** (21.150)
Observations	64	64	64
R-squared	0.001	0.067	0.552
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Electrification Rate		
Time Getting Electricity	-0.191*** (0.044)	-0.179*** (0.045)	-0.095*** (0.024)
Private utility		12.370 (8.140)	
Ln GNI per capita			15.430*** (2.162)
Constant	82.86*** (6.013)	77.84*** (6.807)	-48.20** (18.400)
Observations	64	64	64
R-squared	0.231	0.259	0.600
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Electrification Rate		
Cost as % of GNI pc Getting Electricity	-0.004*** (0.001)	-0.004*** (0.001)	-0.002** (0.001)
Private utility		10.610 (7.702)	
Ln GNI per capita			14.66*** (2.653)
Constant	72.31*** (3.926)	68.65*** (4.719)	-48.60** (22.160)
Observations	64	64	64
R-squared	0.320	0.340	0.581
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

	Electrification Rate		
Country rank on the ease of getting electricity	0.036 (0.106)	0.004 (0.104)	0.044 (0.079)
Private utility		18.380** (9.090)	
Ln GNI per capita			17.530*** (2.077)
Constant	60.43*** (7.207)	56.75*** (7.266)	-77.30*** (16.080)
Observations	64	64	64
R-squared	0.002	0.065	0.553
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Table 10: Regression Results: Transmission and Distribution Losses

Electric power transmission and distribution losses (% of output)			
Procedures Getting Electricity	1.502*** (0.551)	1.517*** (0.554)	0.739* (0.385)
Private utility		0.733 (1.654)	
Ln GNI per capita			-2.370*** (0.477)
Constant	4.991 (3.012)	4.650 (3.120)	29.710*** (5.532)
Observations	106	106	106
R-squared	0.067	0.068	0.237
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Electric power transmission and distribution losses (% of output)			
Time Getting Electricity	0.0189* (0.011)	0.0198* (0.011)	0.008 (0.008)
Private utility		0.920 (1.703)	
Ln GNI per capita			-2.498*** (0.488)
Constant	10.87*** (1.420)	10.45*** (1.629)	33.86*** (5.074)
Observations	106	106	106
R-squared	0.028	0.031	0.227
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Electric power transmission and distribution losses (% of output)			
Cost as % of GNI pc Getting Electricity	0.0001 (0.000)	0.0001 (0.000)	-0.0007*** (0.000)
Private utility		0.559 (1.730)	
Ln GNI per capita			-3.286*** (0.433)
Constant	12.81*** (0.872)	12.59*** (1.102)	42.43*** (4.405)
Observations	106	106	106
R-squared	0.001	0.002	0.274
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Electric power transmission and distribution losses (% of output)			
Country rank on the ease of getting electricity	0.048*** (0.018)	0.048*** (0.018)	0.024* (0.014)
Private utility		0.562 (1.656)	
Ln GNI per capita			-2.385*** (0.469)
Constant	10.16*** (1.310)	9.951*** (1.454)	32.36*** (4.755)
Observations	106	106	106
R-squared	0.062	0.064	0.237
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Table 11: Regression Results: Value lost due to outages

Value lost due to electrical outages			
Procedures Getting Electricity	0.208 (0.289)	0.178 (0.289)	0.139 (0.204)
Private utility		-1.064 (0.858)	
Ln GNI per capita			-1.562*** (0.326)
Constant	3.297** (1.644)	3.848** (1.698)	15.920*** (3.186)
Observations	89	89	89
R-squared	0.006	0.023	0.278
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		
Value lost due to electrical outages			
Time Getting Electricity	0.00827* (0.004)	0.007 (0.004)	0.002 (0.003)
Private utility		-0.745 (0.873)	
Ln GNI per capita			-1.530*** (0.325)
Constant	3.365*** (0.695)	3.761*** (0.836)	16.20*** (2.827)
Observations	89	89	89
R-squared	0.040	0.048	0.277
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		
Value lost due to electrical outages			
Cost as % of GNI pc Getting	0.0002*** (0.000)	0.0002*** (0.000)	0.000 (0.000)
Private utility		-0.578 (0.840)	
Ln GNI per capita			-1.523*** (0.323)
Constant	3.913*** (0.427)	4.147*** (0.548)	16.33*** (2.753)
Observations	89	89	89
R-squared	0.099	0.104	0.276
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		
Value lost due to electrical outages			
Country rank on the ease of	0.006 (0.009)	0.006 (0.009)	0.005 (0.007)
Private utility		-1.094 (0.855)	
Ln GNI per capita			-1.565*** (0.325)
Constant	4.061*** (0.726)	4.477*** (0.793)	16.41*** (2.861)
Observations	89	89	89
R-squared	0.005	0.023	0.279
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Table 12: Regression Results: Procedural Complexity

	Procedures Getting Electricity			
		Full Sample	Public Utilities only	Private Utilities only
Procedures starting a business	0.085** (0.035)	0.061* (0.036)	0.106* (0.056)	-0.013 (0.047)
Ln GNI per capita		-0.146** (0.071)	-0.102 (0.083)	-0.296** (0.146)
Constant	4.535*** (0.286)	5.951*** (0.732)	5.282*** (0.871)	7.781*** (1.566)
Observations	140	140	95	45
R-squared	0.042	0.067	0.077	0.103
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 registering property	0.156*** (0.047)	0.129*** (0.048)	0.188*** (0.063)	0.004 (0.076)
Ln GNI per capita		-0.129* (0.074)	-0.084 (0.092)	-0.274* (0.148)
Constant	4.256*** (0.301)	5.501*** (0.782)	4.818*** (0.959)	7.454*** (1.684)
Observations	139	139	94	45
R-squared	0.073	0.093	0.115	0.102
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 Construction Permits	0.0744*** (0.018)	0.0698*** (0.018)	0.0744*** (0.023)	0.0536* (0.027)
Ln GNI per capita		-0.162** (0.067)	-0.153* (0.080)	-0.214* (0.120)
Constant	4.326*** (0.238)	5.744*** (0.636)	5.616*** (0.726)	6.378*** (1.199)
Observations	140	140	95	45
R-squared	0.106	0.140	0.132	0.170
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1			

Table 13: Time to deal with public service providers

	Time Getting Electricity				
	Full Sample		Public Utilities only	Private Utilities only	
	Including connection moratoria cases	Excluding connection moratoria cases	Including connection moratoria cases	Including connection moratoria cases	
Time starting a business	0.089 (0.121)	0.006 (0.094)	-0.003 (0.047)	-0.054 (0.672)	0.038 (0.028)
Ln GNI per capita		21.630*** (5.119)	-9.492*** (3.008)	-24.020*** (6.797)	-6.808 (6.375)
Constant	113.5*** (8.433)	298.4*** (47.070)	183.8*** (26.570)	327.8*** (70.620)	149.5** (59.070)
Observations	140	140	133	95	45
R-squared	0.004	0.150	0.049	0.168	0.027
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1				

	Time Getting Electricity				
	Full Sample		Public Utilities only	Private Utilities only	
	Including connection moratoria cases	Excluding connection moratoria cases	Including connection moratoria cases	Including connection moratoria cases	
Time registering property	0.326*** (0.114)	0.186 (0.149)	0.001 (0.076)	0.191 (0.175)	-0.011 (0.188)
Ln GNI per capita		-19.460*** (4.780)	-9.469*** (3.148)	-21.380*** (5.772)	-7.134 (6.670)
Constant	96.5*** (10.150)	269.1*** (44.490)	183.5*** (29.200)	291.8*** (53.850)	154.4** (65.270)
Observations	139	139	132	94	45
R-squared	0.060	0.170	0.050	0.000	0.023
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1				

	Time Getting Electricity				
	Full Sample		Public Utilities only	Private Utilities only	
	Including connection moratoria cases	Excluding connection moratoria cases	Including connection moratoria cases	Including connection moratoria cases	
Time construction permits	0.176*** (0.064)	0.144* (0.080)	0.156** (0.070)	0.156** (0.070)	0.051 (0.087)
Ln GNI per capita		-20.490*** (5.291)	-8.129*** (3.076)	-8.129*** (3.076)	-6.983 (6.190)
Constant	88.4*** (12.480)	266.1*** (52.210)	147.4*** (31.130)	147.4*** (31.130)	145.7** (58.110)
Observations	140	140	133	133	45
R-squared	0.050	0.180	0.130	0.00	0.028
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1				

Table 13: Specification with Log of annual sales as independent variable

Variables	1-Basic		2- including access to finance		3-including trade variables		4-including interaction terms		5-including interaction terms but without trade variables		6-inclu only
	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry	Firm
Number of power outages per month	-0.00374 (0.004)	0.00199 (0.007)	-0.00562 (0.004)	-0.00878 (0.010)	-0.0184** (0.008)	-0.0264 (0.017)	-0.0191** (0.008)	0.0109 (0.007)	-0.00568 (0.004)	0.000491 (0.002)	-0.0245* (0.010)
Log of Labor Input	1.186*** (0.039)	1.118*** (0.072)	1.216*** (0.045)	1.286*** (0.085)	1.180*** (0.050)	1.354*** (0.109)	1.171*** (0.045)	0.980*** (0.122)	1.216*** (0.043)	1.147*** (0.074)	1.171*** (0.039)
Capital Input	1.11e-10*** -	0 -	8.59e-11*** -	1.1E-10 (0.000)	8.88e-11*** -	1.19E-10 (0.000)	9.16e-11*** -	5.42e-11*** -	9.06e-11*** -	0*** -	1.49e-10* (0.000)
Access to finance Dummy			0.198* (0.110)	1.591* (0.893)	0.12 (0.144)	2.150* (1.067)	0.0922 (0.131)	0.316 (0.394)	0.188 (0.112)	0.0357 (0.308)	0 (0.000)
Direct Export 10% Dummy					0.0802 (0.172)	-0.0732 (0.607)	0.0955 (0.158)	0.612* (0.305)			-0.191 (0.000)
Direct Import Dummy					0.279** (0.121)	-0.556 (0.612)	0.304** (0.111)	0.530** (0.202)			0.300** (0.000)
Two-way Trader Dummy					-0.0419 (0.233)	0.974 (0.822)	-0.0273 (0.221)	0.191 (0.303)			0.244 (0.000)
Log of real GDP per capita	0.206 (0.187)	0.321 (0.268)	0.216 (0.229)	0.0855 (0.379)	0.185 (0.213)	-0.00776 (0.436)	0.159 (0.212)		0.173 (0.220)		0.075 (0.000)
Country Dummies	No	No	No	No	No	No	No	Yes	No	Yes	No
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Rank on the Ease of Getting Electricity	-0.0202*** (0.008)	-0.0102* (0.006)	-0.0270** (0.011)	-0.0190* (0.011)	-0.0241** (0.010)	-0.019 (0.011)	-0.0144 (0.034)				
Interaction Terms: Industry*Getting Electricity	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Constant	10.39*** -1.724	11.81*** -0.236	10.45*** -2.437	11.64*** -0.367	9.930*** -2.751	11.91*** -0.484	8.988** -3.43	7.459** -2.814	10.82*** -1.611	11.82*** -0.185	23.91*** -
Observations	7,471	1,127	5,619	555	2,927	445	2,927	364	5,619	465	
R-squared	0.58	0.89	0.64	0.93	0.68	0.94	0.69	0.94	0.65	0.93	

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:

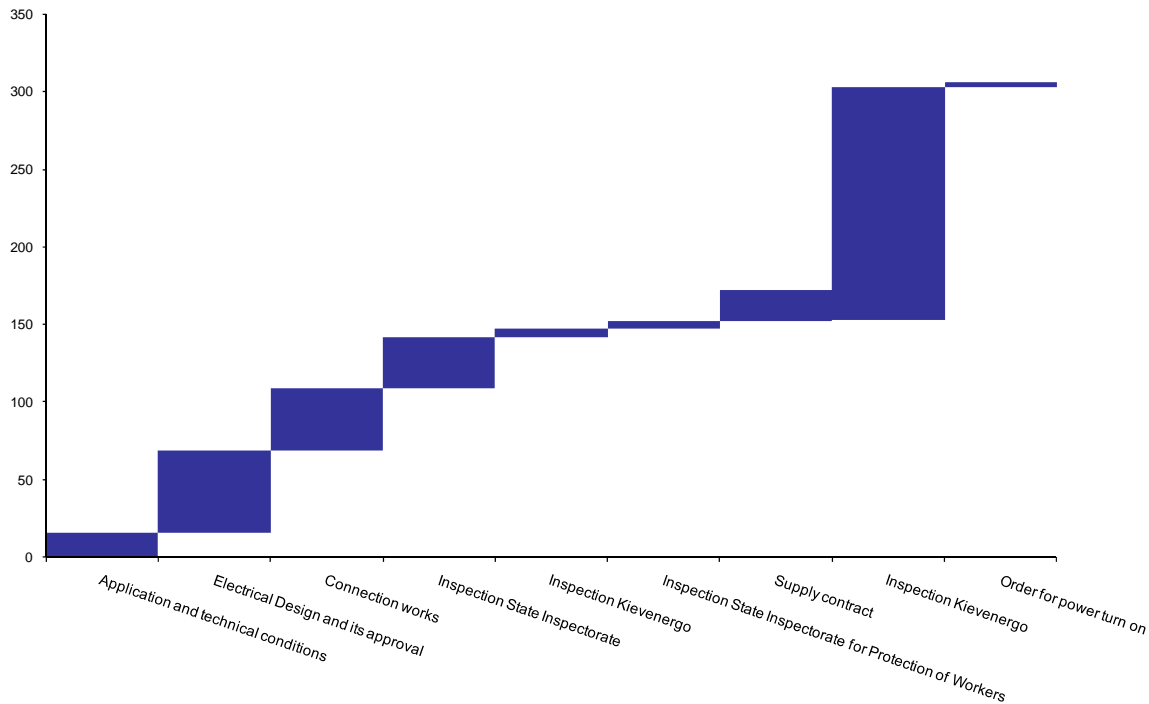
- It is a permanent connection.
- 3-phase, 4-wire Y, 140 kVA
- For the length of the connection the most likely distance is considered. The connection is overhead or underground; whatever is more common in the country, and the area in question.
- The connection involves installation of only one electricity 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. In total [567] respondents in [140] countries contributed to the data presented in this report.

Appendix II

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

Figure: Procedures and Time to obtain an electricity connection Ukraine



Procedure 1:

Submit an application for an electricity connection to Kievenoergo and await technical conditions

Time to complete:

16 calendar days

Cost to complete:

UAH 933

Name of Agency:

Kievenoergo

Comment:

The customer submits to Kievenoergo an application for an electricity connection. A number of documents have to be attached to the application: a letter with a company seal requesting the connection, bank details of the applicant, a company statute, a registration certificate from the tax authorities, a company registration certificate, a certificate stating that the company is included in the national company registry, a document stating appointment of the CEO, a property ownership certificate and a location plan of the property to be connected to electricity. After reviewing the application Kievenoergo issues technical conditions. The technical conditions concern only the external connection. In general they may include instructions for construction of a new substation; lining of high-voltage and low-voltage cables; in a case of reconstruction works - participation of the subscriber in the given actions.

The application for technical conditions is submitted to the Department of Development at Kievenoergo which is then internally passed on to the Regional Office in the particular area of Kiev where the property is located and the Regional Office determines the point of connection. Technicians in the regional offices know the electricity network and substations in the area and usually do not need to visit the site for the preparation of technical conditions.

Procedure 2:

Await completion and approval of the external connection design by a private electrical design company

Time to complete:

53 calendar days

Cost to complete:

UAH 11,474

Name of Agency:

Project design firm

Comment:

Once the technical conditions are issued the customer hires a licensed project design company to prepare the electrical project design of the external connection. As part of the project design the company prepares a topogeodesic plan. The topogeodesic plan is prepared to determine the technical aspects of running cable through the landscape. At the same time the project design firm develops a project on the protection against corrosion of 10 kV cables if installation of a substation is required. These plans are developed simultaneously with the general electrical project design of the external connection.

While the project is being developed the approval of the location of the substation connection to the network and/or the route of the cable 10 kV and 0.4 kV has to be obtained from Kievenoergo and from the Main Architectural Planning Organization. At this point the customer should have an operation permit for the warehouse or Main Plan with the Landscape Allocation Plan. The approvals are obtained by the project design firm.

If a substation is required before the project design is submitted for approval to Kievenoergo it will have to be approved at the State Energy Inspectorate. Once the project design is complete the firm submits it for approval to Kievenoergo. When receiving an approval of the project of the external connection from Kievenoergo it is required to attach the project of the internal wiring of the warehouse which at this point should be approved as part of the general architectural design of the warehouse.

Procedure 3:

Await completion of the external connection works by a private electrical contractor

Time to complete:

40 calendar days

Cost to complete:

UAH 39,750

Name of Agency:

Private electrical contractor

Comment:

Once the external connection design is ready and approved the external connection works can be carried out by a company which has licenses for external electrical connection works, for installing, testing and preparing substations 10/0.4 kV, for running 10 and 0.4 kV cable and which also has a certificate from an electrotechnical laboratory to take electrical measurements and to test high voltage equipment. A qualified electrical contractor usually has all of the above licenses. In addition, the customer or the electrical contractor should have on their team an employee who has special certificate (level 5) for dealing with high voltage equipment.

The installed 10 and 0.4 kV cable lines have to be transferred to the city as "Underground Communication" and the electrical contractor has to obtain technical certificates for the lines. First the electrical contractor has to visit the Main Architectural Planning Organization then Regional Cable Lines and then finally submit the whole package of documents to the Department of Development at Kievenoergo and receive the technical certificate.

After the external connection works are finished electrical measurements have to be taken, and the cable lines, transformer and other electrical equipment including internal wiring have to be tested by the electrical contractor. After the testing the electrical contractor prepares a package of technical documents (more than 20 different documents).

Procedure 4:

Await an external inspection carried out by the State Energy Inspectorate

Time to complete:

33 calendar days

Cost to complete:

no charge

Name of Agency:

State Energy Inspectorate

Comment:

Once the external connection works are completed the State Energy Inspectorate inspects the works. Someone from the applicant's party has to be present during the inspection. The Inspectorate checks whether the completed external connection works follow prescribed in the technical conditions specifications. The inspection by the State Inspectorate for Protection of Workers below is carried out to check the safety of the electrical installation.

Procedure 5:

Await and obtain an external inspection carried out by Kievenoergo

Time to complete:

5 calendar days

Cost to complete:

UAH 420

Name of Agency:

Kievenoergo

Comment:

Kievenoergo inspects the completed external connection works. Someone from the applicant's party has to be present during the inspection.

Procedure 6:

Await and obtain an external inspection carried out by the State Inspectorate for Protection of Workers

Time to complete:

5 calendar days

Cost to complete:

UAH 350

Name of Agency:

State Inspectorate for Protection of Workers

Comment:

The State Inspectorate for Protection of Workers inspects the completed external connection works. Someone from the applicant's party has to be present during the inspection.

Procedure 7:

Conclude a supply contract with Kievenoergo (Energobytt) and a contract for maintenance of the installed substation

Time to complete:

20 calendar days

Cost to complete:

no charge

Name of Agency:

Energobytt (Kievenoergo)

Comment:

To receive all the approvals required for energization (see next procedures) the customer has to first conclude a supply contract with Kievenoergo (Energobytt). The supply contract can be concluded only after all the inspections above are completed.

The documents for the supply contract can be sent by mail. It is required to submit a number of documents regarding internal wiring including a Technical Report of the tests of the internal wiring.

Procedure 8:

Await an external inspection carried out by Kievenoergo and issuance of various approvals from various departments of Kievenoergo required for energization

Time to complete:

150 calendar days

Cost to complete:

UAH 420

Name of Agency:

Kievenoergo

Comment:

Once the supply contract is concluded, Kievenoergo carries out another external inspection and seals the meter. Someone from the applicant's party has to be present during the inspection.

Once all the technical documents are ready and checked during the inspections, and the supply contract is concluded the electrical contractor obtains from Kievenoergo a package of documents which includes a form specifying all the electrical parameters of the substation, its plan, approvals from the Inspectorates and a form which has to be signed in 14 to 15 various departments of Kievenoergo to obtain a permission to turn the substation on and connect it to the 10 kV line.

Procedure 9:

Submit a request to Kievenoergo for a power turn on and electricity starts flowing

Time to complete:

3 calendar days

Cost to complete:

no charge

Name of Agency:

Kievenergo

Comment:

Once the form is signed the customer submits all the approvals and forms to the dispatcher department of Kievenergo. The dispatcher department processes the order which permits it to turn off the 10 kV cable line, do the testing of the high voltage cable and finally to turn on the electricity for the substation.