Training for Reform

Getting Electricity
I. Why does it matter?
II. What does it measure – and what does it not?
III. What are the main findings in Doing Business 2019?
IV. Good practices in Getting Electricity
V. Historical trends
Access to electricity (or lack thereof) is a major obstacle to businesses

1. The World Economic Forum (WEF) sees infrastructure as one of the 4 pillars of competitiveness – i.e. the set of institutions and factors that determine a country’s productivity.

2. According to the World Bank Enterprise Survey (2018), the lack of access to electricity and unreliable quality of supply is the 5th biggest obstacle faced by firms globally.

Biggest obstacles faced by firms (%)

- Access to finance: 15.5%
- Tax rates: 12.4%
- Informal sector: 12.2%
- Political instability: 11.4%
- Electricity: 9.4%
- Corruption: 7.6%
- Poorly educated workers: 6.6%
- Crime and disorder: 3.9%
- Trade regulations: 3.9%
- Tax administration: 3.8%
- Access to land: 3.5%
- Transportation: 3.2%
- Labor regulations: 3.0%
- Business licensing: 2.6%
- Courts: 1.0%

Obstacles to electricity usage vary from the perspective of firms - yet they all undermine development

1. **Obtaining a new connection**: greater time and cost to get an electricity connection are associated with lower electrification rates (Geginat and Ramalho, 2015).

2. **Access to a reliable electricity supply**: eliminating power outages in Eastern Europe and Central Asia would increase GDP by 0.5% (Limi 2008). Moreover, resorting to self-supply through generators is significantly more expensive for firms (Foster and Steinbucks, 2009).

3. **Affordability of electricity tariffs**: electricity tariffs may hinder a firm where prices are high relative to income levels (Abeberese, 2016). In Liberia, the commercial tariff per kilowatt-hour (55 cents) is 4x higher than in Côte d’Ivoire.

4. **Safety**: Faulty wiring can cause direct harm and injury due to fires or explosions (AlKhuzam, Arlet, Ereshchenko and Lopez Rocha, 2018).

The Getting Electricity indicator benchmarks the obstacles for firms across 190 economies
Access to a **reliable electricity supply** is a major constraint for firms

**New measures were added in 2015 to measure the reliability of electricity supply:**

- **One billion people do not have access to electricity** according to the International Energy Agency (IEA). According to the World Bank, the same number do have access but receive electricity services that are highly unreliable.

- These challenges **affect welfare** by undermining such areas as education (Khandker et al., 2016) and healthcare (Adair-Rohani, 2016).
  - In India, **nearly half of all health facilities – serving 580 million people – lack electricity.** Even where health centers have access to power, frequent power shortages significantly hamper the ability to provide quality care.

- While the lack of reliable electricity services can hamper several sectors of the economy, one of the areas that is arguably the most affected is **firm performance** (see Arlet 2017, Geginat and Ramalho 2015).
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What does Getting Electricity measure?

1. Efficiency of connection process

2. Reliability of supply and transparency of tariffs index

3. Electricity tariffs (excluded from rankings)

4. Safety of connection (excluded from rankings; in pilot)

Included in 2015
How are economies **scored** in the Getting Electricity indicator?

**Efficiency of connection process + reliability of supply and transparency of tariff:**

1. Procedures (number)
2. Time (calendar days)
3. Cost (% of income per capita)
4. Reliability of supply and transparency of tariff index (0-8 points)

**Price of electricity (U.S. cents per kWh)**
The price of electricity is **not included** in the index

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*Rankings are based on scores for four indicators*

- Days to obtain an electricity connection: 25%
- Cost to obtain a connection, as % of income per capita: 25%
- Procedures: 25%
- Reliability of supply and transparency of tariffs: 25%

Steps to file a connection application, prepare a design, complete works, obtain approvals, go through inspections, install a meter and sign a supply contract

Power outages and regulatory mechanisms in place to monitor and reduce them; transparency of tariffs
What are the **case study assumptions**?

**The Warehouse:**

- Is owned by a **local** entrepreneur.
- Is located in an area where similar warehouses are typically located, in each economy’s **main business city**.
- Is located in an area with **no physical constraints**.
- Is a **new construction** and is being connected to electricity for the first time.
- Is used for storage of goods.

**The Electricity connection:**

- Is a new 3-phase, 4-wire Y, 140-kilovolt-ampere (kVA) connection.
- Is **150 meters** long. Either low or medium voltage and either overhead or underground.
- Requires works **crossing of a 10-meter road** (such as by excavation or overhead lines), carried out on public land.
- Does not involve work to install the internal electrical wiring (already been completed).

Warehouse will have a monthly electricity **consumption** of 26,880 kWh.
How is the electricity connection process measured?

**Procedures**
- A **procedure is any interaction** involving a company and external parties (utility, electrical contractors, government agencies) to get a new connection.
- Each interaction is counted **separately** (e.g. each inspection, visit, application); online procedures are also counted.
- E.g.: apply for a connection, receive site inspection, obtain a certificate of the internal wiring, carry out connection works, obtain a permit for works crossing a road, obtain the meter installation, etc.

**Time**
- **Time** is recorded in **calendar days**. Procedures may take place **simultaneously**.
- The minimum time for each procedure is **1 day** (and **½ day** for online procedures).
- It captures the **median duration** to complete each procedure with minimum follow-up and no extra payments, as informed by utilities, electrical engineers and other experts.

**Cost**
- **Cost** is calculated based on **all fees and charges** paid by the company to connect a warehouse to the grid (excluding VAT), as informed by utilities and experts – only official costs are included.
- E.g.: costs of the application, external connection works, material, inspections, security deposit.
How is the **reliability of supply and transparency of tariff index** scored?

**Reliability of electricity supply**
(0-3 points)
*Measured by SAIDI and SAIFI*

**Mechanisms for reporting outages and restoring service**
(0-2 points)
*Does the utility use automated tools?*

**Financial deterrents aimed at limiting outages**
(0-1 point)
*Are there any mechanisms in place?*

**Regulatory monitoring**
(0-1 point)
*Does a regulator monitor power outages?*

**Communication of tariffs and tariff changes**
(0-1 point)
*How are tariffs made available to customers?*
Both private and public sector experts are surveyed on ‘Getting Electricity’:

- Distribution Utilities
- Energy Regulatory Bodies
- Experienced electrical contracting firms
- Electrical Engineers
- Experienced building firms

List of contributors is available online (e.g. China for Doing Business 2019)

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<th>Topics</th>
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Source: http://www.doingbusiness.org/en/contributors/doing-business/china
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The top performers on Getting Electricity come from different regions

<table>
<thead>
<tr>
<th>Top performers</th>
<th>Score</th>
<th>Procedures (number)</th>
<th>Time (days)</th>
<th>Cost (% GNI per cap.)</th>
<th>Reliability index (0-8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Arab Emirates</td>
<td>100.0</td>
<td>2</td>
<td>10</td>
<td>0.0</td>
<td>8</td>
</tr>
<tr>
<td>Korea, Rep.</td>
<td>99.89</td>
<td>3</td>
<td>13</td>
<td>35.2</td>
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<tr>
<td>Hong Kong SAR, China</td>
<td>99.34</td>
<td>3</td>
<td>22</td>
<td>1.3</td>
<td>8</td>
</tr>
<tr>
<td>Malaysia</td>
<td>99.27</td>
<td>3</td>
<td>27</td>
<td>26.0</td>
<td>8</td>
</tr>
<tr>
<td>Germany</td>
<td>98.79</td>
<td>3</td>
<td>28</td>
<td>38.5</td>
<td>8</td>
</tr>
<tr>
<td>Thailand</td>
<td>98.57</td>
<td>3</td>
<td>52</td>
<td>40.4</td>
<td>8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>96.45</td>
<td>3</td>
<td>50</td>
<td>23.9</td>
<td>8</td>
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<tr>
<td>Taiwan, China</td>
<td>96.32</td>
<td>3</td>
<td>31</td>
<td>38.6</td>
<td>7</td>
</tr>
<tr>
<td>Sweden</td>
<td>96.21</td>
<td>3</td>
<td>79</td>
<td>30.2</td>
<td>8</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>95.36</td>
<td>3</td>
<td>83</td>
<td>24.1</td>
<td>8</td>
</tr>
<tr>
<td>Switzerland</td>
<td>94.41</td>
<td>3</td>
<td>39</td>
<td>58.1</td>
<td>7</td>
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<tr>
<td>Russian Federation</td>
<td>94.00</td>
<td>2</td>
<td>73</td>
<td>5.7</td>
<td>8</td>
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<tr>
<td>Iceland</td>
<td>92.24</td>
<td>4</td>
<td>22</td>
<td>9.3</td>
<td>7</td>
</tr>
<tr>
<td>China</td>
<td>92.01</td>
<td>3</td>
<td>34</td>
<td>0.0</td>
<td>6</td>
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<tr>
<td>France</td>
<td>92.01</td>
<td>4</td>
<td>53</td>
<td>5.8</td>
<td>8</td>
</tr>
</tbody>
</table>

Lower income economies tend to have more power outages

Average number of power outages per customer in 2017 in the main business city of the economy

Source: Doing Business database
Electricity tariffs are the lowest in MENA and ECA economies

Average electricity tariffs (USD per kWh) in January 2018 in the main business city

Source: Doing Business database
A record 26 economies implemented reforms in 2017/18: Sub-Saharan Africa and East Asia and the Pacific are the regions with the most reformers.

Number of economies with a reform in the area of Getting Electricity

- **Sub-Saharan Africa**: 8
- **East Asia & Pacific**: 7
- **Europe & Central Asia**: 3
- **Middle East & North Africa**: 3
- **Latin America & Caribbean**: 2
- **OECD high income**: 2
- **South Asia**: 1

Reformers are overwhelmingly developing economies

<table>
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<tr>
<th>Feature</th>
<th>Economies</th>
<th>Some highlights</th>
</tr>
</thead>
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<tr>
<td>13 economies facilitated more reliable power supply and transparency of tariff information</td>
<td>Angola; Azerbaijan; Brazil (São Paulo); Gabon; Mozambique; Myanmar; Paraguay; Papua New Guinea; Rwanda; Saudi Arabia; South Africa; Togo; Thailand</td>
<td><strong>Paraguay</strong> rolled out a Supervisory Control and Data Acquisition (SCADA) system to monitor power outages. <strong>Papua New Guinea</strong> improved the reliability of supply by expanding electricity generation capacities.</td>
</tr>
<tr>
<td>10 economies improved process efficiency</td>
<td>Algeria; Armenia; Hong Kong SAR, China; India (Delhi); Mozambique; Niger; Nigeria; Russian Federation; United Kingdom</td>
<td><strong>Niger</strong> made the process for getting an electricity connection faster by increasing the stock of material the utility carries and by allowing the internal wiring certificate of conformity to be obtained at the same time as the external connection works. <strong>Azerbaijan</strong> made getting electricity faster by establishing a single window. <strong>Thailand</strong> streamlined procedures by setting up a dedicated task force at the utility that coordinates the external works, meter installation and electricity turn-on without the need for customer interaction.</td>
</tr>
<tr>
<td>8 economies streamlined approval process</td>
<td>Azerbaijan; Brunei Darussalam; China; France; Malaysia; Nigeria; Russian Federation; Thailand</td>
<td><strong>Azerbaijan</strong> made getting electricity faster by establishing a single window. <strong>Thailand</strong> streamlined procedures by setting up a dedicated task force at the utility that coordinates the external works, meter installation and electricity turn-on without the need for customer interaction.</td>
</tr>
<tr>
<td>4 reduced connection costs</td>
<td>China; India (Delhi); Russian Federation; United Arab Emirates</td>
<td>The <strong>United Arab Emirates</strong> made getting electricity easier by eliminating all costs for commercial and industrial connections of up to 150 kVA.</td>
</tr>
</tbody>
</table>

In China, the Shanghai Municipal Electric Power Company and State Grid Beijing Electric Power Company undertook several initiatives to significantly reduce the time and number of procedures to obtain a new electricity connection.

- **Beijing** reduced the procedures to get a connection from 6 to 3 and decreased time from 141 to 34 days (by removing requirements for site inspection, design review, purchasing materials, preparing a final report of works, and final inspection).

- All **connections costs** for commercial buildings with a subscribed capacity up to 160 kVA were waived.

### Improvements in the connection process in China (Shanghai and Beijing)

<table>
<thead>
<tr>
<th>Step</th>
<th>2017/18 Time</th>
<th>2017/18 Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit application to utility and await approval</td>
<td>4</td>
<td>0.0</td>
</tr>
<tr>
<td>Await external connection works and meter installation</td>
<td>28</td>
<td>0.0</td>
</tr>
<tr>
<td>Sign supply contract and receive electricity turn-on</td>
<td>2</td>
<td>0.0</td>
</tr>
</tbody>
</table>

*Source: Doing Business database*
Example of *Doing Business 2019* reformers: Rwanda reduced the time and costs to get connected to the grid and improved the reliability.

- **Rwanda** made getting electricity more time and cost efficient by having the utility supply all connection material.

- The electricity utility in Rwanda, ERG, began computing the average duration and frequency of outages per customer in Kigali.

<table>
<thead>
<tr>
<th>Improvements in the connection process in Rwanda</th>
<th>2016/17 Time</th>
<th>2017/18 Time</th>
<th>2016/17 Cost</th>
<th>2017/18 Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit application and await estimate of connection fees</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Obtain external inspection</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Purchase material for external connection</td>
<td>11</td>
<td>7</td>
<td>RWF 19,058</td>
<td>RFW 15,000</td>
</tr>
<tr>
<td>Obtain external works, meter installation and final connection by utility</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: *Doing Business database*
Example of *Doing Business 2019* reformers: Papua New Guinea improved electricity reliability

Papua New Guinea significantly reduced power outages due to a **public-private agreement** between ExxonMobil and the utility (PNG Power) to supply Liquefied Natural Gas (LNG) at half the current diesel rate (government's plan to improve the capacity and reliability of the country’s power supply) → It resulted in a **decrease in frequency and duration of power outages**.

Both SAIDI and SAIFI declined considerably in 2017 in Port Moresby

Source: Doing Business database
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Global good practices

✓ Streamlining the approval process

✓ Notification to customers in advance of planned outages

✓ Regulating the electrical profession

✓ Transparency of connection costs and processes

✓ Transparency of electricity tariffs

✓ Conversion to smart grids
A. Efficiency of connection process (I)

1. **Streamlining of approval process**: globally, the United Arab Emirates sets the best practice on the number of procedures. It achieved this feat by simplifying the external connection works and meter installation, requiring clients to **submit an initial application encompassing all the required documentation** so that, once lodged, the utility (DEWA) can perform all procedures seamlessly. Furthermore, the internal wiring check is scheduled at the initial application stage, allowing DEWA to perform the check while it also installs the meter.

2. **Have utility obtain the excavation permit or right of way on behalf of client**: The best practice consists of not having the customer apply for the excavation permit or right of way in the first place; instead the **utility should be responsible for obtaining all the required clearances**.

3. **Lessening the burden of the connection fee**: In Georgia, the National Energy and Water Supply Regulatory Commission approved a **fixed fee** for new commercial electricity connections with a subscribed capacity of 140 kW, covering all the external works and materials required, regardless the complexity of the connection.
A. Efficiency of connection process (II)

4. **Application of a Geographical Information System (GIS):** In Algeria, SONELGAZ (utility) introduced a geographic information system (GIS), eliminating the need of a site visit to provide price quotes for external connection works and determine the connection specifications.

5. **Lessening the burden of security deposits:** Best practices consist on returning the deposit after 1 or 2 years and not at the end of the connection contract, or returning the deposit plus interest accrued. In 19 economies, utilities also allow customers to settle the security deposit with a bank guarantee or bond rather than deposit the entire amount with the utility.

6. **Increasing the transparency of connection costs and processes:** Connection costs should be as transparent as possible, to allow customers to contest them when they feel they are overpaying. In Guatemala and Malaysia there are fixed connection fees, regardless of the complexity of the works. Utilities should post all the necessary information about procedures and paperwork for new connections on their website, in their office or other public offices. Also, they should post their performance standards, such as for turnaround time. In France, for instance, the distribution utility (ENEDIS) published a document outlining different connection schemes and the formulas used to calculate connection costs.
Good practices in Getting Electricity

B. Quality of supply and transparency of tariffs

1. **Measuring System Average Interruption Duration and Frequency indexes (SAIDI & SAIFI):** In Togo, Compagnie Energie Electrique du Togo (utility), began computing the average duration and frequency of outages per customer in Lomé. By implementing the Supervisory Control and Data Acquisition software the utility now calculates SAIDI and SAIFI as the number of customers per feeder is known.

2. **Implementing automated systems for outage monitoring and restoration of service:** In Paraguay, Administración Nacional de Electricidad (utility) started to use Supervisory Control and Data Acquisition (SCADA) automatic energy management system for monitoring of outages and restoration of service.

3. **Increasing transparency and accessibility of existent and new tariffs:** In Algeria, electricity tariffs and tariff changes are now communicated through the website of the Société de Distribution de l’Electricité et du Gaz d’Alger (utility) and are also published online by the Commission de Régulation de l’Electricité et du Gaz d’Algérie (regulator).

4. **Setting financial deterrents to limit outages:** In Brunei Darussalam, the DES (regulator) introduced a new compensation mechanism in 2017 for commercial clients in case non-planned outages with a duration of three hours or more take place.
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The time to get an electricity connection is steadily declining across regions

SA is the region that has reduced the time the most

LAC is the fastest region to get an electricity connection

Source: Doing Business database
The cost to get an electricity connection is steadily declining across regions but remains high in Sub-Saharan Africa.

**Average of Cost (% of income per capita)**

SSA is the most expensive region to get connected to the grid.

Source: Doing Business database
Electricity supply continued to be more reliable across economies

Average of Reliability of supply and transparency of tariff index (0–8)

- **OECD high income**: Reliability showed a significant increase.
- **Europe & Central Asia**: Reliability has increased the most, surpassing other regions.
- **Middle East & North Africa**: Reliability has improved, but not as much as Europe & Central Asia.
- **Latin America & Caribbean**: Reliability is moderate, with some improvement.
- **East Asia & Pacific**: Reliability has increased, but not as significantly as Europe & Central Asia.
- **South Asia**: Reliability is lower compared to other regions, with some improvement.
- **Sub-Saharan Africa**: Reliability is the lowest, with limited improvement.

**EAP** is the region that has increased the most the reliability of supply.

*Source: Doing Business database*
Electricity tariffs continued to decrease in the last year in most regions.

Average electricity tariffs (USD per kWh)

ECA is the region where electricity tariffs are the lowest.

Source: Doing Business database
Understanding the **benefits of wiring regulation**

✓ Three-quarters of economies have an **electrical code or regulation** setting forth standards for electrical installations.

✓ **Qualification requirements** for electricians help individuals overcome the asymmetry of information.

**Many African economies do not have regulatory requirements on electricians’ qualifications**

**How to protect Public Safety?**

- **Electrical code or regulation**
  - United States of America
  - United Kingdom

- **Certifying and licensing the profession**
  - Dubai
  - Philippines

- **Inspection or liability regime**
  - France
  - Germany

✓ **Inspections** are required in about 70% of economies.

✓ A way to ensure the safety of internal installations is to implement **clear liability regimes** placing an **added responsibility on electricians** by holding them legally responsible when incidents occur.

Source: Doing Business database.
THANK YOU!

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