REGULATED INDUSTRIES COMMISSION

T&TEC's Annual Performance Indicator Report

For The Year

2014

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2016

Information Document

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EXECUTIVE SUMMARY

This report is an assessment of the performance of the Trinidad and Tobago Electricity Commission (T&TEC) for the year 2014 with respect to selected key performance indicators of the electricity sector.[1] The Regulated Industries Commission (RIC) assessed T&TEC's performance against targets set by the Determination, its performance in previous years, and performance metrics of utilities in other jurisdiction, in some instances. This is the eighth Annual Performance Indicator Report for T&TEC.

In 2014, there was a notable improvement in T&TEC's performance with respect to certain key performance indicators; however, there was also some deterioration in others. With respect to those areas of improved performance, T&TEC reduced total system losses from 7.08% in 2013 to 6.93% in 2014; however, it did not meet the target of 6.75% set in the Determination. Also, T&TEC improved the reliability of its electricity supply, as shown by reductions in the system reliability indicators: System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI) and Customer Average Interruption Duration Index (CAIDI). Additionally, there was a 17.5% reduction in transmission trips on the network, with a greater number of these trips restored within three hours, in comparison to 2013.

With respect to the areas of weakened performance, T&TEC noted an overwhelming increase in its customer complaints, which rose for 269 in 2013 to 2,992 in 2014. Although there was an increase in the number of complaints received for each complaint category, billing queries accounted for the majority (85%) of these complaints. There was also a significant increase in the complaints resolution rate, from 36.1% in 2013 to 62.8% in 2014. In terms of equipment maintenance, the annual percentage of pole-mounted transformers inspected and serviced by T&TEC fell by 2.7% in 2014, but remained above the minimum target of 20% per annum set in the Determination. Additionally, T&TEC's rate of addressing reported street light failures within 7-days declined significantly from 63.3% in 2013 to 41.8% in 2014. Lastly, T&TEC's financial position weakened, as indicated by a fall in revenue and an increase in both operational

[1] The performance indicators were identified in the Performance Monitoring and Reporting Framework 2005 (PMR) and the Final Determination: Regulation of Electricity Transmission and Distribution 2006-2011 (The Determination).The PMR establishes an effective strategy for monitoring and reporting on the electricity sector in Trinidad and Tobago, to evaluate, guide and strengthen the sector's performance overtime. Whereas the Determination sets the maximum tariffs and sets a methodology for determining the maximum prices that T&TEC may charge for its services.

expenditure and long-term debt. Operating expenditure (TT$3,356,536,000) was approximately 14.3% higher than operating revenue from electricity sales (TT$2,934,544,000) for the year. Long-term debt increased by 35%, while debt as a portion of the Regulatory Asset Base (RAB) remained well above the target of 65%. This is an indication that T&TEC needs to place more emphasis on utilizing borrowed funds for the intended RIC approved capital projects. Also, T&TEC's liquidity position remained below targeted levels, despite a 1% increase in its collection rate over the period.

1.0 INTRODUCTION

1.1 Role of the Regulated Industries Commission (RIC)

The RIC is a statutory body that was established by the Regulated Industries Act No. 26, 1998. As the economic regulator of the Water, Wastewater and Electricity sectors, the RIC's role is to balance the interests of both the service provider and the customers. To achieve this role, the RIC undertakes the following principal activities:

- Setting tariffs at levels that are sufficient for service providers to finance their activities in accordance with obligatory standards and acceptable levels of service expectations, while simultaneously promoting efficiency to ensure that tariffs are fair and reasonable;
- Ensuring that service providers meet their level of service obligation; and
- Safeguarding customers' interests by ensuring that services are provided in accordance with established standards of service.

The RIC is empowered by its Act to carry out studies of efficiency and economy of operation and of performance by service providers and publish the results thereof. The RIC monitors the performance of the Trinidad and Tobago Electricity Commission (T&TEC) to determine and report on the level of compliance with the Final Determination: Regulation of Electricity Transmission and Distribution 2006 – 2011 (The Determination).

1.2 T&TEC's Annual Performance Review

T&TEC is required to collect and submit performance data to the RIC on a quarterly and/or annual basis. This data forms the basis for RIC's assessment of T&TEC's performance, and includes aggregate data on indicators such as electricity coverage, number of customers, electricity purchases and sales. T&TEC's network reliability and system losses are also reviewed, in addition to other performance criteria, such as, customer responsiveness, equipment maintenance, and financial status. The RIC's assessment of T&TEC's performance is then presented in an annual performance indicator report. Accordingly, this is eighth Annual Performance Indicator Report for T&TEC. Data used in the assessment were supplied by T&TEC, except where specified otherwise.

1.3 Purpose of Document

This document reports on T&TEC's performance for the year 2014 with respect to key performance indicators and specific directives outlined in the Determination, and any other metric of performance that is relevant to the electricity transmission and distribution sector. It provides an assessment of the performance indicators against targets set by the Determination, as well as against its performance in previous years, and compares these with the performance of other utilities, where data are available.

1.4 Structure of Document

The remainder of the document is organized into the following sections:

Sections 2.0 - 6.0 Performance Reviews; and

Section 7.0 Conclusion and Recommendations

Additionally, a list of key performance indicators and definitions of key terms of the electricity sector is contained in the Appendix.[2]

[2] The general list of performance indicators for the electricity sector is contained in the Performance Monitoring and Reporting Framework 2005 (PMR)

2.0 AGGREGATE AND OTHER ECONOMIC DATA

2.1 Electricity Service Coverage

Electricity Service Coverage is an indicator of the level of access to electricity. It is a gauge of the level of infrastructural development and capacity for growth in a country. This metric is the ratio of T&TEC's residential customer accounts to the number of households in Trinidad and Tobago irrespective of geographical location. In 2014, the electricity service coverage for Trinidad and Tobago was maintained at 99%, with only a small percentage of the population not supplied by the national electricity grid (see table 1).

Table 1: Electricity Service Coverage (2013-2014)

Year	Estimated T&T population (CSO)[3]	Residential Accounts (T&TEC)	Service Coverage[4]
2013	1,340,557	395,515	99%
2014	1,345,343	400,818	99%

2.2 Number of Customers by Class

T&TEC supplies electricity to customers according to specific classes i.e. Domestic, Commercial, Industrial and Street Lighting.[5] These are based on the customer's electrical load and supply voltage. All customers are billed for energy consumed, measured in kilowatt per hour (kWh). Industrial customers pay an additional charge (demand charge) based on their kilovolts-ampere (kVA) demand. The Street Lighting classification is used to bill private customers and governmental agencies for the electricity that is consumed by private and public outdoor lighting.

T&TEC reported a 1.9% growth in its customer base, with the number of customer accounts increasing from 442,182 in 2013 to 450,733 in 2014, as shown in table 2. Domestic customers

[3] Population estimates were obtained from the Central Statistical Office of T&T at http://cso.gov.tt/data/?productID=31-Population-Mid-Year-Estimates

[4] Service coverage is estimated by Central Statistical Office of Trinidad and Tobago (CSO)

[5] These classes include: **Domestic (Rate A)** supplied at 115/230V at loads less than 50kVA.
Commercial (Rate B) supplied at 115/230V or 230/400V at loads less than 50kVA.
Commercial (Rate B1) supplied at 115/230V, 230/400V, 6.6kV, 12kV or 33kV at loads greater than 50kVA but less than 350kVA.
Industrial (Rate D1-5, E1-5) supplied at 115/230V, 230/400V, 6.6kV, 12kV, 33kV, 66kV, 132kV and higher voltages at various loads greater than 50kVA.

alone accounted for 89% of the customer base, while the remaining 11% comprised of Commercial customers (10%), Industrial customers (0.8%) and Street Lighting customers (0.2%). The commercial class had the largest growth among the customer classes, expanding by 7.2% in 2014.

Table 2: Number of Active Accounts by Class (2013-2014)

Year	Class				TOTAL
	Domestic	Commercial	Industrial	Street Lighting	
2013	395,515	43,168	3,454	45	442,182
2014	400,818	46,284	3586	45	450,733
% Change	**1.3%**	**7.2%**	**3.8%**	**0%**	**1.9%**

2.3 Number of Customers by Area

T&TEC generally serves its customers according to five main distribution areas, namely North, South, East, Central and Tobago, as shown in table 3. In 2014, the South Distribution Area accounted for the largest number of active accounts (136,132), representing 30% of T&TEC's customer base. Tobago had the least number of active accounts (25,089), with 6% of the customer base. The Central had the largest growth among the distribution areas, expanding by 3.1% in 2014.

Table 3: Number of Active Accounts by Area (2013-2014)

Year	Distribution Area					TOTAL
	North	South	East	Central	Tobago	
2013	90,488	133,739	118,280	74,586	25,089	442,182
2014	91,219	136,1116	120,932	76,928	25,538	450,733
% Change	**0.8%**	**1.8%**	**2.2%**	**3.1%**	**1.8%**	**1.9%**

2.4 Electricity Purchased

Energy purchased is measured in kilowatt hours (kWh). There was a minor decline (0.2%) in total electricity purchased by T&TEC, which fell from $9,437,173,000 in 2013 to $9,419,070,885 in 2014 as shown in table 4. The amount of electricity purchased was highest during July-September ($2,412,195,358), and accounted for 25.6% of the total electricity

purchased. While the least purchases were made during January-March ($2,288,589,420), and accounted for 24.3% of total electricity purchased from the generators.

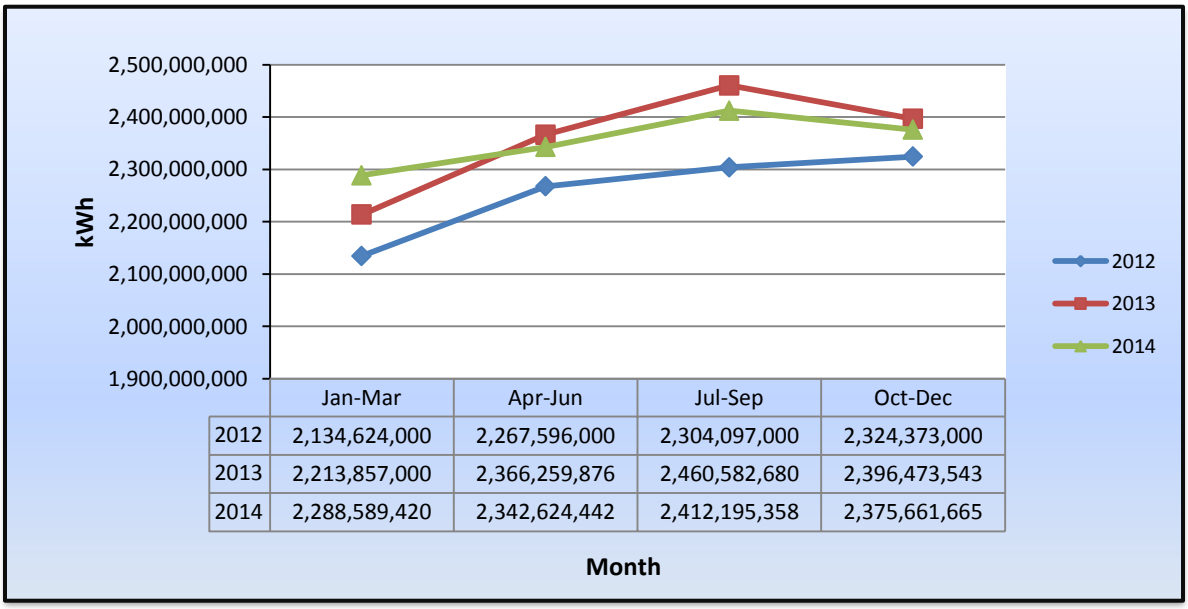
Table 4: Electricity Purchased (2013 - 2014)

Quarter	Electricity Purchases ($/kWh)	
	2013	2014
Jan-Mar	2,213,857,000	2,288,589,420
Apr-Jun	2,366,259,876	2,342,624,442
Jul-Sep	2,460,582,680	2,412,195,358
Oct-Dec	2,396,473,543	2,375,661,665
TOTAL	**9,437,173,000**	**9,419,070,885**

2.4.1 Annual Electricity Purchased Trends

An examination of the trends in annual electricity purchased over the period 2012 to 2014 indicated that in 2012, the amount of electricity purchased increased steadily throughout the year and peaked in the fourth quarter. However, in 2013 and 2014 the amount of electricity purchased increased up to the third quarter, and then declined in the fourth. The largest amount of electricity was purchased during the third quarter (July-September), while the smallest amount was purchased during the first quarter (January-March).

Figure 1: Annual Electricity Purchases Trends (2012 - 2014)



2.5 Electricity Sales

Energy sold is measured in kilowatt-hours (kWh). The total amount of electricity sold to customers by distribution area for 2014 is shown in table 5. The Central Distribution Area had the largest consumption (sales) of electricity, and represented 37% of total consumption. This corresponds with the fact that the area has the highest concentration of large industrial customers throughout the country. There was a minor decline in total consumption as sales decreased from $8,769,418,163 in 2013 to $8,766,782,761 in 2014.

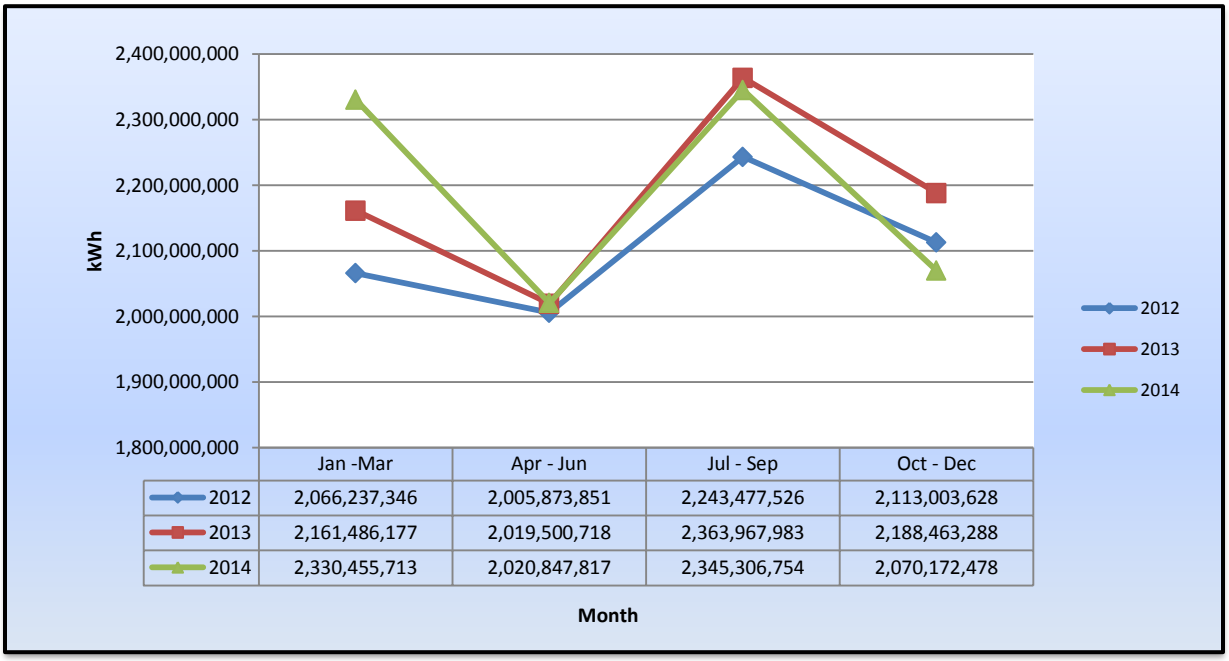
Table 5: Electricity Sales by Distribution Area (2013-2014)

Quarter	Electricity Sales per Distribution Area (kWh)					TOTAL
	North	South	East	Central	Tobago	
Jan -Mar	425,953,551	467,825,645	464,383,136	885,173,520	87,119,861	**2,330,455,713**
Apr -Jun	395,031,452	393,642,684	390,155,789	783,168,212	58,849,680	**2,020,847,817**
Jul - Sep	452,611,651	470,290,887	492,795,616	857,351,598	72,257,002	**2,345,306,754**
Oct - Dec	410,987,537	437,641,660	409,440,348	727,827,402	84,275,531	**2,070,172,478**
Total2014	**1,684,439,826**	**1,769,697,874**	**1,757,406,915**	**3,253,345,202**	**301,892,944**	**8,766,782,761**
Total 2013	**1,673,294,037**	**1,746,840,216**	**1,733,517,435**	**3,328,604,396**	**287,162,080**	**8,769,418,163**

2.5.1 Annual Electricity Sales Trends

An examination of the trends in annual electricity sales over the 12-month period for the years 2012, 2013 and 2014 indicated that the pattern of electricity sales was similar for each of the years. Quarterly electricity sales peaked in the third quarter (July- September), and was at its lowest in the second quarter (April-June).

Figure 2: Annual Electricity Sales Trends (2012-2014)



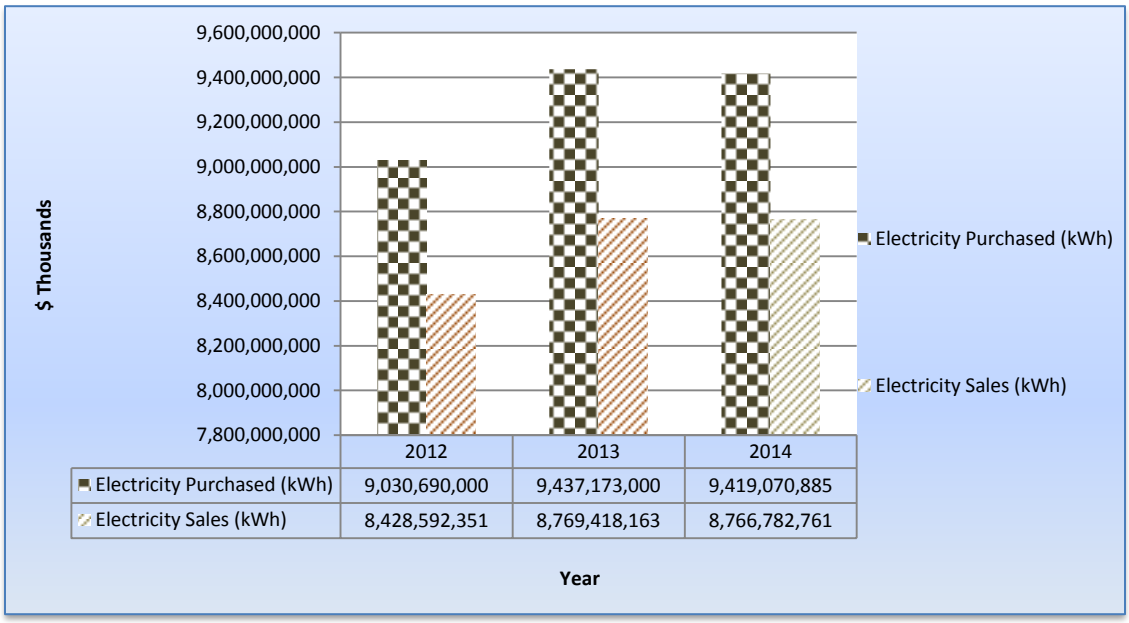
	Jan -Mar	Apr - Jun	Jul - Sep	Oct - Dec
2012	2,066,237,346	2,005,873,851	2,243,477,526	2,113,003,628
2013	2,161,486,177	2,019,500,718	2,363,967,983	2,188,463,288
2014	2,330,455,713	2,020,847,817	2,345,306,754	2,070,172,478

2.6 Annual Electricity Purchases vs. Annual Electricity Sales

The data collected for the electricity purchased by T&TEC from the generators is measured in real-time, while electricity sales are tabulated on customers' consumption billed over various cycles. Consequently, the trend of peaks and troughs for these two indicators do appear not to occur simultaneously in each quarter.

Figure 3 shows a comparison of the annual amounts of electricity purchases to electricity sales over the period 2012 to 2014. During 2012 to 2013, both electricity purchases and sales increased, however the rate of increase in electricity purchases was greater than that of electricity sales over the two years. Whereas, during 2013 to 2014 electricity purchases and sales both decreased, with electricity purchases decreasing at a faster rate than electricity sales.

Figure 3 – Annual Electricity Purchases vs. Annual Electricity Sales (2012-2014)



2.7 Total System Losses

Electrical energy is lost in the transmission and distribution system due to the electrical resistance of the conductors, and some is consumed for own use by T&TEC. Hence, not all the electrical energy entering T&TEC's transmission and distribution network is not sold to customers. Inaccuracies due to defective meters and illegal consumption may also result in discrepancies between the energy supplied to the end users and what is billed. The combination of all the losses is referred to as the total system losses. Technical losses result from inefficiencies in T&TEC's transmission and distribution networks, and commercial losses are due to theft, billing errors, meter inaccuracy, etc.

The RIC has set a system loss target of 6.75% to be achieved by the end of the regulatory control period June 1, 2006 to May 31, 2011. The method used to calculate the system losses for the period is based on the formula used by T&TEC.[6] In 2014, the highest system losses (12.8%) occurred during the fourth quarter (October–December), while the lowest system losses (2.7%) occurred during the third quarter (July-September). Overall, there was a decline in total system

[6] T&TEC's Total System Losses formula is calculated as follows:

$$\text{Total System Losses} = 1 - \left\{ \frac{\text{Energy Units Billed}}{\text{Energy Units Purchased}} \right\}$$

losses from 7.08% in 2013 to 6.93% in 2014, as shown in table 6. However, total system losses remained outside of the target set by the RIC in the Determination.

Table 6: Total System Losses (2013-2014)

Quarter	Energy Units Billed (kWh)	Energy Units Purchased (kWh)	% System Losses (T&TEC'S Formula)
Jan – Mar	2,075,975,056	2,288,589,420	9.29
Apr - Jun	2,273,944,230	2,342,681,442	2.93
Jul - Sept	2,346,690,998	2,412,195,358	2.72
Oct - Dec	2,070,353,149	2,376,116,545	12.87
TOTAL 2014	**8,766,963,433**	**9,419,582,765**	**6.93**
TOTAL 2013	**8,769,418,165**	**9,437,173,099**	**7.08**

2.8 Other Economic Data

This section examines T&TEC's performance based on specific economic and consumption indicators which are reported on a "per employee" or "per customer" basis. The main indicators include electricity sales per employee, customers per employee and consumption per capita.

2.8.1 Electricity Sales per Employee and Customers per Employee

Electricity sales per employee and customers per employee measure labour productivity and the effective use of the utility's resources in the electricity distribution sector.[7] There was a 0.5% increase in electricity sales per employee (kWh) and an increase 1.9% increase in revenue per employee associated with consumption (see table 7). This improvement in labour productivity was based on a 1.9% increase in the total number of customers relative to a 2.9% reduction in the total number of employees at T&TEC during that year.

[7] The World Bank Group (2009). *Benchmarking Data of the Electricity Distribution Sector in the Latin America and Caribbean Region 1995 – 2005*. http://info.worldbank.org/etools/lacelectricity/home.htm

Table 7: Other Economic Data (2013-2014)

Data	2013	2014	% Change
Number of Employees	3,200	3,183	**-0.5**
Electricity Sales (kWh)	8,769,418,163	8,766,782,761	**-0.03**
Number of Customers	442,182	450,733	**1.9**
Electricity Sales per Employee (kWh)	2,740,443	2,754,252	**0.5**
Electricity Sales per Employee ($)	960,022	977,790	**1.9**
Customers per Employee	138	142	**2.9**

2.8.2 Consumption per capita

Consumption per capita is defined as the total amount of electricity sold divided by the population. It gives an indication of a country's electricity consumption averaged per individual not accounting for the specific purpose of use whether domestic, commercial or industrial. There was a 3.8% increase in consumption per capita from 2013 (6,876 kWh) to 2014 (7,140kWh), indicating that there was a marginal growth in average electricity consumption per person within the country over the period. This consumption per capita was compared with data for three Caribbean countries[8], as well as against four other countries with comparable GDP per Capita to Trinidad and Tobago, as shown in table 8.

Consumption per capita in Trinidad and Tobago remained significantly higher than that of the other three Caribbean countries. In fact, in 2014, the consumption per capita for Trinidad and Tobago was greater than the combined consumption per capita of Venezuela (2,660 KWh), Cuba (1,440 KWh) and Jamaica (1,110KWh). However, it was comparable to other countries outside of the region with comparable GDP per capita. Estonia's consumption per capita (6,720 KWh) was closest to T&T's, followed by Czech Republic (6,260 KWh), Oman (6,130 KWh) and Slovak Republic (5,140 KWh) respectively.

[8] Jamaica, Cuba and Venezuela were selected due to data availability at the time.

Table 8: Electricity Consumption Per Capita (2013-2014)

Country	GDP Per Capita (US$)[9]	Consumption per Capita (KWh)[10]		% Change
	2014	2013	2014	
Jamaica	5,119.2	1,126	1,110	**-1.4**
Cuba	7274	1,425	1,440	**1.1**
Venezuela	16,615	3,245	2,660	**-18.0**
Trinidad & Tobago	21,317.4	6,876	7,140	**3.8**
Estonia	20,147.8	6,665	6,720	**0.8**
Slovak Republic	18,501.4	5,202	5,140	**-1.2**
Oman	19,309.6	5,981	6,130	**2.5**
Czech Republic	19,502.4	6,285	6,260	**-0.4**

[9] All GDP per Capita (US$) data was obtained from the World Bank: World Development Indicators at http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2014&start=1960. Except for Cuba and Venezuela which was obtained from the United Nations Database (UN data) at http://data.un.org/Data.aspx?q=GDP+per+capita&d=SNAAMA&f=grID%3a101%3bcurrID%3aUSD%3bpcFlag%3a1

[10] Consumption per Capita (kWh) data for 2014 was obtained from World Bank: World Development Indicators, at http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC/countries/, while 2014data was obtained from the International Energy Agency (IEA) Energy Atlas at http://energyatlas.iea.org/#!/tellmap/-1118783123/1 for availability reasons.

3.0 NETWORK RELIABILITY

A critical part of providing quality service to customers is the delivery of a reliable supply of electricity. An unreliable supply results in economic losses and inconveniences, and increases the likelihood of damage to customer equipment. Therefore, it is important for a utility to meet some minimum standards of reliability, even as it seeks to pursue and maintain economic and operational efficiencies. One of the roles of the RIC, as economic regulator, is to ensure that T&TEC supplies electricity to customers at an acceptable level of reliability.

Reliability metrics can be used as an indication of the condition of the electricity network. These indicators let a utility know if the system is getting better or worse over time. Since all systems are different and stressed by different factors, it can be difficult to make a reasonable comparison between two systems. This means reliability indices are situational in nature and will present different baselines depending on the many intrinsic factors affecting the system. The IEEE Guide for Electric Power Distribution Reliability Indices (IEEE 1366-2012) was used to assess T&TEC's reliability of supply. This is a standard that has been applied across many jurisdictions for the purpose of monitoring and reporting on reliability. Table 9 shows the indices for 2014.

3.1 System Average Interruption Frequency Index (SAIFI)

The System Average Interruption Frequency Index (SAIFI) measures the average number of times that a customer's power is interrupted during a specified time-period. The annual value of SAIFI for 2014 was 4.42 interruptions per customer, which represented a 15.4% improvement from the 5.1 interruptions per customer achieved in 2013. The value of the index suggested that statistically, a T&TEC customer experienced between four to five interruptions in electricity supply per year, as compared to one interruption per customer of the North American Utilities according to IEEE standard (1366-2012). In 2014, SAIFI was highest in July, with 0.55 interruptions per customer on average for the month.

3.2 System Average Interruption Duration Index (SAIDI)

The System Average Interruption Duration Index (SAIDI) measures the average outage duration per customer during a specified time-period. The annual value of SAIDI for 2014 was 326.2 minutes, which represented an 18% improvement from 2013 (398 minutes). This value suggested

that the yearly outage duration for a T&TEC customer was about six times longer than the 58.5 minutes of the North American Utilities according to IEEE standard (1366-2012). In 2014, SAIDI was highest in October, with outages lasting 37.8 minutes on average for the month.

3.3 Customer Average Interruption Duration Index (CAIDI)

The Customer Average Interruption Duration Index (CAIDI) is a ratio of SAIDI to SAIFI. It is a measure of the average outage duration that a customer would experience during a specified time-period. CAIDI is also viewed as the average restoration time. The annual value of CAIDI for 2014 was 73.8 minutes, which represented a marginal improvement (2.9%) from the 76 minutes attained in 2013. This suggested that a customer, who experienced an outage on the distribution system, was without electricity for an average of 1.23 hours, compared 1.61 hours of the North American Utilities according to IEEE standard (1366-2012). In 2014, CAIDI was highest in February (85.8 minutes) and lowest in July (58.8 minutes).

Table 9: Network Reliability (2014)

Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2014	NAU*
SAIFI (No./customer)	0.44	0.24	0.28	0.37	0.26	0.36	0.55	0.43	0.32	0.49	0.42	0.26	**4.42**	1.11
SAIDI (minutes)	25.8	20	23.4	25.2	19.8	30	32.4	35	26.4	37.8	31.8	18.6	**326.2**	58.5
CAIDI (minutes)	59.4	85.8	82.8	69	76.2	83.4	58.8	82.2	81	76.2	75.6	71.4	**73.8**	96.5

*Mean values for North American Utilities supplied by the American Public Power Association, APPA, according to IEEE Standard 1366-2012.

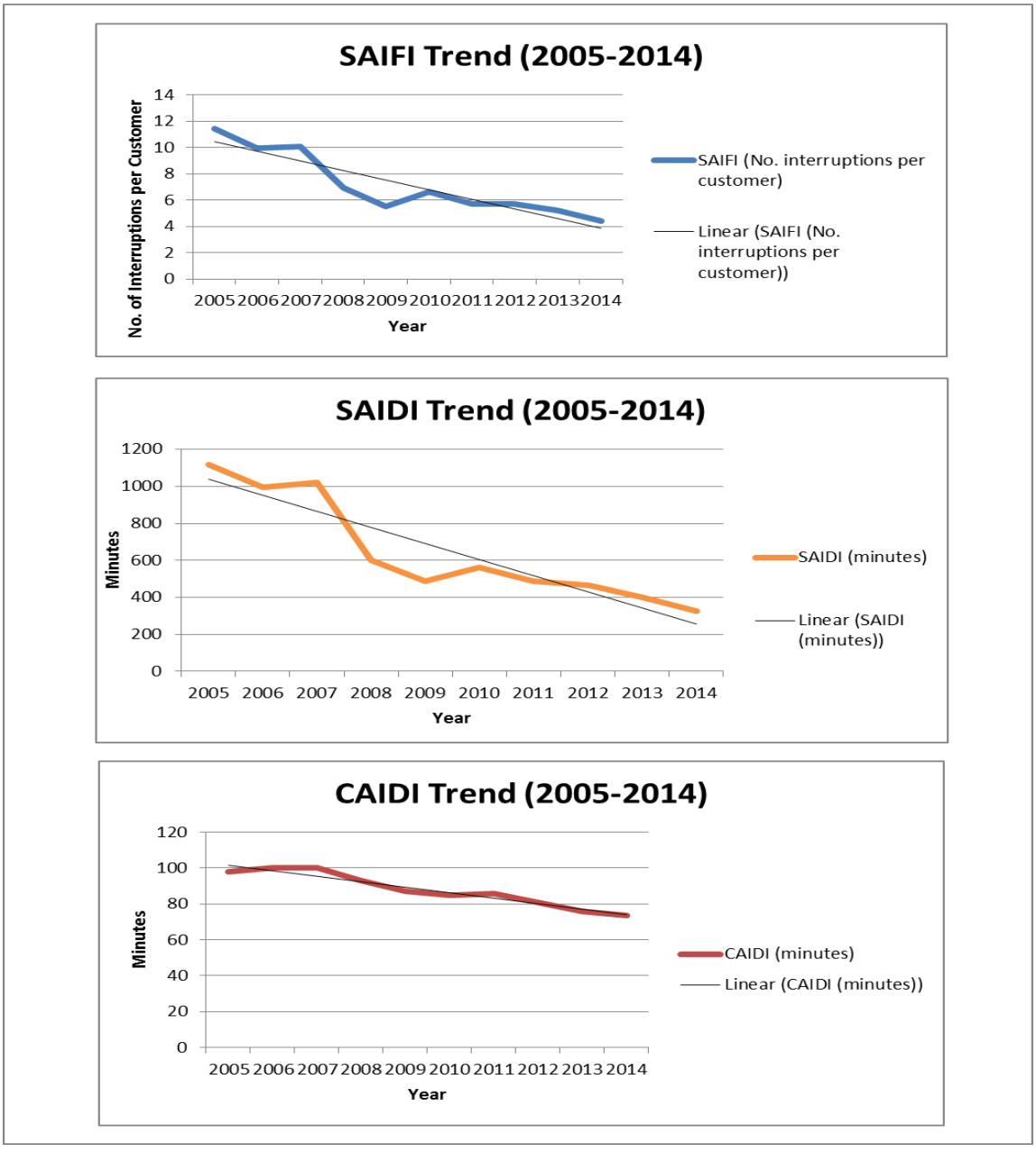
3.4 Network Reliability Trends

An examination of the trends in annual values of SAIFI, SAIDI and CAIDI over the ten-year period 2005 – 2014 showed that there was an overall decline in the indicators, suggesting that T&TEC has been improving its quality of service to customers, by providing a more reliable supply of electricity (see table 10 and figure 4).

Table 10: Network Reliability (2005-2014)

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SAIFI (No. interruptions per customer)	11.43	9.93	10.1	6.94	5.55	6.61	5.68	5.71	5.21	4.42
SAIDI (minutes)	1116	996	1020	603	487	563	486	464	398	326.2
CAIDI (minutes)	98	100	100	93	87	85	86	81	76	73.8

Figure 4: Network Reliability Trends (2005-2014)



3.5 Number of Transmission Trips

In 2014, there were 23 transmission trips, with 17 of these trips occurring on the 33KV network and 6 trips on the 66kV network, as shown in table 11. There were no trips on the 132kV network and therefore no need for restoration. T&TEC performed better at restoring trips on the 66kV network than on the 33kV network, with 83% of the trips being restored within three hours, and 17% within five hours. In the case of the 33kV network, 76% of the trips were restored within three hours and 12% within five hours.

Table 11: Transmission Trips & Interruptions Affecting Customers (2014)

Month	Transmission Circuit Trip outs			Number of Interruptions Restored (<3hrs)			Number of Interruptions Restored (<5hrs)		
	33kV	66k V	132kV	33kV	66k V	132kV	33kV	66k V	132kV
Jan	0	0	0	0	0	0	0	0	0
Feb	0	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	0	0	0	0
Apr	0	1	0	0	1	0	0	0	0
May	2	0	0	2	0	0	0	0	0
Jun	1	1	0	1	0	0	0	0	0
Jul	2	0	0	1	0	0	0	1	0
Aug	3	0	0	2	0	0	1	0	0
Sep	3	1	0	3	1	0	0	0	0
Oct	1	3	0	1	3	0	0	0	0
Nov	2	0	0	1	0	0	0	0	0
Dec	3	0	0	2	0	0	1	0	0
Total	**17**	**6**	**0**	**13**	**5**	**0**	**2**	**1**	**0**

3.5.1 Summary of Transmission Trips & Interruptions

There was a 17.9% decline in the number of transmission trips on the network in 2014 as shown in table 12. The average number of trips restored within three hours increased from 60.7% in 2013 to 78.3% in 2014. Similarly, the average number of trips restored within five hours increased from 3.6% in 2013 to 13% in 2014.

Table 12: Summary of Transmission Trips & Interruptions (2013-2014)

Indicator	No. of Transmission Trips & Interruptions (2013)				No. of Transmission Trips & Interruptions (2014)			
	33kV	66kV	132kV	Total	33kV	66kV	132kV	Total
TOTAL	17	8	3	**28**	17	6	0	**23**
Restoration < 3hrs	15	1	1	**17**	13	5	0	**18**
Restoration < 5hrs	1	0	0	**1**	2	1	0	**3**
% < 3hrs	88.2%	12.5%	33.3%	**60.7%**	76.5%	83.3%	0%	**78.3%**
% < 5hrs	5.8%	0%	0%	**3.6%**	11.8%	16.7%	0%	**13.0%**

4.0 CUSTOMER RESPONSIVENESS AND SERVICE

This section highlights customer complaints and their resolutions, with a focus on certain aspects that are most important to customers. One of the best signals that a utility is improving its service to customers is a reduction in the number of complaints received. In assessing T&TEC's responsiveness and service to customers, the RIC examined the number of complaints received, the number of complaints resolved and the complaints resolution rates.

4.1 Complaints Received by Type

There was an overwhelming increase (1012.2%) in the total number of complaints received, which rose from the 269 complaints in 2013 to 2992 complaints in 2014 (see Table 13). This increase was largely due an influx of billing queries, which rose by over a 1000% in 2014. Billing queries alone accounted for 85% of total customer complaints. Additionally, complaints related to poles/other[11] increased by 99%, while damaged appliances and high/low voltage complaints increased by 56% and 36% respectively. T&TEC received the largest number of complaints (1,122) during the third quarter (July-September), and the least (41) during the first quarter (January-March).

Table 13: Complaints Received by Type (2013-2014)

Type of Complaint	No. of Complaints Received (2013)					No. of Complaints Received (2014)				
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Total	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Total
Billing Query	6	3	4	3	16	0	4	926	1621	2551
Damaged Appliances	0	1	33	81	115	13	62	96	9	180
High/Low Voltage	5	5	8	4	22	2	5	13	10	30
Poles/Other	22	33	44	17	116	26	56	87	62	231
Total	**33**	**42**	**89**	**105**	**269**	**41**	**127**	**1122**	**1702**	**2992**

[11] "Other" complaints include but are not limited to defective street lights, power outages, delays in the delivery of service and line relocation and removals.

4.2 Complaints Resolved by Type

There was significant increase in the number of complaints resolved, which rose from 97 in 2013 to 1,878 in 2014 as shown in table 14. Of the total number of complaints resolved, 90% was related to billing queries alone, while the remaining 10% was collectively related to poles/other, damaged appliances and high/low voltage complaints. In 2014, T&EC resolved the most complaints (1,030) during the third quarter (July-September), and the least (27) during the first quarter (January-March).

Table 14: Complaints Resolved by Type (2013-2014)

Type of Complaint	**Complaints Resolved (2013)**					**Complaints Resolved (2014)**				
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Total	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Total
Billing Query	5	2	3	1	11	0	3	926	753	1682
Damaged Appliances	0	1	7	15	23	7	9	62	2	80
High/Low Voltage	2	3	4	2	11	2	3	4	6	15
Poles/Other	9	15	16	12	52	18	21	38	24	101
Total	**16**	**21**	**30**	**30**	**97**	**27**	**36**	**1030**	**785**	**1878**

4.3 Complaints Resolution Rate

There was significant improvement in T&TEC's customer complaints resolution rate, as the rate increased from 36.1% in 2013 to 62.8% in 2014 as shown in table 15. In 2014, T&TEC had the highest resolution rate (91.8%) during the third quarter (July-September) and the lowest (28.3%) during the second quarter (April-June).

Table 15: Complaints Resolution Rate (2013-2014)

Indicator	Year									
	2013					2014				
	Jan-Mar (Q1)	Apr-Jun (Q2)	Jul-Sep (Q3)	Oct-Dec (Q4)	Total (Q1-Q4)	Jan-Mar (Q1)	Apr-Jun (Q2)	Jul-Sep (Q3)	Oct-Dec (Q4)	Total (Q1-Q4)
No. of Complaints Received	33	42	89	105	269	41	127	1122	1702	2992
No. of Complaints Resolved	16	21	30	30	97	27	36	1030	785	1878
Resolution Rate (%)[12]	**48.5**	**50**	**33.7**	**28.6**	**36.1**	**65.9**	**28.3**	**91.8**	**46.1**	**62.8**

4.4 Response to Written Complaints

Queries, requests and/or complaints can be made to the utility in verbal or written form. One of the important indicators of service quality is the promptness of T&TEC's response to the more formal written queries and complaints of customers. Table 16 provides a summary of T&TEC's performance with respect to written complaints received during 2013-2014.

There was a 36% increase in the number of written complaints received by T&TEC in 2014. Of the 253 written complaints received, 11.9% were not responded to within 2 weeks. In March and December, T&TEC had the highest percentage (43.4%) of written complaints that were not responded to within 2 weeks. While in May, June and November, T&TEC responded to all written complaints within 2 weeks.

[12] The percentage of customer complaints that are resolved during the period, calculated as {(Complaints Resolved/Complaints Received) *100}

Table 16: Response to Written complaints (2013-2014)

Month	No. of written complaints received	No. of written complaints not responded to within 2 weeks	Percentage complaints with Response > 2 weeks
Jan	0	2	-
Feb	8	4	50
Mar	16	7	43.8
Apr	14	2	14.3
May	29	0	0
Jun	18	0	0
Jul	42	1	2.4
Aug	23	1	4.3
Sep	28	3	10.7
Oct	49	3	6.1
Nov	10	0	0
Dec	16	7	43.8
TOTAL 2014	**253**	**30**	11.9
TOTAL 2013	**186**	**55**	29.6

5.0 EQUIPMENT MAINTENANCE

T&TEC is required to provide information on specific directives related to its operations, in addition to meeting requirements stipulated by the RIC in the Determination. These directives include repair and maintenance of pole-mounted transformers, and repair/replacement of defective streetlights, which are discussed below.

5.1 Pole-mounted Transformers

According to the Determination, T&TEC is required to repair and maintain pole-mounted distribution transformers at a rate of at least 20% per annum. Table 17 shows the number of repairs and maintenance to pole-mounted transformers by quarters for the year 2014. Additionally, table 18 shows a year-on-year comparison of repairs and maintenance to pole-mounted transformers for the years 2013 and 2014. There were 34,743 pole-mounted transformers in service at the end of 2014, which represented a 2.6% increase from 2013. The annual percentage of transformers inspected/serviced declined to 101.7% in 2014, but remained well above the 20% minimum requirement. Most of the maintenance was undertaken in the fourth quarter, during which approximately 43.4% of the existing units were inspected/serviced.

Table 17: Repairs and Maintenance to Pole-Mounted Transformers by Quarter (2014)

Indicator	**Quarter**			
	Jan-Mar	Apr-Jun	July-Sep	Oct-Dec
Number of Pole Mounted Distribution Transformers	34,041	34,267	34,525	34,743
Number of Pole Mounted Distribution Transformers Inspected[13]	4,550	9,362	4,620	14,193
No of Transformers Serviced	887	403	461	869
% Inspected/ Serviced	**16.0%**	**28.5%**	**14.7%**	**43.4%**

[13] The number recorded may include inspection of additional equipment such as high voltage sections and high voltage equipment (e.g. air break switches).

Table 18: Year-on-comparison of Repairs & Maintenance of Pole Mounted Transformers (2013-2014)

Indicator	Year		% Change
	2013	2014	
Total No. of Pole Mounted Distribution Transformers	33,858	34,743	**2.6%**
Total No. of Inspections/Servicing	37,955	35,345	**-6.9%**
% Inspections/Servicing	**112.1%**	**101.7%**	**-**

5.2 Street lighting Repair and Replacement

T&TEC is responsible for monitoring the condition and performance of public lighting assets. This includes the development and implementation of plans for the installation, operation, maintenance and replacement of public lighting. It is also required to monitor highway lighting and repair non-working lights within 14 days of discovery. According to the Determination, Street lighting failures reported to the service provider are to be repaired within 7 days.

In 2014, T&TEC received 27,564 reports, of which 11,519 (or 41.8%) repairs and installations were completed in within 7 days. T&TEC also completed 4,385 repairs and installations, pertaining to failures that were not reported by the public. In total, T&TEC completed 26,172 repairs and installations in 2014 as shown in table 19.

Table 19: Quarterly Street Light Repairs and Installations (2014)

Indicator	Quarter				Total
	Jan- Mar	Apr-Jun	July - Sept	Oct - Dec	
(1)No. of Reports Received	8251	5913	7379	6021	**27564**
(2)No. of Repairs & Installation Completed within 7 days	3821	2360	3389	1949	**11519**
(3)No. of Repairs & Installation without a report	1413	849	1134	989	**4385**
(4)Total No. of Repairs &Installation Completed	6553	6837	6618	6164	**26172**

Notes:
(1) Reports received from customers and/or members of the public for repairs to existing streetlights and for new streetlights
(2) Work arising from reports received as in Note 1 and completed in **7 days or less** of the date received.
(3) Work arising from sources other than customer reports, e.g. inspections by staff and observation by crews.
(4) Total work completed within the quarter i.e. repairs and installations arising from customer reports as well as inspections and observation by crews.

The number of reports of street lighting failures received in 2014 was approximately 11.1% higher than that received in 2013 (see table 20). However, there was a 26.7% decline in the number of reported failures that were repaired within 7 days. Consequently, there was 21.5% decrease in the 7-day repair rate for reported failures. In terms of unreported failures, the number of reports detected and repaired increased by approximately 8.1% in 2014. Overall, there was a 7.7% decline in the total number of repairs completed by T&TEC, which fell from 28,365 repairs in 2013 to 26,172 repairs in 2014.

Table 20: Annual Street Light Repairs (2013-2014)

Indicator	2013	2014	% Change
No. of Reports Received	24,818	27564	**11.1%**
No. of Repairs Completed within 7 days	15,711	11519	**26.7%**
7-day Repair Rate for reported failures	63.3%	41.8%	**21.5%**
No. of Repairs without a report	4,058	4385	**8.1%**
Total No. of Repairs Completed (Including carryover from previous year)	28,365	26172	**7.7%**

6.0 FINANCIAL PERFORMANCE AND EFFICIENCY

One of the primary goals of economic regulation is to ensure not just the financial viability and sustainability of utility companies but also to ensure that at a reasonable price, they provide acceptable quality of service to customers. One of the responsibilities of the RIC is to ensure that T&TEC can sustainably finance its operational activities while making sufficient returns on its regulatory asset base (RAB) so that T&TEC can raise additional finance for additional activities within reasonable terms. The RIC is therefore conducting a financial assessment which would help determine whether T&TEC is capable of meeting these requirements. A select set of financial ratios were used to assess T&TEC's financial performance from a debt financing, liquidity, profitability and efficiency perspective (see Table 21).

Table 21: Select Financial Ratios of T&TEC's Performance (2013-2014)

RATIOS	YEAR		TARGET
	2013	2014	
Debt Financing			
Gearing - Full Ratio	(18.02)	(7.07)	
Gearing - Equity & Reserves Only	7.70	10.41	
Funds Flow Interest Cover	0.82	(0.30)	Greater than 3
Cash Interest Cover	(3.02)	(5.22)	Greater than 1
Debt Pay Back Period (Years)	(146.88)	(30.74)	Between 5 to 7
Debt as a proportion of RAB (%)	5.64	9.45	Below 65%
Liquidity			
Collection Rate (%)	79%	80%	
Revenue Billed/Operating Cost	0.98	0.87	Greater than 2
Revenue Collected/Operating cost	1.01	0.93	Greater than 1
Internal Financing (%)	-57%	-252%	Greater than 40%
Profitability and Efficiency			
Return on RAB (%)	-4%	-31%	≈ 9%
Operating Cost per unit ($/kWh)	0.34	0.35	

6.1 Debt Financing

Gearing demonstrates a company's ability to meet its financial obligations or funds borrowed in comparison to owners' equity or capital. Although high gearing ratios are customary for utility companies, T&TEC displayed in both periods that its gearing ratio exceeds the norm and is at risk for being unable to meet its financial obligations. This is because it has no leverage to source finance and is highly susceptible to possible business failure without government guarantees. The full gearing ratio is also reflected negatively because there is a retained deficit and not retained earnings/surplus as reflected on the financial statements in 2013. The loan portfolio of T&TEC proved to be a challenge over this period as both the funds flow and cash interest coverage worsened and was significantly below their ideal target ranges. It suggests that T&TEC may have experienced difficulty in meeting its finance costs. This increase was partially attributable to the increased interest rates associated with the renewed PPA agreement in which the interest rates increased from 5% to 8.75%. The debt payback period in both 2013 and 2014 were negative as the 'funds from operations (FFO)' was insufficient to cover the increase in operating expenditure for that period. This also resulted in the negative figure reflected as the payback period for 2013-2014 as well. In 2014 long term debt increased by 35% which resulted in a long debt repayment period which forces T&TEC to find means to increase revenues and significantly reduce its operating expenditures in order to devote more funds to debt repayment. Debt as a portion of Regulatory Asset Base (RAB) remained well above the target of 65% which suggests that borrowed funds which should have been allocated to RIC approved capital projects were being used to fund other projects and other activities

6.2 Liquidity

According to the indicators presented, T&TEC's liquidity was below the targeted levels as the collection rate hovered at 79% and 80% in 2013 and 2014 respectively. Revenue levels remained constant in 2013-2014, the billed revenue to operating expenditure and the revenue collected to operating cost both showed declines from 2013 to 2014. This suggests that T&TEC may have faced challenges in meeting its full operating costs which is evident in the 60% ($1.3 billion) increase in payables between 2013 and 2014. This claim can be further substantiated by the fact that in 2013 revenue was only able to cover 98% of operating costs while in 2014 revenue just covered 87%. The revenue collected during the period yielded no significant variance in performance to billed revenue. However, revenue dropped to 93%.

The constant revenue figures and increasing operating costs continue to negatively impact the internal financing ratio as the FFO was in a deficit in both 2013 and 2014 respectively making T&TEC completely unable to provide any internal financing. This ratio also does not take into account the funds required to finance T&TEC's existing loans which are steadily increasing and becoming more expensive to fund as T&TEC continues to lose its leverage. This situation confines the funds available to finance capital projects.

6.3 Profitability and Efficiency

T&TEC is a state-owned utility and analysing profitability may not be as useful as in the case of an investor-owned utility. Instead of assessing the traditional return on capital, measuring the return on the RAB is better suited to entities with this type of governance structure. In 2013/2014, the net cash flow return on the RAB was negative 4% and negative 31% respectively, which was below the benchmark of positive 9%. This implies that T&TEC is not making an acceptable return on their RAB and is not generating returns to invest into their future planned activities.

The above approach is often supplemented by financial metrics on costs such as the operating cost per kWh, which may be more suited in determining the efficiency of operations in a state owned public utility. The operating cost per kWh remained steady at $0.34 and $0.35 between 2013 and 2014 respectively. Efficiency incentives were included in the last rate review, to encourage the utility to keep operating costs at sustainable levels.

The RIC will continue with such financial efficiency measures in the second rate review period to incentivize the service provider to reduce its costs.

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

In spite of a 2% growth in T&TEC's customer base in 2014, electricity purchased and electricity sales declined by 0.2% and 0.03% respectively. Total system losses declined from 7.08% in 2013 to 6.93% in 2014, which suggests that T&TEC may have been improving its method to control system losses.

T&TEC's system reliability improved as indicated by notable reductions in the system reliability indicators. In 2014, the SAIDI value was 4.42 interruptions per customer, which represented a 15.4% improvement from 2013. The annual values of SAIDI (326.2 minutes) and CAIDI (73.8 minutes) improved by 18% and 2.9% respectively. While the CAIDI indicator performed well in comparison to the IEEE Standard (1366-2012), there is a significant margin for improvement in the SAIFI and SAIDI indicators. Additionally, there was a 17.9% reduction in the number of transmission trips on the network, with a greater number of these trips being restored within three hours, when compared to 2013.

There was an overwhelming increase (1012.2%) in the number of customer complaints received by T&TEC in 2014. Accordingly, the resolution rate rose from 36.1% in 2013 to 62.8% in 2014. Billing queries accounted for majority of the complaints received (85.3%), followed by poles/other (7.7%), damaged appliances (6.1%) and high/low voltage complaints (1.0%).

There were 34,743 pole-mounted transformers in service at the end of 2014, which represented a 2.6% increase from 2013. Although the annual percentage of the transformers inspected and serviced by T&TEC fell from 112.1% in 2013 to 101.7% in 2014, it remained above the minimum requirement of at least 20% per annum. With respect to street light repairs and replacement, T&TEC received 27564 reports on street lighting failures in 2014. The 7-day repair rate for these reported failures declined to 41.8% in 2014.

In terms of T&TEC's financial position, operating expenditure (TT$3,356,536,000) was approximately 14.3% higher than operating revenue from electricity sales (TT$2,934,544,000) in 2014. Long-term debt increased by 35% while debt as a portion of the Regulatory Asset Base

(RAB) remained well above the target of 65%; suggesting that T&TEC needs to place more emphasis on utilizing borrowed funds for the intended RIC approved capital projects. Notwithstanding a 1% increase in its collection ratio, T&TEC's liquidity position remained below targeted levels.

7.2 RIC's Recommendations

- T&TEC should investigate why there was a significant jump in complaints, and develop a strategy to reduce the number of consumer complaints it receives, especially those related to billing queries, damaged appliances, high/low voltage and poles/other.
- T&TEC needs to review and update its street lighting repair and maintenance programme
- T&TEC should closely monitor its operating cost per unit ($/kWh) as a gauge to its efficiency and seek to maintain or improve its performance in this regard.
- T&TEC should continue its efforts to collect outstanding funds, including accounts receivables from government Ministries and local government authorities.

APPENDIX: PERFORMANCE INDICATORS FOR T&TEC

Item	Category	Indicator	Definition	Units	Reporting Period
1.0	**Aggregate Data**				
1.1		Number of electricity customers by class and area	T&TEC's customer data		Yearly
1.2		KWh sales by area	T&TEC's customer data		Semi Annually
1.3		KWh purchased	The basic unit of electric demand, equal to 1,000 watt-hours.	KWh	Monthly
1.4		Total System Losses	Difference between MWh purchased and sold	MWh	Semi Annually
1.5		Number of connections and disconnections			Yearly
1.6		Peak demand	The maximum load during a specified period of time	MW	Yearly
1.7		Electricity coverage (i.e. Access to electricity)	$\frac{[\text{No. of customers (T\&TEC stats)}]}{[\text{No. of households in T\&T}]}$		Quarterly & Yearly
2.0	**Financial**				
2.1		Maintenance cost per kWh Sold	$\frac{\left[\begin{array}{c}\text{Total annual maintenance costs} \\ \text{(excluding capital cost)}\end{array}\right]}{[\text{MWh sold}]}$	$	Yearly
2.2		Cost of fuel per kWh	$\frac{[\text{Total costs of fuel}]}{[\text{Kwh generated}]}$	$	Quarterly & Yearly
2.3		Cost of fuel (sales)	$\frac{[\text{Fuel costs}]}{[\text{Total utility revenues}]} \times 100$	%	Quarterly & Yearly
2.4		Revenue per kWh	$\frac{[\text{Total revenue from sales}]}{[\text{Total no. of Kwh sold}]}$	($)	Yearly
2.5		Internal manpower costs ratio	Annual internal manpower costs / annual running costs x 100.	%	Yearly
2.6		Energy costs ratio	Annual energy costs / annual running costs x 100.	%	Yearly
2.7		Depreciation costs ratio	Annual depreciation costs / annual capital costs x 100.	%	Yearly

Item	Category	Indicator	Definition	Units	Reporting Period
2.8		Net interest costs ratio	(Interest expenses costs – interest income) / annual capital costs x 100.	%	Yearly
2.9		Sales revenues	(Sales revenues / annual revenues) x 100	%	Yearly
2.10		Total cost coverage ratio	Annual revenues / annual costs.	%	Yearly
2.11		Delay in accounts receivable	Year-end account receivable / annual sales revenues x 12.	months equivalent	Yearly
2.12		Investment ratio	Annual investments subject to depreciation / annual depreciation x 100.	%	Yearly
2.13		Debt service coverage ratio	Profit before interest and tax / (Interest + capital repayments).	%	Yearly
2.14		Operating ratio	$\frac{[\text{Operating costs (including depreciation and interest)}]}{[\text{Operating revenue}]}$	%	Yearly
2.15		Working ratio	$\frac{[\text{Operating costs (excluding depreciation and interest)}]}{[\text{Operating revenue}]}$	%	Yearly
2.16		Return on net fixed assets	Net operating income / net fix assets x 100.	%	Yearly
2.17		Return on equity	Profit after interest and tax / shareholders' equity x 100.	%	Yearly
2.18		Operating cost per customer	$\frac{[\text{Total operating costs}]}{[\text{Total no. of customers}]}$	($)	Yearly
2.19		Operating revenue per kWh	$\frac{[\text{Total operating revenue}]}{[\text{Total no. of KWH sold}]}$	($)	Yearly
2.20		Current ratio	$\frac{[\text{Current assets}]}{[\text{Current liabilities}]}$	%	Yearly
2.21		Quick Ratio	$\frac{[\text{Current assets - stock}]}{[\text{Current liabilities }]}$	%	Yearly

Item	Category	Indicator	Definition	Units	Reporting Period
2.22		Return on capital employed	$\frac{[\text{Profit before interest and tax}]}{[\text{Capital employed }]} x100$	%	Yearly
2.23		Gearing	$\frac{[\text{Interest bearing debt}]}{[\text{Interest bearing debt + equity}]}$		Yearly
2.24		Creditors Payments	$\frac{[\text{Creditors}]}{[\text{Credit purchases}]} x12$	Monthly equivalent	Yearly
2.25		Total revenue	Operating revenue and other revenue for the period	($)	Yearly
2.26		Total expenditure	Operating expenses plus other expenses (Operating Expenses includes Generation, Transmission and Distribution, Administration and General, and Depreciation)	($)	Yearly
2.27		Operating profit	Revenue from the organization's regular activities, less costs, and expenses and before income deduction	($)	Yearly
2.28		Asset turnover	$\frac{[\text{Sales}]}{[\text{Capital employed }]}$		Yearly
2.29		Interest Cover	$\frac{[\text{Profit before interest and tax}]}{[\text{Interest }]}$		Yearly
2.30		Long term debt	Debt liabilities due in excess of one year	($)	Yearly
3.0	**Network Reliability**				
3.1		System average interruption frequency index (SAIFI) (Average number of sustained interruptions per customer)	Total number of reported customer interruptions greater than 1 minute duration / total number of customers served	Interruptions per year	Yearly

Item	Category	Indicator	Definition	Units	Reporting Period
3.2		System average interruption duration index (SAIDI) (Average minutes off supply per customer)	Sum of each outage duration in minutes times the number of customers / total number of customers served	Minutes	Yearly
3.3		Customer average interruption duration index (CAIDI) (Average interruption duration)	$\frac{[SAIDI]}{[SAIFI]}$	Minutes	Yearly
3.4		Number of faults per 10km of distribution lines			Yearly
3.5		Number of faults per 20km of transmission lines			Yearly
3.6		Number of transmission and distribution circuit trip outs by voltage level			Yearly
3.7		Interruptions restored within 3 hours and 5 hours			Yearly
3.8		Supply interruptions per 100 connected customers			Yearly
3.9		Number of complaints on voltage levels per 100 connected customers			Yearly
3.10		Number of faults assigned to modifications at substations			Yearly
3.11		Disaggregation of causes for interruptions of supply: 1. Maintenance 2. New construction 3. User connection 4. Faults			Yearly
3.12		Average response time to interruptions		Minutes	Yearly
4.0	**Affordability and other Economic Data**				

Item	Category	Indicator	Definition	Units	Reporting Period
4.1		Sales per employee (KWh)	$\frac{[\text{Total KWh sales}]}{[\text{Number of employees}]}$	(KWh)	Yearly
4.2		Sales per employee ($)	$\frac{[\text{Total revenue form sales}]}{[\text{Number of employees}]}$	($)	Yearly
4.3		Customers per employee	$\frac{[\text{Total no of customers}]}{[\text{Total number of employees}]}$	Number	Yearly
4.4		Low/High voltage complaints by area		Number	Quarterly and Yearly
4.5		Consumption per capita (kWh)	$\frac{[\text{Total Kwh sales}]}{[\text{Total population}]}$	KWh	Yearly
4.6		Tariff for electricity services by category			Yearly
4.7		Restrictions for non payment of bills		Number	Yearly
4.8		Average consumption by class		KWh	Yearly
4.9		Average electricity bill by class		KWh	Yearly
4.10		Percentage of Customers with installment plans			Yearly
5.0	**Customer Responsiveness and Service**				
5.1		Calls to emergency phone Line(% answered in 30 sec.)			Quarterly and Yearly
5.2		Written complaints not responded to within 5 working days			Quarterly and Yearly
5.3		Complaints received (per 100 customers)			Quarterly and Yearly
5.4		Complaints by major type	Reporting on the major areas of complaint	Number	Quarterly and Yearly
6.0	**Operational Indicators**				
6.1		Operator effectiveness - Training requirements (Per generation unit)	$\frac{[\text{MWh lost due to operator caused outage}]}{[\text{MWh generated}]} \times 100$	%	Quarterly and Yearly

Item	Category	Indicator	Definition	Units	Reporting Period
6.2		Performance of generation unit when most needed (Per generation unit)	$\frac{[\text{Output (MW) at each monthly peak}]}{[\text{Name plate rating}]}$	Number	Quarterly and Yearly
6.3		Spinning Reserves Availability Indicates how well the system responds to load increases	$\frac{[\text{Spinning reserves at each monthly peak}]}{[\text{System peak load}]} \times 100$	%	Quarterly and Yearly
6.4		Generator Performance under Peak Load	$\frac{\left[\begin{array}{l}\text{The generator unit output (MW)}\\ \text{at each monthly system load peak}\end{array}\right]}{[\text{The unit's name plate rating}]}$		Quarterly and Yearly
6.5		Capacity Factor	$\frac{[\text{Annual electricity produced (MWh)}]}{\left[\begin{array}{l}\text{Installed capacity (MW) x}\\ \text{8760 (period in hours)}\end{array}\right]} \times 100$	%	Yearly
6.6		Load Factor When the capacity factor is approximately the same as the load factor, this is an indication that installed capacity matches demand.	$\frac{[\text{Annual electricity produced (MWh)}]}{\left[\begin{array}{l}\text{Maxium load (MW) x}\\ \text{8760 (period in hours)}\end{array}\right]} \times 100$	%	Yearly
6.7		Monthly System Peak Load Demand Indicates if monthly system peak loads are being met	$\frac{[\text{Available capacity (MW) at each monthly peak}]}{[\text{System peak load}]} \times 100$	%	Quarterly and Yearly
6.8		Generation Unavailability This indicates the generation capacity short fall due to forced or planned outages	$\frac{\left[\begin{array}{l}\text{Unavailable capacity (MW)}\\ \text{at each monthly peak}\end{array}\right]}{[\text{System peak load}]} \times 100$	%	Quarterly and Yearly
6.9		Forced outage rate at monthly peak (per generator)	$\frac{[\text{unit rating (MW)} \times \text{outage hours (hrs)}]}{[\text{installed capacity (MW)} \times \text{period (hrs)}]}$		Quarterly and Yearly
6.10		Availability Factor Measures the availability of each unit after partial or full outages (both planned and forced) have been allocated	$\frac{\left[\begin{array}{l}\text{Total hours of operation}\\ \text{of plant during the period}\end{array}\right]}{[\text{Total length of period (hours)}]} \times 100$ Ratio of available to installed capacity	Between 70% to 80% of the range, depending on system output factor %	Quarterly and Yearly

Item	Category	Indicator	Definition	Units	Reporting Period
		Indicates whether sufficient capacity is available in the total system			
6.11		Output Factor (per unit) Measures the extent to which each unit capability is used	$\frac{[\text{MWh generated in period}]}{[\text{Site rating on unit (MW) x hours in period connected to system}]} \times 100$	%	Quarterly and Yearly
6.12		Realization of monthly system loads	$\frac{[\text{Available capacity (MW)}]}{[\text{System peak load at each monthly peak}]} \times 100$	%	Quarterly and Yearly
6.13		Inadequate generation capacity due to a forced or planned outages	$\frac{[\text{Unavailable capacity (MW)}]}{[\text{System peak load at each monthly peak}]} \times 100$	%	Quarterly and Yearly
6.14		Average Heat Rate (per unit) Measures the amount of energy needed to produce one KWh of electrical output. Provides information on how efficient the conversion from heat to KWh. The smaller the heat rate the greater the efficiency	$\frac{[\text{Total Energy content of fuel burned}]}{[\text{Net KWh generated by unit}]}$	kJ/KWh	Quarterly & yearly