THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF ENERGY

ENERGY AND WATER UTILITIES REGULATORY AUTHORITY (EWURA)

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Energy and Water Utilities Regulatory Authority
ISO 9001:2015 Certified

NATURAL GAS SUB-SECTOR REGULATORY PERFORMANCE REPORT FOR THE YEAR ENDED 30TH JUNE 2021

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CHAIRMAN'S STATEMENT

On behalf of the Board of Directors of the Energy and Water Utilities Regulatory Authority (EWURA), I am pleased to present an overview of the Mid and Downstream Natural Gas Sub-Sector Annual Performance Report for the Financial Year Ended 30th June 2021. This is the second annual performance report for the Mid and Downstream Natural Gas Sub-sector after the first report for the financial year ended 30th June 2020.

The report has been prepared in fulfilment of the Authority's legal obligation to disseminate information to its stakeholders on matters relevant to the regulation of the mid and downstream natural gas sub-sector. The report has been prepared to inform stakeholders on the developments and milestones achieved during the period under review. It provides key information to investors on the available and potential investment opportunities in the mid and downstream natural gas sub-sector.

The report outlines the overall annual performance of the mid and downstream natural gas sub-sector during the period under review. It covers operational and financial performance of regulated suppliers; natural gas supply and demand balance; safety and technical requirements, legal and regulatory compliance. It also highlights achievements and key observations noted during the period under review. Further, the report provides information on policy matters as well as the status of implementation of various projects in the mid and downstream natural gas sub-sector.

During the period under review there was overall increase in natural gas production and consumption. EWURA continued to facilitate and improve business and investment environment by promoting and supporting existing and prospective investors in the mid and downstream natural gas sub-sector through development of regulatory tools, issuance of construction approvals and licences.

The above achievements could not be achieved without efforts of various key players in the natural gas industry. I would like to express my gratitude to the Government of the United Republic of Tanzania through the Ministry of Energy for a firm guidance and support during the period under review. I would also like to thank our development partners, investors and stakeholders for their cooperation extended to EWURA in executing its legal mandate. I hope with such cooperation, EWURA will continue to bring positive impact to the industry and economy as a whole.

Ahmad S. K. Kilima
Deputy, Board Chairman
April 2022

FOREWORD

This report has been prepared in accordance with section 7(f) of the EWURA Act, Cap. 414, which requires the Authority to disseminate information on matters relevant to its functions. Moreover, Section 31(2) of the Petroleum Act, Cap. 392 requires the Authority to submit to the Minister responsible for energy the annual report related to its activities. The report, among other things, intends to disseminate to the Government and other stakeholders the performance of the Mid and Downstream Natural Gas sub-sector in Tanzania Mainland.

The commercial production of natural gas commenced in 2004 and 2006 at Songo Songo Island and Mnazi Bay, respectively. As of December 2016, the total Gas Initially in Place (GIIP) amounted to 57.54 TCF of which 47.13 TCF is off-shore and 10.41 TCF is on shore. During the period under review, Tanzania produced 60,619.12 MMscf of natural gas which is an increment of 1.32% compared to 59,831.43 MMscf produced in the previous year. Natural gas production increased to meet the demand of natural gas for power generation, industrial heating, commercial, institutions households' usage and compressed natural gas for fueling vehicles. Increasing natural gas activities indicates growth of the natural gas industry in the country.

Further, the Authority continued to ensure that the integrity of natural gas processing, transmission, distribution, supply and compressed natural gas infrastructure is maintained to the required standards. EWURA conducted awareness programs to its stakeholders with the view to create awareness and understanding on local content issues. During the same period, EWURA developed the Common Qualification System (CQS) to manage local content issues and other regulatory requirements.

Despite the progressive growth of natural gas industry in the country, there is an obvious under-utilization of natural gas infrastructures due to limited investment in the mid and downstream segments of the sub-sector. Inadequate infrastructure continued to limit the usage of natural gas in the country despite the available demand.

EWURA would like to acknowledge the contribution extended by the following service providers namely; the Tanzania Petroleum Development Corporation (TPDC), Gas Company (T) Limited, Songas (T) Limited, Pan African Energy (T) Limited, Maurel et Prom, Dangote Cement Limited and Anric Gas Technology Tanzania Co. Ltd in preparation of this report.

Lastly, I wish to extend my heartfelt appreciation to all EWURA Staff, the Management and Board of Directors of EWURA for their dedication in preparing this report.

Eng. Godfrey H. Chibulunje
Acting Director General
April 2022

ABBREVIATIONS AND ACRONYMS

ANRIC Gas	ANRIC Gas Technology Tanzania Company Limited
BCF or Bcf	Billion Standard Cubic Feet
CNG	Compressed Natural Gas
CNG-V	Compressed Natural Gas Vehicles
EWURA	Energy and Water Utilities Regulatory Authority
GASCO	Gas Company (Tanzania) Limited
GJ	Gigajoule
GTL	Gas-to-Liquids
HSE	Health, Safety and Environment
LSSP	Local Suppliers and Service Providers
LNG	Liquefied Natural Gas
LTI	Lost Time Injuries
Mcf	Thousand Standard Cubic Feet
MMBtu	Million British Thermal Unit
MMSCF	Million Standard Cubic Feet
MMSCFD	Million Standard Cubic Feet per Day
MW	Megawatt
PRS	Pressure Reduction Station
PAET	Pan African Energy Tanzania Limited
PNG	Piped Natural Gas
PPE	Person Protective Equipment
TANESCO TBS	Tanzania Electric Supply Company Limited Tanzania Bureau of Standards
TCF	Trillion Standard Cubic Feet
TPDC	Tanzania Petroleum Development Corporation

EXECUTIVE SUMMARY

This is the second annual performance report for the Mid and Downstream Natural Gas Sub-sector after the first report for the financial year ended 30th June 2020. This report covers annual performance of mid and downstream natural gas sub-sector for the financial year ended 30th June 2021.

The report has been prepared in fulfilment of the Authority's legal obligation to disseminate information to its stakeholders on matters relevant to the regulation of the mid and downstream natural gas sub-sector. The report provides key information to investors on the available and potential investment opportunities in the mid and downstream natural gas sub-sector.

Natural gas usage has been growing tremendously in Tanzania in the past one year. As of June 2021, a total of 1,573 customers were using natural gas while there were only 600 customers in the previous year. These customers composed of 12 Power Plants, 49 industries, 637 households, 1 commercial, 8 Institutions and 864 vehicles for the FY 2020/21 while in FY 2019/20 there were 12 power plants, 45 industries, 337 households, 1 commercial, 5 Institutions and 200 vehicles.

The Authority continued to monitor compliance to technical, safety and economic aspects of gas processing plants, transmission pipelines and distribution networks in Mtwara, Lindi, Coast and Dar es Salaam regions. The overall compliance level by natural gas facilities during the period under review was 94.43% as compared to 93.6% in the previous year.

During the period under review, EWURA issued two (2) licences, one (1) for processing activities and another for transmission activities. Moreover EWURA issued five (5) construction approvals for construction of natural gas distribution infrastructures and CNG filling station in Dar es Salaam, Lindi and Coast regions.

EWURA continued to promote local content and monitor compliance performance of service providers and their contractors in respect of the midstream and downstream petroleum activities as per Petroleum (Local Content) Regulations in year 2017. As of 30th June 2021, the "Local Suppliers and Service Providers (LSSP)" database had 737 registered local business entities who are eligible to participate in the provision of goods and services in the petroleum midstream and downstream activities in Mainland Tanzania. The number of registered local business entities increased by 267 from 470 in the previous year.

Financial performance analysed revenue generation, costs and profit of service providers (PAET, TPDC and Songas). During the period under review, the financial performance analysis showed that gross revenue generation increased by 3% whereby TPDC attained an increase of 12% compared to PAET and Songas who recorded a decrease of 3% and 10%, respectively. It should be noted that in FY 2019/20 there were an increase of 6% in generation of gross revenue.

Further, in FY 2020/21 natural gas processing costs increased by 0.1% compared to a decrease of 33.8% recorded in FY 2019/20. Also, during the year under review, natural gas transmission costs increased by 5.5% compared to an increase of 6.3% recorded in the previous financial year. Apart from that, in FY 2020/21 natural gas distribution costs decreased by 21.9% compared to an increase of 15.6% recorded in FY 2019/20.

Key observations in the mid and downstream natural gas sub-sector includes inadequate gas distribution network infrastructure to meet the natural gas demand; risks of personal injury and property damage posed by third party activities and encroachment along the way leaves; inadequate investment in Compressed Natural Gas filling stations to meet available demand and low utilization of processing and transmission natural gas infrastructure.

EWURA thrived to engage other sectorial stakeholders to mitigate the challenges facing the growth of the mid and downstream natural gas sub-sector. In order to ensure the promotion of investments and adherence to safety is enhanced in the mid and downstream natural gas sub-sector, stakeholders' consultative meetings were conducted and a number of guidelines and procedures were developed.

1. INTRODUCTION

Pursuant to section 7 of the EWURA Act, Cap. 414 and section 29 of the Petroleum Act, Cap. 392, EWURA is mandated to regulate mid and downstream natural gas value chain which include processing, transmission, storage and distribution of natural gas in Mainland Tanzania. In addition, consistent with Regulation 4 of the Petroleum (Natural Gas Mid and Downstream) General Regulations 2020, EWURA has the following functions: -

(a) to protect the interests of consumers with regard to price, availability, quality and reliability of supply;
(b) to protect the public from dangers arising from processing, transportation, storage, conveyance, shipping, supply or use of natural gas;
(c) to promote efficient use of natural gas by consumers; and
(d) to advise the Government on all matters related to importation, exportation, processing, storage, transportation, conveyance, shipping, supply or use of natural gas.

In line with the functions conferred upon it under section 7(f) of the EWURA Act, Cap. 414, EWURA has prepared this annual performance report for the financial year ended 30th June 2021, which requires the Authority to disseminate information on matters relevant to its functions. Moreover, Section 31(2) of the Petroleum Act, Cap. 392 requires the Authority to submit to the Minister responsible for energy the annual report related to its activities.

The report provides an overview of performance of the Mid and Downstream Natural Gas sub-sector for the period ended 30th June 2021. It provides detailed analysis of operational and financial performance of regulated suppliers; natural gas supply and demand balance; compliance to safety, technical, legal and regulatory requirements. Further, the report provides information on policy matters as well as the status of implementation of various projects in the natural gas sub-sector. Furthermore, the report highlights achievements and key observations noted during the period under review as well as recommendations.

During the period under review, natural gas demand continued to grow due to increased demand for power generation, industrial heating, commercial, institutions households' usage and compressed natural gas for fueling vehicles. EWURA continued to promote local content and monitor compliance performance of service providers and their contractors in respect of the midstream and downstream petroleum activities as per Petroleum (Local Content) Regulations in year 2017. As of 30th June 2021, the number of registered local business entities increased by 267 from 470 in the previous year.

In general, the report illustrates milestones achieved during the period under review detailed under development of natural gas regulatory tools and standards; issuance of natural gas regulatory approvals; natural gas performance monitoring; natural gas supply and demand balance, achievements and key observations noted during the period under review as well as recommendations.

2. REGULATORY TOOLS AND STANDARDS

EWURA monitored the compliance by service provider to existing laws, guidelines, codes and standards. During the year under review, EWURA developed the Energy and Water Utilities Regulatory Authority (Electricity and Natural Gas) (Tariff Application and Rate Setting) Rules, 2021. Existing regulatory tools governing the mid and downstream natural gas sub-sector are as shown in **Annex 1**. In collaboration with TBS and in consistent with Section 30(2) (q) of the Petroleum Act, Cap. 392, a number of natural gas standards have been developed as shown in **Annex 2**. In addition, EWURA submitted a proposal to develop natural gas standards for Road Vehicles Compressed Natural Gas (CNG) fuel system components.

3. CONSTRUCTION APPROVAL AND LICENCE

3.1 Construction Approvals Issued

During the period under review, EWURA issued five (5) construction approvals for construction of distribution infrastructures and CNG filling stations. This number shows an increase in natural gas activities in the financial year ended 30th June 2021 compared to previous year where, two (2) construction approvals were issued. Details of construction approvals issued are as shown in **Table 1.**

Table 1: Construction Approvals Issued

SN.	Applicant Name	Approval No.	Date Of Issue	Type of Construction Approval
1	ANRIC Gas Technology Tanzania Company Limited	NGCA-2021-01	30-Mar-2021	Construction of natural gas filling Station, storage facility, dispensing facility and mobile CNG trailer at Temeke in Dar es Salaam
2	Tanzania Petroleum Development Corporation	NGCA-2021-02	17-May-2021	Construction of natural gas distribution facilities for supplying natural gas to LN Future Industries and Balochistan Group of Industries at Kisemvule, Mkuranga in Coast Region
3	Tanzania Petroleum Development Corporation	NGCA-2021-03	17-May-2021	Construction of natural gas distribution facilities for supplying natural gas to customers at Nzasa Street, Sinza in Kinondoni Municipality
4	Tanzania Petroleum Development Corporation	NGCA-2021-04	17-May-2021	Construction of natural gas distribution facilities for supplying natural gas to customers at Police Barracks, Kilwa Road, in Temeke Municipality
5	Tanzania Petroleum Development Corporation -	NGCA-2021-05	3i-May-2021	Construction of natural gas distribution facilities for supplying natural gas to customers at Mnazi Mmoja in Lindi Municipality

Source: EWURA

3.2 Licences Issued

EWURA issued five (2) licences in respect of processing activities (1) and transmission activities (1) during the financial year ended 30th June 2021, as shown in **Table 2.**

Table 2: Licences Issued

SN.	Licensee	Licence Number	Date Of Issue	Type of Licence
1	Gas Company Tanzania Limited (GASCO)	NGTL – 2021 – 001	31-May-2021	Transmission
2	Gas Company Tanzania Limited (GASCO)	NGPL – 2021 – 001	31-May-2021	Processing

Source: EWURA

3.3 Complaints and Dispute Resolution

During the period under review, there were no disputes or complaints received by EWURA in the mid and downstream natural gas sub-sector. As the number of industrial and household customers is increasing, EWURA is likely to receive complaints from consumers of regulated services and goods. There are procedures in place to handle complaints and disputes should EWURA receive them.

4. NATURAL GAS INFRASTRUCTURE PERFORMANCE MONITORING

The Authority continued to monitor the level of compliance and integrity of natural gas infrastructures including natural gas processing plants, high-pressure transportation pipelines and low-pressure distribution network facilities including natural gas supply through virtual pipeline networks and compressed natural gas filling stations. This section provides an overview of the natural gas processing, transmission and distribution networks performance monitoring in relation to regulatory requirements. A list of service providers and their scope of operations is as shown in **Annex 4.**

4.1 Natural Gas Processing Infrastructures Performance

The natural gas processing infrastructure is comprised of four processing plants with total installed processing capacity of 470MMscfd located at Songo Songo Island in Lindi region and Mnazi Bay and Madimba in Mtwara region. The Government of the United Republic of Tanzania, through TPDC, owns two natural gas processing plants with installed processing capacity of 210MMscfd and 140MMscfd at Madimba and Songo Songo Island, respectively. Songas owns one natural gas processing plant with installed processing capacity of 110MMscfd at Songo Songo Island and Maurel et Prom (M&P) owns and operates a natural gas processing plant with installed processing capacity of 10MMscfd at Mnazi Bay. Details of total installed processing capacity is as shown in **Figure 1**.

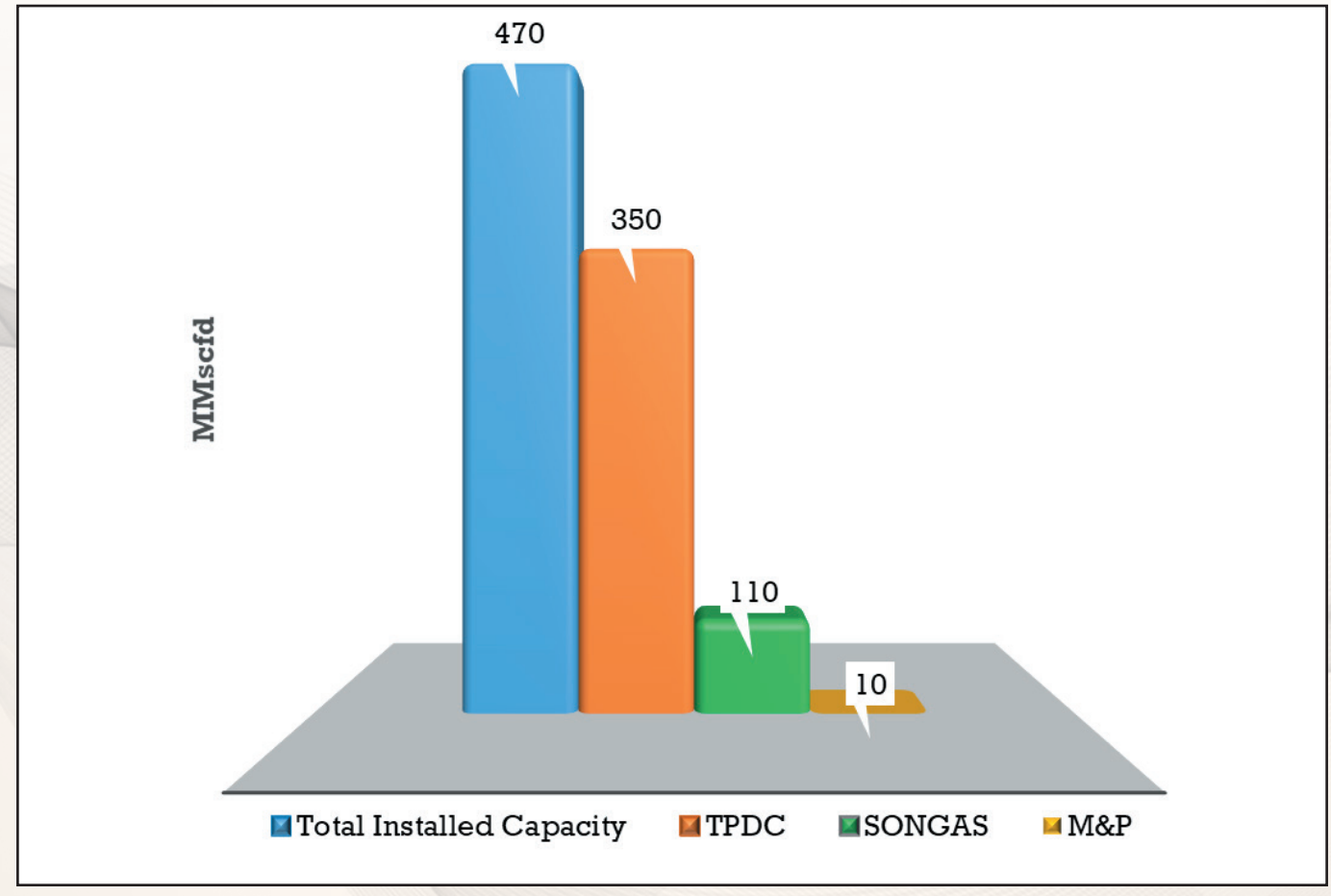


Figure 1: Total Installed Capacity of Natural Gas Processing Plants

4.1.1 Processing Plants Technical Performance

Technical performance of natural gas processing plants was analysed based on the installed capacity, maximum demand, plant availability, plant utilization and integrity management. EWURA carried out performance monitoring by analysing and verifying information received from regulated entities on the above-mentioned key performance indicators.

4.1.1.1 Installed Capacity of Processing Plants

The total installed processing capacity remained 470MMscfd as there were no new investments in this category during the review period. The four natural gas processing plants installed capacity is as shown in **Table 3.**

Table 3: Installed Capacity of each Processing Plant

S/N	Processing Plant	Installed Capacity (MMscfd)
1.	TPDC Madimba	210
2.	TPDC Songo Songo	140
3.	Songas	110
4.	Maurel Prom	10
	Total	470

Source: TPDC, Songas and M&P

TPDC processing plants located at Madimba and Songo Songo Island accounted for 44.7% and 29.8%, respectively of the total processing installed capacity. Songas processing plant located at Songo Songo Island accounted for 23.4% of the total installed processing capacity while M&P processing plant at Mnazi Bay accounted for 2.1% of the total processing capacity as shown in **Figure 2**.

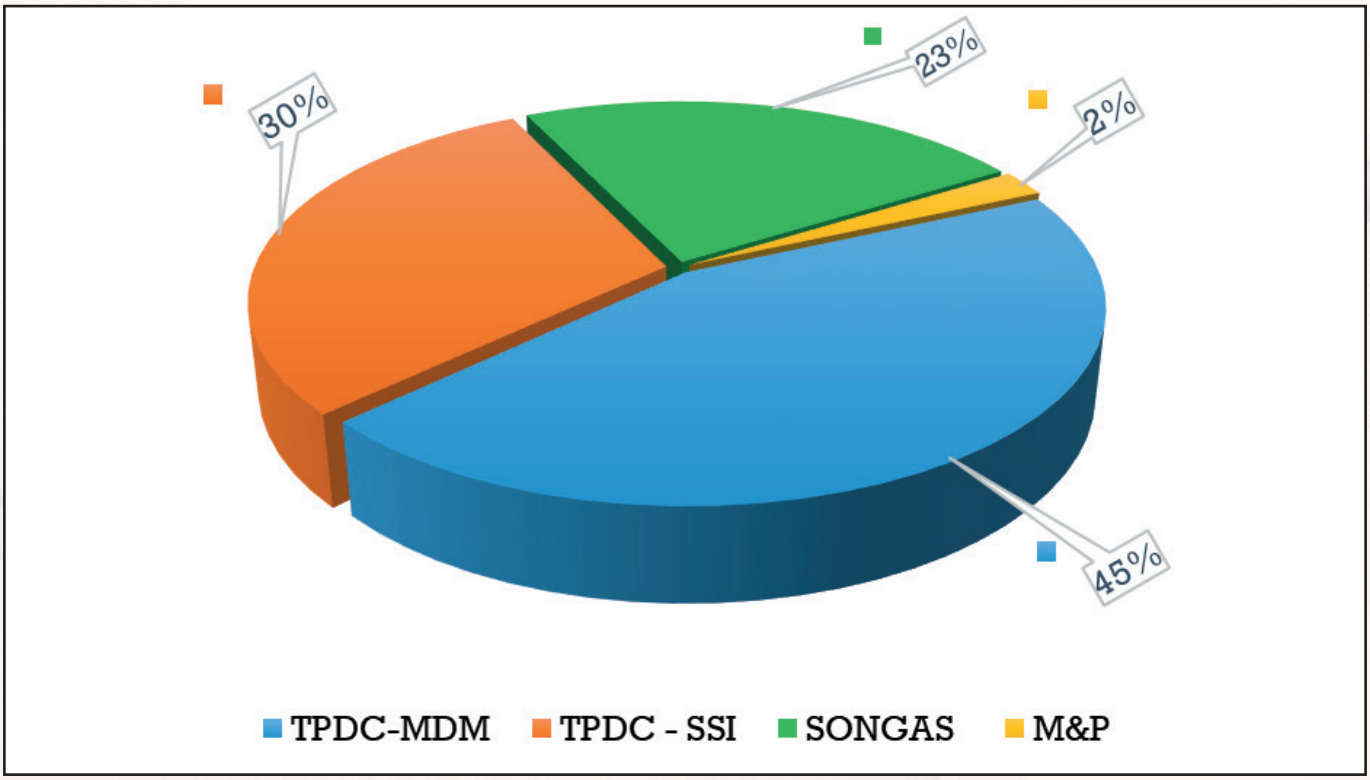


Figure 2: Installed Capacity of each Processing Plant

4.1.1.2 Natural Gas Demand

The natural gas demand reached by each processing plant during the period under review is as shown in **Table 4**. EWURA continued monitoring the service delivery of natural gas by service providers to ensure that the supply meets the available demand, at all times.

Table 4: Natural Gas Nomination/Actual Demand in MMscfd Recorded

S/N	Processing Plant	Nomination	Actual Demand	Date
1.	TPDC Madimba	110	105.90	12 March 2021
2.	TPDC Songo-Songo	70	71.72	5 March 2021
3.	Songas	87.03	86.10	27 January 2021
4.	Maurel et Prom	2.88	2.82	7 June, 2021

Source: TPDC, Songas and M&P

4.1.1.3 Natural Gas Processing Plants Availability

The Natural gas processing plant availability was measured based on the amount of time the plant was able to produce natural gas. EWURA monitored the operations of all natural gas processing plants to ensure their operations and maintenance are carried out in a timely manner in order to enhance their availability. During the period under review, all processing plants availability were at 100%. The average processing plants availability of the processing plants are as indicated in **Table 5**.

Table 5: Annual Average Plant Availability of Different Processing Plants

S/N	Processing Plant	Available Capacity (MMscfd)	Average Plant Availability (%)
1.	TPDC Madimba	210	100
2.	TPDC Songo-Songo	140	100
3.	Songas	110	100
4.	M&P	10	100

Source: TPDC, Songas and M&P

4.1.1.4 Processing Plants Utilization

The processing plant utilization was analysed through multiplication of the plant's actual output per month or year times 100 and divide this number by the plant's maximum output per month or year.

During the period under review, annual average utilization for TPDC Madimba, TPDC SSI, Songas and M&P processing plants are as depicted in **Table 6** and **Figure 3**. The analysis shows the need for TPDC to increase the capacity utilization of its existing natural gas processing plant and transmission pipeline infrastructure by extending supply to other regions for new natural gas market creation.

Table 6: Processing Plants Utilization

S/N	Plant Name	Available Capacity	Actual Output (FY 2019/20)	Actual Output (FY 2020/21)
1.	TPDC Madimba	210	64.13	74.28
2.	TPDC Songo Songo	100	25.64	24.67
3.	Songas	110	72.06	66.5
4.	Maurel & Prom (M&P)	10	2.4	2.4

Source: TPDC, Songas and M&P

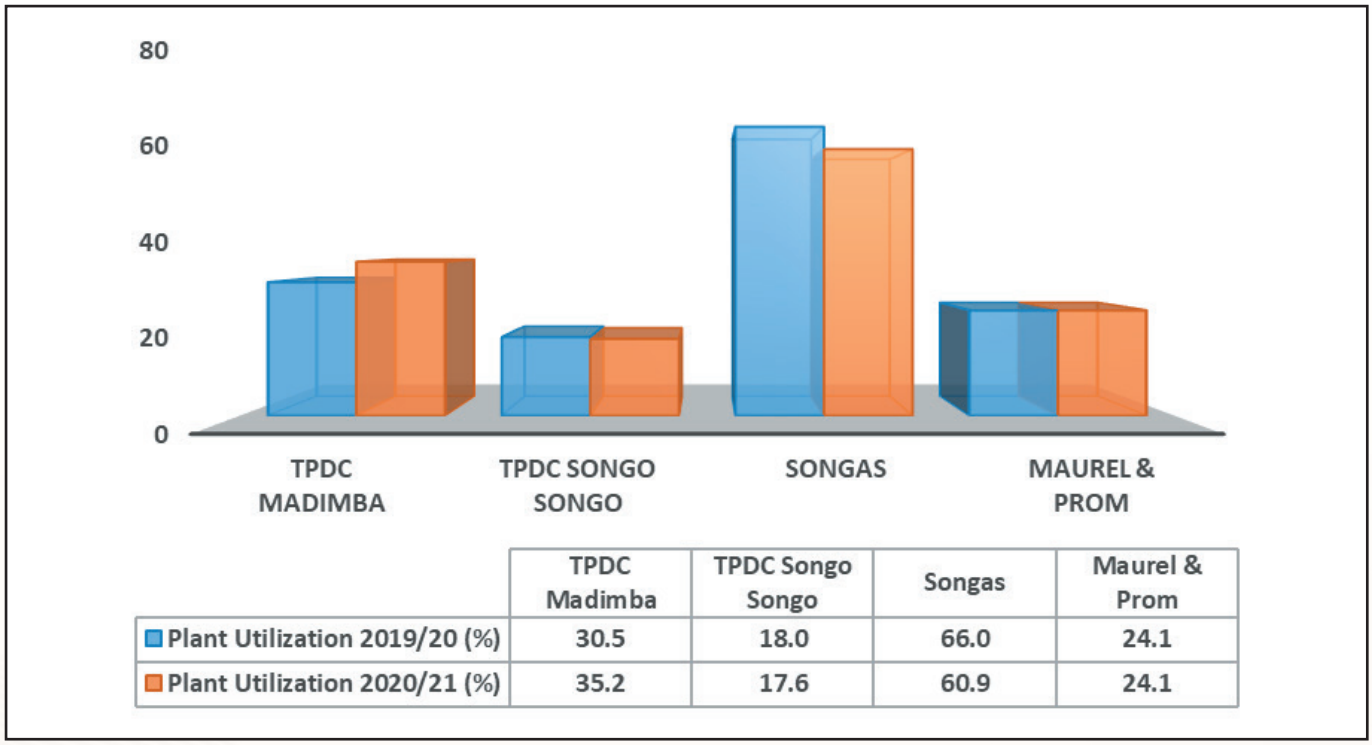


Figure 3: Processing Plants Utilization

4.1.1.4.1 TPDC Madimba Processing Plant Utilization

During the period under review, Madimba gas processing plant was available at 100% with average daily utilization of 74.28 MMscfd equivalent to 35.2% utilization capacity. Utilization for the gas processing plant increased by 4.7% from 30.5% in the previous year. Details of the plant utilization are as shown in **Figure 4**.

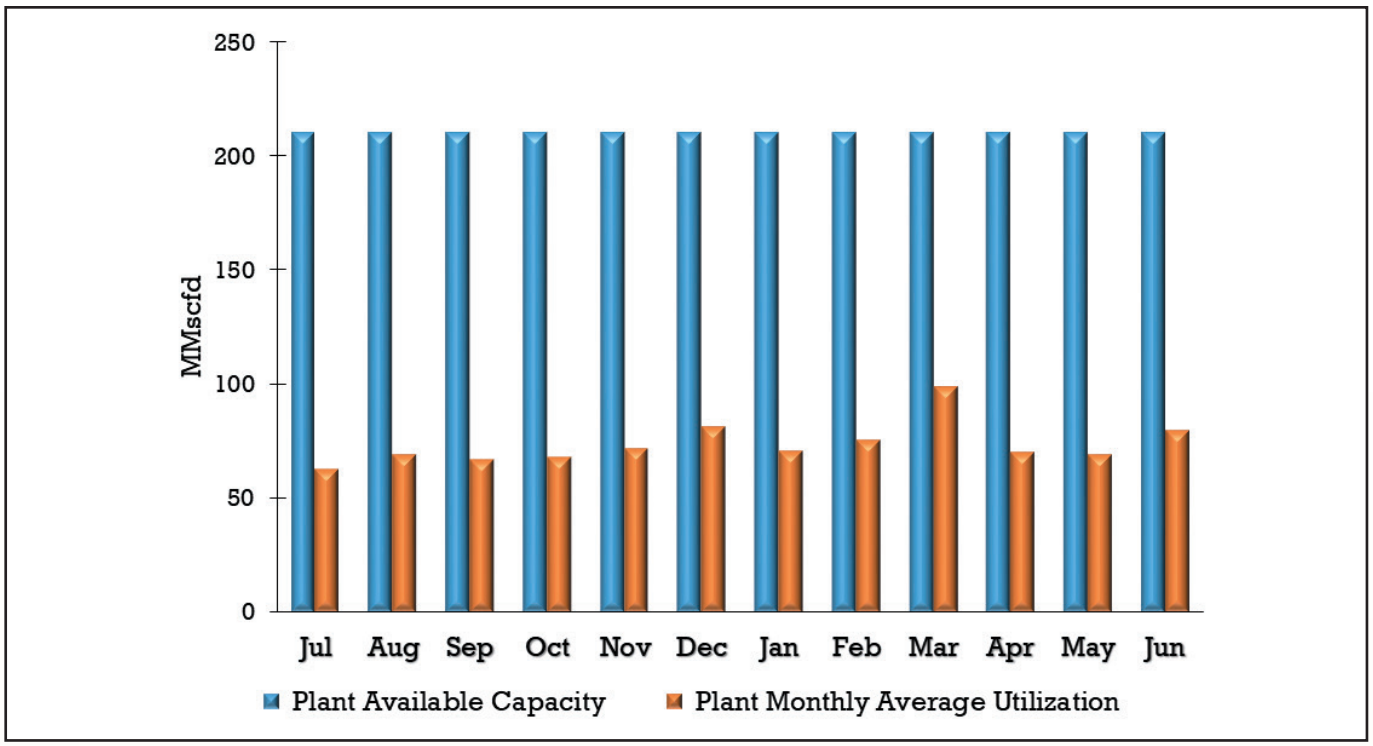


Figure 4: Monthly TPDC Madimba Gas Plant Utilization Capacity

4.1.1.4.2 TPDC Songo Songo Gas Processing Plant Utilization

During the period under review, Songo Songo gas processing plant was available at 100% with average daily utilization of 24.67 MMscfd equivalent to 17.62% utilization capacity. Utilization for the gas processing plant decreased by 0.38% from 18% in the previous year. Details of plant utilization is as shown in the **Figure 5**.

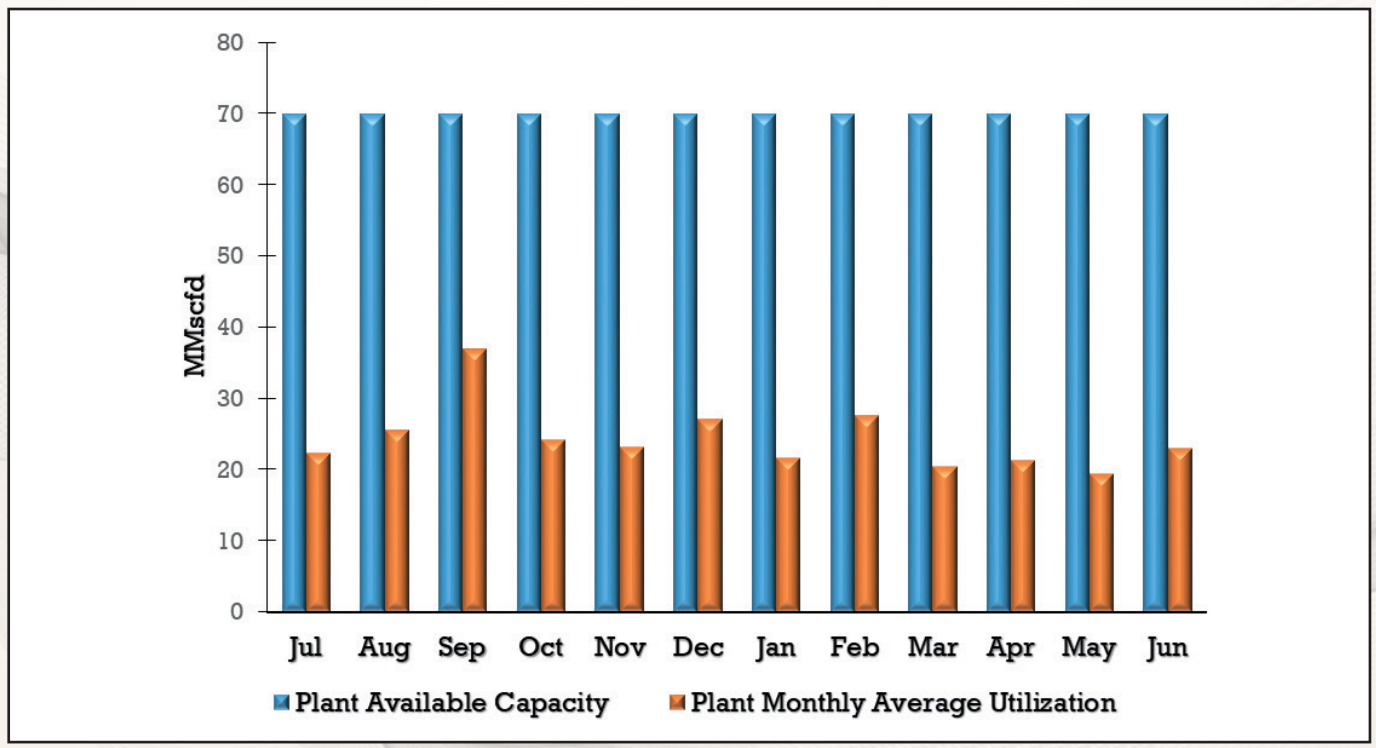


Figure 5: Monthly TPDC SSI Gas Plant Utilization Capacity

4.1.1.4.3 Songas Processing Plant Utilization

During the period under review, Songas gas processing plant was available at 100% with average daily utilization of 66.5 MMscfd equivalent to 60.9% utilization capacity. Utilization for the gas processing plant decreased by 5.1% from 66% in the previous year. Details of plant utilization is as shown in **Figure 6**.

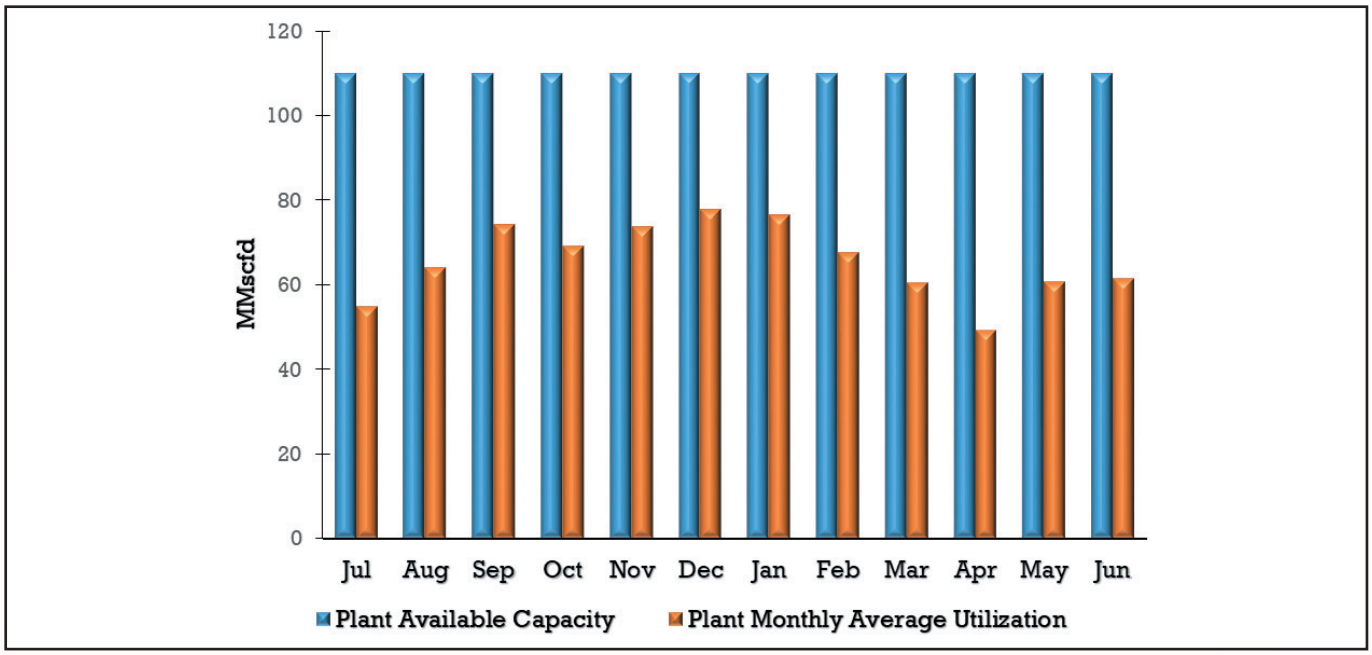


Figure 6: Monthly Songas Gas Plant Utilization Capacity

4.1.1.4.4 M&P Gas Processing and Receiving Facilities

During the period under review, the plant was available at 100% with average daily utilization of 2.4 MMscfd equivalent to 24% utilization capacity. Utilization for the gas processing plant was maintained at 24% from the previous year. Details of plant utilization is as shown in **Figure 7**.

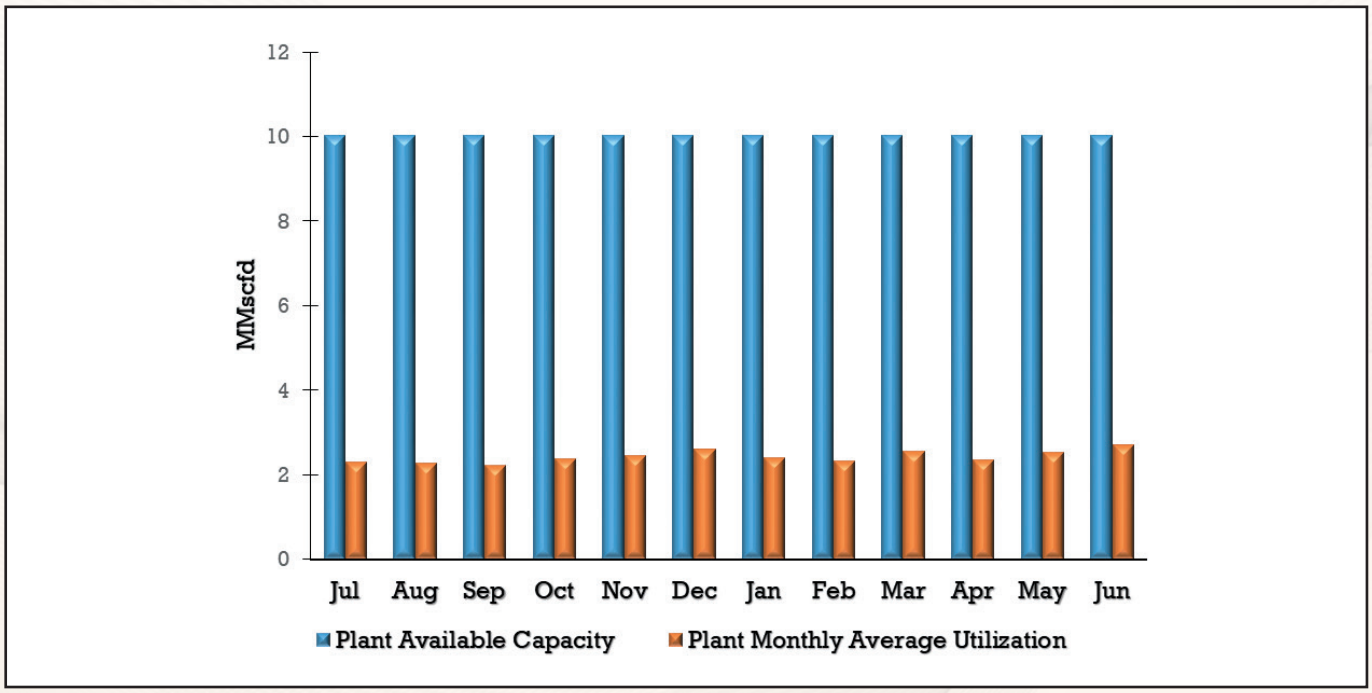


Figure 7: Monthly M&P Gas Plant Utilization Capacity

The total gas processing plant available capacity in the country is 470MMscfd. The reported average daily gas production in the country was 167.86MMscfd equivalent to 36.0% utilization capacity for the FY 2020/21 compared to average daily gas production in the country of 164.0 MMscfd equivalent to 34.9% utilization capacity in FY 2019/20 as indicated in **Figure 8** and **Figure 9**. Processing plant utilization in the country increased by 1.1% from 34.9% in the previous year.

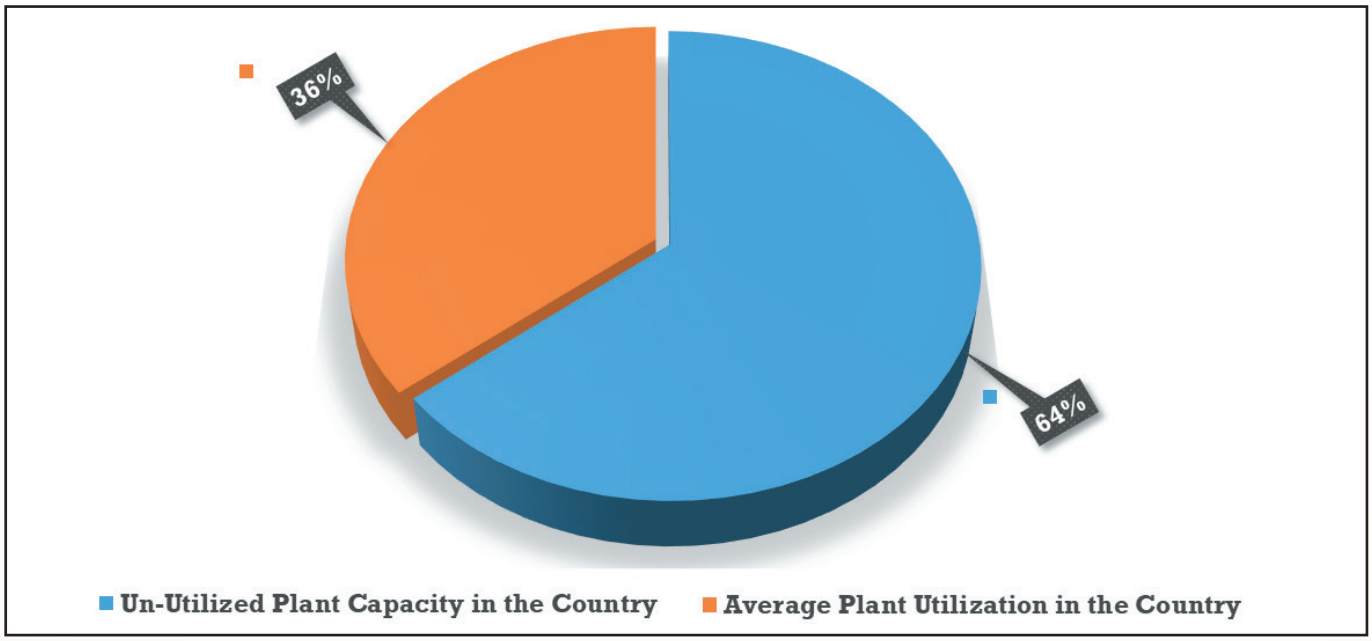


Figure 8: Total Processing Plant Utilization in the Country

The Authority continued to create conducive business environment in order to attract private sector investment in the mid and downstream natural gas segment which will result into increased utilization of existing infrastructures.

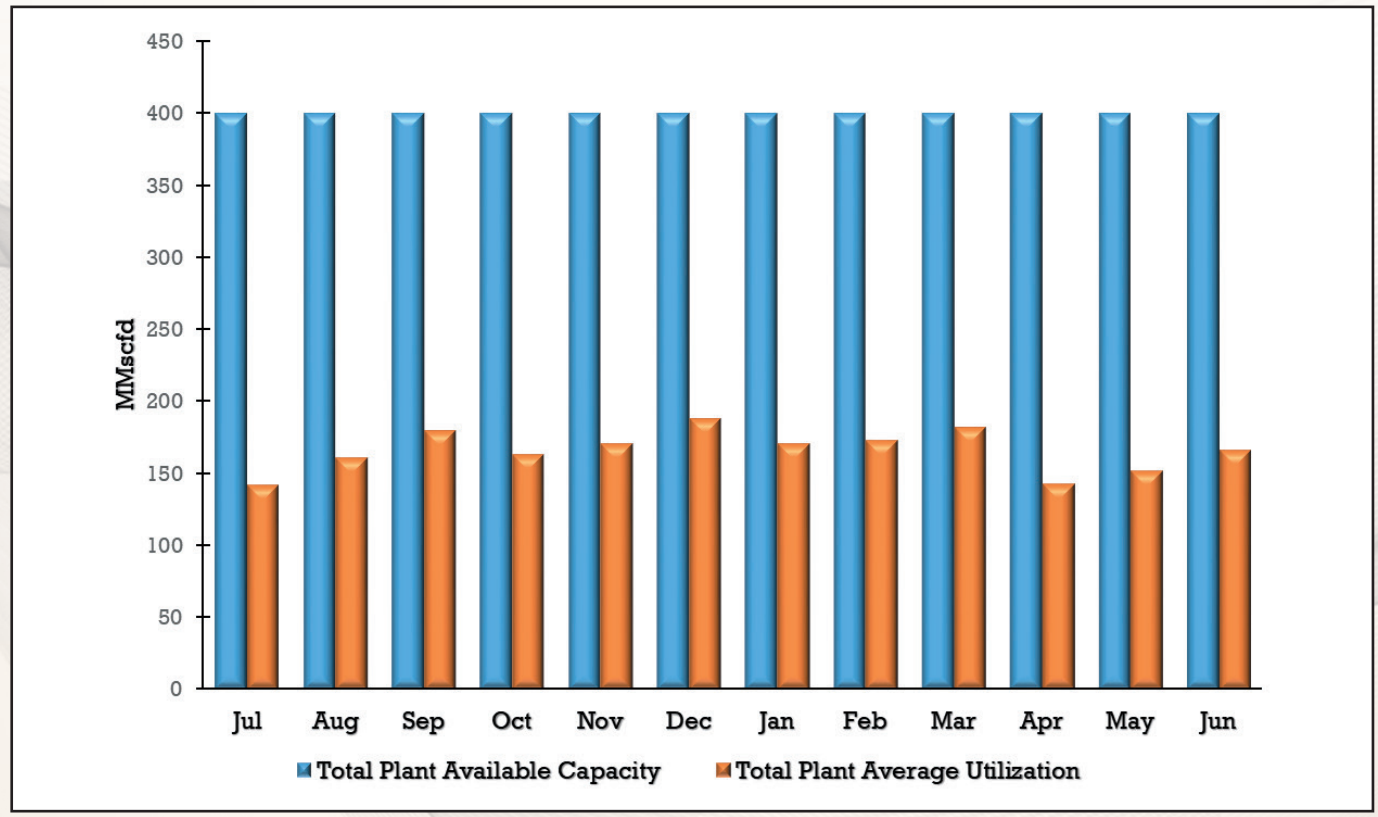


Figure 9: Plant Available Capacity against Utilization in the Country

4.1.1.5 Natural Gas Processing Plants Production

The overall natural gas production during the year under review was 60,619.12 MMscf compared with 59,831.43MMscf in 2019/20 which is equivalent to an increase of 1.3% as is shown in **Table 7**. This increment was a result of increased gas production at TPDC Madimba gas processing due to increased downstream usage of natural gas.

Table 7: Natural Gas Processing Plants Production

S/N	Processing Plant	Processed Gas (MMscf)	Plant Contribution (%)		
		Year 2019/20	Year 2020/21	Year 2019/20	Year 2020/21
1.	TPDC Madimba	23,432.8	26,919.2	39.2	44.4
2.	TPDC Songo Songo	9,175.8	8,842.1	15.3	14.6
3.	Songas	26,342.0	23,978.4	44.0	39.6
4.	Maurel Prom (M&P)	881.1	879.5	1.5	1.4
	Total	**59,831.43**	**60,619.12**	**100**	**100**

Source: TPDC, Songas & M&P

4.1.1.6 Asset Integrity Management

The Asset Integrity Management (AIM) of natural gas infrastructure was assessed based on its ability to function effectively and efficiently. During the period under review, gas processing plants operations were monitored and maintained to ensure the quality of services rendered to customers is maintained.

4.1.1.7 Natural Gas Quality Monitoring and Performance

The Authority monitored the quality standards of regulated products and services pursuant to section 250 of the Petroleum Act, Cap. 392. During the period under review, the processing plants complied to natural gas required standards, commercial terms and conditions including but not limited to the following:

(a) Water and hydrocarbon dew point;
(b) Sulphur, Hydrogen Sulphide, Carbon Dioxide, liquids contents ;
(c) Gross or Net Heating Value of natural gas;
(d) Temperature and pressure at entry point into the system; and
(e) Wobble Index.

The natural gas quality properties from both operating fields monitored by the Authority are as shown in **Table 8.**

Table 8: Quality of Natural Gas Composition (in % Mole)

Natural Gas Component	Reference of Gas Quality	Quality of Natural Gas		
		Songas	TPDC	M&P
Methane (CH_4)	87.0 - 99.0	97.2851	98.0107	98.1138
Ethane (C_2H_6)	1.5 - 9.0	0.9237	1.00494	1.0213
Propane (C_3H_8)	0.1 - 1.5	0.2862	0.29789	0.2753
iso-Butane (C_4H_{10})	0.01 - 0.3	0.0625	0.03969	0.0985
n-Butane (C_4H_{10})	0.01 - 0.3	0.0792	0.05219	0.0985
iso-Pentane (C_5H_{12})	trace - 0.04	0.0282	0.01361	0.0189
normal-Pentane (C_5H_{12})	trace - 0.04	0.0243	0.01048	0.0189
Hexanes (C_6H_{14})	trace - 0.06	0.0284	0.01249	0.0360
Carbon Dioxide (CO_2)	0.05 - 1.0	0.4934	0.30559	0.2503
Nitrogen (N_2)	0.2 - 5.5	0.7136	0.25243	0.1859
Hydrogen Sulphide (H_2S)	trace to 0.02	0.0000	0.0000	0.0000
Moisture (ppm)	trace to 5.00	0.9192	0.0000	0.0000
Specific Gravity	0.57 to 0.62	0.5850	0.5677	0.5600
Gross Heating Value (MJ/m^3)	36.0 to 40.2	38.1000	38.1386	38.1400

Source: www.uniongas.com, Songas, TPDC and M&P

The Authority will remain vigilant to ensure the quality of produced and processed natural gas supplied to end consumers remain within the acceptable ranges as indicated in **Table 8.**

4.1.1.8 Natural Gas Safety Performance features

Natural gas composed of mostly methane (97%) and this make the gas safer to use compared to petrol and diesel or any other fuel of hydrocarbons in nature. Table 9 shows features of natural gas that are advantageous compared to petrol and diesel when used as a fuel.

Table 9: Advantages of Natural Gas Compared to Petrol and Diesel

S/N	Natural Gas	Petrol	Diesel
1.	Composed of mostly lower hydrocarbons (Methane-C1) and hence when combustion take place less CO_2 emission and hence reduces air pollution	Composed of higher hydrocarbons (from Ethane-C2 and higher) and hence when combustion take place emits more CO_2 and nitrogen oxides (NOx), which are precursors to smog	Composed of higher hydrocarbons (from Ethane-C2 and higher) and hence when combustion take place emits more CO_2 and nitrogen oxides (NOx), which are precursors to smog
2.	Saves cost of importing Gasoline and Diesel as the gas is produced in Tanzania	Imported and hence prices fluctuate depending on the world market trends	Imported and hence prices fluctuate depending on the world market trends

S/N	Natural Gas	Petrol	Diesel
3.	Lower operational costs than petrol/ diesel powered vehicles- It is cheaper in terms of price by more than 40% when compared with petrol and diesel	Not cheap since the product is imported	Not cheap since the product is imported
4.	High auto-ignition temperature (about 540°C) hence narrow range of flammability (5-15%)	Highly flammable with auto-ignition temperature is about 280°C	Highly flammable when compared with natural gas but less flammable when compared with petrol. Auto-ignition temperature is about 210°C
5.	Mixes quickly and evenly in air since it is in gaseous state	It is in liquid state takes more time to mix with air for a complete combustion	It is in liquid state takes more time to mix with air for a complete combustion

4.2 Natural Gas Transmission Infrastructures Performance

Natural gas is transported to various customers categories located in Mtwara, Lindi, Costal and Dar es salaam regions through a high-pressure transmission network of 1,792km pipelines with 904MMscfd capacity, 24 hours a day, 365 days a year.

4.2.1 Natural Gas Transmission Pipelines

The transmission pipeline network comprises of 533 km of TPDC, 232 km of Songas and 27.5km of M&P as shown in **Table 10.** TPDC pipeline comprises a 24" diameter, 29km offshore pipeline from Songo Songo Island to Somanga Fungu, 36" diameter of 477km onshore pipeline from Madimba in Mtwara to Kinyerezi in Dar es Salaam with Maximum Operating Pressure (MOP) of 90bar and a normal operating pressure of 72bar. This pipeline is also connected to a spur line of 27km with 16" diameter from Kinyerezi to Tegeta.

Songas pipeline comprises a 16" diameter of onshore pipeline with 207km from Somanga Fungu to Dar es Salaam including a 25km, 12" diameter submarine pipeline from Songo Songo Island to Somanga Fungu with Maximum Operating Pressure (MOP) of 90bar and normal operating pressure ranging between 75bar to 50bar. M&P has a total of 27.5km of onshore and off-shore transmission pipeline from Mnazi Bay to TANESCO's power plant in Mtwara region.

Table 10: Length, Capacity and Operator of Pipelines Infrastructure

S/N	Pipeline Location	Length (km)	Capacity (MMscfd)	Network Operator
1.	Mtwara– Kinyerezi in Dar es Salaam	533	784	GASCO
2.	Songo SongoIsland – Somanga Fungu			
3.	Kinyerezi – Tegeta in Dar es Salaam			
4.	Songo Songo Island – Dar es Salaam	232	110	Songas
5.	Mnazi Bay – TANESCOin Mtwara	27.5	10	M&P
	Total	**792**	**904**	

Source: TPDC, Songas and M&P

4.2.2 Natural Gas Transmission Technical Performance

Transmission technical performance analysis was based on how pipeline operators identified, prioritized, assessed, evaluated, repaired and validated the integrity of gas transmission pipelines in the event of a leak or failure, which may affect availability and quality of service of gas transportation to intended end-users. The analysis of technical performance of transmission pipelines considered, among other things, pipeline length, number of main valve stations, service availability, percentage utilization, number of outages, way-leave clearance and pipeline integrity management. The key performance indicators above were evaluated by analysing and verifying information received from regulated suppliers from time to time.

4.2.2.1 Installed Capacity of Transmission Pipeline

The natural gas transmission pipeline network length remained 792km with total installed capacity of 904 MMscfd. During the period under review, no new investments were made in the transmission segment.

4.2.2.2 Transmission Pipeline Network Length

The total transmission pipeline length is 792km, of which the contribution of TPDC, Songas and M&P to the transmission pipeline length was 67.3%, 29.3% and 3.4%, respectively as shown in **Table 11**. The pipeline network has a number of 25 main line valves of which TPDC has 16 block station valves, Songas has 8 main line valves and M&P has 1 main line valve.

Table 11: Length of Transmission Pipeline Network per Operator

S/N	Service Provider	Pipeline Length(km)	Number of valve stations	Contribution total pipeline length (%)
1.	TPDC	533	16	67.3
2.	Songas	232	8	29.3
3.	Maurel Prom (M&P)	27.5	1	3.4
	Total	**792**	**25**	**100**

Source: TPDC, Songas & M&P

4.2.2.3 Transmission Pipeline Availability, Utilization and Outages

The overall availability of transmission pipeline for transportation of natural gas from production areas to customers was 100%. The utilization was 12.50%, 59.73% and 3.44% for TPDC, Songas and M&P owned infrastructures, respectively. The pipeline availability during the period under review are as shown in **Figure 10**, **Figure 11** and **Figure 12**, respectively. The overall pipeline availability and utilization are as shown in **Table 12**.

Table 12: Transmission Pipeline Availability against Capacity Utilization

S/N	Name	Installed capacity (MMscfd)	Average Availability (%)	Capacity Utilization (%)	No. of (leakage)	No. of Outages reported
1.	TPDC	784	100	12.50	0	0
2.	SONGAS	110	100	59.73	0	0
3.	M&P	70	100	3.44	0	0
To-tal	**0**	**0**				

Source: TPDC, Songas and M&P

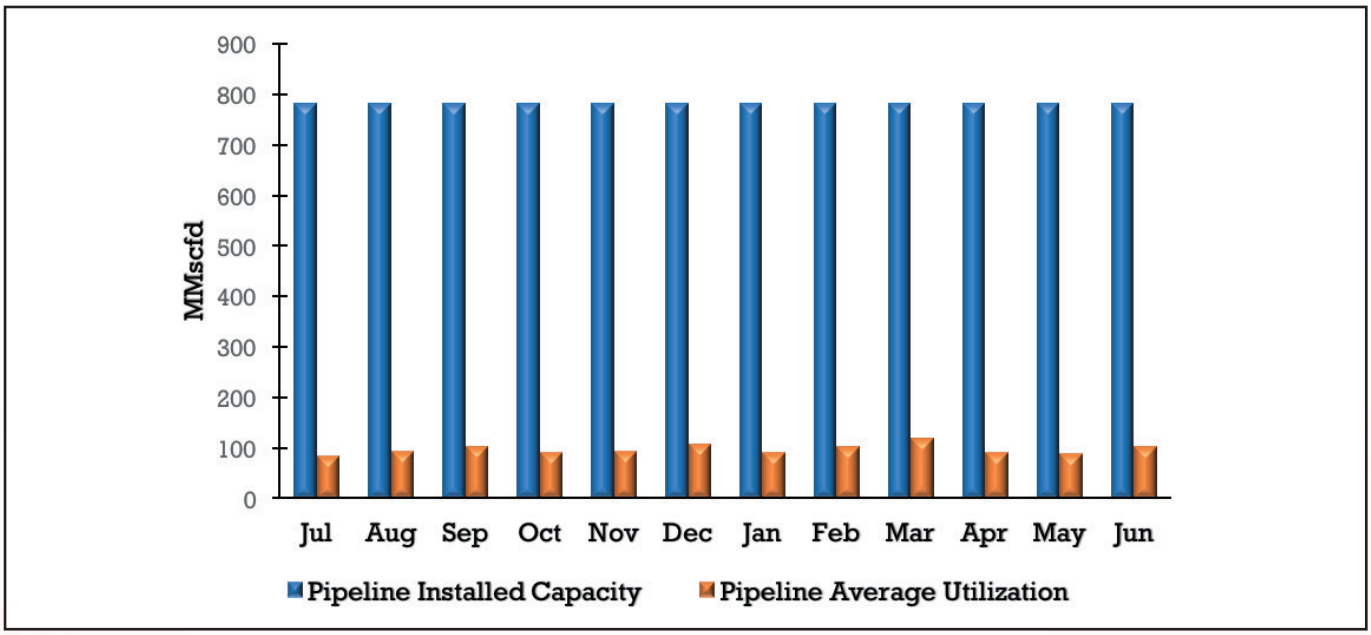


Figure 10: TPDC Pipeline Capacity Utilization

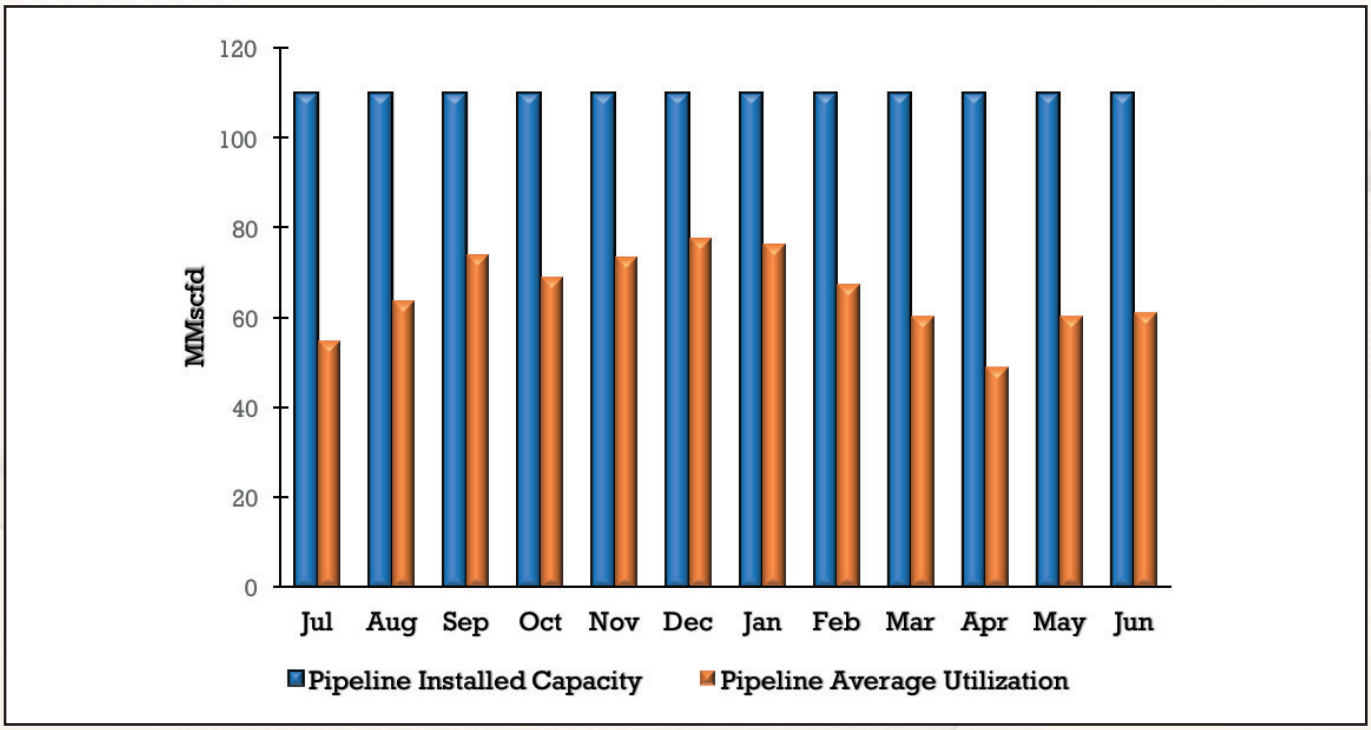


Figure 11: Songas Pipeline Capacity Utilization

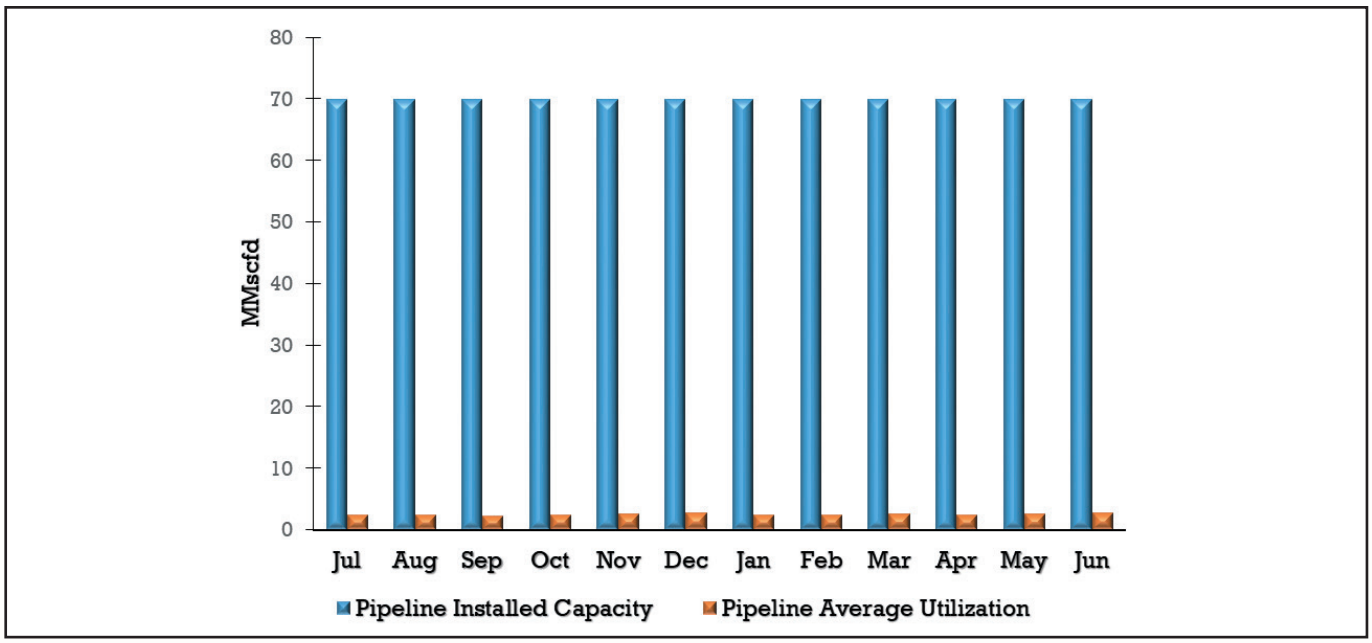


Figure 12: M&P Pipeline Capacity Utilization

4.2.2.4 Transmission Pipeline Integrity Management

During the period under review, EWURA monitored transmission pipeline integrity management. Service providers carried out transmission pipeline integrity management by using cathodic protection system, pipeline pigging and way leave management.

(a) Pipeline Cathodic Protection

Cathodic Protection is applied to transmission pipeline networks for protecting pipelines from corrosion by maintaining an electrical potential difference between the pipeline and anodes placed at strategic points along the pipeline. During the period under review, the Authority required Service providers to maintain an electrical potential difference between the pipeline and anodes by ensuring cathodic readings are within the required range. The detailed distance covered and number of cathodic protection test points installed along the existing transmission pipeline is as shown in **Table 13** and **Annex 5.**

Table 13: Corrosion Protection System (Cathodic Protection)

S/N	Name	Length of pipeline (km)	Length of pipeline covered by CP units	Number of CP units (CP systems) on pipeline	Number of non-performing CP units
1.	TPDC	533	533	8	1
2.	Songas	220	200	200	3
3.	M&P	27.5	27.5	3	0
	Total	780.5	760.5	211	4

Source: TPDC, Songas and M&P

(b) Pipeline In-Line Inspections

Pipeline Inline Inspection (Pigging) for transmission pipeline infrastructure were conducted for M&P transmission pipeline covering 27.5km to verify its integrity. TPDC did not implement pigging, despite the fact that its transmission pipeline was due for pigging. The overall pipeline length pigged is as shown in **Table 14**.

Table 14: Pipeline In-Line Inspections (PIGs)

S/N	Name	Length of the pipeline (km)	Date last pigging performed	Length pigged	Number of defects identified
1.	TPDC	533	-	0.0	0
2.	M&P	27.5	29 Sept 2020	27.5	0

Source: TPDC and M&P

(c) Pipeline Way leave Management

Pipelines were monitored to check compliance by service providers to way leave management procedures to minimize risks associated with damaged pipeline such as un-authorized third-party activities and erosion. EWURA ensured service providers adequately attended erosion incidents at different areas along the pipelines including the erosion occurred at Kinyerezi River. A typical example of TPDC and Songas pipelines which were exposed by erosion and repaired are as shown in **Figure 13.**

Some access roads to the main valve stations were not maintained making the way leave inaccessible. Service providers were required to maintain the access roads to main valve stations for enhancing their accessibility during emergency situation.

Effect of soil erosion due to heavy rain

The view of Kinyerezi river after reconstruction to control erosion

Figure 13: Repair of Songas/ TPDC Pipeline exposed by erosion at Kinyerezi River

Number of wayleave patrols performed, encroachments and erosions noted are as shown in **Table 15**.

Table 15: Transmission Pipeline Way Leave Management

S/N	Operator	Length (km)	Number of wayleave patrol performed	Number of interruption/erosions affected pipeline	Number of encroachments within the way leave
1.	TPDC	533	4	22	4
2.	SONGAS	220	12	4	0
3.	M&P	27.5	9	2	0
	Total	**780.5**	**25**	**28**	**4**

4.3 Natural Gas Distribution Infrastructure Performance

The entire distribution network is safeguarded by controlling ''Gas Over-pressurization". The pressure control devices are installed at Pressure Reduction Stations (PRS) located in Mtwara, Coast and Dar es Salaam regions. Natural gas distribution network is comprised of steel and polyethylene pipes.

During the period under review, EWURA monitored natural gas distribution and supply network to ensure compliance with safety requirements and industry best practices. Service providers complied with safety requirements with the exception of existing encroachments.

4.3.1 Distribution Network Length and Capacity

The distribution pipeline network consists of both piped gas and virtual pipes (CNG). The distribution network is predominantly polyethylene pipelines. As residential and commercial premises are connected to the network, the length of pipeline in the distribution network continue to increase. The length of the distribution network at the end of 30thJune 2021 was 113.91km which is an increase of 11.37km from 102.54km reported in the previous year.

The distribution network has a total installed capacity of approximately 320foMMscfd of distribution pipelines supplying natural gas to power plants, industrial customers (heating and power generation for own use), institutions, households and commercial customer.

4.3.2 Natural Gas Distribution Service Providers

The transmission pipelines link Mtwara, Lindi, Coast and Dar es Salaam regions and is connected to the distribution network through pressure reduction stations/city gates for controlling supply pressure downstream to end users. Distribution network in Dar es Salam is jointly owned by PAET and TPDC, while the distribution networks located in Mtwara, Lindi, and Coast regions are owned by TPDC and operated by GASCO. The distribution network installed capacities and their respective pipeline lengths are as shown in **Table 16.**

Table 16: Capacity & Length of Natural Gas Distribution Network Operator

S/N	Distribution Network & Location		Length (km)	Capacity (MMscfd)	Facility Operator
1.	Kinyerezi I connection		1.3	70	GASCO
2.	Kinyerezi II connection		1	48	
3.	Tegeta 45 connection		4.6	24	
4.	Ubungo I connection		0.5	86	
5.	Ubungo II connection				
6.	Dangote connection	Phase I & II connection	2.7	55	GASCO
7.	Goodwill connection		1.6	15	GASCO
8.	Mkuranga distribution trunk-line	Lodhia & Knauf connection	4.6	10	GASCO
9.	NNGI – Ubungo	BVS 15 – Ubungo	0.1	15	GASCO
10.	Mikocheni pipeline	Coca Cola connection	0.8	1.27	GASCO
		Ubungo-Mikocheni	7.8	5.172	
		Dar es Salaam Households project (Phase I&II)	14	0.983	
		UDSM cafeteria connection project	0.72	0.075	
11.	Mtwara Households and Institutions project (Phase I&II)		25.2	10	GASCO
12.	Dar Es Salaam Ring main	*Ubungo PRS–Buguruni–Kurasini*	53	10.5	PAET
13.					
14.		Gongo la mboto PRS – Buguruni		10.5	
		Wazo Hili PRS – Wazo Hill factory		16	
	Total		**113.91**	**320**	

Source: PAET& TPDC

4.3.3 Compressed Natural Gas

Compressed Natural Gas (CNG) is a fuel gas compressed to less than 1% of the volume it occupies at standard atmospheric pressure. It is stored and distributed in hard containers at a pressure of 200 – 250 bar (2,900–3,600 psi), usually in cylindrical or spherical shapes. The Authority monitored the safety of high pressure involved (200 – 250bar) in CNG or virtual pipeline networks ' by ensuring service provider inspect or re-calibrate the pressure control devices installed at CNG mother and Daughter stations located in Dar es Salaam region.

4.3.3.1 Compressed Natural Gas Mother and Daughter Stations

The virtual distribution network in the previous year comprised of CNG Mother Station located at Ubungo and two daughter stations namely Serena Hotel at the City Centre and Mikoani Edible Oil Industry at Mbagala located in Dar es Salaam. The Authority continued to monitor safe operations of virtual pipeline network (CNG cylinders) including CNG storage packs at each daughter station and CNG trailers moving CNG into cylinders from mother station during the period under review.

4.3.3.2 Compressed Natural Gas Filling Station

The demand for compressed natural gas continued to increase during the last three years. PAET operates a public CNG filling station located at Ubungo in Dar es Salaam with average fuelling capacity of 150 vehicles per day. During the period under review the Authority granted construction approval to Anric Gas for construction of natural gas filling station, storage facility, dispensing facility and mobile CNG trailer at Temeke and monitored safe operations of existing CNG filling stations including the dispensing price.

4.3.3.3 Vehicles Conversion Workshops

Natural gas vehicle conversion enhances gasoline cars by installing a parallel natural gas fuel system whereby CNG fuel conversion transfers high pressure natural gas from the vehicle's storage tank to the engine compartment where pressure is reduced to the operating pressure of the engine's fuel-management system. There are basically two types of conversion engine system to CNG available in the country namely Bi-Fuel or Switchable System and Dual Fuel System Conversion Systems. **Figure 14** shows a vehicle mounted with CNG cylinder converted, inspected and certified to be filled with CNG at the CNG filling station by a CNG-FSI approved by TBS.

Figure 14: CNG Cylinder mounted locally into the Vehicle in Dar es Salaam

Pursuant to section 19 (1) of the Petroleum (Natural Gas Midstream and Downstream) General Regulations, 2020, all CNG facilities shall be installed, repaired, routinely maintained, modified, dismounted or withdrawn by part or all CNG fuel system components by CNG installation workshop approved by the Contractor Registration Board (CRB). CNG workshops are subject to CRB's approval and must, at all times, comply with applicable law, TBS standards and codes.

4.3.4 Households Connection Lines

During the period under review, there were 437 household customers supplied with natural gas out of which 125 are located in Mtwara and 312 are located in Dar es Salaam. There was an increase of 100 households in Dar es Salaam from 212 household customers reported in previous year.

4.3.5 Natural Gas Distribution Technical Performance

The natural gas distribution pipeline performance was analysed in respect to the number of pressure reduction stations (PRS), pipeline lengths, isolation valves, number of customers and distribution network integrity. Service providers who were operational under this segment were TPDC and PAET.

4.3.5.1 Pressure Reduction Station

The Distribution Network comprises of various sizes of PRS associated with main line valves, relief valves, slum shut valves mainly for controlling pressure to safeguard the downstream network. Further, the network includes filtration system and metering skids. List of pressure reduction system and main line valve per service provider is as shown in **Table 17**.

Table 17: Number of PRS and Isolation Valves along Distribution Network

S/N	Operator Name	Number of PRS	Isolation Valves
1.	TPDC	24	139
2.	PAET	3	133
	Total	**27**	**272**

Source: PAET & TPDC

4.3.5.2 Natural Gas Piped Customer's Meter

The Authority monitored compliance with Weight and Measure Agency (W.M.A) requirements by service providers to ensure and maintain integrity of natural gas meters used for billing purposes. All piped natural end-users were billed by either through postpaid or prepaid gas meters installed within their premises.

The number of natural gas piped customers meters of various category installed to each end-user at the end of 30th June 2021 were 708 as shown in **Table 18** and **Table 19**. This is an increase of 108 gas meters from 600 gas meters reported in the previous year. A list of all end-users piped gas meters is as shown in **Annex 6**, **Annex 7** and **Annex 8**.

Table 18: List of Piped Gas Meters per Service Provider

Natural Gas End-User	Customer's Meter Location and Service Provider					
Customer category	**DSM**	**Coast**	**Lindi**	**Mtwara**	**Total**	**Service Provider**
Power plant	6	0	0	0	6	TPDC
Industry	1	5	0	1	7	TPDC
Commercial	0	0	0	0	0	TPDC
Institution	3	0	0	4	7	TPDC
Households	312	0	200	125	637	TPDC
Power plant	6	0	0	0	6	PAET
Industries	40	0	0	0	40	PAET
Commercial	1	0	0	0	1	PAET
Institution	1	0	0	0	1	PAET
Power Plant	1	0	1	0	2	Songas
Industries	1	0	0	0	1	Songas
Total	**372**	**5**	**201**	**130**	**708**	

Source: Songas, PAET & TPDC

4.3.5.3 Natural Piped Gas Customers Meter per Category

The Authority continued to monitor the integrity of piped and compressed natural gas measuring devices (meters and dispensers) by ensuring all service providers comply with Weight and Measure Agency (W.M.A) requirements. The summary of Natural gas measuring devices per customer category is as shown in **Table 19**.

Table 19: Number of Natural Gas Measuring Device per Customer Category

Operator	Power	Industry	Household	Commercial	Institution	CNG
TPDC	6	7	637	0	7	0
PAET	3	40	0	1	1	1
Songas	2	1	0	0	0	0
Total	11	48	637	1	8	1

Source: PAET & TPDC

4.3.5.4 Distribution Pipeline Way leave Management

The Authority monitored the safe operation to minimize major risk posed by conducting un-coordinated third-party activities and encroachments within wayleaves to ensure the public safety at large, their properties and environment. Most distribution pipeline wayleaves are not owned by operators, instead they rent from owners namely TANROADS, TARURA, TRC, TAZARA and TANESCO.

Lack of wayleave ownership makes the management and control of underground facilities very complicated due to the fact that, many stakeholders including owners, users and local government authorities are involved. The Authority continued to monitor safe operations of natural gas distribution networks including ensuring wayleaves management activities were performed as shown in **Table 20**.

Table 20: Distribution Network Wayleave Management

S/N	Operator	Length (km)	Number of wayleave patrol performed	Number of interruption/erosions affected pipeline	Number of encroachments within the way leave
1.	TPDC	60.9	12	0	0
2.	PAET	53	360	1	4
Total	**113.91**	**372**	**1**	**4**	

Source: PAET & TPDC

Natural gas distribution and supply operations in general complied with all aspects, except noted few existing encroachments within hazardous area posing high risk of explosion due to cooking activities within hazardous area. The list of distribution pipeline wayleave interferences noted during the period under review are as shown in **Annex 9**.

4.4 Health, Safety and Environment

The Authority monitored Health, Safety and Environmental (HSE) performance of the midstream and downstream natural gas operations to assess the level of compliance on the following aspects: -

(a) the pipeline valves for high pressure pipelines operated by TPDC, Songas and M&P;
(b) corrosion, erosion and clearance of way leaves;
(c) % availability of gas processing, pipelines, PRS and CNG filling stations;
(d) leakage of natural gas;
(e) integrity of gas processing plants, pipelines and distribution networks; and
(f) third party activities along transmission and distribution network.

During the period under review, there was no serious HSE issues, with exception of noted injection of inadequate odorant due to inconsistence injection of odorant at Ubungo and Mtwara TPDC distribution network. **Table 21** indicates the environment performance and **Table 22** outlines the integrity of PSV, meter and chromatography devices.

4.4.1 Environment Performance Indicators

Table 21: Environment Performance Indicators

Facility	Environmental Performance Indicator		
Natural Gas Processing Plant	**Hydrocarbon spills to the environment**	**Controlled/influents discharges to water (max ppm)**	**Flared gas (MMscf)**
TPDC - M	0	0	8.13
TPDC - SSI	0	32.2	9.45
Songas	0	1	36.14
M&P	0	0	1.55

Source: M&P, Songas, PAET & TPDC

4.4.2 PSV, Metering and Chromatography Devices' Integrity

Table 22: Outline of PSV, Metering and Chromatography Device's Integrity

S/N	Operator	Type of devices	No. of device available	No. of device re-calibrated	Calibration in %	Target %
1.	TPDC	PSV	211	0	0	100
		Meter	19	0	0	100
		Chromatography	2	1	50	100
2.	Songas	PSV	2	2	100	100
		Meter	2	2	100	100
		Chromatography	0	0	NA	100
3.	M&P	PSV	15	15	100	100
		Meter	1	1	100	100
		Chromatography	2	2	100	100
4.	PAET	PSV	93	88	81.8	100
		Meter	78	78	100	100%
		Chromatography	2	1	50	100%
		CNG dispenser	1	0	0	100

Source: M&P, SONGAS, PAET & TPDC

4.4.3 Near Miss, Incidents, Accidents and Lost Time Injury

In oil and gas operations, near miss refers to "unplanned event that did not result in injury, illness or damage – but had the potential to do so". The sum of fatalities and lost work day cases referred to Lost Time Injury (LTI) was zero during the review period in all-natural gas infrastructures. However, there was only one injury that was recorded at Songo Songo gas plant operated by GASCO.

Service providers complied with safety required standard as there were no substantive injuries sustained by employees that ultimately caused loss of productive work time in the form of worker delays, absenteeism, fatality or permanent disability. **Table 23** summarizes health, safety and environmental incidents at different work site of service providers while **Table 24** indicates the natural gas leak monitoring performance.

Table 23: Number of Near Miss, Incidents, Accidents and Lost Time Injury

Facility	Number of near miss, incidents, accidents and lost time injury					
	Near miss	Incidents	Accidents	Lost Time Injury	Injuries Occurred	Target Set
G. Plants						
TPDC	38	32	5	0	1	0
SONGAS	2	0	7	0	0	0
M&P	2	0	0	0	0	0
T. Pipelines						
TPDC	2	1	0	0	0	0
SONGAS	0	0	0	0	0	0
M&P	0	0	0	0	0	0
D. Pipelines						
TPDC	8	4	0	0	0	0
PAET	0	0	0	0	0	0
Filling Station						
PAET	0	0	0	0	0	0

Source: M&P, SONGAS, PAET & TPDC

4.4.4 Natural Gas Leaks Monitoring

Table 24: Natural Gas Leak Monitoring

Facility	Natural Gas Leak Performance Monitoring			
	No. of gas leaks survey conducted	No. of significant gas leaks occurred	No. of unplanned gas release	LTI
G. Plants				
TPDC - M	365	0	0	0
SONGAS	379	0	0	0
M&P	48	1	0	0
T. Pipelines				
TPDC	48	0	0	0
SONGAS	12	3	1	0
M&P	48	0	0	0
D. Pipelines				
TPDC	52	0	0	0
PAET	365	0	0	0
M&P	0	0	0	0
Filling Station				
PAET	365	0	0	0

Source: M&P, SONGAS, PAET & TPDC

4.4.5 HSE Emergency Drills Performed against Target Set

The Authority monitored HSE drills performance by service providers in order to assist personnel to know their roles and responsibilities in an emergency situation in accordance with the workplace plans and procedures, and to test the workforce response to an emergency is as shown in **Table 25**.

Table 25: HSE Emergency Drills Performed against Target Set

Facility	HSE Emergency Drills Performed against Target set					
	Planned HSE Drills	Performed	Performed within set time	Performance against Plan in (%)	Response Rate (%)	Target set in (%)
G. Plants						
TPDC	12	16	16	130	90	100
SONGAS	24	17	17	95	90	100
M&P	14	11	10	79	79	100
T. Pipelines						
TPDC	8	6	6	75	75	100
SONGAS	1	1	1	100	90	100
M&P	14	11	10	79	79	100
D. Pipelines						
TPDC	12	12	12	100	90	100
PAET	12	12	12	100	100	100
Filling Station						
PAET	12	12	12	100	100	100

Source: M&P, SONGAS, PAET & TPDC

The Authority monitored HSE emergency response by service providers which includes who to contact, evacuation routes, how to act during an emergency, how to mitigate risk to your people and facilities, and detailed communication procedures to follow during and after a specific emergency occurs is as shown in **Table 26**.

Table 26: HSE Emergency Response Plan against Performance

Facility	HSE Emergency Response Plan against Performance			
	No. of emergency occurred	No. of emergency responded within set time	Emergency Response Rate (%)	Response Target (%)
G. Plants				
TPDC	0	0	0	100
SONGAS	12	12	100	100
M&P	0	0	0	100
T. Pipelines				
TPDC	2	2	100	100
SONGAS	0	0	0	100
M&P	0	0	0	100
D. Pipelines				
TPDC	0	0	0	100
PAET	0	0	0	100
Filling Station				
PAET	0	0	0	100

Source: M&P, SONGAS, PAET & TPDC

5. LOCAL CONTENT

EWURA continued to monitor compliance by regulated suppliers to local content requirements and create awareness to the public on local content matters.

5.1 Local Content Performance

Local content performance of regulated service providers in the mid and downstream natural gas sub-sector was monitored as per Petroleum (Local Content) Regulations 2017 during the period under review.

Regulated service providers submitted their local content plans and the corresponding local content performance reports. A typical local content plan includes all aspects related to optimization of employment and training of Tanzanians, implementation of succession plan for positions which were previously occupied by expatriates; participation of Tanzanians in research, development and innovation; Others are procurement of locally produced or available goods and services; technology transfer to Tanzanians; utilization of local legal services; prioritizing engineering services provided by Tanzanian firms; utilization of local financial services; and utilization of local insurance services.

Further, the Petroleum (Local Content) Regulations 2017 provide for preference to eligible Tanzanian nationals and firms in the bidding process for execution of works or provision of various goods and services and employment opportunities. However, in an event that capable local suppliers and services providers are not available, foreign bidders are required to enter into joint venture arrangement with local firms whose participating interest or shares are not less than 25%.In the event the formation of joint ventures is not practical, EWURA is mandated to approve any other business arrangement which will guarantee local value addition such as technology transfer. Local content performance level of service providers is highlighted in **Table 27**.

Table 27: Local Content Performance

S/N	Requirements	TPDC		PAET		SONGAS		M&P	
		x/y	%	x/y	%	x/y	%	x/y	%
1	Number of local employees out of total employees	368/368	100	100/101	99	72/72	100	87/89	99
2	Number of local staff trained out of total employees	135/135	100	103/103	100	2/6	33	31/31	100
4	Number of local financial services utilized out of total financial services	7/7	100	2/2	100	3/3	100	2/2	100
5	Number of local insurance policies utilized out of all insurance service awarded	4/4	100	4/5	80	4/4	100	2/2	100
7	Number of procurements awarded to nationals out of total number of procurements	45/48	93	40/48	55.6	5/6	83	34/34	100
		x = localelement; y= total							

5.2 Local Suppliers and Service Providers Database

The Authority also continued to maintain and update the Local Suppliers and Service Providers Database (LSSP). The registration comprised of local business entities and foreign companies which had entered into joint venture arrangements with local companies whose participating share or interest was at least 25%. The registration is a precondition to participate in rendering goods or provision of various services in the petroleum sub-sector in Mainland Tanzania. As of 30th June 2021, the Authority had registered 737 local business entities in the LSSP Database and the number of registered local business entities increased by 267 from 470 in the previous year.

Also the Authority in collaboration with the Petroleum Upstream Regulatory Authority (PURA) continued with the development of Common Qualification System (CQS) which is due to be finalized during FY 2021/2022. CQS is electronic filing of local content plans, reports and registration among others. Upon completion, the LSSP Database will be integrated into CQS. Also new database for professionals' registration will be among the services to be provided by the Authority through CQS. Therefore, local suppliers and service providers continued to register through the current arrangement by accessing the registration form on the websites of the Authority www.ewura.go.tz and that of the Ministry of Energy www.nishati.go.tz. The list of registered local suppliers and service providers as of 30th June, 2021 is shown in **Table 28**.

Table 28: Summary of Registered Local Suppliers and Service Providers (LSSP)

S/N	LSSP Categorization	Entities (FY 2019/20)	Entities (FY 2020/21)
1	Agriculture, Fishing and Forestry	4	4
2	Manufacturing	12	14
3	Electrical Works and Equipment	34	38
4	Construction, Building and Mechanical Works	98	120
5	Whole Sale, Retail Trade, Supply of Spares and Repair of Motor vehicles	13	72
6	Transportation and Logistics	68	124
7	Accommodation and Food Services Activities	18	45
8	Medical and Healthcare Services	3	8
9	Telecommunications, Information and Communication Technology (ICT) and Security Systems	25	41
10	Financial and Insurance Services	9	20
11	Real Estate Services	7	24
12	Professional, Scientific and Technical Services	90	97
13	Legal Services	35	44
14	Administrative and Support Services	32	50
15	Capacity Building and Manpower Supply	5	10
16	Security Services	17	26
	Total	**470**	**737**

Source: EWURA

6. FINANCIAL PERFORMANCE

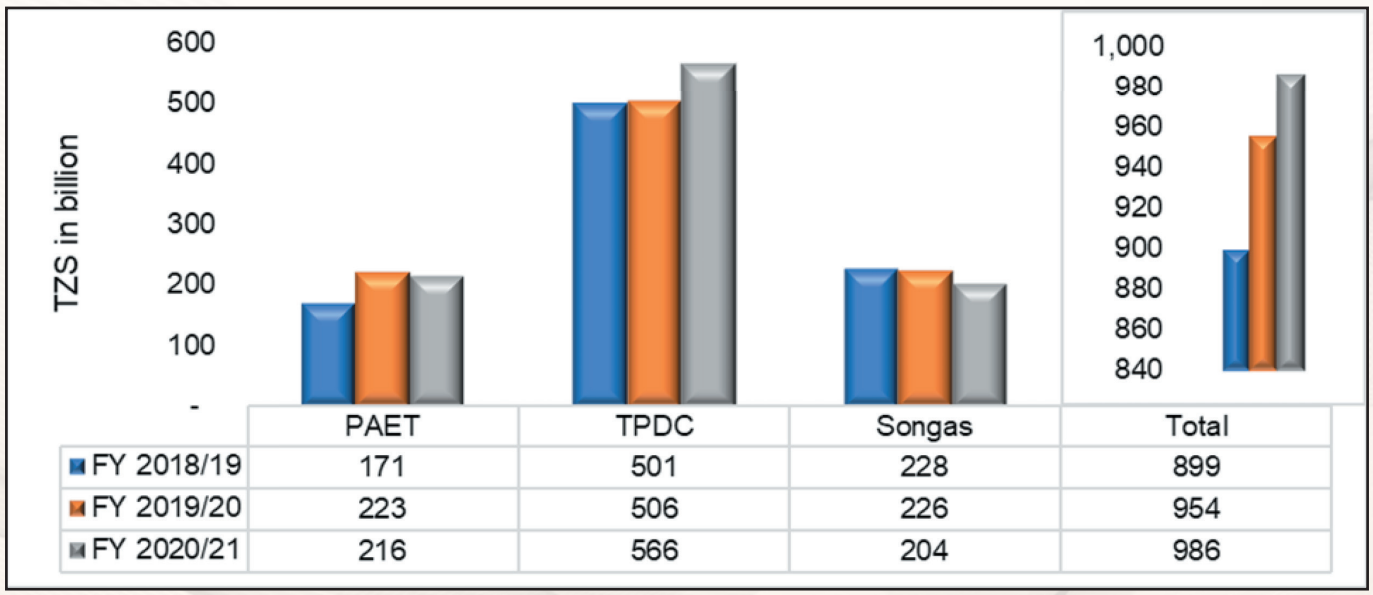
This section briefly highlights financial performance of three (3) natural gas utilities for the year 2020/2021 by making comparison to their performances in the previous two years, 2018/19 and 2019/20. The utilities under consideration are Pan African Energy Tanzania Limited (PAET), Tanzania Petroleum Development Corporation (TPDC) and Songas Limited.

Principal activities for Songas are processing and transportation of natural gas and generation of electricity in Tanzania using natural gas from Songo Songo Island. PAET deals with production and marketing of natural gas produced from Songo Songo under the terms of a Production Sharing Agreement (PSA) signed in October 2001 between the Government of the United Republic of Tanzania, TPDC and PAET. Likewise, TPDC processes, transports and distribute natural gas for power generation, industrial customers and household customers.

The financial performance of the utilities under consideration are based on audited financial reports (Songas and PAET) which are reported on calendar years (2018, 2019 and 2020) whilst, TPDC's performance has been assessed based on its draft financial statement for the year 2020/21 and the same is reported on financial years ending June (FY 2018/19, FY 2019/20 and FY 2020/21).

6.1 Revenue Generation

In FY 2020/21, the overall gross revenue generation from the natural gas sub-sector increased by 3% compared to an increase of 6% recorded in FY 2019/20. However, only TPDC recorded an increase in revenue by 12, whilst, Songas and PAET recorded the deterioration of revenue by 10% and 3%, respectively. **Figure 15** shows revenue generation by companies for three financial years.



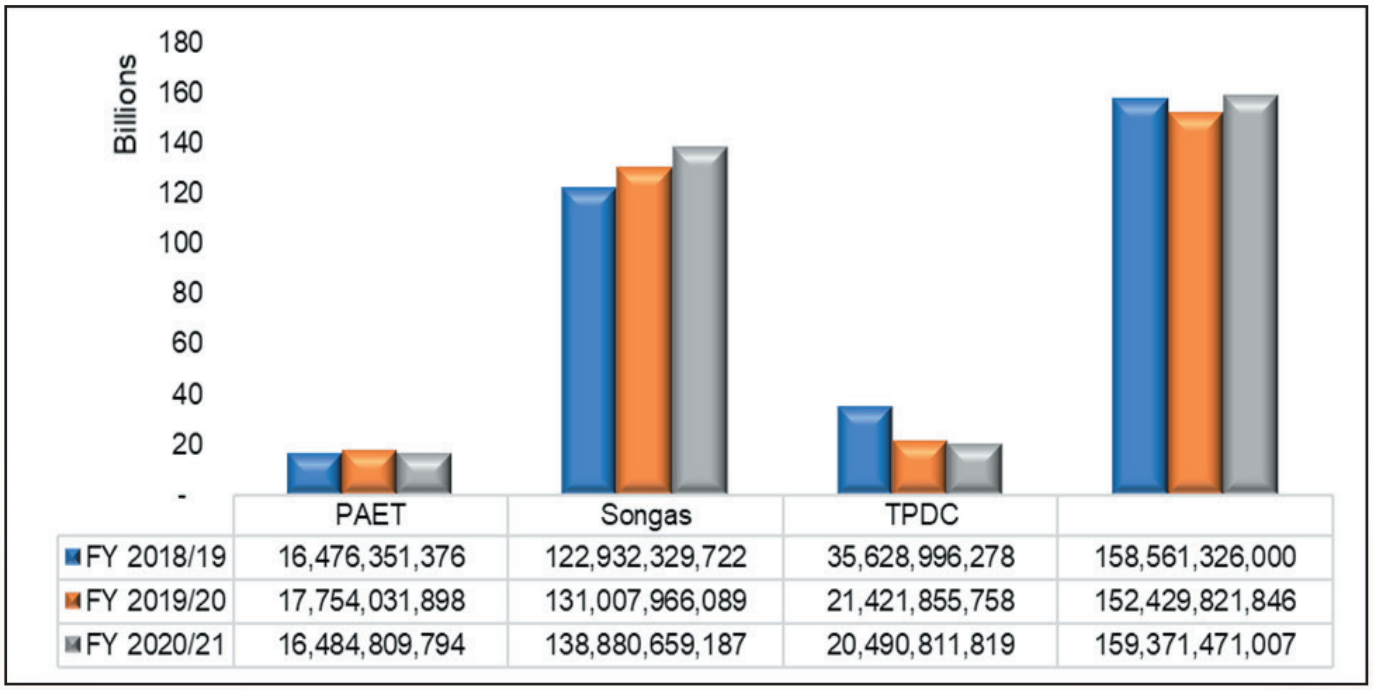
	PAET	TPDC	Songas	Total
FY 2018/19	171	501	228	899
FY 2019/20	223	506	226	954
FY 2020/21	216	566	204	986

Figure 15: Revenue Generation

The increase in revenue generation by TPDC is attributed to an increase in processed and transported natural gas from 32.617 Billion Cubic Feet (BCF) in 2019/20 to 35.761 BCF (which is about 10 percent), supplied to downstream customers.

6.2 Total Cost

In FY 2020/21, the overall costs of processing, transmission and distribution of natural gas increased by 5% from TZS 152.4 billion to TZS 159.4 billion. It should be noted that in FY 2019/20, the overall cost decreased by 4%. In the year under review, the mentioned cost for PAET decreased by 7% from TZS 17.8 billion to TZS 16.5 billion; Songas, costs increased by 6% from TZS 131.0 billion to TZS 138.9 billion; and TPDC's costs decreased by 4% from TZS 21.4 billion to TZS 20.5 billion from FY 2019/20 to FY 2020/21, respectively. **Figure 16** shows total costs of processing, transmission and distribution by companies from FY 2018/19 to FY 2020/21.



	PAET	Songas	TPDC	
FY 2018/19	16,476,351,376	122,932,329,722	35,628,996,278	158,561,326,000
FY 2019/20	17,754,031,898	131,007,966,089	21,421,855,758	152,429,821,846
FY 2020/21	16,484,809,794	138,880,659,187	20,490,811,819	159,371,471,007

Figure 16: Total Costs by Companies

6.3 Processing Costs

As highlighted in section 4.1, there are four natural gas processing plant infrastructures. Based on data availability, natural gas processing costs for three processing plants were analyzed, these are Madimba and Songo Songo plants owned by TPDC and Songo Songo plant owned by Songas and operated by PAET.

During FY 2020/21, total costs for processing natural gas was recorded at TZS 27.43 billion being an increased by 0.1% compared to TZS 27.40 billion of the previous year. It should be noted that the processing costs decreased by 34% in 2019/2020. For PAET, the processing costs decreased by 1.9% compared to an increase of 8% recorded in FY 2019/20. Whilst, TPDC's processing costs in FY 2020/21 increased by 1.5% compared to a decrease of 47% recorded in the FY 2019/20. The processing cost structure were repair & maintenance (53%), staff related cost (27%) and other costs (20%). **Figure 17** and **Table 29** shows processing costs by percentage and values, respectively.

Table 29: Processing Costs (TZS in billion).

Description	TPDC	PAET	Total
Salaries & related Staff Cost	2.08	5.45	7.52
Repair and Maintenance	13.42	1.15	14.57
Depreciation Cost	-	-	-
Other O&M Costs	1.24	4.10	5.34
Total	16.74	10.70	27.43

**Other O&M costs include all costs apart from those mentioned in above table*

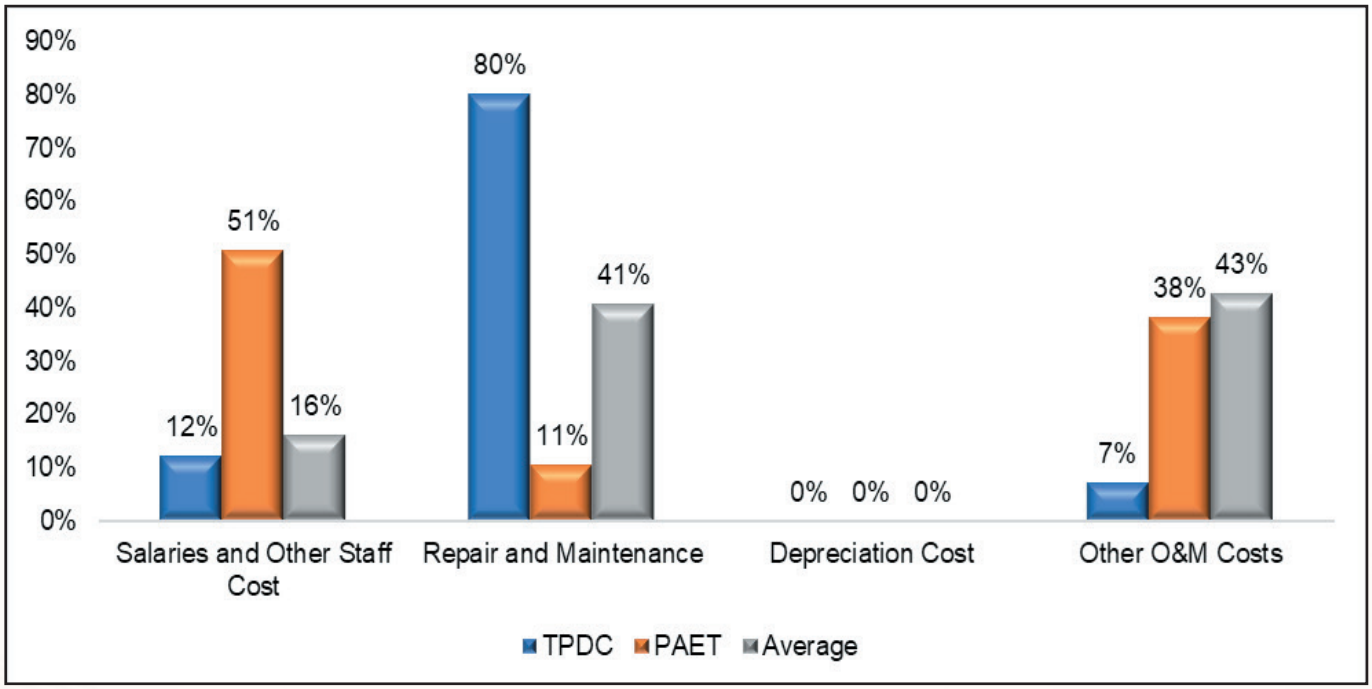


Figure 17: Processing Cost Structure by Percentage

6.4 Transmission Costs

The natural gas transmission pipeline networks are owned by TPDC, Songas and Maurel Prom, the analysis was based on TPDC and Songas transmission costs. During the FY 2020/21, the transmission costs increased by 5.5% from TZS 134.6 billion in FY 2019/20 to TZS 142.0 billion in FY 2020/21. It should be noted that, in FY 2019/20, transmission costs increased by 6.3%. Further, for TPDC, in FY 2020/21, transmission costs decreased by 12.4% compared to a decrease of 1.3 recorded in the previous financial year. Furthermore, Songas recorded an increase of 6.0% and 6.6% in FY 2020/21 and FY 2019/20, respectively. **Figure 18** and **Table 30** shows transmission costs by percentage and values, respectively.

Table 30: Transmission Costs (TZS in billion).

Description	TPDC	Songas	Total
Salaries & related Staff Cost	-	0.22	0.22
Repair and Maintenance	3.14	0.78	3.92
Depreciation Cost	-	137.88	137.88
Other O&M Costs	-	-	-
Total	3.14	138.88	142.03

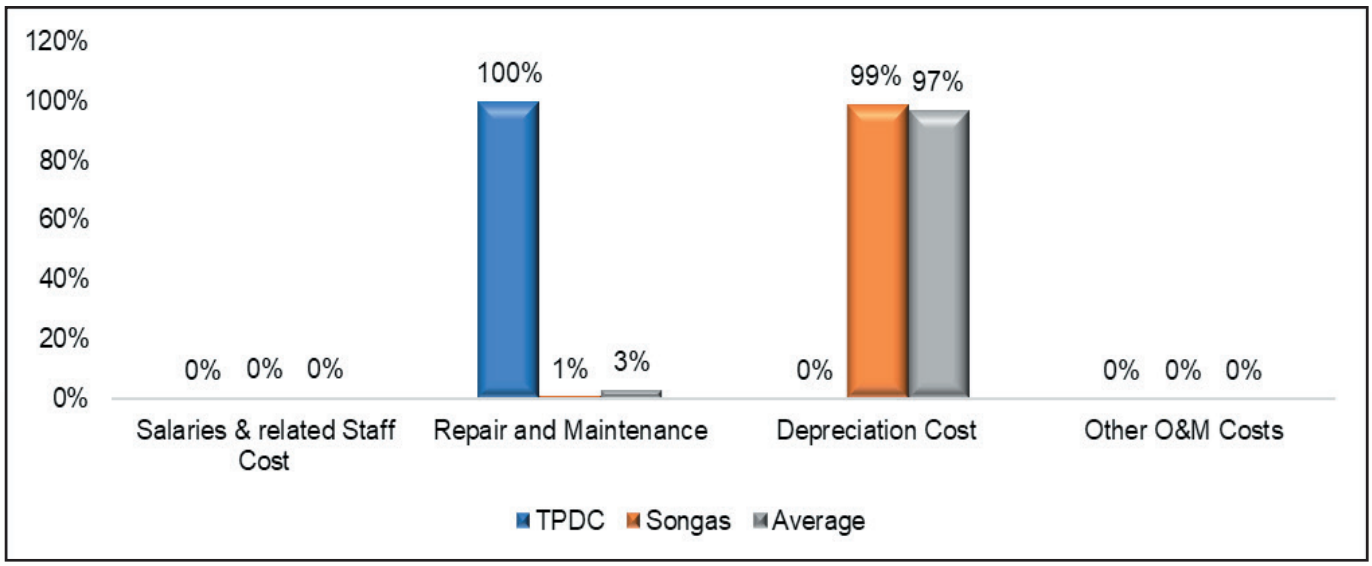


Figure 18: Transmission Cost Structure by Percentage

6.5 Distribution Costs

The natural gas distribution networks in the country are owned by PAET and TPDC. Moreover, TPDC's distribution network is operated by its subsidiary company, GASCO.

During FY 2020/21, total distribution cost decreased by 22% from TZS 8.2 billion in FY 2019/20 to TZS 6.4 billion in FY 2020/21. It should be noted that in FY 2019/20, distribution cost increase of 16%. For PAET, the distribution costs decreased by 15.6% from TZS 6.9 billion in FY 2019/20 to TZS 5.8 billion in FY 2020/21, likewise, it should be noted that an increase of 7.9% was recorded in FY 2019/20. Whilst, TPDC's distribution costs in FY 2020/21 decreased by 54.5% from TZS 1.3 billion in FY 2019/20 to TZS 0.6 billion in FY 2020/21, also, it is worth to note an increase of 81.3% recorded in FY 2019/20. **Figure 19** and **Table 31** shows distribution costs by percentage and values in TZS, respectively.

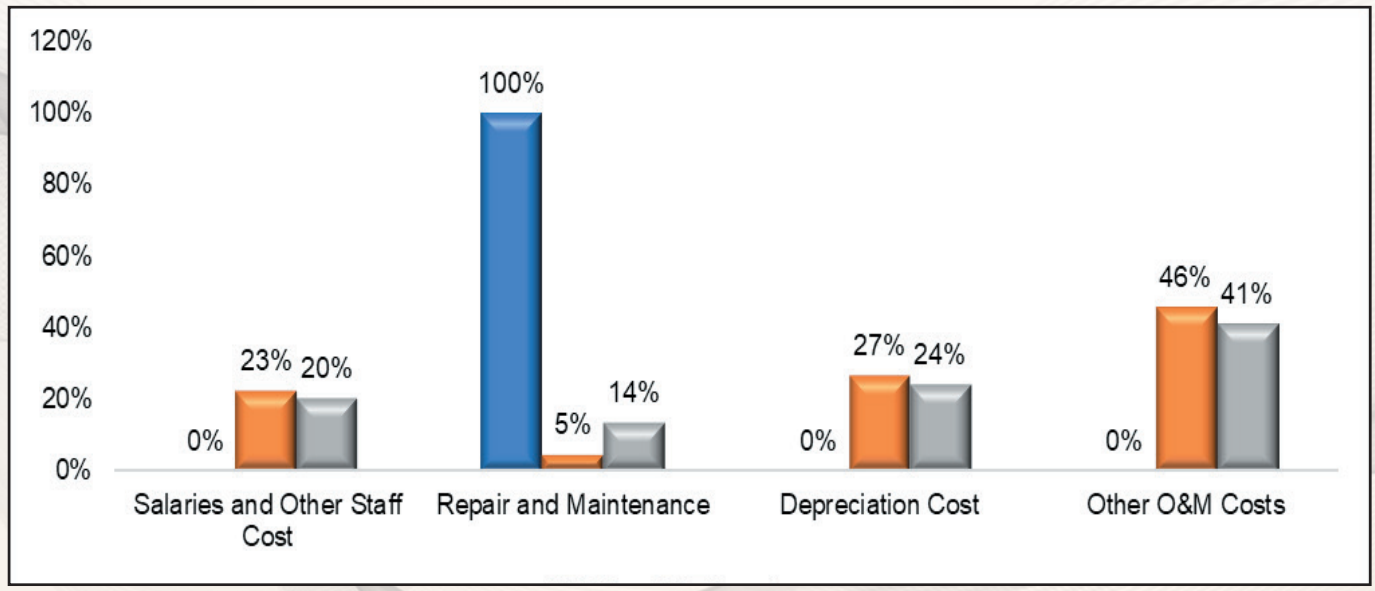


Figure 19: Distribution Cost Structure by Percentage

Table 31: Distribution Costs (TZS in billion).

Description	TPDC	PAET	Total
Salaries & related Staff Cost	-	1.31	1.31
Repair and Maintenance	0.61	0.27	0.88
Depreciation Cost	-	1.56	1.56
Other O&M Costs	-	2.65	2.65
Total	0.61	5.79	6.40

**Other O&M costs include all costs apart from those mentioned in above table*

7. NATURAL GAS SUPPLY AND DEMAND BALANCE

The utilization of natural gas mainly for power generation and industrial heating in Tanzania commenced in June 2004. To-date, the market structure comprises mainly of the following customer categories

(i) power generation
(ii) industrial
(iii) residential customers,
(iv) commercial customers,
(v) institutional customers
(vi) compressed natural gas for vehicles (CNG-V) as shown in **Table 19**.

The natural gas sub-sector is growing very fast. The demand for natural gas is expected to increase due to an upsurge in power generation, industrial heating, households and CNG for fuelling vehicles. With the current rate of demand growth, the supply of natural gas may be constrained in a short period of time due to inadequate natural gas production wells and distribution network. With the increase of natural gas demand in the downstream market, it is necessary to develop new wells in the upstream.

7.1 Natural Gas Supply

During the period under review, the overall gas processing from both gas fields Songo Songo Island (SSI) in Lindi and Mnazi Bay in Mtwara was 60,619.12MMscf compared to 59,831.43 MMscf gas processed in 2019/20. This increase was prompted by increased demand of natural gas in power production and industrial use.

The quantity of natural gas processed at Songas gas plant was 23,978.40MMscf in year 2020/21, compared to 26,342.00 MMscf produced in year 2019/20 which indicated a decrement of 8.97%. Natural gas processed at TPDC gas processing plants in Madimba and Songo Songo Island was 35,761.26 MMscf in year 2020/21 compared to 32,608.64 MMscf in year 2019/20. The figures indicate that there was an increment of 9.67%. The increase was due to resumption of TPDC natural gas processing plant at Songo Songo Island as a result of connecting TPDC's infrastructure to natural gas supplied by PAET as well as increase of downstream customers.

Moreover, M&P gas processing plant supplied natural gas to Mtwara TANESCO power plant was 879.46 MMscf in FY 2020/21, compared to 881.09 MMscf in the previous year 2019/20. More details are provided in **Figure 20**.

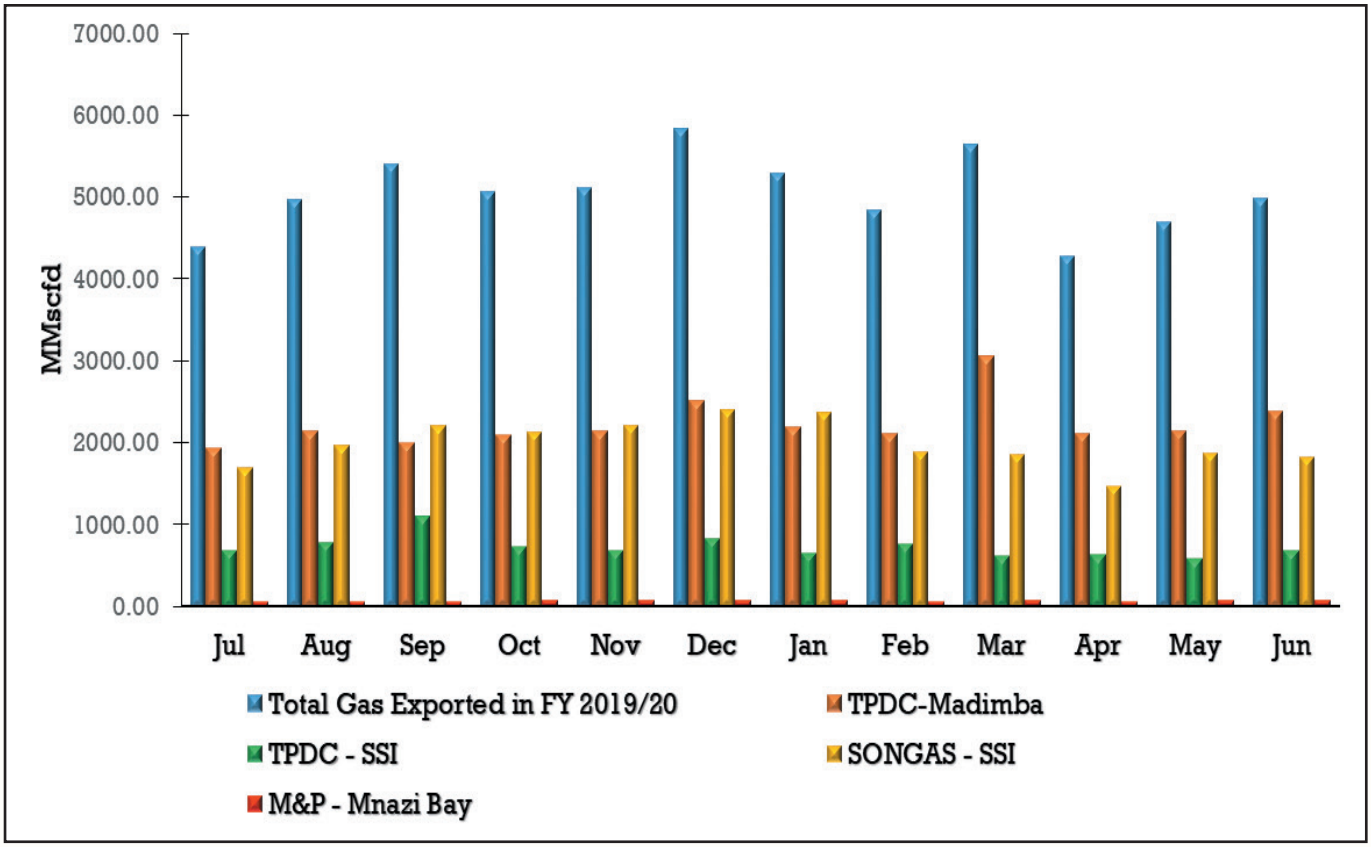


Figure 20: Total Natural Gas Processed

7.2 Natural Gas Sales

During the period under review, the overall gas processed from both gas fields i.e. Songo Songo Island (SSI) gas field in Lindi, and Mnazi bay gas field in Mtwara was 60,619.12 MMscf compared to 59,253.81 MMscf similar period in previous year. A total of 60,619.12 MMscf of natural gas was exported for power generation, industrial, commercial, households and CNG Vehicles refuelling customers. **Figure 21** indicates natural gas sales to various customer categories.

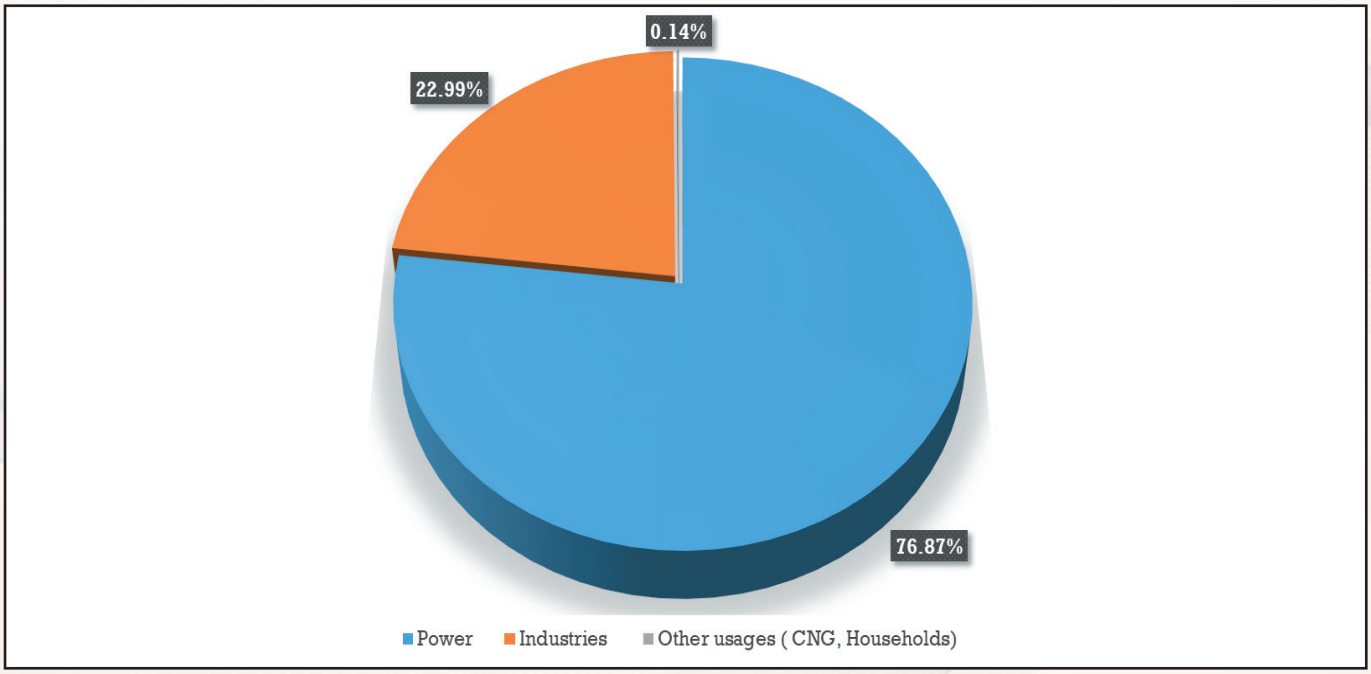


Figure 21: Natural Gas supplied to Power, Industrial and other Customers

7.3 Natural Gas Prices

In 2015, the Petroleum Act was enacted which provided the framework for pricing natural gas in the country. As a result, the Petroleum (Natural Gas Pricing) Regulations, 2020 were developed by the Minister responsible for petroleum affairs to operationalize the Petroleum Act in respect of natural gas pricing. The average natural gas price for industrial customers during the period under review was 8.33$/MMBtu. The average price for cement industries was 5.53$/MMBtu, ceramic industry was 6.64$/MMBtu and institutions such as Tanzania Prison Services was 5.76$/MMBtu. The prices were benchmarked with USA's price as indicated in **Figure 22**.

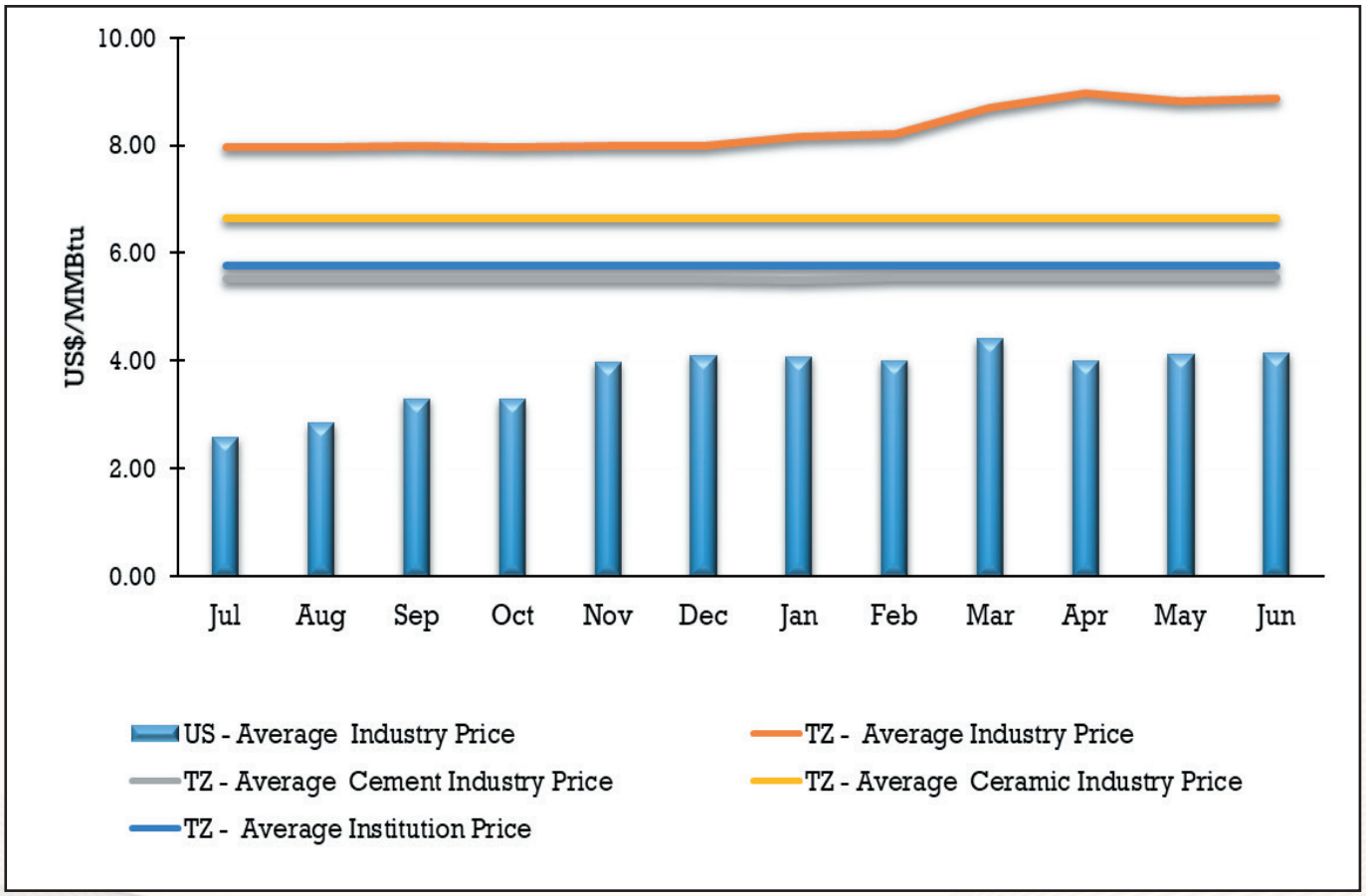


Figure 22: Natural Gas Prices for different industrial customers

7.4 Benchmarking of Natural Gas Prices

As of 30th June, 2021, the average monthly natural gas price for thermal power plants supplied as protected gas was 4.2U$/MMBtu while the prices for thermal power plants supplied as additional gas, was 3.73U$/MMBtu. Other gas prices included the price for Mnazi Bay gas sold to TANESCO power plant in Mtwara was 5.36U$/MMBtu and the average price for TPDC gas sold to TANESCO power plants was 5.4U$/MMBtu.

The Authority benchmarked the natural gas prices for thermal power generation and industrial use in Tanzanian market with USA market as shown in **Figure 23**. The average USA prices for power generation and industrial use were 3.01U$/MMBtu and 3.73U$/MMBtu respectively over the same period under review. It was noted that, in general the USA market price for power and industrial are lower compared to local market price.

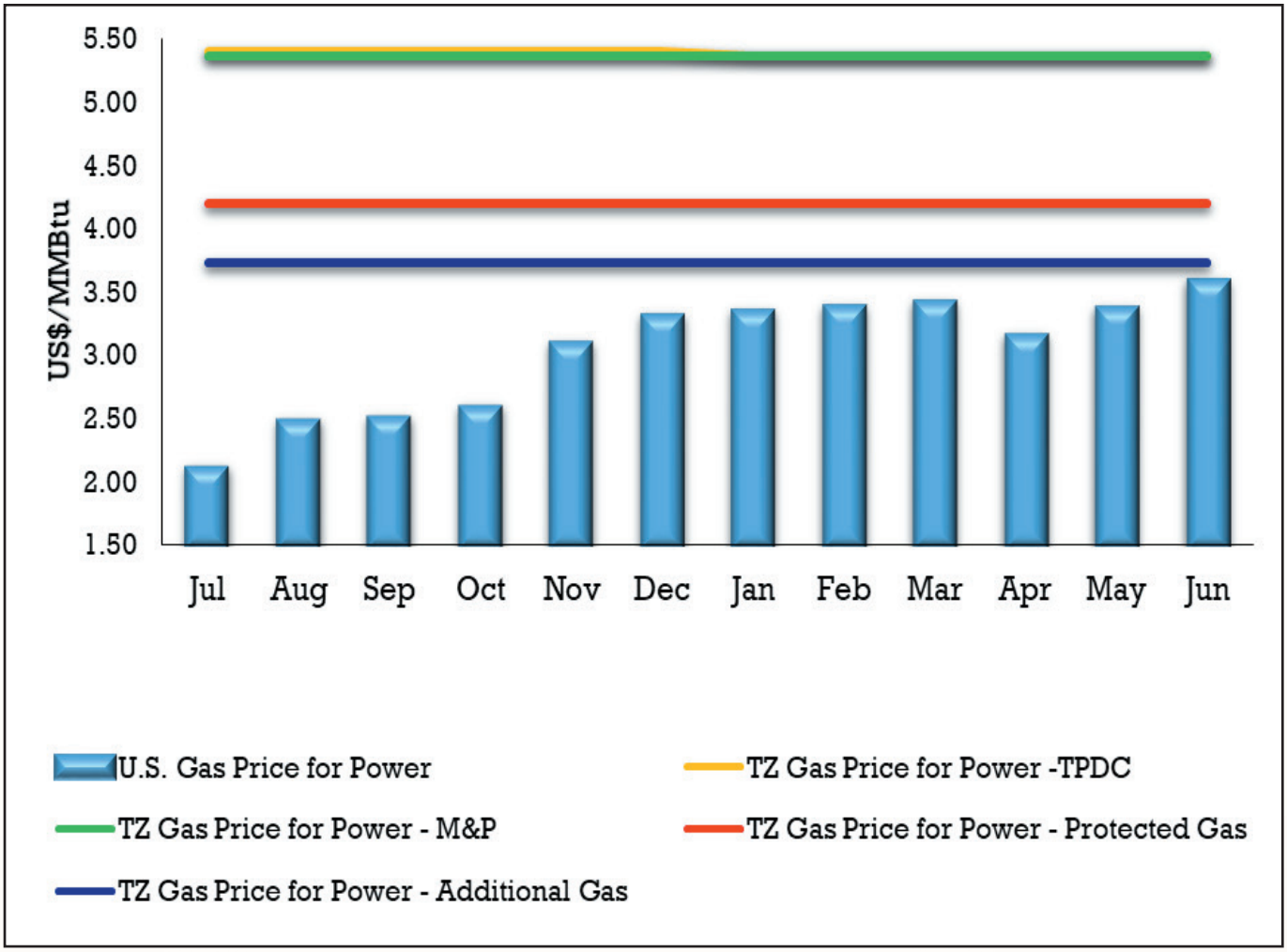


Figure 23: Natural Gas Prices for Power Benchmarked to US prices

8. ACHIEVEMENTS, KEY OBSERVATIONS AND RECOMMENDATIONS

During the period under review, EWURA achieved number of milestones and observed a number of challenges during compliance monitoring of mid and downstream natural gas sub-sectors as detailed below: -

8.1 Achievements

(a) The Authority through compliance monitoring and inspections, assured the integrity of natural gas midstream and downstream natural gas infrastructures are maintained by the service providers to the required standards;
(b) The number of Local Suppliers and Service Providers (LSSP) registered in the database since 30th June 2021 increased from 470 to 737 as of 30th June 2021 which is equivalent to 64% increase. This show the increase of local participation in petroleum activities;
(c) The Authority upgraded the Common Qualification System (CQS) for local content management by integrating Petroleum Upstream Regulatory Authority (PURA) section;
(d) The Authority coordinated signing Memorandum of Understanding (MoU) for Protection of Underground Infrastructure within shared way leave between way leaves owners and users; and
(e) The Authority developed various natural gas regulatory tools to guide the industry.

8.2 Key Observations and Recommendations

Key observations noted in the mid and downstream natural gas sub sector during the period under review are as detailed below: -

(a) Inadequate gas distribution network to meet the natural gas demand and future markets (industries, households, commercial and CNG for fuelling vehicles); The Authority will continue to prepare new and review existing regulatory tools to attract more private sector participation to extend the network to other regions in Tanzania, which will increase utilization of processing and transmission natural infrastructure;
(b) Risks posed by third party activities and encroachment along the way leaves. The Authority coordinated signing Memorandum of Understanding (MoU) for Protection of Underground Infrastructure within shared way leave between way leaves owners and users. This will enable the members to develop different guidelines, procedures and review performance of each member as per guidelines for protection of underground infrastructures;
(c) Inadequate investment in Compressed Natural Gas (CNG) dispensing units to meet available demand for vehicles converted or dedicated vehicles. The Authority will continue to prepare or review existing regulatory tools governing the CNG business including the already approved relevant rules covering issuance of construction approval and licences; also the Authority established an online database for natural gas service providers and suppliers (Common Qualification System - CQS) where new investors have direct access to existing service providers in the natural gas industry.

(d) Inadequate control to ensure the CNG Fuel System inspectors are not conducting CNG Vehicle Conversion activities and vice versa which is strictly not recommended to avoid conflict of interest leading to jeopardising of public safety; The Authority coordinated a CNG activities key stakeholder's meeting which resolved that, TBS in consultation with CNG stakeholders to prepare/develop CNG vehicles Inspection guidelines or procedure and checklist/inspection form for CNG Fuel System inspectors.

(e) Importation of second-hand CNG cylinders in the country compromise the public safety and their properties. The Authority coordinated a CNG activities key stakeholder's meeting and reported the matter to TBS for implementation. One of the resolution was for CRB as the CNG workshop certifier to prepare/develop CNG vehicles conversion workshop guidelines/ criteria in accordance to TBS standards as the CNG workshops are the ones responsible for cylinder installation into the vehicles. The Authority will continue to coordinate CNG activities key stakeholder's meeting in collaboration with the Ministry of energy

9. CONCLUSION

In general, the Authority performed its regulatory function and ensured that the mid and downstream natural gas sub-sector operations complied with the standard requirements with respect to technical, safety and economical aspects. Sectorial stakeholders' involvement was used as a means to ensure that the challenges encountered during the period under review were mitigated.

ANNEXES

Annex 1: Natural Gas Regulatory Tools

S/N	Citation / Title	GN Number	Date Published
1.	Petroleum (Natural Gas) (Transmission and Distribution Activities) Rules, 2018	GN 176/2018	May 4, 2018
2.	Petroleum (Natural Gas)(Licensing Fees) Rules, 2020	GN 301/2020	May 1, 2020
3.	Petroleum (Natural Gas) (Supply and Marketing Services) Rules, 2019	GN 219/2019	March 25, 2019
4.	Petroleum (Compressed Natural Gas) (Supply and Marketing Services) Rules, 2019	GN 220/2019	March 22, 2019
5.	Petroleum (Natural Gas) (Processing) Rules, 2019	GN 221/2019	March 22, 2019
6.	The Petroleum (Natural Gas) (Storage) Rules, 2019	GN 182/2019	March, 15 2019
7.	The Petroleum (Natural Gas) (Regulatory Accounting and Reporting Standards) Rules, 2019	GN 183/2019	March, 15 2019
8.	The National (Petroleum and Natural Gas) (Information System) Rules, 2019	GN 184/2019	March, 15 2019
9.	Petroleum (Natural Gas) Customer Services Charter Guidelines, 2019	N/A	2019
10.	Petroleum (Natural Gas Pricing) Regulations, 2020	GN 353/2020	May, 15 2020
11.	The Petroleum (Natural Gas Midstream and Downstream) General Regulations, 2020	GN 270/2020	April, 17 2020
12.	The Petroleum (Corporate Integrity Pledge) Regulations, 2019	GN 782/2020	November, 1 2019
13.	The Energy and Water Utilities Regulatory Authority (Compounding of Offences) Regulations, 2020	GN 397/2020	May, 29 2020
14.	The Petroleum (Local Content) Regulations, 2017	GN 197/2017	May, 5 2017
15.	The EWURA Consumer Complaints Settlement Rules, 2020	GN 428/2020	June, 5 2020
16.	The Energy and Water Utilities Regulatory Authority (Electricity and Natural Gas) (Tariff Application and Rate Setting) Rules, 2021	GN 396/2021	May 21, 2021

Annex 2: Natural Gas TBS Standards

S/N	Citation / Title	Status	Application
1.	TZS 2255:2018 (1st Ed) Petroleum and natural gas industries	Published	Steel pipe for pipeline transportation systems
2.	TZS 1792: 2016 (1st Ed) Safety and control devices for gas burners and gas\-burning appliance — Particular requirements — Part 3	Published	Gas/air ratio controls, pneumatic type
3.	TZS 1970: 2017 – ISO 15649: 2001 (1st ed) Petroleum and natural gas industries	Published	Piping
4.	TZS 1790:2016 – ISO 23550:2011 (1st ed) Safety and control devices for gas burners and gas\-burning appliances	Published	General requirements
5.	TZS 1791:2016-ISO 23551-1:2012 Safety and control devices for gas burners and gas\-burning appliances — Particular requirements — Part 1	Published	Automatic and semi\-automatic valves
6.	TZS 1790:2016-ISO 23550:2011 Safety and control devices for gas burners and gas\-burning appliances	Published	General requirements
7.	TZS 1920-5:2016-ISO 1042-5:2004 Petroleum and natural gas industries — Cements and materials for well cementing — Part 5	Published	Determination of shrinkage and expansion of well cement formulations at atmospheric pressure
8.	TZS 1920-4:2016-ISO 1042-4:2004 Petroleum and natural gas industries — Cements and materials for well cementing — Part 4	Published	Preparation and testing of foamed cement slurries at atmospheric pressure
9.	TZS 1920-3:2016-ISO 1042-3:2003 Petroleum and natural gas industries — Cements and materials for well cementing —Part 3	Published	Testing of deep water well cement formulations
10.	TZS 1920-1:2016-ISO 1042-1:2009 Petroleum and natural gas industries — Cements and materials for well cementing — Part 1	Published	Specification
11.	TZS 1307: 2010 ISO 11439: 2000 Gas cylinders	Published	high pressure cylinders for the on\- board storage of natural gas as a fuel automotive vehicles
12.	TZS 1187 (Part 5): 2010(1st Ed) Road vehicles\-Compressed Natural Gas \(CNG\) fuel system components Part 5	Published	Manual cylinder valve
13.	TZS 1187 (Part 1): 2010 (1st Ed) Road vehicles\-Compressed Natural Gas \(CNG\) fuel system components part 1	Published	General requirements and definitions
14.	TZS 1187 (Part 17): 2010(1st Ed) Road vehicles\-Compressed Natural Gas \(CNG\) fuel system components Part 17	Published	Flexible fuel line

S/N	Citation / Title	Status	Application
15.	TZS 1187 (Part 16): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 16	Published	Rigid fuel line
16.	TZS 1187 (Part 2): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 2	Published	Performance and general test method
17.	TZS 1187 (Part 11): 2010 Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components part 11	Published	Gas/ air mixer
18.	TZS 1187 (Part 10): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components part 10	Published	Gas\- flow adjuster
19.	TZS 1187 (Part 12): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 12	Published	Pressure relief valve \ (PRV\)
20.	TZS 1187 (Part 8): 2010 Road vehicles \- Compressed Natural Gas \(CNG\) fuel system components part 8	Published	Pressure indicator
21.	TZS 1187 (Part 9): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 9	Published	Pressure regulator
22.	TZS 1187 (Part 15): 2010 Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components part 15	Published	Gas\- tight housing and ventilation hose
23.	TZS 1187 (Part 13): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 13	Published	Pressure relief device \ (PRD\)
24.	TZS 1187 (Part 14): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 14	Published	Excess flow valve
25.	TZS valve187 (Part 6): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 6	Published	Automatic valve
26.	TZS 1187 (Part 3): 2010 (1st Ed) Road vehicles\- Compressed Natural Gas \(CNG\) fuel system components Part 3	Published	Check valve
27.	(TBS) standards (ISO 11439:2013) Gas cylinders- High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles and conversion components	Published	Gas Cylinders
28.	TBS standards (TZS 1187:2010-1/ISO 15500-1) – Converted CNG vehicle safety requirements	Published	General Requirements and definitions

Annex 3: Natural Gas Construction Approvals

SN.	Applicant Name	Approval No.	Date Of Issue	Type of Construction Approval
1	Tanzania Petroleum Development Corporation	NGCA-2018-01	31-May-18	Connection of natural gas supply for Coca-Cola and BIDCO to National Natural Gas Infrastructure in Dar es Salaam Region
2	Dangote Cement Limited Tanzania	NGCA-2018-02	9-Nov-18	Connection of natural gas supply for Compressed Natural Gas Mother Station, CNG Storage Cylinders and CNG Dispensing facilities to National Natural Gas Infrastructure at Dangote Cement Factory in Mtwara Region
3	Tanzania Petroleum Development Corporation	NGCA-2018-03	9-Nov-18	Connection of natural gas supply for Lodhia Steel Industry to National Natural Gas Infrastructure at Mwanambaya in Mkuranga, Costal Region.
4	Tanzania Petroleum Development Corporation	NGCA-2019-01	3-Apr-19	Connection of natural gas supply for University of Dar es salaam households and cafeteria to National Natural Gas Infrastructure
5	Tanzania Petroleum Development Corporation -	NGCA-2019-02	3-Apr-19	Connection of natural gas supply for University of Dar es salaam, Lufungila and Mlalakuwa households to National Natural Gas Infrastructure
6	Tanzania Petroleum Development Corporation	NGCA-2019-03	22-Jun-19	Connection of natural gas supply for Mtwara households and institutions to National Natural Gas Infrastructure Mtwara Region
7	Pan African Energy (T) Limited	NGCA-2020-01	4-Mar-20	Connection of natural gas supply to Pasta Industries Limited, Vingunguti within Dar es Salaam
8	Pan African Energy (T) Limited	NGCA-2020-02	4-Mar-20	Connection of natural gas supply by virtual pipeline (Compressed Natural Gas) to Mikoani Edible Oil in Mbagala, Dar es Salaam

Annex 4: List of Service Providers and their scope of operations

Regulated service provider	Scope of regulated service	Location	Year commenced service
PAET	Distribution Network	Dar es Salaam region	2004
Songas (T) Ltd	Processing Plant	Lindi region	2004
Songas (T) Ltd	Transmission Pipeline	Lindi to Dar es Salaam region	2004
M&P	Processing Plant	Mtwara - Mnazi Bay	2009
M&P	Transmission Pipeline	Mnazi bay to TANESCO in Mtwara	2009
TPDC	Processing Plant	Mtwara - Madimba	2016
TPDC	Processing Plant	Lindi – Songo Songo	2016
TPDC	Transmission Pipeline	Mtrwara to Dar es Salaam	2016
TPDC	Distribution Network	Mtwara, Lindi, Costal and DSM region	2016

Annex 5: Number of Cathodic protection test points installed

Transmission Pipeline Segment	CP test points installed	Voltage reading range	CP test points inspected	CP test points complied	CP test points reported mal-functioned	CP test points complied in (%)	Target 100%
TPDC (From SS/Madimba to Wazo hill)	8	850mV-1200mV	8	8	1	87.5	100
M&P	3	2.0mV-2.5mV	-	-	-	-	100
SONGAS	8	850mV-1200mV	8	8	0	100	100

Annex 6: List of industrial customers supplied by TPDC

SN	Name of customer	Date of installation	Average consumption (Mscfd)	Usage	Gas Odorization status	Location	Supplier
1.	Cocacola Kwanza Ltd	2019	0.09	Heating	OK	Dar es Salaam	TPDC
2.	Dangote Industries Tanzania Ltd	2018	12.32	Power and Heating	No Odorization Unit	Mtwara	TPDC
3.	Goodwill Ceramics Ltd	2017	3.90	Power and Heating	No Odorization Unit	Coast Region-Mkurnga	TPDC
4.	Knauf Gypsum	2020	0.22	Heating	OK	Coast Region-Mkuranga	TPDC
5.	Lodhia Steel Ltd	2019	0.26	Heating	OK	Coast Region-Mkuranga	TPDC
6.	MM Integrated Steel Mills (MMI 1)-KIBOKO	2010	0.12	Heating	OK	Dar es Salaam	TPDC
7.	MM Integrated Steel Mills (MMI 2)	2010	0.15	Heating	OK	Dar es Salaam	TPDC
8.	MM Integrated Steel Mills (MMI 3)	2014	0.13	Heating	OK	Dar es Salaam	TPDC
6	Balochistan Group of Industries	2021	Not yet started	Heating	Odorised	Mkuranga	TPDC
7	LN Future Building Material Company Limited	2021	Not yet started	Power	Odorised	Mkuranga	TPDC

Annex 7: List of industrial customers supplied by PAET

SN	Name of customer	Average Consumption (Mmscfd)	Usage	Gas odorization status	Location	Supplier
1	Aluminium Africa (ALAF)	0.3	Boiler +Power	Ok	Chang'ombe	PAET
2	Azam Bakeries Co Ltd	0.05	Boiler	Ok	Kipawa	PAET
3	Bautech Company Ltd 1		Boiler	Ok	Vingunguti	PAET
4	Bora Industries	0.01	Boiler	Ok	Chan'ombe	PAET
5	East Coast Oil & Fats Ltd	0.54	Boiler	Ok	Kurasini	PAET
6	Iron and Steel Limited	0.10	Heating	Ok	Mikocheni	PAET
7	Kamal Steel Ltd	0.14	Heating	Ok	Chan'ombe	PAET
8	Kioo Glass	2.51	Heating	Ok	Chan'ombe	PAET
9	MM Integrated Steel (MM1)	0.11	Heating	Ok	Mikocheni	PAET
10	MM Integrated Steel (MM2)	0.15	Heating	Ok	Mikocheni	PAET
11	MM Integrated Steel (MM3)	0.11	Heating	Ok	Mikocheni	PAET
12	Murzah Oil Mills Unit 1	-	Boiler	Ok	Vingungutu	PAET
13	Murzah Oil Mills Unit 2	0.18	Boiler	Ok	Vingunguti	PAET
14	Murzah Oil Unit Mills Unit 4	0.01	Boiler	Ok	Vingunguti	PAET
15	Murzah Soap and Detergent Unit 3	0.29	Boiler	Ok	Buguruni	PAET
16	Namera Group of Industries	0.06	Boiler	Ok	Gongo la mboto	PAET
17	Nampak (T) Ltd	0.01	Boiler	Ok	Ilala Bungoni	PAET
18	Nida Textile Mills Ltd	0.33	Boiler	Ok	Tabata	PAET
19	OK Plast Ltd	0.13	Boiler	Ok	Vingunguti	PAET
20	SBC Tanzania - Pepsi	0.18	Boiler	Ok	Kiwalani	PAET
21	Serengeti Breweries Ltd	0.10	Boiler	Ok	Chang'ombe	PAET
22	SilAfrica Tanzania T Ltd	0.02	Boiler	Ok	Chang'ombe	PAET
23	Steel Masters Ltd	0.11	Heating	Ok	Chang'ombe	PAET
24	Tanpack Tissues Ltd	0.09	Boiler	Ok	Mikocheni	PAET
25	Tanzania Breweries (TBL)	0.26	Boiler	Ok	Ilala Karume	PAET
26	Tanzania Cigarette Company (TCC)	0.24	Boiler +Power	Ok	Chang'ombe	PAET
27	Tanzania Cuttleries	0.01	Heating	Ok	Chang'ombe	PAET
	Manufacturer Ltd					
28	Tanzania-Chinese Textile (TCFT)	0.001	Boiler	Ok	Ubungo	PAET
29	VOT Tanzania	0.02	Boiler	Ok	Kurasini	PAET
30	Gaia Eco Solution	0.1	Boiler	Ok	Vingunguti	PAET
31	Said Salim Bakhresa & Co Ltd	0.001	Boiler	Ok	Buguruni	PAET

SN	Name of customer	Average Consumption (Mmscfd)	Usage	Gas odorization status	Location	Supplier
32	Soap & Allied Industries Limited	0.01	Boiler	Ok	Chang'ombe	PAET
33	A-one	0.83	Boiler +Power	Ok	Kiwalani	PAET
34	Tanzania Breweries 2 (TBL2) (DAR BREW)	-	Boiler	Ok	Ubungo	PAET
35	Royal Soap & Detergent Industry Ltd	0.33	Boiler	Ok	External - Ubungo	PAET
36	Jumbo Packaging	0.03	Boiler	Ok	Boiler	PAET
37	Mikoani Edible oil	0.09	Boiler	Ok	Boiler	PAET
38	Tanzania Pasta Industries	0.04	Boiler	Ok	Boiler	PAET
39	Tanzania Portland Cement Limited (AG)	5.22	Heating Kilns	Ok	Tegeta - Wazo	PAET
40	Tanga Pharmaceuticals		Boiler			PAET

Annex 8: List of thermal power generation customers

SN	Name of power generation customer	Year of installation	Installed capacity (MW)	Installed capacity (MMscfd)	Average consumption (MMscfd)	Gas Odorization status	Location	Supplier
1	Songas Power Plant Limited UPP	2004	191	70/110	38.86	Ok	Dar es Salaam	PAET
2	TANESCO - PGSA (Ubungo I)	2011	102	25	4.56	Ok	Dar es Salaam	PAET
3	TANESCO - PGSA (Tegeta 45)	2018	45	10	4.13	Ok	Dar es Salaam	PAET
4	Somanga fungu	2010	7.5	7.74	0.14	Ok	Somanga	PAET
5	Ubungo II Power Plant	2015	129	30		No Odorization Unit	Dar es Salaam	TPDC
6	Kinyerezi I Power plant	2015	150	30	13.26	No Odorization Unit	Dar es Salaam	TPDC
7	Kinyerezi I Extension	2015	185			No Odorization Unit	Dar es Salaam	TPDC
8	Kinyerezi II Power plant	2016	240	36	31.44	No Odorization Unit	Dar es Salaam	TPDC
9	TANESCO Mtwara Power Plant	2006	18	10	2.41	No Odorization Unit	Mtwara	M&P

Annex 9: List of Natural Gas Pipelines Way Leave Interferences

SN	Type of facility	Encroachment/ Erosion	Location	Way leave owner	Marker posts visibility	Natural Gas Supplier
1	Main gas pipeline	Encroachment	Mwakaringa road	TARURA	Visible	PAET
2	Main gas pipeline	Encroachment	Toyota area	TRC	Visible	PAET
3	Main gas pipeline	Encroachment	Buguruni kwa mnyamani	TRC	Visible	PAET
4	Main gas pipeline	Encroachment	Mikocheni light industries	TARURA	Visible	PAET
5	Main gas pipeline	Erosion	Tabata Relini	TRC	Visible	PAET
6	Main gas pipeline	Erosion	Ukonga area	TRC	Visible	PAET
7	Main gas pipeline	Erosion	Mission (KTM)	Tanroad	Visible	PAET
8	Main gas pipeline	Erosion	Mabibo bridge	TRC	Visible	PAET
9	Pipeline	1	Salasala, Dar es Salaam	Tanesco	Visible	Songas
10	Mtwara -Dar Transmission Pipeline	Erosion	Mangamba-Mtwara (AA KP 15)	TPDC	Visible	TPDC
11	Mtwara -Dar Transmission Pipeline	Erosion	Mbae-Mtwara (AA KP 18/19)	TPDC	Visible	TPDC
12	Mtwara -Dar Transmission Pipeline	Erosion	Mbuyuni-Mtwara (AA KP 21/22)	TPDC	Visible	TPDC
13	Mtwara -Dar Transmission Pipeline	Erosion	Kilimahewa -Mtwara (AA KP 22/23)	TPDC	Visible	TPDC
14	Mtwara -Dar Transmission Pipeline	Erosion	Singino-Mtwara (AA KP 24/25)	TPDC	Visible	TPDC
15	Mtwara -Dar Transmission Pipeline	Erosion	Haikata-Mtwara (AA KP 25/26)	TPDC	Visible	TPDC
16	Mtwara -Dar Transmission Pipeline	Erosion	Mabatini-Mtwara (AA KP 27/28)	TPDC	Visible	TPDC
17	Mtwara -Dar Transmission Pipeline	Erosion	Changarawe-Mtwara (AA KP 41/42)	TPDC	Visible	TPDC

SN	Type of facility	Encroachment/ Erosion	Location	Way leave owner	Marker posts visibility	Natural Gas Supplier
18	Mtwara -Dar Transmission Pipeline	Erosion	Ndumbwe- Mtwara (AA KP 42/43)	TPDC	Visible	TPDC
19	Mtwara -Dar Transmission Pipeline	Erosion	Pangatena-Lindi (AA KP 57/58)	TPDC	Visible	TPDC
20	Mtwara -Dar Transmission Pipeline	Erosion	Moka -Lindi (AA KP 126)	TPDC	Visible	TPDC
21	Mtwara -Dar Transmission Pipeline	Erosion	Kiwawa-Kilwa (AA KP 205)	TPDC	Visible	TPDC
22	Mtwara -Dar Transmission Pipeline	Erosion	Matandu-Kilwa (Near BVS No. 8)	TPDC	Visible	TPDC
23	Mtwara -Dar Transmission Pipeline	Erosion	Mkuranga (AB KP 131/132)	TPDC	Visible	TPDC
24	Mtwara -Dar Transmission Pipeline	Erosion	Gongolamboto-Dar es Salaam (AB KP 188/189)	TPDC	Visible	TPDC
25	Mtwara -Dar Transmission Pipeline	Erosion	Kimara Golani-Dar es Salaam (AC KP 4/ 5)	TPDC	Visible	TPDC
26	Mtwara -Dar Transmission Pipeline	Erosion	Kimara Baruti -Dar es Salaam (AC KP 9/ 10)	TPDC	Visible	TPDC
27	Mtwara -Dar Transmission Pipeline	Erosion	Makongo Juu -Dar es Salaam (Mbezi River)	TPDC	Visible	TPDC
28	Mtwara -Dar Transmission Pipeline	Erosion	Goba -Dar es Salaam (Before & After BVS No. 16)	TPDC	Visible	TPDC
29	Mtwara -Dar Transmission Pipeline	Erosion	Goba Kunguru Street -Dar es Salaam	TPDC	Visible	TPDC
30	Mtwara -Dar Transmission Pipeline	Erosion	Wazo -Near Tegeta Station -Dar es Salaam	TPDC	Visible	TPDC

SN	Type of facility	Encroachment/ Erosion	Location	Way leave owner	Marker posts visibility	Natural Gas Supplier
31	Mtwara -Dar Transmission Pipeline	Encroachment -Sand Mining	Tegeta River -Dar es Salaam	TPDC	Visible	TPDC
32	Mtwara -Dar Transmission Pipeline	Encroachment - Sand Mining	Kinyerezi Kanga Street, Dar es Salaam	TPDC	Visible	TPDC
	Mtwara -Dar Transmission Pipeline	Encroachment- Excavation by DAWASA	Goba-Kinguru Street, Dar es Salaam	TPDC	Visible	TPDC
33	Mtwara -Dar Transmission Pipeline	Encroachment -Excavation of Fish Ponds	Ziwani-Mtwara	TPDC	Visible	TPDC
34	Mtwara -Dar Transmission Pipeline	Encroachment - Commercial Activities	Kinyerezi Stands-Dar es Salaam	TPDC	Visible	TPDC

ewura

Energy and Water Utilities Regulatory Authority

ISO 9001: 2015 Certified

EWURA House, Plot No 3,
Block AD, Medeli West
P.O. Box 2857
Dodoma - Tanzania
Tel: +255-26 2329003-4
Fax: +255-26 232900
Email: info@ewura.go.tz
Website: www.ewura.go.tz