Utility Performance and Behavior in Africa Today

ANNEX C

OPERATIONAL PERFORMANCE
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The operational data for utilities covered by the data platform Utility Performance and Behavior in Africa Today (UPBEAT) were less widely available than the data on their financial operations (see annex B) or on transparency and accountability (see annex D). Data are downright scarce on generator availability, and transmission and distribution systems’ reliability. At the distribution level, data on the System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) are relatively plentiful. By way of contrast, data on system losses are much more widely available, as are data on time to connect, at least at the country (not utility) level. This is only because the data collection was undertaken as part of the World Bank’s Doing Business framework. The reported operational performance indicators are not always comparable because the methodology used for collecting and measuring the relevant operational parameters for computing indicators is not disclosed.

The scarcity of data constrains meaningful comparisons of reported indicators and inhibits the ability to draw conclusions. Several trends are nevertheless notable:

- Utilities with management information systems (MISs) that collect accurate data on interruptions are more likely to report reliability indicators and appear themselves to have better reliability. This implies that better measurement and improved data quality may lead to better reporting and performance.

- In recent years, total distribution losses mounted for utilities reporting this indicator. This alarming trend means utilities are forgoing sizable revenues and incurring higher costs, impacting cost recovery and profitability. Also, utilities that electrified rapidly tend to see higher reported total system or distribution losses.

- The time required to connect new customers has plummeted for all utility groups with a distribution function. Access planning, flexible financing of connection charges, and wider sector reforms that promote access and improved performance appear to be key.
**C.1 ALL UTILITIES**

**C.1.1 Reliability**

*Relatively few utilities report on generation availability, but the figures reflect what might be expected for the typical operating profile of each type of plant.*

Of the 76 utilities in the study, 48 have a generation segment (i.e., vertically integrated utilities [VIUs], generation-only utilities, and generation-transmission utilities). Figure C.1 shows generator availability by fuel type—liquid fuel, natural gas, hydropower, renewable energy—for these utilities, where data were available. It also shows the number of utilities reporting generator availability data each year:

- Liquid fuel generator availability ranged from 17.2 (Ethiopia’s EEP in 2016) to 98.1 percent (Rwanda’s EUCL in 2017) for all utilities during the period 2012–18, while the median ranged between 76.0 and 88.8 percent for the same period.
- Natural gas generator availability ranged from 36.9 (Kenya’s Kengen in 2013) to 99.0 percent (Angola’s PRODEL in 2018) for all utilities in the dataset between 2012 and 2018, while the median was 74.0 to 91.5 percent.
- Hydropower generator availability ranged from 44.0 (DRC’s SNEL in 2017) to 100 percent (Burkina Faso’s SONABEL) between 2012 and 2018; the median ranged from 89.6 to 92.9 percent.
- Availability of renewable energy generators ranged from 18.8 (Cabo Verde’s ELECTRA in 2017) to 100 percent (Angola’s PRODEL, Burkina Faso’s SONABEL and Rwanda’s EUCL in multiple years) during the period from 2012 to 2018, while the median ranged from 78.6 to 100 percent.

Sample sizes, as noted in annex A, are small, as data on generator availability were scarce: of the 48 utilities with a generation function, half reported availability of their generation plants in 2018: half of the generation-only utilities and VIUs and one generation-transmission utility. Almost every utility with a generation function, 41 of 48, has liquid fuel generation capacity, and about a third of these utilities (13 of 41) report availability of their plants running on liquid fuels. The least-reported availability is for the solid fuel generation plants of the six utilities with solid fuel generation capacity; only one, Rwanda’s EUCL, reports availability of plants running on solid fuels.

Of the 76 utilities in the study, 48 have a transmission function (i.e., VIUs, transmission-only, generation-transmission, and transmission-distribution). Figure C.2 shows...
reported transmission SAIDI (in hours) and SAIFI (in interruptions) for these utilities, where data were available. SAIDI data were available for only five utilities; SAIFI data were available for four. Transmission SAIDI ranged from 0.01 (Namibia’s Nampower, from 2012 to 2018) to 72.7 hours (Cameroon’s Eneo in 2016) between 2012 and 2018; median transmission SAIDI ranged from 0.01 to 8.05 hours. Transmission SAIFI ranged from 0.18 (Namibia’s Nampower in 2018) to 36.0 (Angola’s RNT in 2017) interruptions during the period 2012–18; median transmission SAIFI ranged from 0.25 to 12.1 interruptions.

Of the 76 utilities in the study, 61 have a distribution function (i.e., VIUs, distribution-only, and transmission-distribution). Figure C.3 shows reported distribution SAIDI (in hours) and SAIFI (in interruptions) for these utilities, where data were available. SAIDI data were available for 28 utilities; SAIFI data for 26 utilities. Between 2012 and 2018, distribution SAIDI ranged from 0.04 (Mozambique’s EDM in 2014) to 900 hours (Eritrea’s EEC in 2015); median distribution SAIDI ranged from 30.3 to 87.4 hours. Distribution SAIFI ranged from 0.10 (PUC in the Seychelles in 2018) to 3,658.0 interruptions (Burkina Faso’s SONABEL in 2018) during the period 2012–18; median distribution SAIFI ranged from 16.1 to 31.0 interruptions.

Some utilities report consistent improvements over time. Reporting of SAIDI and SAIFI differs substantially among utilities, making cross-utility comparisons of little use. Time series data, however, make apparent which utilities are most improved. As box C.1 shows, Rwanda’s EUCL is one such example.

Not all utilities with an appropriate information system—one that allows them to collect accurate data on interruptions (for example, SCADA, or supervisory control and data acquisition)—report reliability indicators. VIUs and distribution-only utilities with an appropriate information system (IS) are much more likely to report distribution SAIDI and SAIFI data. Only 2 of the 21 distribution-only utilities have an IS capable of measuring reliability, and both report reliability indicators. In 2018, 18 VIUs (of 39) had an IS appropriate for measuring reliability, and 11 of them reported reliability indicators; 8 VIUs without an appropriate IS also reported on their reliability. These patterns suggest that utilities with an IS do not always report data, nor does the absence of an IS necessarily prevent reporting. In the former case, sufficient regulatory or other incentives may not exist to encourage reporting; in the latter, variations in reporting methods across utilities make inter-utility comparisons potentially misleading.
Rwanda’s reliability of supply is the most improved in East Africa

Rwanda has shown substantial improvements in supply reliability. It has achieved this by vastly expanding its generating capacity while rehabilitating, upgrading, and extending transmission and distribution infrastructure. Rwanda is now better able to serve demand from consumers while expanding electricity access. Over the past decade, Rwanda electrified its population at one of the fastest rates in the world, boosting access to electricity from 6 percent in 2009 to an estimated 54 percent in March 2020. It met the hike in demand from existing customers and connected new users by tripling its generating capacity, from 76 megawatts (MW) in 2010 to 225 MW in 2020, incorporating investments in zero-carbon resources, and attracting direct investment in more than 17 independent power producers.

Massive investments in infrastructure improvements were financed by the government, the World Bank, and other development partners, together with measures undertaken by the utility, EUCL, to improve its operational performance in electricity supply and customer service, with strong focus on loss reduction. Those measures include a Revenue Protection Program, supported by advanced metering technologies, to monitor consumption of large customers and load of feeders and distribution transformers, and the incorporation of state-of-the-art information systems. System losses have consequently fallen, despite the construction of vast new infrastructure at all voltage levels; in 2018 losses dipped below 20 percent for the first time since 2010.

As shown in figure C.1.1, reliability has also improved drastically in recent years, with distribution SAIDI and SAIFI plunging 50 percent between 2016 and 2018, while in other utilities in the region values have increased or seen only modest reductions.

**FIGURE C.1.1 Distribution SAIDI and SAIFI in East African utilities**

Note: SAIDI = System Average Interruption Duration Index; SAIFI = System Average Interruption Frequency Index.
Of the 61 utilities with a distribution segment, roughly 43 percent have a Revenue Protection Program (RPP) in place; an additional 20 percent will have one in place by the end of 2021. Figure C.4 shows the number of utilities with an RPP.

### C.1.2 Efficiency

_If reported total distribution losses appear to have worsened in recent years. Time to connect has improved markedly._

Figure C.5 shows transmission losses for the 49 utilities with a transmission segment. Transmission losses ranged from 1.5 (Senegal’s Senelec in 2018) to 15 percent (Liberia’s LEC in 2018) during the period 2012–18; median transmission losses were in a narrow range from 5.0 to 6.3 percent. Transmission losses were available for only 17 utilities.

Figure C.6 shows distribution losses for the 61 utilities with a distribution segment. Distribution losses ranged from 4 for Namibia’s Erongo RED (Regional Electricity Distributor Company) in 2015 to 51 percent for Liberia’s LEC in 2018 during the period 2012–18; median distribution losses were in a narrow range from 13.4 to 17.6 percent. Distribution losses were available for 19 utilities.

Many VIUs do not report transmission and distribution losses separately; instead, they provide one number representing total system losses.3 Figure C.7 shows system losses for the 40 utilities with both a transmission and distribution segment (i.e., VIUs and transmission-distribution utilities). System losses ranged from 6.3 percent (CEB in Mauritius in 2017) to 58.4 percent (Liberia’s LEC in 2018) during the period 2012–18; median system losses were in a narrow range from 19.5 to 22.1 percent. System losses were available for 34 utilities.

As shown in box C.2, CIE in Côte d’Ivoire is a standout in the region for reducing system losses.
The Compagnie Ivorienne d’Electricité (CIE) provides electricity service in Côte d’Ivoire under an *affermage*-type concession contract with the government. Responsible for generation, transmission, distribution, and retail supply, CIE is privately owned (85 percent), with the government holding a minority (15 percent) of the shares. The main shareholder (Eranove) controls a 54 percent stake. CIE’s contract was signed for 15 years in 1990 and extended for a second 15-year period in 2005.

Among vertically integrated utilities (VIUs) and distribution-only utilities, CIE has some of the lowest system losses in West Africa. Total losses have dropped more than 8 percentage points since 2012, from 23.6 to 15 percent. This has been achieved mostly by stemming nontechnical losses (fraud and other unmetered consumption), which has helped to boost sales for CIE as well as decreased the generation needed to meet demand.

CIE has incorporated state-of-the-art information systems to support operations, and implemented efficient processes in all business areas. CIE’s meter-readers have adequate equipment and tools to proceed to remove illegal connections, but disconnections are difficult to implement in some low-income areas. CIE receives no government subsidies for losses incurred in areas where anti-fraud and other commercial operations are constrained. Moreover, the company’s remuneration under the *affermage* depends on actual sales, so it has an incentive to optimize losses in supply. Staff responsible for billing and collections have individual objectives in their contracts and receive bonuses based on performance and results. Meters are also being moved to residential property edges to make meter reading and disconnections easier.

Figure C.2.1 shows CIE’s distribution losses (black dashed line) compared with other VIUs (orange columns) and distribution-only utilities (green columns) in West Africa.
Figure C.9 shows how many days it takes the utilities with a distribution function (61 utilities) to connect new customers. Time to connect ranged from 34 days (Rwanda’s EUCL in 2015) to 458 days (Guinea-Bissau’s EAGB in 2012) between 2012 and 2018; median time to connect steadily improved, from 117 days in 2012 to 90 days in 2018. Data on time to connect were available for 42 utilities.

Improvements in time to connect have largely been made as part of deliberate campaigns by utilities to reduce connection costs and improve response times. Box C.3 shows how KPLC in Kenya and Umeme in Uganda managed to drastically reduce time to connect.

Source: World Bank RISE data.
internal wiring and productive use. A strategic effort
has been made to review the concessional model
and broader institutional and regulatory framework
for rural electrification and address the root causes of
poor results in previous years. Policy reforms included
removal of barriers to connection, promotion of uni-
versal use of prepaid meters, and investment support
for internal wiring and productive use. The role of
Senelec was strengthened as the key implementer
of grid electrification, which is the least-cost solution
for over 95 percent of rural households, as shown by
a Sustainable Energy for All (SE4ALL)-funded geospa-
tial analysis.

Consistent with the government’s reforms, Senelec
has improved its operational performance in build-
ing electrification infrastructure and running com-
cerical processes to hire new customers. The
company has been able to implement an average
of 30,000 rural connections per year in its conces-
sion perimeter, and is prepared to expand this role
through the four new concessions recently granted
by the government.

The median time to connect has fallen for utilities in
all power pools, but the drop is most drastic in the
East African Power Pool (EAPP). Within EAPP, KPLC
(Kenya) and Umeme (Uganda) have shown the great-
est improvements (see figure C.3.1). The utilities have
used similar measures to achieve these gains, recog-
nizing that customers were prevented from connect-
ing for a range of physical, financial, regulatory, and
administrative reasons.

KPLC launched a massive “last mile” connection pro-
gram for businesses and households near higher-volt-
age transmission line extensions. KPLC also reduced
its US$500 connection charge to US$150 and allowed
customers to finance new connection charges over
a 48-month period with payments on their monthly
bills. Between 2013 and 2018, the program cut the
average time to connect new low-voltage customers
from 150 to 97 days.

Under its concession arrangement, Umeme is respon-
sible for connecting new customers. Low-voltage
connections cost US$60, but government pays
the rural connection charge. By 2015, Umeme was
responding to requests for new connections within
an average of seven days. Quotation for nonstandard
new services is provided within three to five days,
and the construction works start immediately after
payment by the customer. Between 2013 and 2018,
Umeme slashed the average time to connect from
132 to 66.

Utilities in the West African Power Pool (WAPP) also
made impressive reductions in time to connect, with
Senegal’s Senelec leading the way. The Government
of Senegal recently incorporated comprehensive
reforms to the National Rural Electrification Program
(PNER) to increase access and promote universal use
of prepaid meters along with investment support for

**BOX C.3**

**Reducing time to connect in Kenya, Senegal, and Uganda**

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**FIGURE C.3.1** Time to connect customers in Kenya,
Senegal and Uganda, 2013–18
C.2 VERTICALLY INTEGRATED UTILITIES

The operational performance of VIUs is generally in line with the performance of all utilities in the dataset, as VIUs dominate the set.

C.2.1 Reliability

The reported reliability of VIUs was slightly better than generation-only utilities in the full dataset. VIUs were also more likely to have an MIS and RRP in place.

Figure C.10 shows generator availability by fuel type—liquid fuel, natural gas, hydropower, renewable energy—reported by the generation segments of VIUs:

- Liquid fuel generator availability ranged from 41.0 (Madagascar’s JIRAMA in 2015) to 98.10 percent (Rwanda’s EUCL in 2018) during the period 2012–18, while the median ranged between 68.0 and 85.9 percent during the same period.
- Only Côte d’Ivoire’s CIE reported natural gas generator availability; it ranged from 83.8 percent in 2014 to 91.5 percent in 2017 and 2018.
- Hydropower generator availability ranged from 44.0 (DRC’s SNEL in 2017) to 100 percent (Burkina Faso’s SONABEL in 2017) between 2012 and 2018; the median ranged from 72.1 to 91.3 percent.
- Availability of renewable energy generators ranged from 18.8 (Cabo Verde’s ELECTRA in 2017) to 100 percent (Burkina Faso’s SONABEL and Rwanda’s EUCL across multiple years) during the period from 2013 to 2018 (no VIUs reported availability in 2012), while the median ranged from 57.9 to 100 percent.

Median generator availability for liquid fuel among VIUs ranged from 2.5 percentage points below the median for all utilities with a generation segment to 5.6 percentage points above. Median generator availability for hydropower among VIUs ranged from 16.5 percentage points lower than the median for all utilities (with a generation segment) to 1 percentage point higher. Median renewable energy generator availability ranged from 17.1 percentage points lower than the median for all utilities (again with a generation segment) to 15.6 percentage points higher.

Figure C.11 shows SAIDI (in hours) and SAIFI (in interruptions) reported by the transmission segments of VIUs. Reported transmission SAIDI ranged from 0.01 (Namibia’s NamPower from 2012 to 2018) to 72.2 hours (Cameroon’s Eneo in 2016) between 2012 and 2018; median transmission SAIDI ranged from 0.01 to 36.11 hours. Transmission SAIDI was available for only Eneo and NamPower. Reported transmission SAIFI ranged from 0.18 (Namibia’s NamPower in 2018) to 23.7 interruptions (Cabo Verde’s ELECTRA in 2017) during the period 2012–18; median reported transmission SAIFI ranged from 0.25 to 11.96 interruptions. Reported transmission SAIFI was only available for ELECTRA and NamPower.
Figure C.12 shows reported distribution SAIDI (in hours) and SAIFI (in interruptions) reported by the distribution segments of VIUs. Reported distribution SAIDI ranged from 0.04 (Mozambique’s EDM in 2014) to 900 hours (Eritrea’s EEC in 2015) between 2012 and 2018; median distribution SAIDI ranged from 18.7 to 73.0 hours. Reported distribution SAIFI ranged from 0.1 (PUC in the Seychelles in 2018) to 3,658 interruptions (Burkina Faso’s Sonabel in 2018) during the period 2012–18; median distribution SAIFI ranged from 10.1 to 28.4 interruptions.

Figure C.13 shows the effect of an appropriate IS on reported distribution SAIDI among VIUs in 2018. Most of the VIUs with an IS adequate for measuring reliability had lower reported SAIDI than utilities without an appropriate IS: median reported distribution SAIDI for VIUs with an appropriate IS was 30.5 hours, compared with a median of 165 hours for VIUs without. The same is true for SAIFI.

Reported reliability indicators improve over time for utilities with an appropriate IS. For example, Cabo Verde’s ELECTRA (a VIU) improved SAIDI from 87.4 hours in 2014 to 53 hours in 2018; SAIFI improved from 39.6 interruptions in 2014 to 29.3 interruptions in 2018. After integrating adequate IS tools into its daily operations in 2013–14, Rwanda’s EUCL (a VIU) improved SAIDI from 88 hours in 2016 to 31 in 2018; SAIFI fell from 121 in 2016 to 57 in 2018.

**FIGURE C.12** Distribution SAIDI and SAIFI, VIUs, 2012–18

![Graph showing distribution SAIDI and SAIFI](image)

Note: SAIDI = System Average Interruption Duration Index; SAIFI = System Average Interruption Frequency Index.

**FIGURE C.13** IT capacity and reporting of distribution SAIDI, VIUs, 2018

![Graph showing IT capacity and reporting](image)

Note: Utilities that do not yet have IT capacity to measure SAIDI, but are planning to introduce it by the end of 2021, are counted as “no capacity” for the purpose of this analysis. Note: IT = information technology; SAIDI = System Average Interruption Duration Index; VIUs = vertically integrated utilities.
Figure C.14 shows the number of VIUs with an RPP in place. VIUs are more likely to have an RPP than other utilities with a distribution function. About 46 percent of VIUs have an RPP in place, compared to 34 percent of all utilities with a distribution function. Another 23 percent of VIUs will introduce an RPP by the end of 2021, compared to 16 percent of all utilities with a distribution function.

C.2.2 Efficiency

VIU performance on efficiency measures tracks closely with the dataset as a whole.

Figure C.15 shows the losses reported by the transmission segment of VIUs. The median losses hover at around 6 to 7 percent, with little variation among utilities or from year to year, irrespective of sample size. The median transmission losses for VIUs closely track the median for all utilities with a transmission segment. Transmission losses for VIUs ranged from 1.5 to 15 percent during the years 2012 to 2018. Transmission losses were reported only by 13 VIUs, as most report total system losses instead.

Figure C.16 shows the losses reported by the distribution segment of VIUs. Reported distribution losses show more variation than transmission losses, ranging from 4.8 to 51 percent. The median ranged from 13.0 to 17.6 percent from 2012 to 2018. Median reported distribution losses for VIUs also closely track the median for all utilities with a distribution segment; it is within 0.7 percentage points every year from 2012 to 2018. Distribution losses were reported by 12 VIUs, as most report total system losses instead.

Figure C.17 shows the total system losses reported by VIUs. Reported system losses range from 6.3 to 58.3 percent. The median ranged from 20 to 22.5 percent between 2012 and 2018. Data on reported system losses were available for 32 utilities.
Figure C.18 shows how many days it takes the distribution segment of VIUs to connect new customers. The amount of time required to connect ranges from 34 to 458 days. The median drops over time from 113 in 2012 to 89 in 2018. This likely signals improved performance, not selection bias, as the sample size remains relatively constant from 2012 to 2018. Median time to connect for VIUs tracks closely with the median for all utilities with a distribution segment. Time-to-connect data were available for 35 utilities.

C.3 GENERATION-ONLY UTILITIES

Few generation-only utilities report reliability data; those that do perform about as well as the dataset as a whole.

C.3.1 Reliability

Generation-only utilities showed mixed performance on generator availability, performing better than other utilities for some fuel types, but worse for others.

Figure C.19 shows generator availability by fuel type—liquid fuel, natural gas, hydropower, renewable energy—reported by generation-only utilities:

- Liquid fuel generator availability ranged from 61.9 (Ghana’s VRA in 2017) to 92.3 percent (Kenya’s Kengen in 2013) during the period 2012–18, while the median ranged between 73 and 79.9 percent during the same period.
- Natural gas generator availability ranged from 36.9 (Kenya’s Kengen in 2016) to 99 percent (Angola’s PRODEL in 2018) between 2012 and 2018, while the median ranged between 54.5 and 86.0 percent.
- Hydropower generator availability ranged from 84 (Angola’s PRODEL in 2017) to 99 percent (Angola’s PRODEL in 2018) between 2012 and 2018; the median ranged from 89.2 to 95.7 percent.
- Availability of renewable energy generators ranged from 72 (Kenya’s Kengen in 2013) to 100 percent (Angola’s PRODEL in 2018) during the period 2012–18, while the median ranged from 72 to 95.7 percent.

Median liquid fuel generator availability for generation-only utilities ranged from 7.1 percentage points below the median for all utilities (with a generation segment) to 10.8 percentage points higher. Median natural gas generator availability was between 3.7 and 17.5 percentage points lower for generation-only utilities than for all utilities. Median hydropower availability was between 2.9 and 7.1 percentage points higher for generation-only utilities than for all utilities, while renewable energy ranged between 2.3 percentage points lower to 7.5 percentage points higher for generation-only utilities than for all utilities.

C.4 TRANSMISSION-ONLY UTILITIES

Reported operational data for transmission-only utilities were limited; only one utility reported both transmission SAIDI and SAIFI data. Available data suggest that operational performance for transmission-only utilities tracks closely with performance of the entire dataset.
C.4.1 Reliability

Few transmission-only utilities report reliability data; it is therefore difficult to draw any meaningful conclusions.

Figure C.20 shows SAIDI (in hours) and SAIFI (in interruptions) reported by transmission-only utilities. Only Angola’s RNT and Ghana’s GRIDCo reported transmission SAIDI, which ranged from 4.1 to 25 hours between 2016 and 2018. Median transmission SAIDI ranged from 8 to 16.8 hours during the same period, about 1 to 10 hours more than for all utilities with a transmission segment. Only Angola RNT reported transmission SAIFI, which ranged from 1 to 36 interruptions; because only one utility reported SAIFI data, comparisons to all utilities with a transmission segment would not be useful.

C.4.2 Efficiency

Reported efficiency data for transmission-only utilities were limited, but the data available indicate that the reported indicators are slightly better on efficiency measures than similar reported indicators in the full dataset.

Figure C.21 shows the losses reported by transmission-only utilities. The median stays relatively constant at about 4 percent with little variation around the median or over time. Median reported transmission losses are slightly lower than for all utilities with a transmission segment, ranging from 3.8 to 4.6 percent (compared with a range of 5.0 to 6.1 percent for all utilities). Reported transmission losses were available for only three transmission-only utilities.

C.5 DISTRIBUTION-ONLY UTILITIES

Distribution-only utilities report roughly the same on most indicators as other utilities in the dataset with a distribution function. However, they appear to report considerably better indicator values for efficiency (losses and time to connect).

C.5.1 Reliability

Only a small number of distribution-only utilities report reliability indicators.

Figure C.22 shows reported SAIDI (in hours) and SAIFI (in interruptions) reported by distribution-only utilities. Reported distribution SAIDI ranged from 5.2 (Angola’s ENDE in 2018) to 274.5 hours (Ghana’s ECG in 2012) between 2012 and 2018; median distribution SAIDI ranged from 40.6 to 274.5 hours. Reported distribution SAIFI ranged from 2.3 (Angola’s ENDE in 2018) to 135.3 interruptions (Ghana’s ECG in 2014) during the period.
2012–18; median reported distribution SAIFI ranged from 20.8 to 135.3 interruptions. Data were available for four distribution-only utilities.

Other than the period 2012 to 2014, when only one distribution-only utility reported SAIDI and SAIFI, the median reported distribution SAIDI and SAIFI tracked the median for all utilities with a distribution segment closely: median reported SAIDI for distribution-only utilities was between 17 hours lower to 30 hours higher than for all utilities; median SAIFI was between 4.7 interruptions lower to 7.1 interruptions higher than for all utilities.

Figure C.23 shows the number of distribution-only utilities with an RPP in place. About 30 percent of distribution-only utilities have an RPP in place, compared to 34 percent of all utilities with a distribution segment. Another 15 percent of distribution-only utilities will introduce an RPP by the end of 2021, compared to 16 percent of all utilities with a distribution segment.

C.5.2 Efficiency

Efficiency indicators are poorly reported by distribution-only utilities. The reported performance of distribution-only utilities on efficiency measures is considerably better than for the dataset as a whole.

Figure C.24 shows the losses reported by distribution-only utilities. Reported losses ranged from a minimum of 4 percent (Namibia’s Erongo RED in 2015) to a maximum of 36 percent (Sierra Leone’s EDSA in 2018). Median reported distribution losses ranged from 15.8 percent to 18.8 percent; the median for reported distribution-only utilities was consistently between 0.4 percentage points lower to 5 percentage points higher than the median for all utilities with a distribution segment. Distribution loss data were available for six distribution-only utilities.
ANNEX C: OPERATIONAL PERFORMANCE

C.6 OTHER UTILITIES

Operational data for generation-transmission and transmission-distribution utilities were extremely limited, making it difficult to draw conclusions.5

C.6.1 Reliability

Figure C.26 shows generator availability by fuel type—hydropower, liquid fuel, and renewable energy (data were not available for other fuel types)—reported by Ethiopia’s EEP, the only generation-transmission utility for which data were available:

- Hydropower generator availability data were available for Ethiopia’s EEP from 2014 to 2017, and ranged from 74 to 91 percent during that period. In 2018, the most recent year available, its hydropower generator availability was 91 percent.
- Liquid fuel generator availability data for Ethiopia’s EEP were available from 2014 to 2017, and ranged from 17 percent to 46 percent.
- Data on the availability of renewable energy generators for Ethiopia’s EEP ranged from 49 percent to 83 percent.

C.6.2 Efficiency

No transmission loss data were available for generation-transmission utilities. Only one data point was reported on the transmission segment losses of the transmission-distribution utility, Zimbabwe’s ZETDC. The utility reported 4.4 percent transmission loss in 2012. Zimbabwe’s ZETDC also reported separate distribution losses in 2012 with a value of 13.1 percent.

Figure C.29 shows how many days it takes Zimbabwe’s ZETDC to connect new customers. The number of days required ranged from 106 to 125.
FIGURE C.27 Transmission SAIDI and SAIFI, generation-transmission utilities, 2015–17

Note: SAIDI = System Average Interruption Duration Index; SAIFI = System Average Interruption Frequency Index.

FIGURE C.28 Reported distribution SAIDI and SAIFI, transmission-distribution utilities, 2015–18

Note: The years 2012–14 are excluded because there were no SAIDI and SAIFI data available for transmission-distribution utilities in those years. SAIDI = System Average Interruption Duration Index; SAIFI = System Average Interruption Frequency Index.

FIGURE C.29 Time to connect, transmission-distribution utilities, 2012–18

Endnotes

1. Availability of solid- and nuclear-powered generators are excluded because none of the utilities in the dataset had data on generator availability for these fuel types.

2. A separate entity, the National Electricity Transport Corporation (SONATREL), has since taken over the transmission function.

3. For utilities that report transmission and distribution losses separately, system losses were calculated as 1 minus ([1-transmission losses] times [1-distribution losses]).

4. Of VIUs with an adequate IS, 8 of 25 report SAIFI, compared to only 3 of 14 VIUs without an adequate IS. VIUs with adequate IS reported substantially lower SAIFI than VIUs without adequate IS tools: median reported distribution SAIFI for VIUs with adequate IS was 24 interruptions, compared to a median of 330 interruptions for VIUs appropriate IS tools.

5. Because of the small sample size, we do not attempt to draw headline conclusions in this section.