A World Bank Group Flagship Report

Doing Business 2018

Getting Electricity

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Getting Electricity Team

June 1, 2018

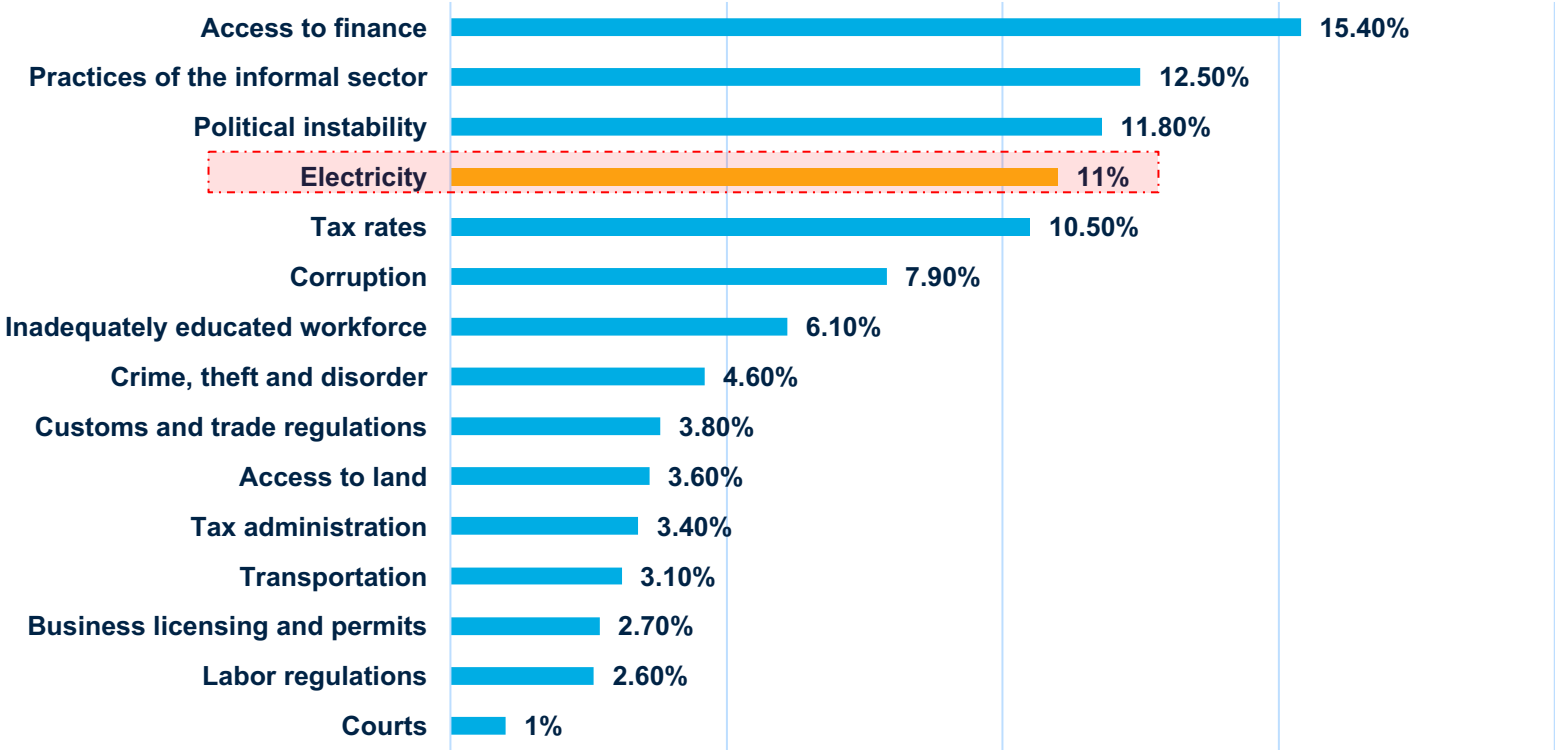
I. **Why does it matter?**
II. What does it measure – and what does it not?
III. New research questions
IV. What are the main findings
V. Best practices and reforms

- **One billion people do not have access to electricity** according to the International Energy Agency. The WB estimates that the same number do have access but receive unreliable electricity services
- One of the areas that is arguably the most affected is **firm performance** (see Arlet 2017, Ramalho 2015).
- Barnebeck et al (2012) estimate that the annual economic growth drag of a **weak power infrastructure is about 2 % points in GDP in Sub-Saharan** Africa over 1995–2007

Access to electricity (or lack thereof) is a major obstacle to businesses

1. The **World Economic Forum (WEF)** sees infrastructure, including electricity 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 Entreprise Surveys (2017)**, the lack of access to electricity and unreliable quality of supply is the fourth biggest obstacle faced by firms in developing economies



Source: World Bank Enterprise Survey 2017

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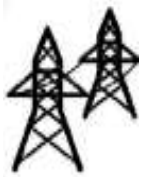
Obstacles to electricity usage vary from the perspective of firms - yet they all undermine development



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 electricity 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 Cote d'Ivoire.

The Getting Electricity indicator benchmarks these obstacles for firms across 190 economies

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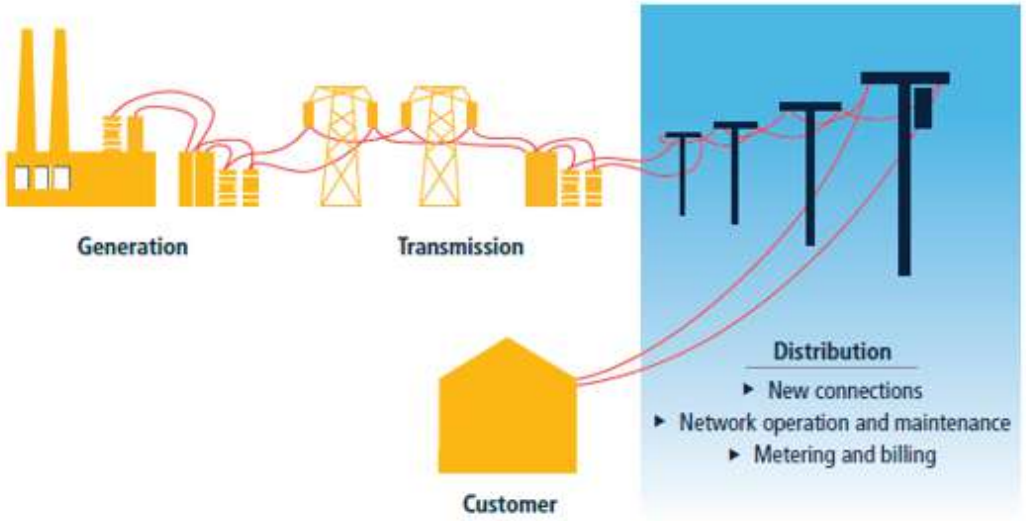
What does Getting Electricity measure?

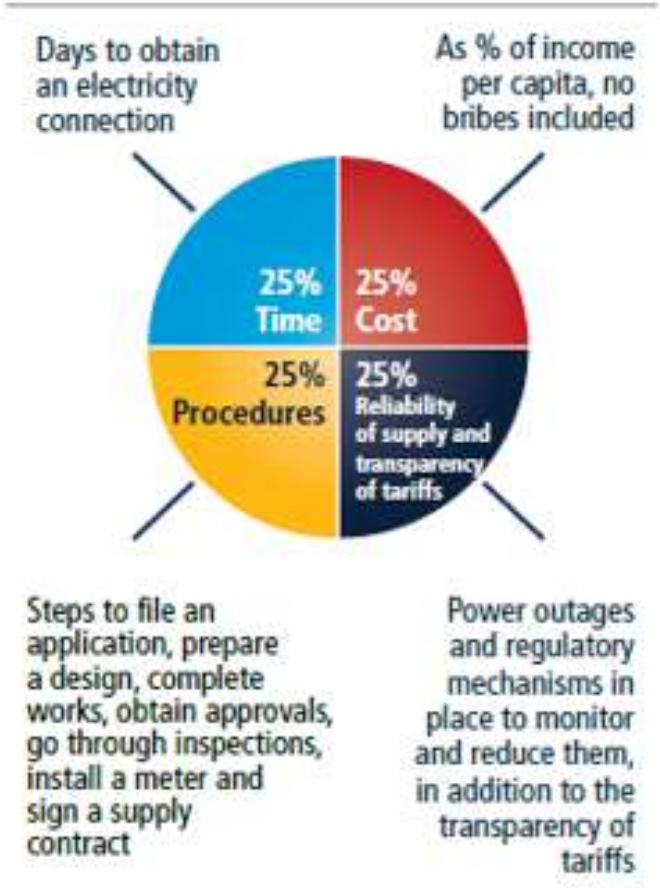
1. Efficiency of connection process



2. Reliability of supply and transparency of tariffs index

3. Electricity tariffs (excluded from rankings)

Rankings are based on distance to frontier scores for four indicators



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Input is received from +1’000 respondents around the world

Both **private** and **public** sector experts are surveyed

Service side

- Distribution Utilities
- Regulatory Bodies

Customer side

- Experienced electrical contracting firms
- Electrical Engineers
- Experienced building firms

Contributors in Malaysia

Listed below are those participants who agreed to be acknowledged.

Select an economy

Topics	Contributors
Starting a Business	15
Dealing with Construction Permits	14
Getting Electricity	14
Registering Property	13
Getting Credit	33
Protecting Minority Investors	15
Paying Taxes	4
Trading across Borders	12
Enforcing Contracts	17
Resolving Insolvency	22
Labor Market Regulation	11

Source: http://www.doingbusiness.org/contributors

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.
- 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.

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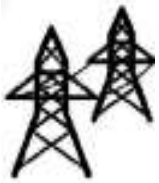
To measure the ease of connection we capture the procedures, time and costs to get a new electricity connection



1. Procedures to obtain an electricity connection (number)

- Submitting all relevant documents and obtaining all clearances and permits
- Completing all required notifications and receiving all necessary inspections
- Obtaining external installation works and possibly purchasing materials
- Concluding any necessary supply contract and obtaining final supply

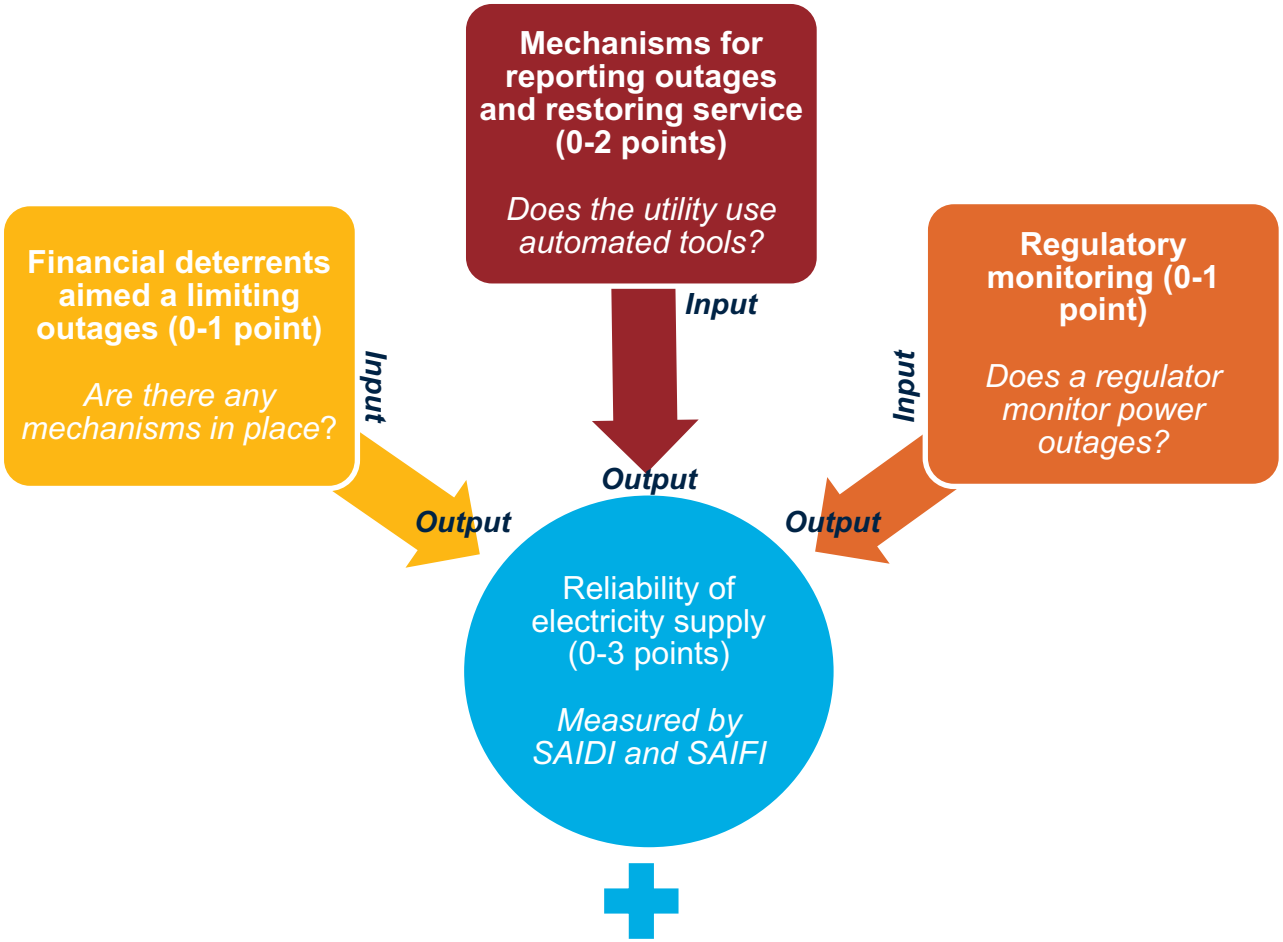
2. Time required for completing each procedure (calendar days)

- Is at least 1 calendar day
- Each procedure starts on a separate day
- Does not include time spent gathering information
- Reflects the time spent in practice, with little follow-up and no prior contact with officials

3. Cost required to complete each procedure (% of income per capita)

- Official costs only, no bribes
- Value added tax excluded

How is the reliability of supply and transparency of tariff index scored?



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SAIDI and SAIFI indices are used to measure outages

- The System Average Interruption Frequency Index (SAIFI) is the average number of interruptions that a customer experienced over a year. The System Average Interruption Duration Index (SAIDI) is the total outage duration for each customer served through over a year,
- SAIDI and SAIFI are the most common and accepted measure of outages according to the Berkeley National Laboratory and the U.S. Department of Energy

Power outage estimates are cross-checked

Data collected from utility and/or regulator

1.1.3 If Yes, please fill in the table below for Kuala Lumpur. Data should include load shedding and planned outages (e.g. maintenance).

	2016		2017		
	SAIDI *hours of power outages*	SAIFI *frequency of power outages*	SAIDI *hours of power outages*	SAIFI *frequency of power outages*	Comments Explain significant changes from 2016
Average per customer	0.54 *hours per year*	0.57 *n° outages*	*hours per year*	*n° outages*	

► Are both planned outages and load shedding included in the SAIDI and SAIFI estimates? -Click to Select-

► If major events are excluded in the estimates above, please specify how they are determined:

► Please update the minimum outage time (in minutes) used for the calculation of SAIDI and SAIFI (considered to be 1 last year):

Outage data is cross checked with private sector

1.1.1 How many power outages did you personally experience in 2017?

Unscheduled power outages	-Click to Select-
Scheduled power outages (e.g. maintenance, load shedding, etc.)	-Click to Select-

How is the index scored

Reliability of supply and transparency of tariffs index (0-8 points): What does it measure?

- **Total duration and frequency of outages per customer a year (0-3):** Scoring based on SAIDI/SAIFI indices. **If SAIDI/SAIFI is not measured, or is over 100, the economy is ineligibles to score on the index**
- **Mechanisms for reporting outages (0-1):** How does the distribution utility record and measure power outages?
- **Mechanisms for restoring service (0-1):** How does the distribution utility manage restoration of service?
- **Regulatory monitoring (0-1):** Does a regulator, that is a separate entity from the utility, monitor power outages?
- **Financial deterrents to aimed at limiting outages (0-1):** What mechanisms are in place for compensation for outages?
- **Communication of tariffs and tariff changes (0-1):** How are tariffs made available to customers?

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Electricity tariffs are based on a standardized bill

Electricity tariffs are based on a standardized bill, which is divided by consumption and converted into USD → this gives price per kWh

For the following questions, please assume that:

1) The case study warehouse in **Kuala Lumpur** is **locally owned** by an entrepreneur and is used for commercial purposes with the following conditions:
   - Operates **30 days a month** from 9:00am to 5:00pm (**8 hours/day**), with equipment utilized at **80% of capacity** on average without electricity cuts (assumed for simplicity reasons). Although March has 31 days, for calculation purposes, only 30 days has been taken.
   - Has a subscribed **capacity of 140 kVA**, a power factor of 1 (**1 kVA = 1 kW**).
   - Monthly energy consumption of **26,880 kWh/month**, and hourly consumption of 112 kWh.

2) If multiple electricity suppliers exist, assume that the **cheapest** supplier per customers served is used.

Please fill in the table below. Alternatively, please send the relevant tariff schedule or your monthly bill for **March 2016** to DBelectricity@worldbank.org - or provide a link to the utility's page with tariffs .

	March 2016 local currency	**Comments** Explain any change from March 2015
Energy/usage charge for 26,880 kWh		
Capacity/demand charge for 26,880 kWh		
Administrative/processing costs		
Taxes (excluding VAT)		
Other (please describe)		
TOTAL		

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Incendie au grand marché de Bamako : Une grande partie du Marché rose partie en fumée

Par **L'Indicateur du Renouveau** - 12 Déc 2017

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Dans la nuit du 10 au 11 décembre, le Grand march
par un incendie. Une grande partie du Marché rose
avec au moins une centaine de boutiques et kiosqu

Mali : Incendie au grand marché de Bamako : Les commerçants indexent les poteaux électriques

19 décembre 2017 | Société

AIRFRANCE

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Après l'incendie survenu, le lundi 11 décembre 2017, au Grand marché de Bamako qui a coûté aux commerçants une perte en vie humaine et des dégâts matériels estimés à des milliards de F CFA, l'heure est à la

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NCENDIE AU GRAND MARCHE DE BAMAKO : LES COMMERÇANTS INDEXENT LES 'OTEAUX ÉLECTRIQUES

près l'incendie survenu, le lundi 11 décembre 2017, au Grand marché de Bamako qui a coûté aux commerçants une perte en vie umaine et des dégâts matériels estimés à des milliards de F CFA, l'heure est à la recherche des auteurs. En attendant la déclaration fficielle des enquêteurs en pleine manœuvre pour déterminer les causes et les responsables de l'incendie, des doigts accusateurs ont pointés sur la société de gestion d'électricité, l'Energie du Mali (EDM Sa).

This year we are collecting data on the “quality” of the internal and external wiring

Key areas: what is required by law regarding qualifications, inspections, design review, etc

1. Internal wiring of warehouse

3.4.3 Who typically conducts the installation of the internal wiring in the warehouse?
- ☐ Private company (in-house)
- ☐ Private company (external party)
- ☐ Utility (or third party hired by utility)
- ☐ Other - please specify:

3.4.4 What are the legal requirements for the party carrying-out the internal wiring installation?
- ☐ Degree in engineering
- ☐ Minimum years of professional experience - please specify how many years:
- ☐ Professional license or certification - please specify what authority issues this certification:
- ☐ Other - please specify:

Legal Basis (if applicable)
Comments:

3.4.5 Is there a legal obligation to conduct an internal wiring inspection as part of the connection process?
-Click to Select- Legal Basis (if applicable)

3.4.6 If applicable, who conducts the mandatory internal wiring inspection?
- ☐ Utility
- ☐ Licensed private company separate from the one doing the internal wiring installation
- ☐ State energy agency - please specify the name of the agency:
- ☐ Other - please specify:

3.4.7 According to the law and prior to the installation works, are the internal wiring plans (e.g. wiring diagrams) checked by the utility (or a third-party agency on its behalf)?
- ☐ Yes – Utility checks
- ☐ Yes – Third party checks. Name of agency:
- ☐ No

Legal Basis (if applicable)
Comments:

3.4.8 If applicable, what are the legal requirements for the party reviewing the internal wiring plans?
- ☐ Degree in engineering
- ☐ Minimum years of professional experience - please specify how many years:
- ☐ Professional license or certification - please specify what authority issues this certification:
- ☐ Other - please specify:

Legal Basis (if applicable)
Comments:

2. External wiring from grid to warehouse

3.4.9 Who conducts the installation of the external wiring connection to the warehouse?
- ☐ Private company
- ☐ Utility (or third party hired by utility)
- ☐ Other - please specify:

3.4.10 What are the requirements imposed by the law on the party carrying-out the external connection works?
- ☐ Degree in engineering
- ☐ Minimum years of professional experience - please specify how many years:
- ☐ Professional license or certification - please specify what authority issues this certification:
- ☐ Other - please specify:

Legal Basis (if applicable)
Comments:

3.4.11 Once the external works are completed, is a final inspection required by law or any regulation?
-Click to Select-
Legal Basis (if applicable)

3.4.12 If applicable, who conducts the external wiring connection inspection?
- ☐ Utility
- ☐ Licensed private company
- ☐ State energy agency - please specify the name of the agency:
- ☐ Other - please specify:

Comments:

D. Knowledge and training

3.4.13 Does the utility provide training to engineers, technicians and/or inspectors involved in the connection process when there is a change in regulation or practice (e.g. technology)? -Click to Select-
Comments:
► If yes, does the utility receive public funds for the above-mentioned trainings? -Click to Select-

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The top performers on Getting Electricity come from different regions

Top ten performers			DTF	Procedures	Time	Cost (%)	Reliability Index
1		United Arab Emirates	99.92	2	10	25.2	8
2		Korea, Rep.	99.89	3	13	37.0	8
3		Taiwan, China	99.45	3	22	38.9	8
4		Hong Kong SAR, China	99.02	3	27	1.4	8
5		Germany	98.79	3	28	40.2	8
6		Sweden	96.21	3	52	31.2	8
7		Switzerland	94.41	3	39	59.2	7
8		Malaysia	94.33	4	31	28.0	8
9		United Kingdom	93.29	3	79	24.9	8
10		Russian Federation	92.81	3	83	41.5	8

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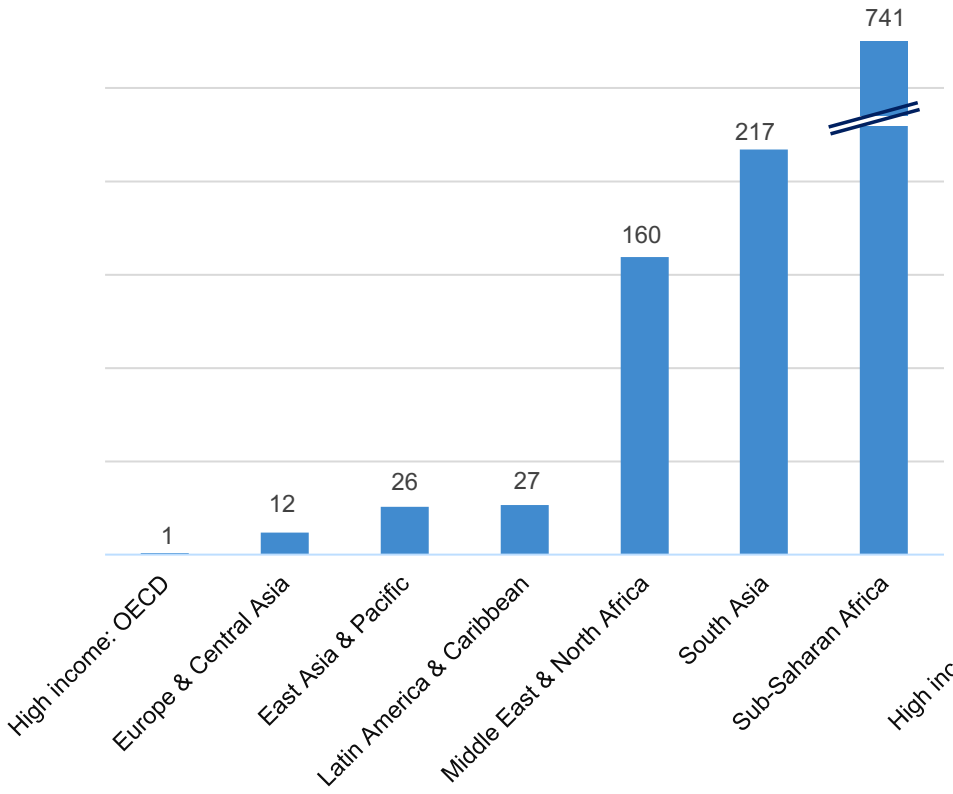
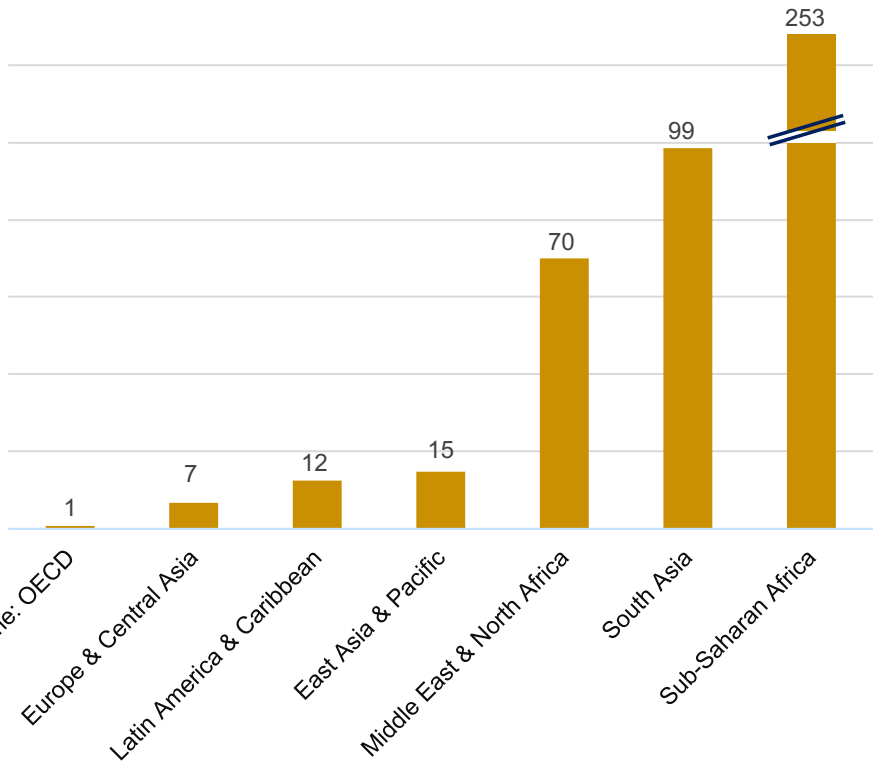
Power outages are the highest in Sub-Saharan African and South Asia

Total outage duration per region for 2015 in hours (SAIDI)

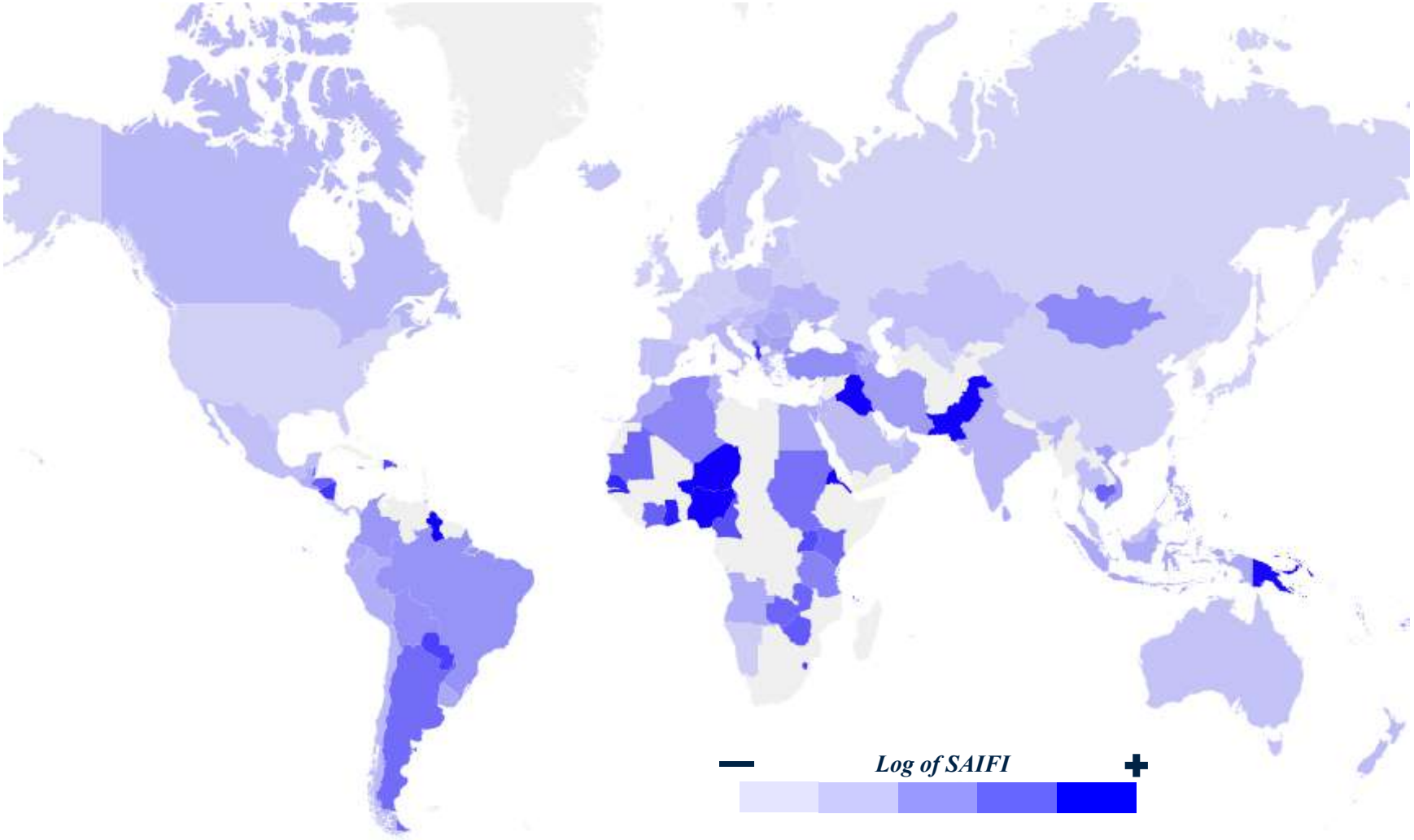


Total outage frequency per region for 2015 (SAIFI)



Source: Doing Business database. Sample of 142 economies.

Low income economies tend to have more power outages



Source: Doing Business database

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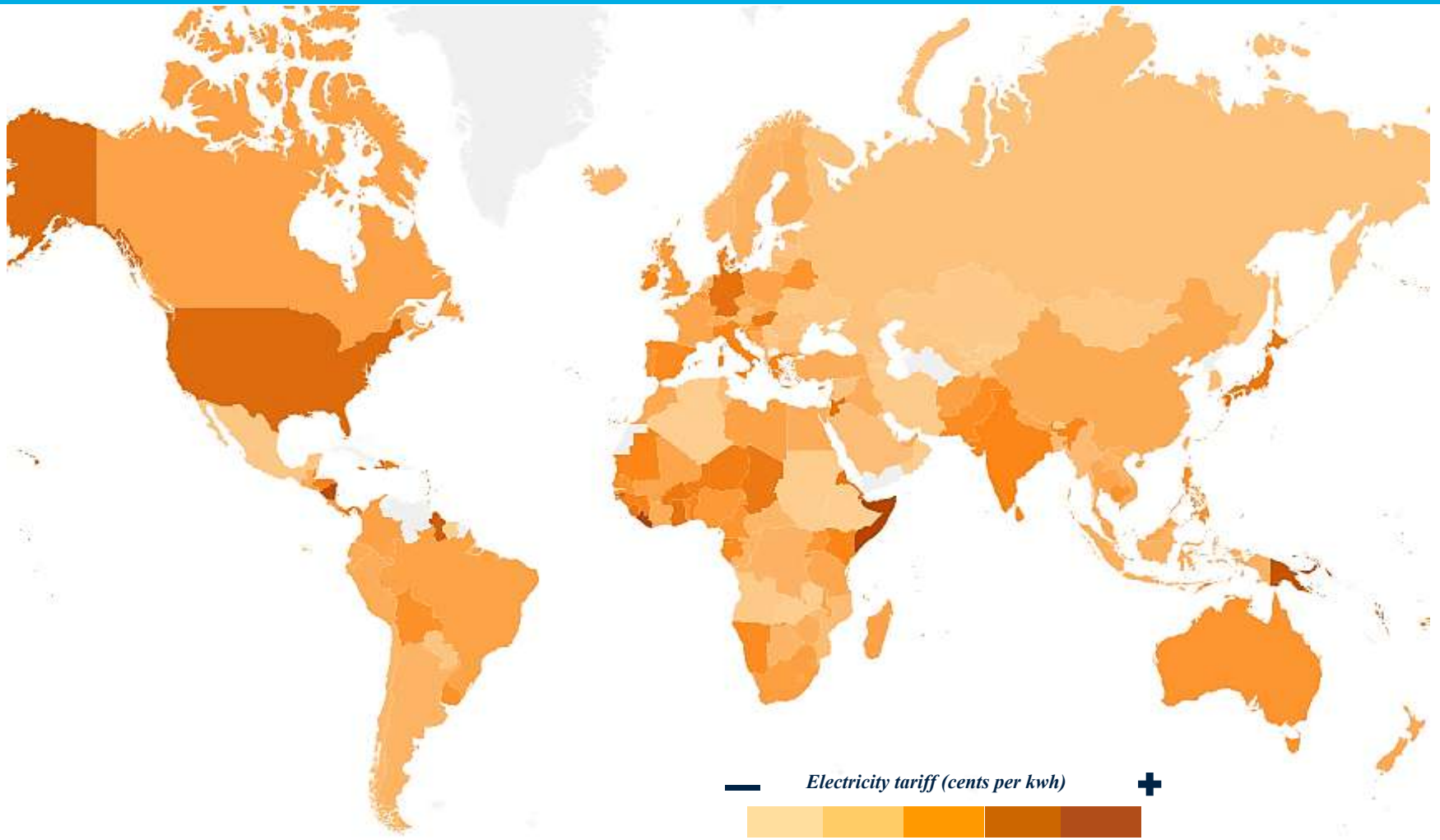
Electricity tariffs are the lowest in MENA and ECA economies



Source: Doing Business database

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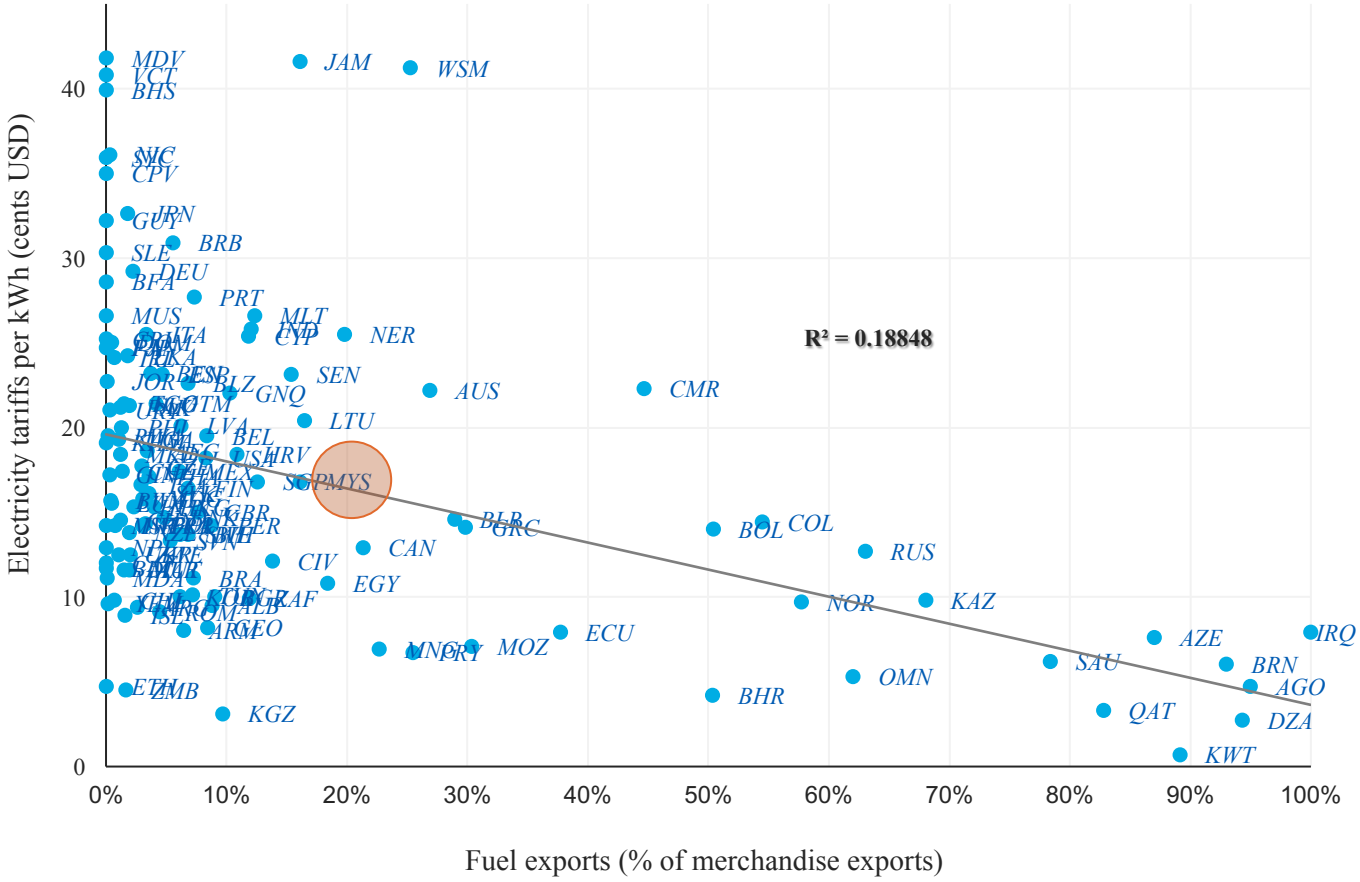
Resource rich economies are likely to offer low electricity tariffs

One way to proxy natural resource endowment according to Asiedu et al (2013) is the share of fuel exports (% of merchandise exports).



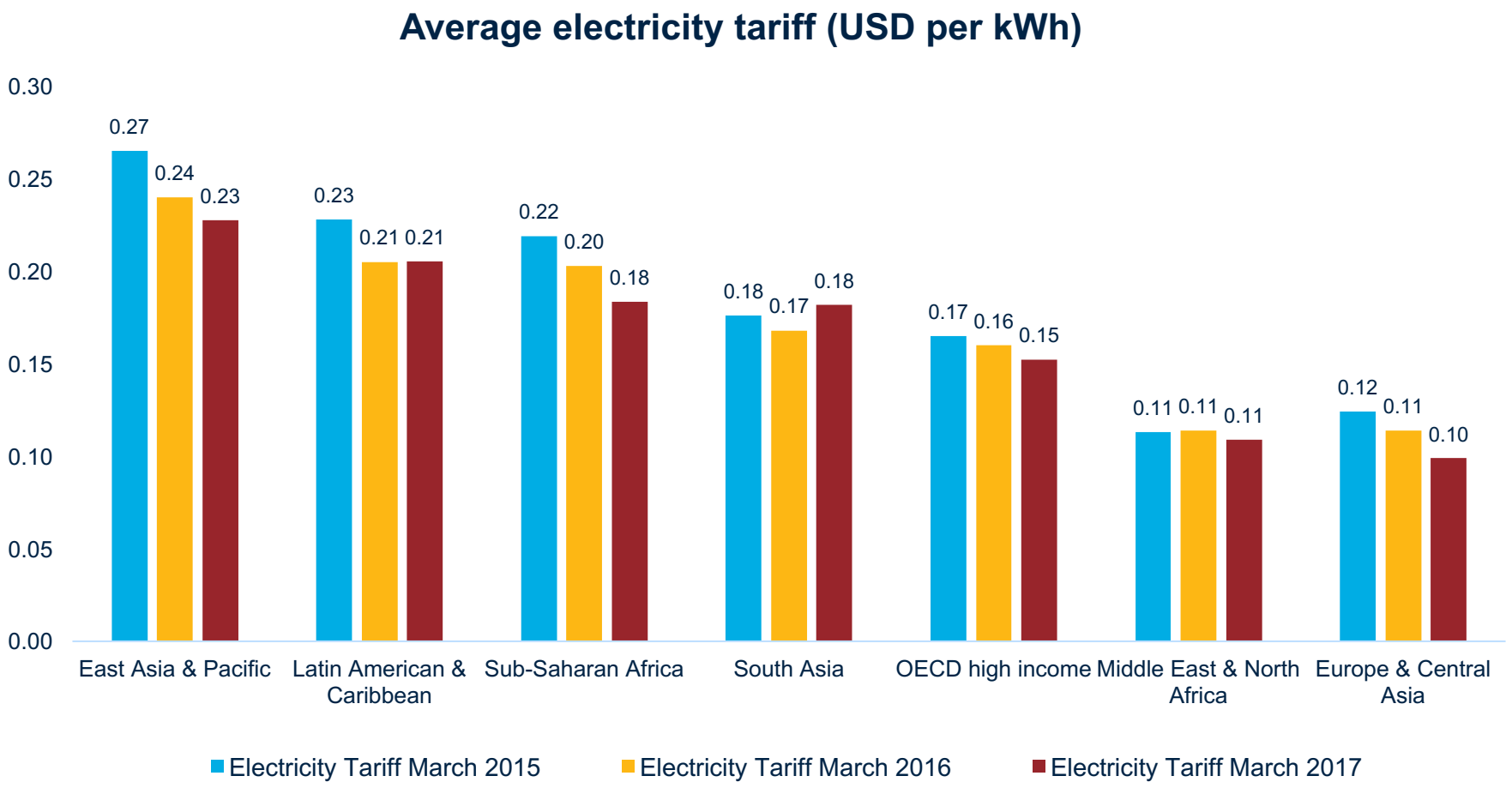
Where is electricity cheap?

Economy	¢ per kWh
Kuwait	0.8
Algeria	3.0
Kyrgyz Republic	3.8
Zambia	3.8
Ethiopia	4.4
Qatar	4.8
Sudan	5.1
Bahrain	5.3
Brunei	5.3

Where is electricity expensive?

Economy	¢ per kWh
Solomon Islands	96.0
Somalia	60.0
Liberia	55.6
Kiribati	46.2
Guinea-Bissau	31.2
Antigua	44.2
Marshall Islands	40.6
South Sudan	38.8
Sierra Leone	32.3
Samoa	37.1

Electricity tariffs have decreased by nearly 5% over the past years



Source: Doing Business database

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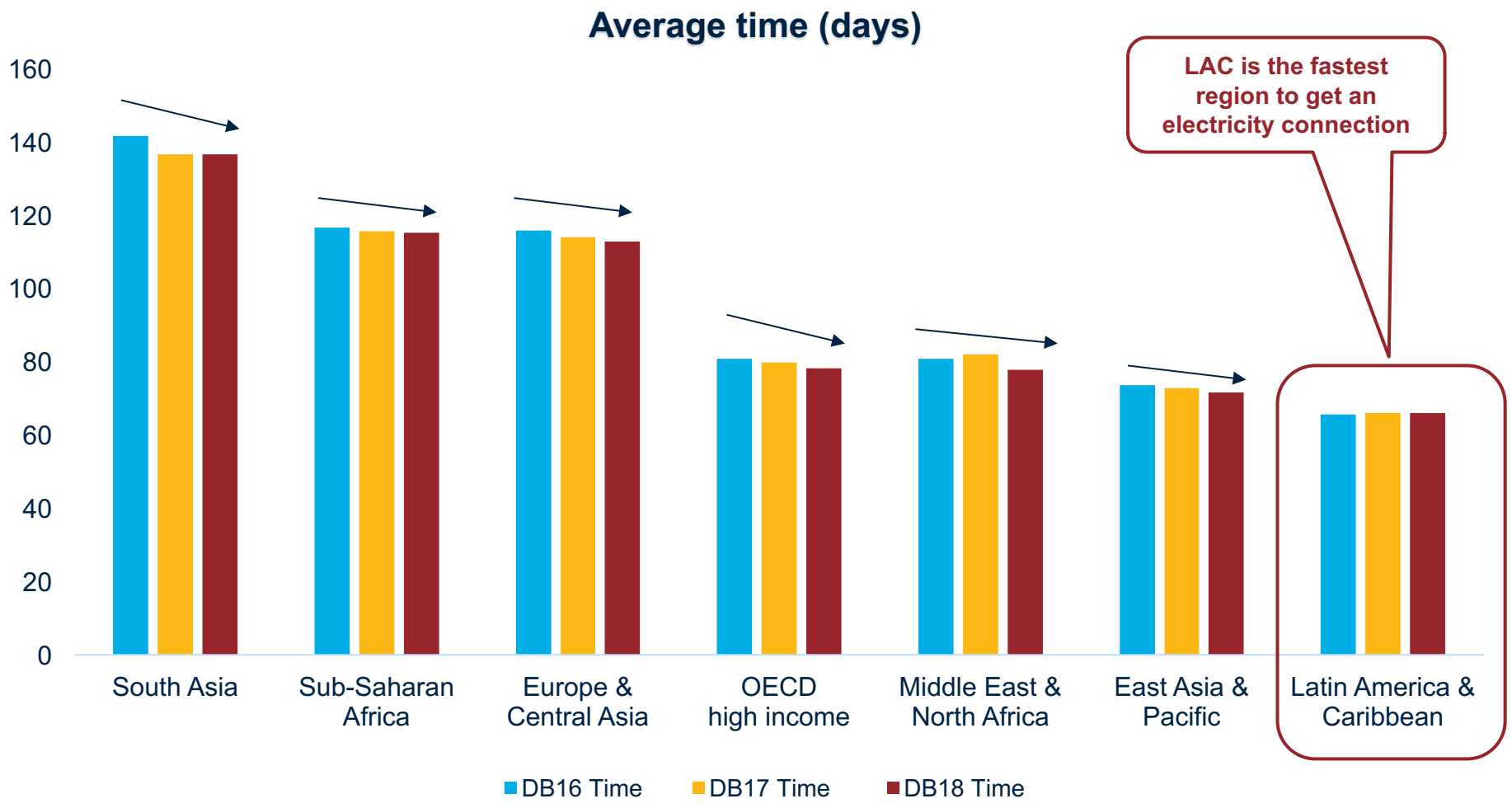
The time to get an electricity connection is steadily declining across regions



Source: Doing Business database

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What are good practices in Getting Electricity (1/2) ?

A. Efficiency of connection process

1. **Streamlining of approval process:** In 2016/2017, in Mozambique, EDM (utility) issued a regulation to process faster the electricity connections for businesses, and now all connection works are done by the utility, including the design and construction of distribution line, resulting in significantly less number of procedures and reduced time and connection costs.

2. **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.

3. **Application of a Geographical Information System (GIS):** In Thailand, MEA (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.

What are good practices in Getting Electricity (2/2)?

B. Quality of supply and transparency of tariffs

1. **Measuring System Average Interruption Duration and Frequency indexes (SAIDI & SAIFI):** In Montenegro, CEDIS (utility) began **computing the average duration and frequency of outages** per customer in Podgorica. 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 Vietnam, Ho Chi Minh City Power Corporation (utility) started to use Supervisory Control and Data Acquisition (SCADA) **automatic energy management system** for monitoring and restoration of power outages.

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** for commercial clients in case of non-planned outages with a duration of three hours or more.

Example of *Doing Business 2018* reformers (1/2):
Indonesia made getting electricity easier and reduced the costs in 2016/17

Indonesia, Jakarta **implemented GIS**: Perusahaan Listrik Negara (utility) can process the application without an external site inspection.

- ✓ The cost to obtain an inspection and certificate of operation for the internal wiring passed from 2,572,500 LCU to 2,205,000 LCU.
- ✓ The cost to apply for a new electricity connection passed from 152,017,987.99 LCU to 124,354,246.03 LCU.

N.	Procedure	Time to Complete	Associated Costs
1	Obtain inspection and compliance certificate for internal wiring installation	7 days	**2,205,000**
2	Submit connection application to PLN and await approval and estimate	3 days	**124,354,246.03**
~~3~~	~~Receive external inspection by PLN~~ **Procedure eliminated**	~~1 day~~	~~0~~
3.	Obtain external works from PLN's contractor	21 days	0
4.	Obtain final connection from PLN	3 days	0

Source: Doing Business database

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Example of *Doing Business 2018* reformers (2/2):
Italy made getting electricity easier in 2016/17

Areti, the electricity utility in Rome, underwent through a digital and organizational modernization, focused on streamlining the application process and reducing the time to obtain external works and meter installation.

- ✓ Connections to the low tension network are analyzed and processed through **SAP-ISU**. → This **reduced** the total time to process the application from 60 to 30 days.
- ✓ Reduction in time to connect to electricity due to the **simplification of external connection works.** → total time decrease from 64 to 45 days.

Improvements in the connection process in Italy	Doing Business 2017		Doing Business 2018
Submit application and await estimate	60	Faster →	30
Receive external site inspection by utility	15		15
Purchase and install secondary transformer	7		7
Obtain external works, meter installation and electricity flow	64	Faster →	45

Source: Doing Business database

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THANK YOU!

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