

Annex: pilot indicators on getting electricity

Infrastructure services such as roads, water, electricity and telecommunications matter for private businesses. Where access and quality are poor, they can slow a company's growth. Managers responding to World Bank Enterprise Surveys in 89 economies between 2006 and 2009 estimated that their spending on such items as fuel, electricity, telecommunications and water amounted to 9% of annual sales, more than for machinery. They reported losses due to electricity outages amounting to 3.2 percent of sales. And when asked about the biggest constraint to the operation and growth of their business, more managers identified weak electricity services and access to finance than any other issue.¹

To move into higher-value-added activities that rely on electricity-based technologies, small and medium-size enterprises depend on a reliable and affordable supply of electricity. But because of capacity constraints in power utilities, especially in low-income economies, this important input often cannot be guaranteed. Whether electricity is reliably available or not, the first step for a customer is always to gain access by obtaining a connection. It is this first and key step that *Doing Business* aims to measure through a new set of pilot indicators on the process a private business must go through to do so.

By applying its methodology to the question of electricity provision, *Doing*

Business aims to illustrate the implications for entrepreneurs of weak commercial services by distribution companies and to complement existing data sets. Consistent, objective data on connection services can inform utilities, regulators and governments seeking to strengthen sector performance and serve as an input for research on links to economic outcomes.

The data differ in important ways from other electricity data sets. The new indicators do not reflect the costs associated with electricity consumption or measure the percentage of households and businesses connected to electricity in each economy. Nor do the indicators measure problems of quality, such as the frequency of service interruptions, energy losses and voltage drops, which represent a significant burden on businesses. But analysis using data on the new indicators as well as from the World Economic Forum's *Global Competitiveness Report* suggests a positive correlation between the efficiency of the connection process and entrepreneurs' perceptions of the overall quality of infrastructure services (figure 12.1).

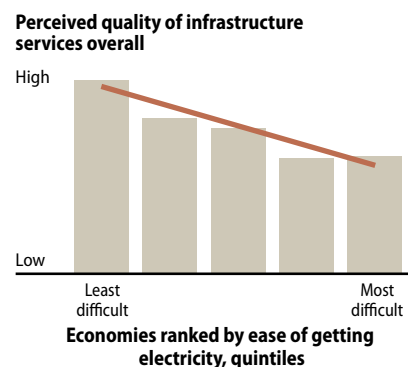
CONSTRUCTING THE INDICATORS

Doing Business tracks all procedures required for a business to obtain an electricity connection for a newly constructed building, including an extension or expansion of the existing infrastruc-

ture.² To ensure that the data are comparable across economies, respondents in the 140 economies covered were presented with a standard case study:

An entrepreneur would like to connect his newly built warehouse for cold meat storage to electricity. The internal wiring up to the metering point has already been completed by the 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-kilovolt-ampere (kVA) connection.³

FIGURE 12.1
Easier connection—better perception of overall infrastructure quality



Note: Relationships are significant at the 1% level and remain significant when controlling for income per capita.
Source: *Doing Business* database; WEF (2008).

Based on the case study, distribution utilities in the main business city of each economy were asked to describe the procedures for obtaining an electricity connection along with the time and cost of completing them. From their responses, 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. For details on methodology see data notes on page 95.

WHO MAKES IT EASY TO GET ELECTRICITY?

An entrepreneur in Ukraine seeking to get his cold-storage business connected to electricity has to go through 9 different procedures to obtain design approvals, technical certificates for the required power lines and multiple inspections of the connection works, including an inspection from the State Inspectorate for Protection of Labor. The process takes 306 days and costs \$8,419, or 262% of income per capita.

Economies such as Denmark, Germany and Japan make it much easier for businesses to connect to electricity (table 12.1). In Germany, which has the fastest process, it takes only 3 interactions with the utility and 17 days. An entrepreneur simply needs to sign a supply contract with an electricity retailer and have his licensed master electrician take care of the electricity application. The utility then completes the external connection works. The entrepreneur's warehouse is hooked up to electricity in less than 3 weeks, with a total connection cost of \$2,151 (5% of income per capita).

Procedures are few in economies where utilities:

- *Coordinate with other agencies*, such as the municipality or the building department, freeing customers from having to contact the same agencies several times. In Romania the private contractor hired to complete the connection works must get a separate construction license for the

TABLE 12.1

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

Procedures (number)			
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 Grenadines	3	Russian Federation	8
Sweden	3	Tajikistan	8
Switzerland	3	Ukraine	9
Antigua and Barbuda	4	Bosnia and Herzegovina	10

Time (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

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

Source: Doing Business database.

- 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.
- *Transfer responsibility for safety compliance* of the building's internal wiring to private electricians. This is done in Denmark, Germany, Japan and Mauritius. But in economies such as Ukraine contractors have to obtain multiple approvals from different

agencies to comply with safety standards.

- *Ensure efficient procurement planning*, freeing customers from having to obtain the materials needed. In economies like Bangladesh, Tanzania and the Central African Republic customers may be asked to provide such materials as poles, meter boxes or transformers because the utility does not have them in stock.

The number of interactions customers have with the utility and other

agencies is the biggest determinant of connection delays. In economies where businesses have to go through 6–10 procedures to get connected, the process takes 144 days on average. In economies with 3–5 procedures, it takes 104 days on average. It takes 56 days to get connected in the 10 economies with the fewest procedures, and 215 days in the 10 economies with the most.

Differences in the voltage level to which customers need to connect are the biggest driver of differences in connection costs across economies. High-income economies often have electricity distribution systems that can connect a customer requesting a 140-kVA connection simply by extending an overhead line or underground cable. The cost in these cases is a quarter to a half of the cost in cases where the customer's premises must be connected to the next higher voltage level.

But connection costs 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).

Connection costs can be divided into 2 main categories: a fixed connection fee that should reflect a cost model on how to spread the fixed costs of operating a distribution grid over all customers,⁴ and the variable costs for each connection, accounting for the labor, material and inspections required.⁵ In

many economies the bill also includes the costs of a security deposit and payments to other agencies for permits, inspections and approvals.⁶

Where the connection process is more complex, the variable costs a customer must pay account for a larger share of the total. While fixed costs represent an average 59% of the total cost in the 10 lowest-cost economies, they amount to only 8% of the total in the 10 highest-cost economies. This reduces the transparency of connection costs and utilities' accountability to customers, possibly leaving more room for corruption.

WHAT IS TO COME?

Data have been collected for 140 economies (table 12.2). More detailed data for each economy can be found on the *Doing Business* website. In the coming year the sample of economies will be expanded, with the aim of covering the same sample as the main *Doing Business* indicators. As more data become available, the data set on the *Doing Business* website will be updated. A report with a more detailed analysis of findings is under preparation, as is a background paper on the methodology. Feedback from governments and utilities is welcome and will be used as input in further refining the methodology.

TABLE 12.2
Getting electricity data

Economy	Procedures (number)	Time (days)	Cost (% of income per capita)
Afghanistan	4	424	618.2
Albania	5	162	614.5
Angola	8	41	1,102.3
Antigua and Barbuda	4	42	140.0
Argentina	6	74	25.2
Armenia	8	242	673.0
Australia	5	46	15.4
Austria	5	23	110.7
Azerbaijan	8	225	624.4
Bahamas, The	7	61	45.0
Bahrain	5	72	47.8
Bangladesh	7	109	3,171.4
Belarus	6	218	1,291.4
Belgium	4	50	44.2
Belize	5	106	341.9
Benin	5	172	15,816.9
Bhutan	5	241	1,675.4
Bolivia	7	51	1,484.4
Bosnia and Herzegovina	10	127	276.7
Botswana	5	117	465.4
Brazil	6	36	163.2
Bulgaria	6	102	295.1
Burkina Faso	4	158	15,443
Burundi	4	158	43,020.5
Cambodia	4	169	3,854.1
Cameroon	4	67	1,735.3
Canada	8	133	164.4
Cape Verde	4	46	1,112.9
Central African Republic	6	210	14,377.7
Chile	6	31	88.4
China	4	118	835.7
Colombia	5	150	1,243.6
Congo, Dem. Rep.	6	73	28,304.0
Costa Rica	5	62	329.0
Côte d'Ivoire	5	43	4,303.7
Croatia	5	70	319.8
Cyprus	4	306	13.9
Czech Republic	6	279	184.9
Denmark	3	43	106.2
Djibouti	4	180	6,473.4
Dominica	5	73	1,188.1
Ecuador	5	89	973.5
Egypt, Arab Rep.	7	50	453.5
El Salvador	7	74	467.3
Estonia	4	99	206.1
Ethiopia	4	75	6,967.3
Fiji	6	46	794.8
Finland	5	53	20.9
France	5	123	27.9
Gabon	5	160	256.9
Gambia, The	4	178	6,975.1
Georgia	4	71	666.3
Germany	3	17	5.1
Ghana	4	78	2,240.5
Greece	6	77	35.6
Grenada	4	30	244.6
Guatemala	4	39	677.4
Guinea-Bissau	8	437	4,125.8
Honduras	8	33	963.4
Hong Kong, China	4	101	1.8
Hungary	6	252	98.3
Iceland	4	22	8.7
India	7	67	504.9
Iran, Islamic Rep.	6	143	1,050.3
Ireland	4	106	21.3
Israel	6	113	12.7
Jamaica	6	48	80.1
Japan	3	105	0
Jordan	5	43	525.2
Kazakhstan	5	103	300.5
Kenya	5	162	1,405.3
Kyrgyz Republic	6	325	2,478.4
Lao PDR	5	127	3,245.2
Latvia	5	193	335.1
Lebanon	5	75	29.9
Lesotho	5	86	2,675.7
Lithuania	4	98	62.3
Luxembourg	5	120	51.5
Macedonia, FYR	5	90	924.9
Madagascar	5	419	8,466.2
Malawi	5	179	11,654.8
Malaysia	6	51	42.6
Maldives	6	101	823.1
Mauritius	3	44	262.8
Mexico	7	169	577.1
Moldova	7	126	650.7
Montenegro	4	67	409.3
Morocco	5	71	2,295
Namibia	7	40	403.9
Nepal	6	73	2,890.0
Netherlands	5	125	38.9
New Zealand	5	47	73.3
Nicaragua	6	70	1,695.3
Niger	4	165	4,295.9
Nigeria	8	260	1,146.8
Norway	4	59	14.1
Oman	5	66	70.8
Pakistan	5	233	2,334.7
Panama	5	35	10.7
Paraguay	4	53	409.8

Economy	Procedures (number)	Time (days)	Cost (% of income per capita)
Peru	5	118	521.8
Philippines	5	63	466.5
Poland	4	143	233.2
Puerto Rico	5	32	433.8
Qatar	3	90	3.8
Romania	7	207	312.8
Russian Federation	8	272	4,521.6
Saudi Arabia	3	71	78.0
Senegal	6	125	7,007.0
Serbia	4	81	513.4
Seychelles	5	132	479.5
Sierra Leone	8	441	1,279.1
Singapore	5	76	34.2
Slovenia	5	38	115.4
South Africa	5	171	443.2
Spain	4	85	169.6
Sri Lanka	4	132	1,548.5
St. Kitts and Nevis	4	18	377.3
St. Lucia	4	25	469.9
St. Vincent and the Grenadines	3	52	459.6
Suriname	5	128	745.7
Sweden	3	52	21.1
Switzerland	3	39	68.8
Syrian Arab Republic	5	71	994.2
Tajikistan	8	211	1,456.8
Tanzania	4	382	251.4
Tonga	5	50	128.8
Trinidad and Tobago	5	56	53.6
Tunisia	4	58	1,136.1
Turkey	4	62	812.6
Uganda	5	151	5,209.9
Ukraine	9	306	262.0
United Arab Emirates	4	55	15.9
United Kingdom	5	111	42.2
United States	5	48	16.8
Uzbekistan	7	123	2,532.8
Vietnam	4	127	1,685.1
West Bank and Gaza	6	70	1,567.1
Yemen, Rep.	4	35	6,926.1
Zambia	4	103	1,042.7

1. According to World Bank Enterprise Surveys for 89 economies, 15.6% of managers consider electricity the most serious constraint, and a similar share (15.7%) consider access to finance the most serious constraint (<http://www.enterprisesurveys.org>).
2. An *extension* involves extending the network by laying low-voltage underground cables or installing low-voltage overhead wires from the metering point to the closest substation. An *expansion* involves installing a pole- or pad-mounted distribution transformer and connecting it between the customer's metering point and the utility's medium-voltage network.
3. The load of 140 kVA was chosen to reflect the energy needs of a relatively electricity-intensive small or medium-size enterprise. By comparison, a residential customer would need 20–40 kVA. A 140-kVA load is also significant enough to assume that the entrepreneur cannot opt to steal electricity instead.
4. Where connection fees are fixed, they are usually calculated as a function of the peak electricity demand of the facility to be connected. These fixed fees can often be found on the website of the utility or the regulator.
5. Detailed information on different cost components for each economy can be found on the *Doing Business* website (<http://www.doingbusiness.org>).
6. Security deposits represent a significant financial burden. In Ethiopia a medium-size company requesting an electricity connection will lose an amount equivalent to 148% of income per capita because of the security deposit, required as a guarantee that it will pay future electricity bills. Because the utility holds the deposit until the end of the contract and repays it without interest, the company cannot put that money to a more productive use. Security deposits are charged by utilities in both the top 10 economies on the cost of a new electricity connection and the bottom 10. But in the better-performing economies they are significantly lower and utilities offer arrangements reducing the financial burden. In Australia, Hong Kong (China) and Panama customers can opt in part for a guarantee from a bank, at a lower cost than the interest that would be lost on the deposit.