THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF ENERGY

ENERGY AND WATER UTILITIES REGULATORY AUTHORITY (EWURA)

NATURAL GAS SUB-SECTOR REGULATORY PERFORMANCE REPORT FOR THE YEAR ENDED 30TH JUNE 2020

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF ENERGY

ENERGY AND WATER UTILITIES REGULATORY AUTHORITY (EWURA)

ewura
Energy and Water Utilities Regulatory Authority
ISO 9001: 2015 Certified

NATURAL GAS SUB-SECTOR REGULATORY PERFORMANCE REPORT FOR THE YEAR ENDED 30TH JUNE 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAIRMAN'S STATEMENT

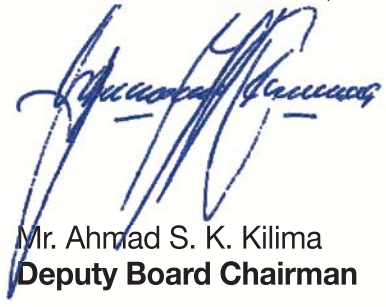
I have a pleasure to present an overview of Natural Gas Sub-Sector Performance Report for the Financial Year ending on 30th June 2020. For the country to move from an unacceptable low level of development to sustainable growth, along with a gross reduction in poverty we need domestic natural resources to monetize the economy.

A well-managed natural gas sub-sector can bring huge positive and sustainable impacts including the development of domestic downstream markets and service industries, employment, improved - regional and local transport infrastructure, expanded power grids, townships developments and socio-economic growth.

"The existing policies for the natural gas sub sector had ensured that relevant legislation are reflected in government's natural gas sub-sector development strategies to attract foreign and local private investments, encourages Public-Private Partnerships to develop natural gas markets among others, power plants, petrochemical industry, energy-intensive industries and natural gas infrastructure"

EWURA shall continue to facilitate improvement of investment environment by promoting and supporting private sector participation in the energy sector.

My sincere appreciation goes to the Government of the United Republic of Tanzania for creating a conducive environment, which enabled EWURA to conduct its functions efficiently and effectively.



Mr. Ahmad S. K. Kilima
Deputy Board Chairman

FOREWORD

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

The Sub-sector performance report presents regulatory activities carried out by EWURA and the overall performance of regulated service providers in the Main land Tanzania for the period between July 2019 and June 2020.

Tanzania has been exploring for oil and gas for more than half a century. However, the commercial production commenced in year 2004 and 2006 at Songo Songo Island and Mnazi Bay through Songas Tanzania (T) Limited and Maurel et Prom Exploration Production (T) Ltd; respectively. As of December 2016, 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 respectively.

“Over the period, notable achievements have been registered among others things, the Authority ensured the integrity of natural gas processing, transmission, distribution and supply infrastructures are maintained by the service providers to the required standards; it has developed and installed Common Qualification System (CQS) to manage local content issues and developed various natural gas regulatory tools to guide the development of the industry”.

EWURA continued to ensure that the quantum of composite value added to, or created in the economy of Tanzania through deliberate utilization of Tanzanian human and material resources and services in the petroleum operations. EWURA efforts resulted to promotion of Tanzanian staffs to be the chief executive officer and deputy managing director of Songas and PAET respectively.

However, the sub-sector still faces some challenges, such as inadequate gas distribution network to meet the natural gas demand for future markets (industries, households, commercial, and transport); risks posed by third party activities and encroachment along the way leaves; and Low utilization of processing and transmission natural gas infrastructure due to inadequate investment in the downstream segment.

Therefore, I would like to acknowledge the contribution provided by the following stakeholders namely; Tanzania Petroleum Development Corporation (TPDC), Gas Company (Tanzania) Limited (GASCO) (a subsidiary company of TPDC), Songas (T) Limited, Pan African Energy (PAET), Maurel et Prom (M&P) and other stakeholders in the midstream and downstream petroleum Sub-sector in the country.

Eng. Godfrey H. Chibulunje
ACTING DIRETOR GENERAL

ABBREVIATIONS AND ACRONYMS

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
HFO	Heavy Fuel Oil
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	Tanzania Electric Supply Company Limited
TBS	Tanzania Bureau of Standards
TCF	Trillion Standard Cubic Feet
TPDC	Tanzania Petroleum Development Corporation

EXECUTIVE SUMMARY

Tanzania is endowed with hydrocarbon discoveries along its South -East-coast shore of the Indian Ocean. The first discovery was made in 1974 at Songo Songo Island (232 km South of Dar es Salaam). As of December 2016, 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 discovery.

The Authority's regulatory activities in relation to natural gas sub-sector include protecting customers' interest through the promotion of competition; promoting access to and affordability of natural gas services; promoting least-cost investment by encouraging improvement in the operational and economic efficiency of the petroleum industry. Others are protecting natural gas infrastructure and uses of natural gas; promoting appropriate standards for quality, reliability and affordability of petroleum products taking into account the effect of activities of the petroleum industry on the environment; promoting the Health, Safety and Environment (HSE) of the persons employed in the sub-sector; and promoting maximum participation of Tanzanians in every part of petroleum value chain through local content.

During the period under review, several regulatory tools were developed and some are already gazetted while others have already been approved or are at various stages of approvals by the Government. The Authority continued to carry out technical and economic compliance monitoring of midstream and downstream activities in the natural gas sub-sector. Periodic compliance monitoring inspections were carried out to assess the level of compliance requirements of natural gas infrastructure, operations and maintenance on the following: -

(a) the pipeline valves for Songas, TPDC and M&P high pressure pipelines;
(b) signs of corrosion, erosion and restoration of way leaves;
(c) integrity of natural gas infrastructures;
(d) conducting leak surveys of natural gas; and
(e) encroachment of the distribution network operated by PAET and TPDC.

During the period under review, the Authority conducted compliance monitoring inspections to the gas processing facilities managed by Songas and TPDC at Songo Songo Island, Madimba gas processing facility managed by TPDC and Mnazi Bay gas processing facility managed by Maurel et Prom. All natural gas facilities operated in accordance with the requirements of the Petroleum Act, 2015.

In order to strengthen the linkages between the extractive industries with the rest of the economy, the Government approved the Petroleum (Local Content) Regulations in year 2017. The Authority managed to effectively and efficiently monitor the local content compliance performance by various operators in respect of the midstream and downstream petroleum activities.

Further, the Authority continued to promote and update by registering new stakeholders into the "Local Suppliers and Service Providers (LSSP"). As of 30th June 2020, the LSSP had 470 registered local business entities.

The analysis of financial performance for Songas and PAET are based on the audited financial statements of the year 2019 and TPDC on draft financial statements for the financial year 2019/20. During the period under review, the financial performance analysis showed that, gross revenue generation increased by 6%; whereby PAET attained significant increase of 31%, TPDC recorded an increase of 1% and Songas revenue dropped by 1%.

The ratio analysis showed that, in current ratio, there were good utilization of current assets in working capital management from Songas. In addition, PAET attained good margin of 37%, Songas realized average margin of 12% and TPDC got low margin 5%. Further, PAET attained the higher return on assets of 23%, Songas 12% and TPDC recorded the lowest return on asset of 0.79%. Furthermore, PAET and Songas recorded collection efficiency of 99% and 94% arrears inclusive; respectively.

1. INTRODUCTION

Tanzania is endowed with hydrocarbon discoveries along its east-coast shore of the Indian Ocean. The first discovery was made in 1974 at Songo Songo Island (232 km South of Dar es Salaam). This was followed by a number of discoveries at Mnazi Bay in 1982 (about 564 km South of Dar es Salaam), Mkuranga in 2008 (about 60 km South of Dar es Salaam), Nyuni and Kiliwani (approximately 2.5 km South-East of Songo Songo Island) and during the year 2011 in deep sea between Mafia and Mnazi Bay. As of December 2016, 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 respectively.

EWURA is responsible for regulating midstream and downstream natural gas activities that include processing, transmission, storage and distribution of natural gas in Mainland Tanzania. According to Regulation 4 of the Petroleum (Natural Gas Mid and downstream) General Regulations 2020, in addition to functions of EWURA conferred under the Act Cap 414 of the Laws of Tanzania, the Authority in relation to mid and downstream has the following functions;-

(a) to protect the interest 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;
(d) to advise the Government on all matters related to importation, exportation, processing, storage, transportation, conveyance, shipping, supply or use of natural gas.

As of June 2020 the natural gas infrastructures installed in the country includes processing plants with a total processing installed capacity of 470 MMscfd, transmission pipelines with installed capacity of 904 MMscfd with 792km long and distribution network with 320 MMscfd as and combined 102.54km length. By June 2020, natural gas contributed about 62.4% to the power generation. In addition, natural gas is used in other sectors such as industrial heating, commercial, institutions, as fuel for CNG-Vehicles and households.

During the period under review; EWURA ensured the installed infrastructures are operated efficiently, promoted policies geared to attract private sector participation and ensured the regulatory functions were conducted in accordance with the applicable laws of Tanzania and industry best practices. The report covers the performance analysis of processing plants, transmission pipelines and distribution network based on key performance indicators. In particular, the report addresses milestones achieved during the period under review which include: development of natural gas regulatory tools and standards; issuance of natural gas regulatory approvals; natural gas performance monitoring; the natural gas supply and demand balance, achievements and challenges.

2. DEVELOPMENT OF REGULATORY TOOLS AND STANDARDS

In collaboration with the Ministry of Energy and stakeholders, EWURA developed a number of natural gas regulatory tools. As of 30th June 2020, a number of regulatory tools which include ten (10) rules and two (2) guidelines were developed and published. A list of rules and guidelines developed by EWURA is shown in **Table 1** and all developed regulatory tools are shown in **Annex 1.**

Table 1: Developed Regulatory Tools (Rules and Guidelines)

S/N	Citation / Title	GN. Number	Date Published
1.	The Energy and Water Utilities Regulatory Authority (Tariff Application and Rate Setting) Rules, 2017	GN 452/2017	November 17, 2017
2.	Petroleum (Natural Gas) (Transmission and Distribution Activities) Rules, 2018	GN 176/2018	May 4, 2018
3.	Petroleum (Natural Gas)(Licensing Fees) Rules, 2020	GN 301/2020	May 1, 2020
4.	Petroleum (Natural Gas)(Supply and Marketing Services) Rules, 2019	GN 219/2019	March 25, 2019
5.	Petroleum (Compressed Natural Gas) (Supply And Marketing Services) Rules, 2019	GN 220/2019	March 22, 2019
6.	Petroleum (Natural Gas) (Processing) Rules, 2019	GN 221/2019	March 22, 2019
7.	The Petroleum (Natural Gas) (Storage) Rules, 2019	GN 182/2019	March 15, 2019
8.	The Petroleum (Natural Gas) (Regulatory Accounting and Reporting Standards) Rules, 2019	GN 183/2019	March 15, 2019
9.	The National (Petroleum and Natural Gas) (Information System) Rules, 2019	GN 184/2019	March 15, 2019
10.	The EWURA Consumer Complaints Settlement Rules, 2020	GN 428/2020	June 5, 2020
11.	Petroleum (Natural Gas) Customer Services Charter Guidelines, 2019	N/A	2019
12.	Petroleum (Local Content) Guidelines, 2019	N/A	2019

Furthermore, over the period EWURA identified and proposed development of various natural gas standards to Tanzania Bureau of Standards (TBS) in accordance with Section 30(2)(q) of the Petroleum Act, Cap 39. In consultation with TBS, various standards were developed including, Standards on Steel Pipe for Transportation System, Safety and Control Devices for Gas burners and Gas Storage Facilities specifications, Compressed Natural Gas and Pressure Control and Safety devices. A list of developed natural gas standards is shown in **Annex 2.**

3. NATURAL GAS REGULATORY APPROVALS

3.1 Construction approval

Pursuant to Section 127(1) of Petroleum Act, Cap 392, EWURA is mandated to issue construction approval to any person intending to construct a petroleum installation or petroleum carriage facility. As of 30th June 2020, EWURA issued eight (8) construction approvals. Six (6) construction approvals were issued to Tanzania Petroleum Development Corporation and the other two (2) were issued to Pan-African Energy (T) Limited. A list of issued construction approvals is shown in **Table 2.**

Table 2: 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

SN.	Applicant Name	Approval No.	Date Of Issue	Type of Construction Approval
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

The outcome of issuance of construction approvals enabled TPDC to extend its distribution networks in regions of Dar es Salaam and Mtwara, where 337 household customers, five (5) industrial and five institutions customers were connected to the distribution network. PAET connected and supplied natural gas to two more industries in Dar es Salaam region.

3.2 Licensing

As of 30th June 2020, EWURA approved various natural gas rules and licensing templates necessary for licensing requirements. However, no license was issued to three (3) existing operators in midstream and downstream which are PAET, SONGAS (T) Limited and M&P as they commenced their operations prior to the promulgation of Petroleum Act, Cap.392. Section 260(4) of the Petroleum Act, Cap.392 provides that all existing natural gas service providers at the date of coming into force of the Petroleum Act, Cap.392 are deemed to have licence. During the period under review there was no new license applications received by EWURA.

3.3 Local Content

During the period under review, EWURA continued to ensure that the quantum of composite value added to, or created in the economy of Tanzania through deliberate utilization of Tanzanian human and material resources and services in the petroleum operations. This is meant to stimulate the development of capabilities of Tanzanians and to encourage local investment and participation by compelling all service providers in the natural gas sub-sector to procure local manufactured goods and services, employ locals and ensure that employed local personnel are trained to take over responsibilities held by foreign staff overtime. EWURA efforts resulted to promotion of Tanzanian staffs to be the chief executive officer and deputy managing director of Songas and PAET respectively.

3.3.1 Local Content Regulations Requirements

The Petroleum (Local Content) Regulations, 2017 requires licensees, contractors, sub-contractors or any other person carrying out a petroleum activity to abide to local content requirements in respect of procurement of goods, services, employment, training, succession, research and development. Others are, technology transfer, legal services, financial services and insurance services. In order to achieve that, natural gas service providers in the mid and downstream of natural gas sub sector comply with the law.

3.3.2 Local Suppliers and Service Providers (LSSP)

Regulation 38 of the Petroleum (Local Content) Regulations, 2017 requires EWURA to establish and maintain the Tanzanian Local Suppliers and Service Providers (LSSP) Database through which local suppliers and service providers procured by petroleum operators for preference in the provision of goods and services in the petroleum activities. The registration is an on-going exercise, the Authority updates the LSSP each month as applications are received; and processed. LSSP Database was launched by EWURA on 11th June, 2018.

As of 30th June 2020, the EWURA had registered 470 local business entities in the database. The approved suppliers and service providers are eligible to participate in the execution of works and provision of various goods and services in the petroleum midstream and downstream activities in Mainland Tanzania.

The Database is accessible on the websites of the Authority-www.ewura.go.tz as well as that of the Ministry of Energy-www.nishati.go.tz. A list of registered local suppliers and service providers by 30th June, 2020 is shown in **Table 3.**

Table 3: Summary of Local Suppliers and Service Providers (LSSP)

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

3.4 Complaint and Dispute Resolution

During the period under review, there were no disputes or complaints brought to the attention of EWURA in relation to natural gas sub-sector. As the number of industrial and household customers is increasing exponentially, disputes may arise in the near future and EWURA has procedures in place to handle such disputes.

4. NATURAL GAS PERFORMANCE MONITORING

During the review period, the Authority monitored the integrity of natural gas infrastructures including gas processing plants, high-pressure pipelines and low-pressure distribution network facilities including low pressure pipelines to household's customers, virtual pipelines and compressed natural gas (CNG) for vehicles. A list of service providers and their scope of operations is as shown in **Annex 3.**

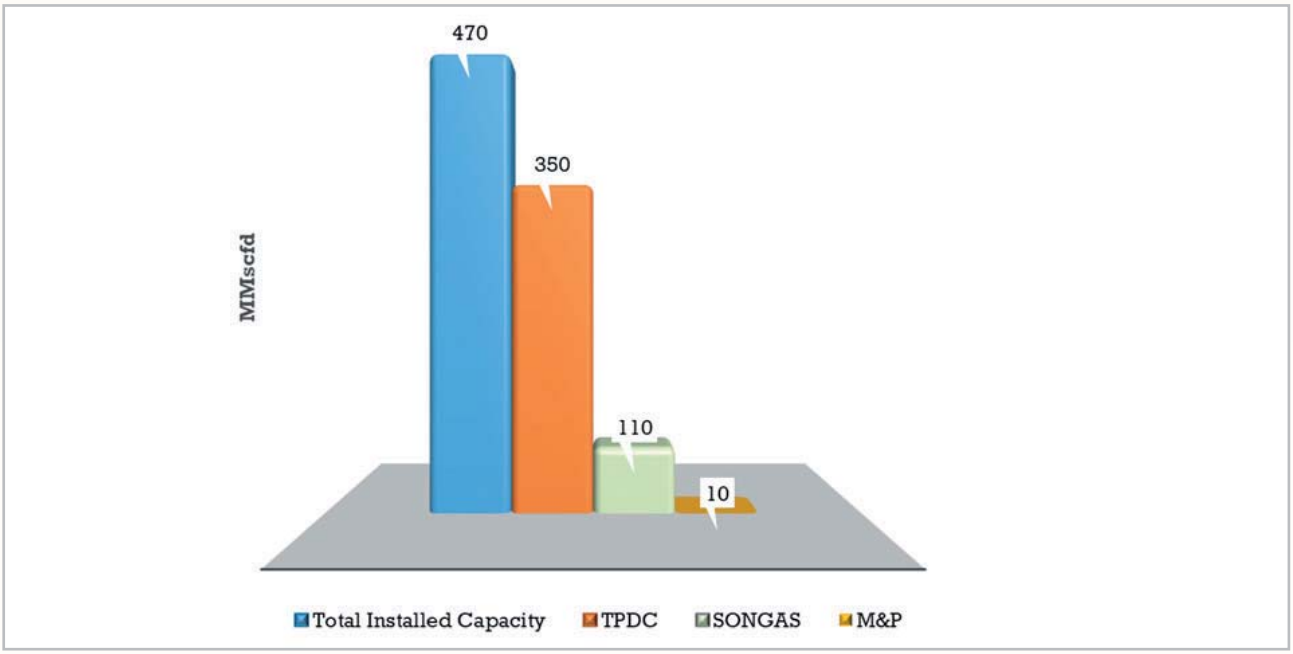
4.1 Natural Gas Processing Infrastructures Performance

4.1.1 Natural Gas Processing Plants

As of 30th June 2020, the natural gas processing infrastructures comprised of four processing plants with total installed capacity of 470MMscfd located at Songo Songo Island in Lindi region, Mnazi Bay and Madimba in Mtwara regions. The Government of the United Republic of Tanzania, through TPDC, owns two natural gas processing plants with a combined installed capacity of 350MMscf. The two natural gas processing plants are operated by Gas Company (GASCO), TPDC's subsidiary company entrusted to process the natural gas, transport and carry out the distribution and supply of natural gas to different customers. One natural gas processing plant is located at Madimba with a capacity of processing 210MMscfd and the second is located at Songo Songo Island with capacity of processing 140MMscfd of natural gas.

The third natural gas processing plant with installed capacity of 110MMscfd is located at Songo Songo Island owned by Songas but operated by PAET on contractual basis. The fourth processing plant with capacity of processing 10MMscfd is located at Mnazi Bay owned and operated by Maurel et Prom (M&P). The total installed capacity of natural gas processing plants in the country stands at 470 MMscfd as shown in **Figure 1**.

Figure 1: Total Installed capacity of Natural Gas Processing Plants



Source: TPDC, SONGAS and M&P

4.1.2 Natural Gas Processing Plants Technical Performance

During the period under review, technical performance of natural gas processing plants was analysed in respect of installed capacity, the maximum demand, the plant availability, the plant utilisation and integrity management. Furthermore, EWURA continued to carry out performance monitoring by analysing and verifying information received from regulated entities based on the above-mentioned key performance indicators.

4.1.2.1 Installed capacity of processing plants

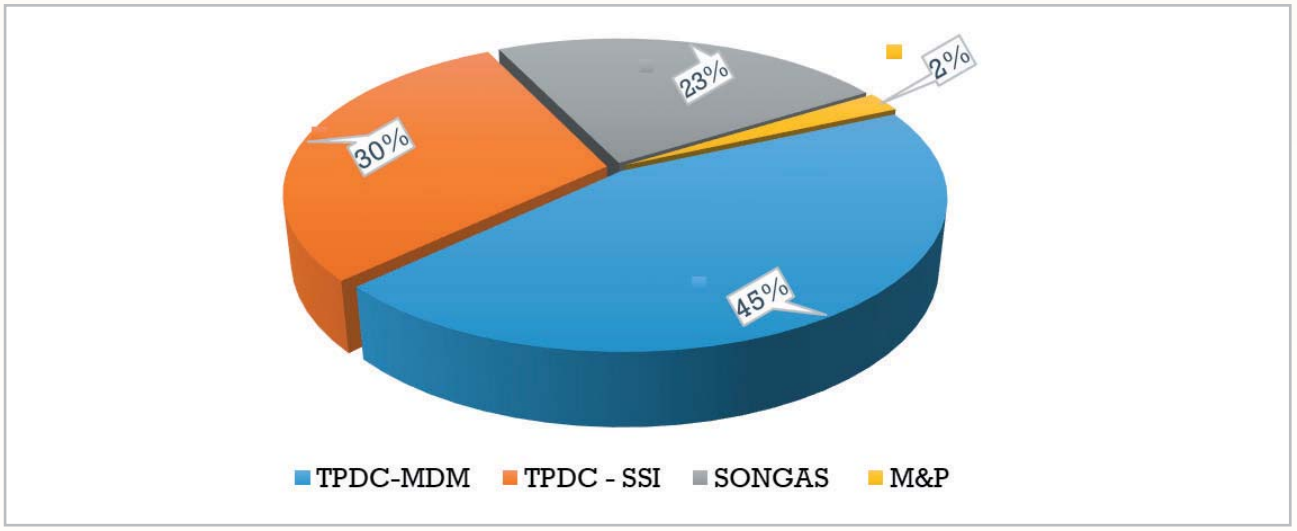
As of 30th June 2020, the total installed processing capacity of natural gas processing plants in the country was 470 MMscfd. The contribution of each service provider processing plants in the total processing installed capacity is as shown in **Table 4.**

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

Table 4: Processing capacity for each service provider for FY 2019/20.

S/N	Name of the Processing Plant	Installed Capacity (MMscfd)	(%)
1.	TPDC Madimba	210	44.7
2.	TPDC Songo Songo	140	29.8
3.	Songas	110	23.4
4.	Maurel Prom	10	2.1
	Total	**470**	**100**

Figure 2: Processing capacity for each service provider for FY 2019/20



Source: TPDC, SONGAS, M&P

4.1.2.2 The Peak processed natural gas according to demand

The highest natural gas demand nomination reached by each processing plant during the period under review is as shown in **Table 5**. Furthermore, EWURA continued monitoring the service delivery of natural gas service providers to ensure the supply meets the actual demand.

Table 5: Highest Natural Gas Nomination (demand) recorded

S/N	Processing Plant	Nomination (MMscfd)	Highest Demand (MMscfd)	Date
1.	TPDC Madimba	90.00	90.41	10 September 2019
2.	TPDC Songo-Songo	40.00	40.30	29 November 2019
3.	Songas	87.03	92.5	16 July 2019
4.	Maurel Prom	2.83	3.3	19 November 2019

4.1.2.3 Natural Gas Processing Plants Availability

During the period under review, the average availability of the TPDC Madimba, TPDC SSI, Songas and M&P processing plants are as indicated in **Table 6**.

The Natural gas processing plant availability refers to the amount of time the plant is able to produce natural gas over a certain period, divided by the total amount of time in the period. It measures the time a processing plant is ready to process natural gas throughout the year. EWURA continued to monitor the operations of all-natural gas processing plants to ensure the maintenance are carried out in timely manner to maintain or enhance the plant availability.

Table 6: Annual average plant availability of different service providers

S/N	Processing Plant	Installed capacity (MMscfd)	Average plant availability (%)
1.	TPDC Madimba	210	100
2.	TPDC Songo-Songo	140	99
3.	Songas	110	99.16
4.	M&P	10	100

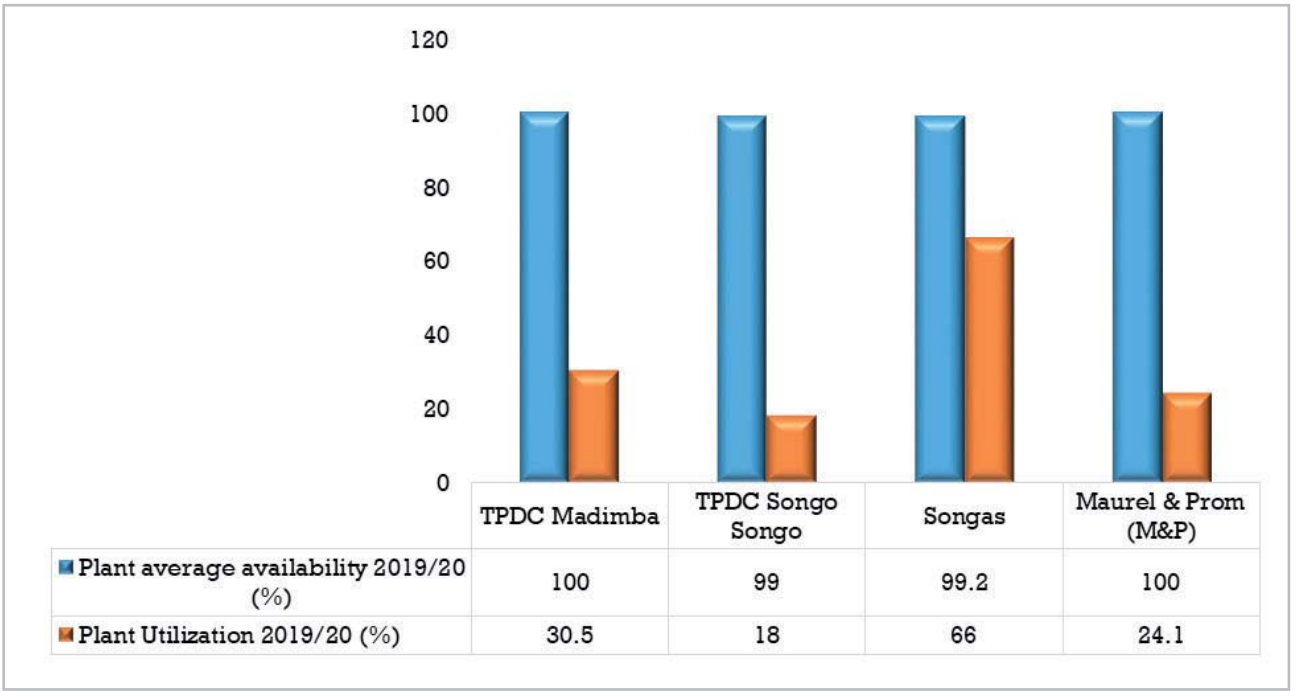
4.1.2.4 Natural Gas Processing Plants Utilization

"The annual average plant utilisation for TPDC Madimba, TPDC SSI, Songas and M&P processing plants are as depicted in **Table 7".** During the period the country witnessed good hydrological conditions which made TANESCO the anchor customer to generate more power from its hydro power plants hence low-capacity utilization for most of processing plants and transmission pipelines. Despite that, for TPDC to increase the capacity utilization of existing natural gas infrastructure, it should be enabled by the government to extend the natural gas transmission pipeline to other regions and create more markets for natural gas.

Table 7: Processing Plants Utilisation

S/N	Plant Name	Plant average availability 2019/20 (%)	Plant Utilization 2019/20 (%)
1.	TPDC Madimba	100	30.5
2.	TPDC Songo Songo	99	18.0
3.	Songas	99.2	66.0
4.	Maurel & Prom (M&P)	100	24.1

Figure 3: Processing Plants utilisation



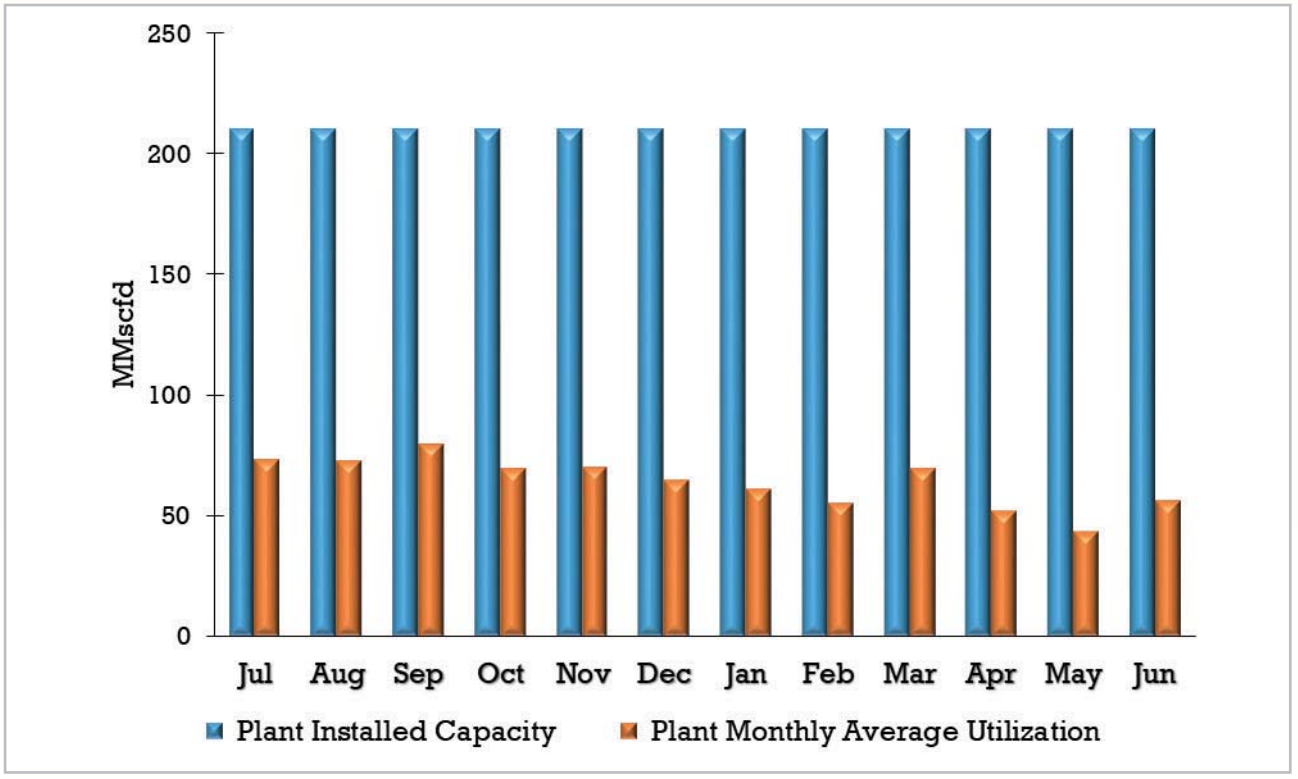
Source: TPDC, SONGAS & M&P

4.1.2.4.1 TPDC Madimba Processing Plant Utilization

"The plant is located at Madimba in Mtwara region with installed capacity of 210 MMscfd of which is currently operating at an average of 64.13MMscfd determined by gas nomination from downstream users including TANESCO generation plan. During the period under review, the average daily plant utilization capacity was 64.13MMscfd which is equivalent to 30.5% utilization capacity."

The TPDC's gas facilities at Madimba complied with the Health, Safety and Environmental requirements (HSE), the technical and economic regulation aspects in respect to the laws. The details of plant availability and utilization are shown in **Figure 4**.

Figure 4: Monthly TPDC Madimba Gas Plant Utilization Capacity 2019/20



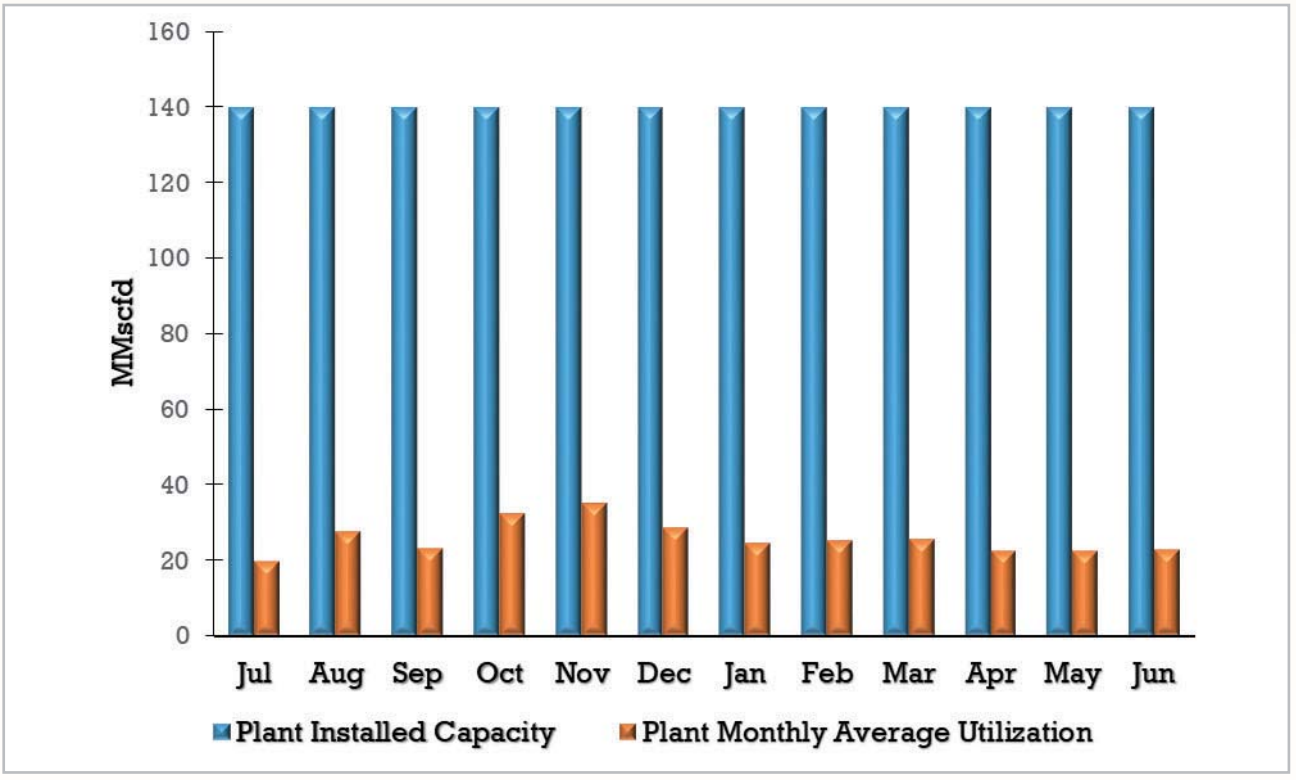
Source: TPDC

4.1.2.4.2 TPDC Songo Songo gas processing plant Utilization

The plant is located at Songo Songo Island in Lindi region with installed processing capacity of 140MMscfd. The processed natural gas from the island is transported through a 24" diameter marine pipeline from Songo Songo Island to Somanga Fungu, where gas pressure from Songo Songo is equalized with gas from Madimba in Mtwara for further transportation to Dar es Salaam.

TPDC's Songo Songo gas processing plant continued to receive natural gas from SS11 and SS12 wells supplied by PAET. The referred processing plant operated at an average of 25.64MMscfd, which was equivalent to 18 percent capacity utilization. The Plant availability and utilization is as shown in the **Figure 5**.

Figure 5: Monthly TPDC SSI Gas Plant Utilization Capacity 2019/20



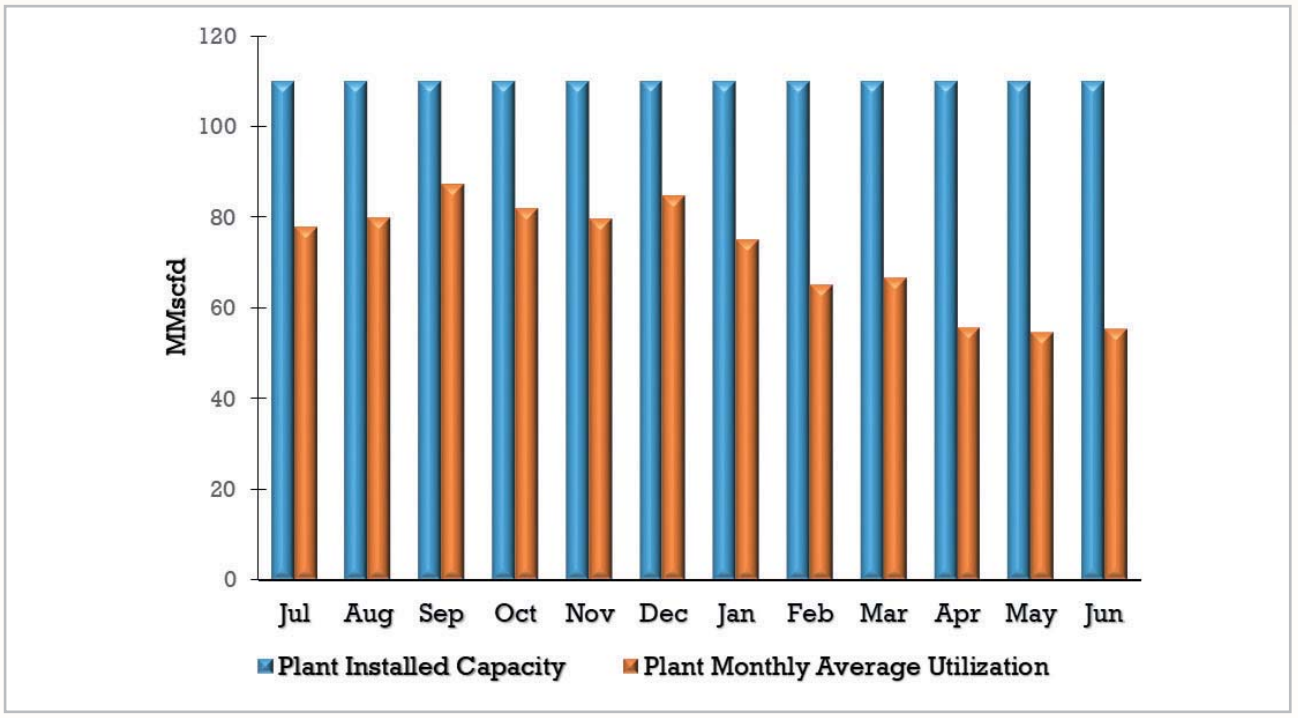
Source: TPDC

4.1.2.4.3 SONGAS Gas Processing Plant Utilization

As highlighted before, Songas Gas Processing plant was installed in 2004 with an initial capacity of 70MMscfd and in 2011 it was re-rated to 110 MMscfd. The processing plant operated at a daily average of 72.06MMscfd processing capacity as determined by gas nomination on the downstream.

It should be noted that the natural gas processing plant and the transportation pipeline are owned by Songas Limited but the processing plant is operated by Pan African Energy as per the terms and conditions of the Management Contract between the parties. The average daily plant utilization capacity during the review period was 72.38MMscfd equivalent to 66% utilization capacity as shown in **Figure 6**.

Figure 6: Monthly SONGAS Gas Plant Utilization Capacity 2019/20

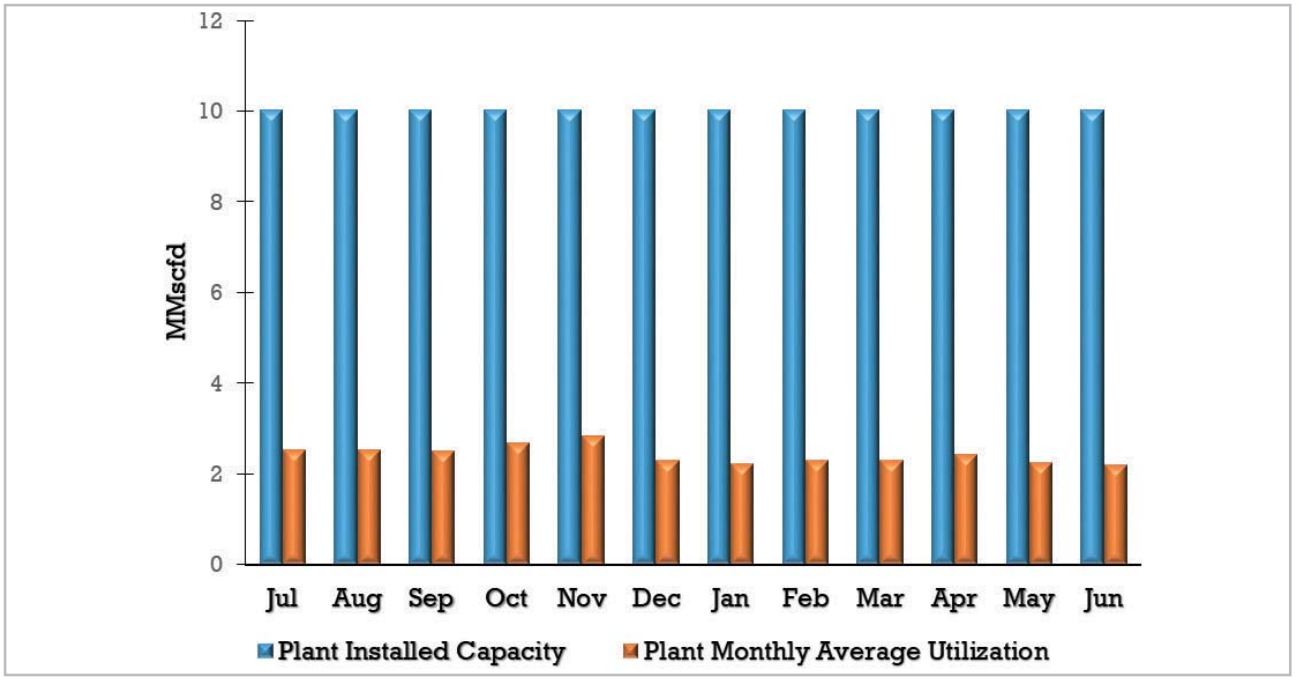


Source: SONGAS

4.1.2.4.4 M&P Gas Processing and Receiving Facilities

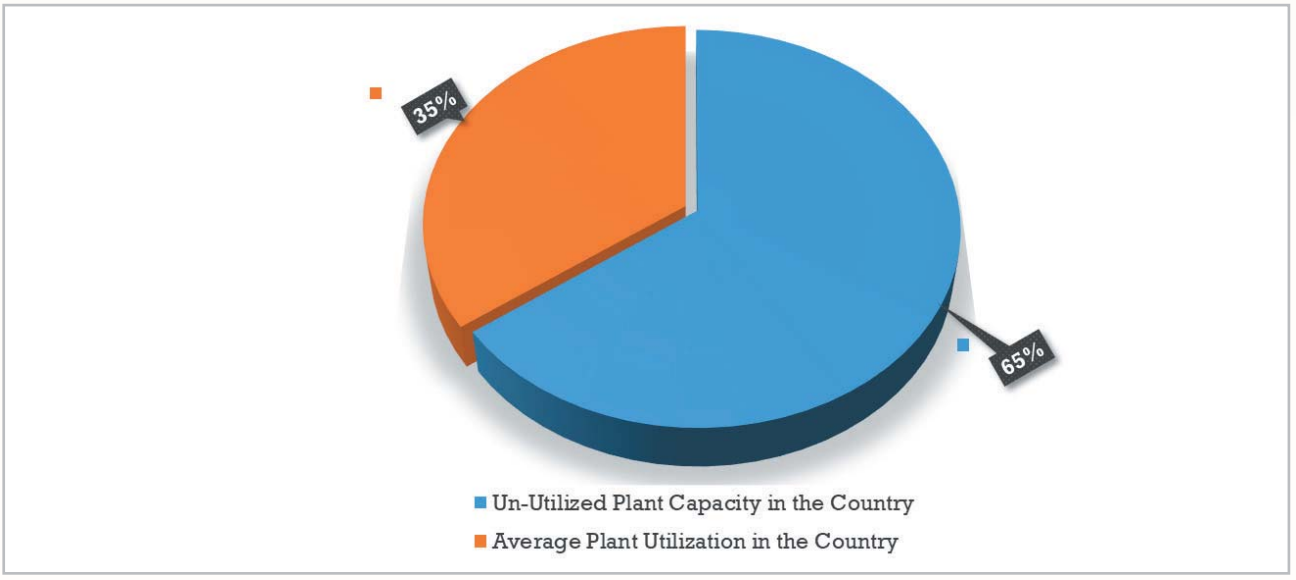
The gas processing plant has an installed capacity of 10 MMscfd, however, currently the M&P processing plant capacity stands at 2.41MMscfd. The anchor customer for this plant is TANESCO Power Generation Plant at Mtwara, which supplies power in Mtwara and Lindi regions. The average daily plant utilization capacity was 2.41 MMscfd equivalent to 24.1% utilization capacity for the FY 2019/20 as it is shown in **Figure 7** below. As the demand for power in these two regions grows the plant utilization is expected also to grow.

Figure 7: Monthly M&P Gas Plant Utilization Capacity 2019/20



The total gas processing plants capacity is 470 MMscfd in the country, whereby the reported average daily gas production in the country was 164.0 MMscfd equivalent to 34.9% utilization capacity for the FY 2019/20 compared to average daily gas production in the country of 166.90 equivalent to 35.5% utilization capacity in FY 2018/19 as indicated in **Figure 8** and **Figure 9**.

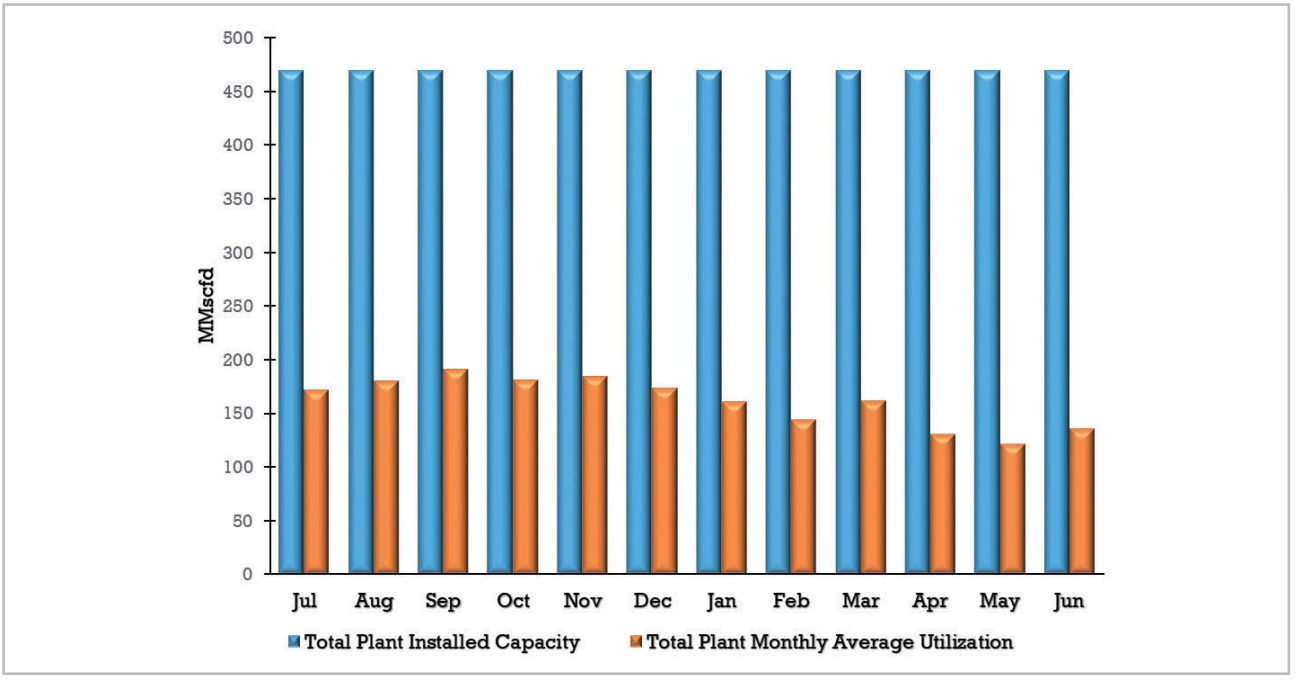
Figure 8: Total Processing Plant Utilization in the Country FY 2019/20



Source: TPDC, SONGAS & M&P

The Authority continues with developing user-friendly regulatory tools to attract participation of private sector to invest in transmission and distribution segments which may result into increased utilization of government infrastructures in both segments.

Figure 9: Plant Installed Capacity Vs Utilization in the country FY2019/20



Source: TPDC, SONGAS & M&P

4.1.2.5 Natural Gas Processing Plants Production

During the period under review, the overall gas production from both gas fields Songo Songo Island (SSI) in Lindi and Mnazi Bay in Mtwara was 59,831.43MMscf compared with 60,911.87 MMscf in 2018/19 as is shown in **Table 8.**

Table 8: Natural Gas Processing Plants Production

S/N	Processing Plant	Natural Gas Processed (MMscf)		Contribution (%)	
		Year 2018/19	Year 2019/20	Year 2018/19	Year 2019/20
1.	TPDC Madimba	26,650.91	23,432.84	43.75	39.16
2.	TPDC Songo Songo	4,445.11	9,175.8	7.30	15.33
3.	Songas	28,910.20	26,342	47.46	44.03
4.	Maurel Prom (M&P)	905.65	881.09	1.49	1.47
	TOTAL	**60,911.87**	**59,831.43**	**100**	**100**

4.1.2.6 Integrity of processing plant infrastructure

EWURA monitored the integrity of the natural gas processing infrastructure to ensure that the services to customers are maintained. Generally, the integrity of the natural gas processing infrastructures was in good condition.

4.1.3 Natural Gas Quality Performance

During the reporting period, the Authority continued to monitor the quality and standards of regulated products and services pursuant to section 250 of the Petroleum Act, Cap. 392. The monitoring involved natural gas quality and adherence by service providers to commercial terms and conditions and infrastructure operational standards. The natural gas quality properties from both operating fields monitored by the Authority are as shown in **Table 9,** include:

(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.

Table 9: Quality of Natural Gas Composition (in % Mole)

Natural Gas Component	Reference Quality of Natural Gas	Quality of Natural Gas			
		Songas	TPDC-SSI	TPDC	M&P
Methane (CH_4)	87.0 - 97.0	97.1959	97.960	98.6488	98.0457
Ethane (C_2H_6)	1.5 - 9.0	1.0106	0.96153	0.96178	1.08081
Propane (C_3H_8)	0.1 - 1.5	0.2851	0.13515	0.1306	0.2653
iso-Butane (C_4H_{10})	0.01 - 0.3	0.0623	0.02332	0.01729	0.09617
n-Butane (C_4H_{10})	0.01 - 0.3	0.0790	0.02919	0.02102	-
iso-Pentane (C_5H_{12})	trace - 0.04	0.0280	0.00402	0.00217	-
normal-Pentane (C_5H_{12})	trace - 0.04	0.0242	0.00330	0.0000	0.01909
normal-Pentane (C_5H_{12})	trace - 0.04	0.0242	0.00330	0.0000	0.01909

Natural Gas Component	Reference Quality of Natural Gas	Quality of Natural Gas			
		Songas	TPDC-SSI	TPDC	M&P
Hexanes (C_6H_{14})	trace - 0.06	0.0269	0.00246	0.01509	0.01647
Carbon Dioxide (CO_2)	0.05 - 1.0	0.4819	0.35699	0.20319	0.29876
Nitrogen (N_2)	0.2 - 5.5	0.7233	0.55864	0.0000	0.17747
Hydrogen Sulphide (H_2S)	trace to 0.02	0.0000	0.0000	0.0000	0.0000
Total	100	100	100	100	100
Moisture (ppm)	trace to 5.00				
Specific Gravity	0.57 to 0.62	0.585	0.57014	0.56370	0.56
Gross Heating Value (MJ/m^3)	36.0 to 40.2	38.060	39.75000	38.11001	38.11068

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

The quality and content of methane, hydrogen sulphide and carbon dioxide over the period remained in acceptable ranges. The Authority will remain vigilant to ensure the quality of produced and processed natural gas to be supplied to end consumers remain within the acceptable ranges as indicated in **Table 9**.

4.2 Natural Gas Transmission Pipelines Performance

4.2.1 Natural Gas Transmission Pipelines

As of 30th June 2020, the natural gas transmission pipeline network comprised of 792km with total capacity of 904 MMscfd. The transmission pipeline network comprises of 533km for TPDC, 232km for Songas and 27.5km for M&P as shown in **Table 10.** Moreover, TPDC's pipeline comprises of a 24", 29km submarine pipeline from Songo Songo Island to Somanga Fungu, where it connects to a 477km, 36" diameter onshore pipeline from Madimba in Mtwara to Kinyerezi in Dar es Salaam, with Maximum Operating Pressure (MOP) of 90 bar and a normal operating pressure of 72 bar. This pipeline is also connected to segment of 27km with 16" diameter from Kinyerezi to Tegeta.

Songas delivery system comprises of a 16" onshore pipeline of 207 km from Somanga Fungu to Dar es Salaam and a 25 km, 12" submarine pipeline from Songo Songo Island to Somanga Fungu with Maximum Operating Pressure of 90bar and normal operating pressure of about 75 bar.

The M&P gas processing plant at Mnazi Bay in Mtwara has the 10MMscfd of gas processing facility owned and operated by M&P. It has an installed capacity of 10MMscfd with 27.5km transmission pipeline length from Mnazi Bay to TANESCO's power plant in Mtwara region. The Authority ensured the integrity of all these infrastructure is maintained and operated at required standards.

Table 10: Length, Capacity and Ownership of Pipelines.

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

Source: TPDC, SONGAS/PAET and M&P

4.2.2 Natural Gas Transmission Technical Performance

The analysis of technical performance of transmission pipelines include pipeline length, number of valve stations, availability, utilization, outages, way leave clearance and pipeline integrity management which involves, among other things, the cathodic protection of the pipelines, third party damages and pipeline in line inspections conducted over the stipulate period.

For the period under review, the Authority continued to carry out performance monitoring of regulated infrastructure by analysing and verifying information received from regulated suppliers from time to time on above mentioned key performance indicators.Three service providers TPDC, Songas and M&P submitted several operational reports which have been considered in the preparation of this report.

4.2.2.1 Installed Capacity of Transmission Pipeline

As of 30th June 2020, the natural gas transmission pipeline network comprised of 792km with total capacity of 904 MMscfd. Of the total distance, TPDC owns a transmission pipeline with a distance of 533km from Mtwara to Kinyerezi in Dar es Salaam, Songas owns a 232km transmission pipeline from Songo Songo Island in Lindi Region to Dar es Salaam region and M&P owns a 27.5 km pipeline from Mnazi Bay to Mtwara as shown in **Table 11**. There are 25 valve stations serving the pipeline network.

4.2.2.2 Transmission Pipeline Network Contribution

As of 30th June 2020, the overall contribution of TPDC, Songas and M&P to the total transmission pipeline length was 67.3%, 29.3%and 3.4% respectively as shown in **Table 11**.

Table 11: Contribution of service providers to transmission pipeline network

S/N	Service Provider Name	Pipeline Length(km)	Number of valve stations	Contribution to 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**

4.2.2.3 Transmission Pipeline Availability, Utilization and Outages

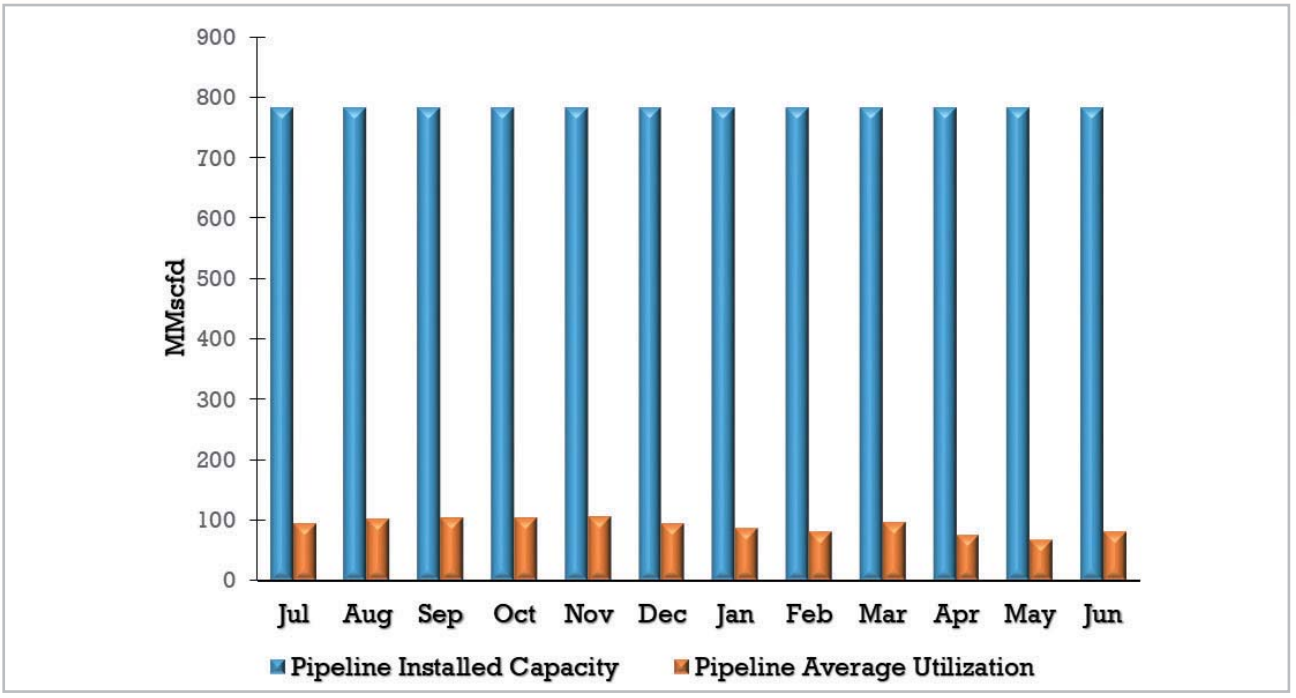
The overall availability of transmission pipeline to transport natural gas from production areas to customers and other areas was 100% for all transmission. The utilization was 11.18%, 76%, 23.6% for TPDC, Songas and M&P owned infrastructures. The outage ranges between 0 for TPDC and 1 for Songas which is within best industrial practices.

Over the review period the Authority monitored the pipeline integrity management programs such as pigging, cathodic protection, erosion prevention and ensured that service providers implemented the infrastructure management programs as per standards requirements. The pipeline availability for TPDC, SONGAS and M&P 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 Vs. Capacity Utilization

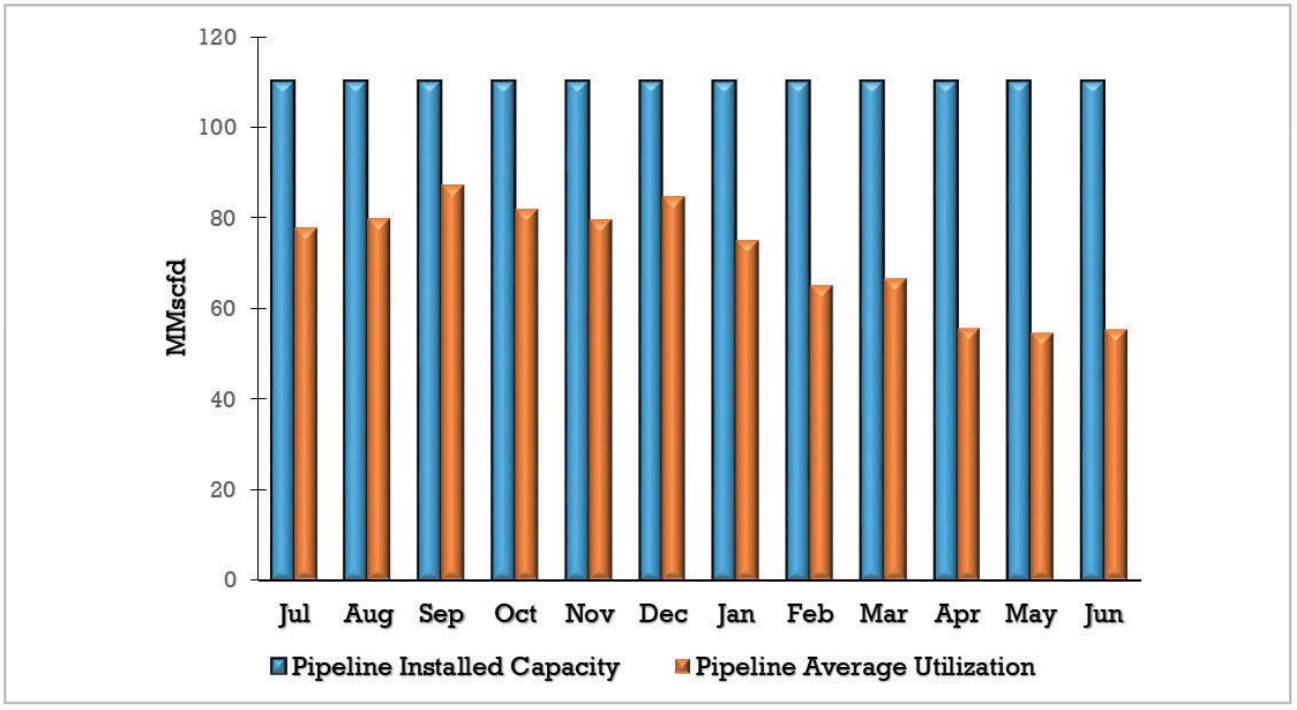
S/N	Service Provider Name	Pipeline Installed capacity (MMscfd)	Pipeline Average Availability (%)	Pipeline Capacity Utilization (%)	No. of (leakage)	No. of Outages reported
1.	TPDC	784	100	11.18	0	0
2.	SONGAS	110	100	76	1	1
3.	M&P	70	100	23.6	0	0
	Total				**1**	**1**

Figure 10: TPDC Pipeline Capacity Utilization FY 2019/20



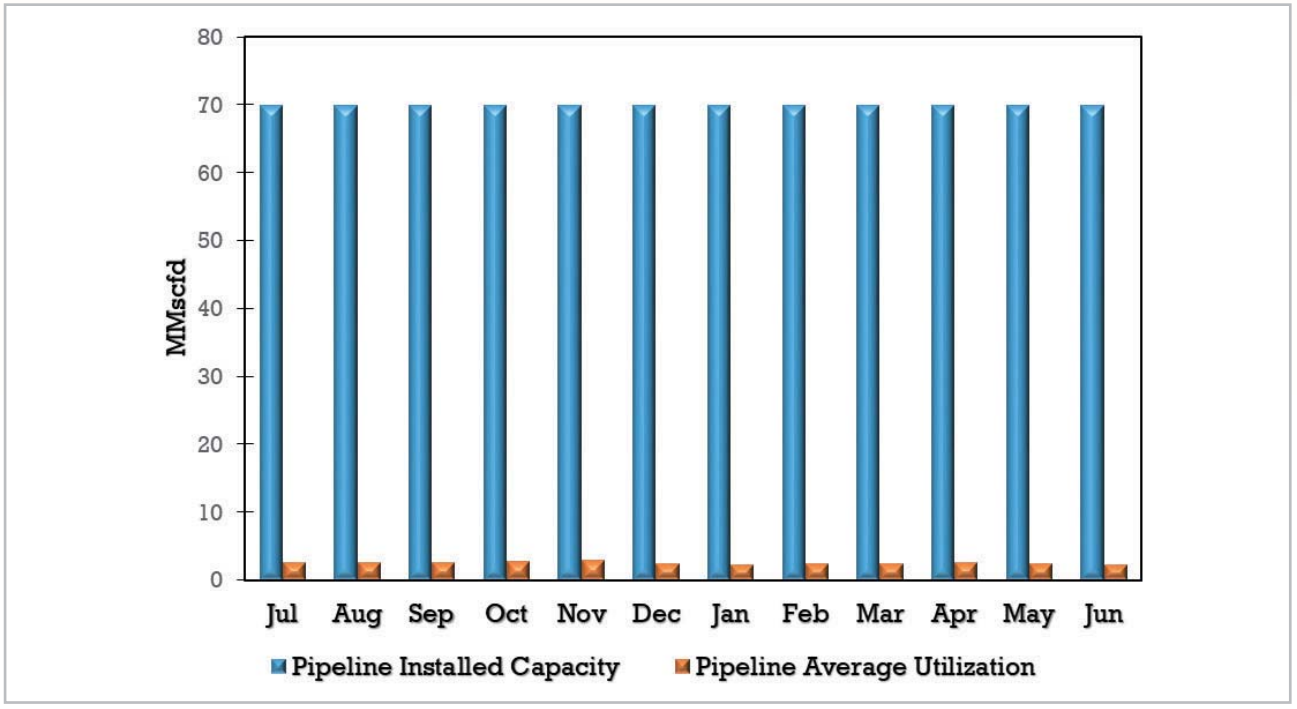
Source: TPDC

Figure 11: SONGAS Pipeline Capacity Utilization FY 2019/20



Source: SONGAS

Figure 12: M&P Pipeline Capacity Utilization FY 2019/20



Source: M&P

4.2.2.4 Transmission Pipeline Integrity Management

(a) Cathodic protection

During the period under review, the routine integrity management of the pipeline infrastructure was implemented by using cathodic protection system, the pigging and way leave management carried out by service providers over the period. The detailed distance covered and number of cathodic protection test points installed along the transmission pipeline is as shown in **Table 13** below and **Annex 4.**

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	220	14	1
3.	M&P	27.5	27.5	2	0

(b) Pigging

Over the reporting period, the Authority received operational reports from service providers, Songas and M&P which indicated that pipelines were cleaned, inspected and maintained by using Pipeline Inspection Gauge (PIG). The pigging process of TPDC pipelines was not implemented due to the fact that the timeline for mandatory pigging, which is done after every five years, was still not due as the pipeline was commissioned towards the end of year 2015. Pigging for Songas pipeline was planned to be implemented during the period under review, however, it was not implemented because of gas leak incident at MLV 20 located at Somanga Fungu on 3rd November 2019 due to failure of line stopper sealing element. Songas fixed the problem by installing a new bypass line. The Authority will continue to engage the service providers to ensure they conduct pigging of their pipelines in the next financial year to ensure its integrity is maintained. The overall pipeline length pigged is as shown in **Table 14.**

Table 14: Pipeline In-Line Inspections (PIGs)

S/N	Name	Total Length of the pipeline (km)	Date last pigging performed	Length pigged	Number of defects identified
1.	TPDC	533	-	0	0
2.	SONGAS	220	June, 2019	200	1
3.	M&P	27.5	-	0	0

(c) Pipeline way leave management

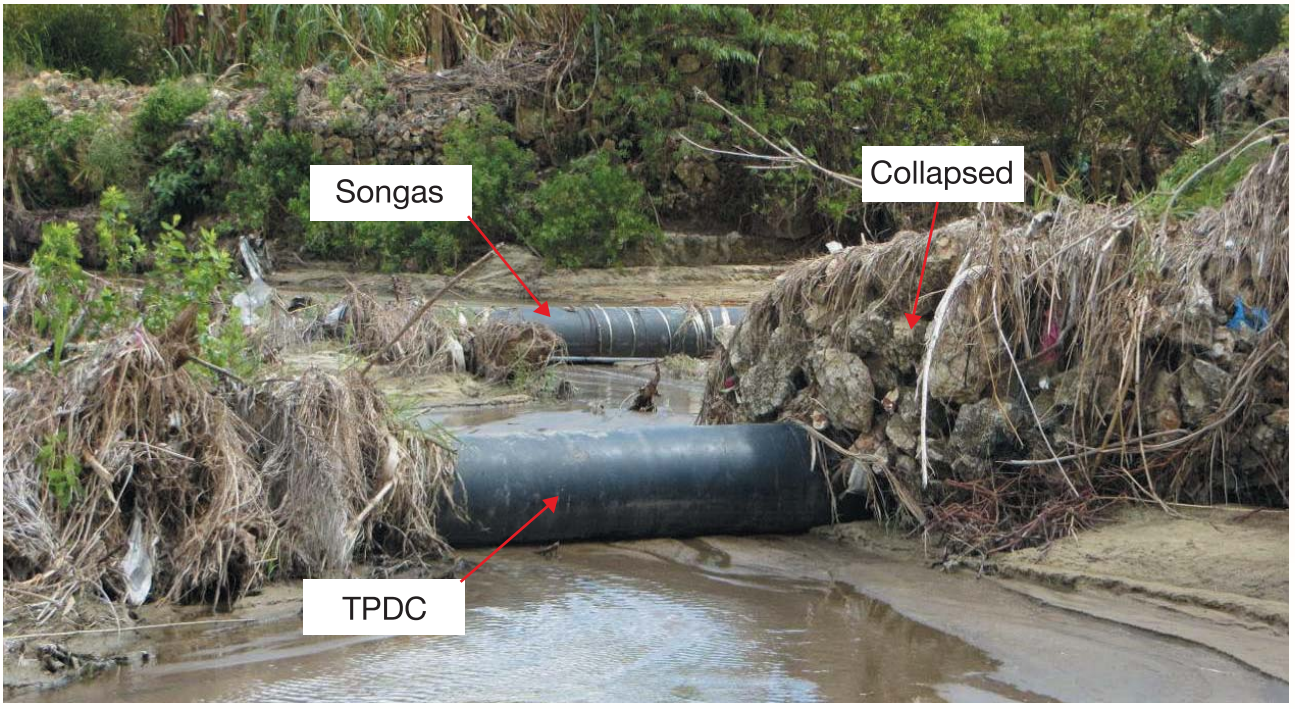
During the period under review, the Authority continued with monitoring the pipeline way leave clearance. It was observed that all service providers cleared their way leaves to minimize risk of fire. However, some access roads to the way leaves were not maintained hence made some parts of the way leave inaccessible. Despite the fact that way leaves were cleared, it was observed that some parts of the way leaves, had serious erosion incidents. These parts affected by erosion includes; Muhoro river crossing, Mwanambaya, Kinyerezi

River, Makongo Juu and Kimara-Kilungule. With EWURA oversight the service providers adequately attended the erosion incidents in mentioned areas.

A number of pipeline patrol conducted was ten, four and twelve by TPDC, Songas and M&P respectively. Number of encroachment observed within the way leave were six and two along TPDC and Songas transmission pipeline respectively.

A typical example of TPDC and Songas pipelines exposed by erosion is as shown in **Figure 13.**

Figure 13: Songas and TPDC Pipeline exposed by erosion at Kinyerezi River



Source: EWURA

The number of way leave patrol performed, encroachments and erosion noted is as shown in **Table 15.**

Table 15: Transmission Pipeline Way Leave Management

S/N	Name of operator	Length (km)	Number of ways leave patrol performed	Number of interruption/ erosions affected pipeline	Number of encroachments within the way leave
1.	TPDC	533	10	0	6
2.	SONGAS	200	4	3	2
3.	M&P	27.5	12	3	0

4.3 Natural Gas Distribution Network Performance

During the period under review, the natural gas distribution and supply in general complied with the standards and industrial best practice with the exception of encroachments within hazardous areas that continued to pose high risk of explosion due to economic activities

carried out by petty traders. Some of the areas affected by encroachments include Toyota industrial area along Pugu road, Mwenge, Mikocheni, Ubungo Kibuku and Bidco factory (Mwenge). However, various mitigation measures were taken by service providers in collaboration with EWURA that spearheaded the initiative of drafting the Memorandum of Understanding between the way leaves owners and utilities which provides a framework of working in the shared way leaves.

It is envisaged that EWURA initiatives shall provide the effective and lasting solution to eliminate risks caused to the infrastructures by uncontrolled third-party activities and encroachment within the shared way leaves.

4.3.1 Natural Gas Distribution Network

As of 30th June 2020, the natural gas distribution network comprised of installed capacity of 40MMscfd with 19.4km located in Mtwara, 8.17 MMscfd with 5.6km located in Coastal and 32.5 MMscfd with 78km located in Dar es Salaam. The first distribution network in the country was built and operated by Pan African Energy (T) Ltd since 2004. Currently, the distribution network has reached a total installed capacity of more than 320 MMscfd and 103km of low-pressure pipelines supplying natural gas to power plants, industrial customers (heating and power generation for own use), institutions, households, commercial customer, CNG-Vehicles. Customers are located in Mtwara, Lindi, Coast and Dar es Salaam regions.

Part of the distribution infrastructure, is jointly owned by both PAET and TPDC, and is operated by PAET in Dar es Salaam. The remaining distribution infrastructure is owned by TPDC and operated by its subsidiary company GASCO. To safeguard the entire distribution network, the pressure control devices are installed at Pressure Reduction Stations (PRS), CNG mother and daughter stations located in Mtwara, Lindi, Coastal and Dar es Salaam regions. The installed capacity of natural gas distribution infrastructure and their corresponding pipeline lengths are as shown in **Table 16.**

Table 16: Capacity & Length of Natural Gas Distribution Network

S/N	Distribution Network & Location		Length (km)	Capacity (MMscfd)	Facility Operator
1.	Kinyerezi I connection		6.5	70	GASCO
2.	Kinyerezi II connection			46	
3.	Tegeta 45 connection			20.7	
4.	Ubungo I connection			86	
5.	Ubungo II connection				
6.	Dangote connection	Phase I & II connection	2.8	30	GASCO
7.	Goodwill connection		1.65	15	GASCO
8.	Mkuranga distribution trunk-line	Lodhia & Knauf connection	3.9	10	GASCO
9.	NNGI – Ubungo -	BVS 15 – Ubungo – Mikocheni	1.42	15	

S/N	Distribution Network & Location		Length (km)	Capacity (MMscfd)	Facility Operator
9.	NNGI – Ubungo	BVS 15 – Ubungo	1.42	15	GASCO
	Mikocheni pipeline	Mikocheni pipeline			
		Coca Cola connection	0.15	7.5	
		Ubungo-Mikocheni pipeline	7.2		
		Dar es Salaam Households project (Phase I)	9.32		
		UDSM cafeteria connection project			
10.	Mtwara Households and Institutions project (Phase I)		16.6	10	GASCO
11.	Dar es Salaam Ring main	Ubungo PRS – Buguruni–Kurasini	53	10	PAET
		Gongo la mboto PRS – Buguruni			
		Wazo Hili PRS – Wazo Hill factory			
Total			**102.54**	**320**	

Source: PAET & TPDC

4.3.2 Natural Gas Virtual Pipeline Network (CNG)

As of 30th June 2020, the virtual distribution network had one CNG Mother Station and one CNG dispensing unit located at Ubungo, two CNG daughter stations located at Serena Hotel and Mikoani Edible Oil Industry located at Mbagala.

4.3.2.1 Natural Gas Vehicles Conversion Workshops

As of 30th June 2020, there were two natural gas vehicles conversion workshops namely Dar es Salaam Institute of Technology (DIT) and Bureau of Industrial Cooperation (BICO) of the University of Dar es Salaam. To expedite the utilization of natural gas in the country, the Government through the Authority continued to improve business environment in order to encourage the private sector to invest more in this area. The Ministry of Energy developed Petroleum (Natural Gas Midstream and Downstream) General Regulations, 2020 (GN 270). The Authority, in collaboration with stakeholders, developed Petroleum (Compressed Natural Gas) Rules, 2019 (GN.220) to attract investment in this segment of business

4.3.3 Natural Gas Households Connection Lines

During the period under review, there were five industrial customers connected to the National Natural Gas Infrastructure in three different regions. These customers are: Dangote Cement (Tanzania) Limited located in Mtwara, Goodwill Ceramic Factory Company Limited, Lodhia Steel Group of Companies and Knauf Gypsum Factory Limited located in Mkuranga District - Coast region; and Coca Cola Kwanza Limited located in Mikocheni Light Industrial area in Dar es Salaam region.

During the period under review, there were 337 household customers connected to low pressure distribution networks in Mtwara and Dar es Salaam. Out of the 337 houses, 125 households are located at Mtwara Mikindani Municipal in Mtwara region while 212 households are at Mikocheni, the University of Dar es Salaam and Mlalakuwa, in Dar es Salaam region. “There were also six institutional customers connected to the natural gas supply network in Mtwara and Dar es Salaam. These customers are Mtwara Teachers College, Mtwara Technical Teachers College, Mtwara Technical Secondary School and Lilungu Prison located in Mtwara, while two institutions; University of Dar es Salaam and Keko Prison located in Dar es Salaam.”

The distribution network also is connected to TANESCO power plants at Kinyerezi I, Kinyerezi II and Ubungo II while other power plants such as Ubungo Power Plant - Songas, Ubungo I and Tegeta 45 power plant are supplied by PAET.

4.3.4 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, PAET and M&P.

4.3.4.1 Natural gas distribution installed capacity

As of 30 June 2020, the natural gas distribution network comprised of 102.54km with combined capacity of 320 MMscfd as shown in **Table 16**. 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. Furthermore, the network included filtration system and metering skid. 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	Service Provider Name	Number of PRS	Isolation Valves
1.	TPDC	19	118
2.	PAET	3	45
3.	M&P	2	7
Total		**24**	**170**

4.3.4.2 Natural Gas Customers

The low-pressure natural gas distribution network comprises of various customers or end-user such as power generation plants, industrial, commercial, institutions, households and CNG vehicles located in Mtwara, Lindi, Costal and DSM regions. During the period under review, the Authority continued to monitor the quality and standard of the regulated services rendered by service providers supplying natural gas to about **600** customers of various category as shown in **Table 18 and Figure 19.** The outcome of regulatory oversight, made the natural gas distribution and supply network in general to comply with regulatory requirements. A list of all end-users connected with low pressure natural gas network is as shown in **Annex 7, Annex 8, Annex 9 and Annex 10.**

Table 18: List of Natural gas connected customers per service provider

Natural Gas End-User	Customer Location and Service Provider					
Customer category	**DSM**	**Coastal**	**Lindi**	**Mtwara**	**Total**	**Service Provider**
Power plant	6	0	0	0	6	TPDC
Industry	1	3	0	1	5	TPDC
Commercial	0	0	0	0	0	TPDC
Institution	1	0	0	3	4	TPDC
Households	212	0	0	125	337	TPDC
CNG -Vehicles	0	0	0	0	0	TPDC
Power plant	3	0	0	0	3	PAET
Industries	39	0	0	0	39	PAET
Commercial	1	0	0	0	1	PAET
Institution	1	0	0	0	I	PAET
CNG -Vehicles	200	0	0	0	200	PAET
Power plant	0	0	0	1	1	M&P
Power Plant	1	0	1	0	2	Songas
Industries	1	0	0	0	1	Songas
Total	**465**	**3**	**1**	**130**	**600**	

4.3.4.3 Natural gas customers connected per category

The summary of the Natural gas customers connected per category in the country for power generation, industry, households, commercial, institution and CNG are as shown in **Table 19**.

Table 19: Number of natural gas customers per category

Service Provider	Power	Industry	Household	Commercial	Institution	CNG
TPDC	6	5	337	0	4	0
PAET	3	39	0	1	1	200
M&P	1	0	0	0	0	0
Songas	2	1	0	0	0	0
Total	**12**	**45**	**337**	**1**	**5**	**200**

4.3.4.4 Distribution pipeline way leave management

During the period under review, TPDC, PAET and M&P did not have their own way leaves in their natural gas distribution network. Instead, they rented from other way leave owners namely TANROADS, TARURA, TRC, TAZARA and TANESCO. The management of these way leaves had many stakeholders including way leave owners, way leave users, and local government authorities. However, it was observed that there were un-coordinated third-party activities and encroachments within way leaves which posed risk to the public safety, properties and environment. The way leaves management activities performed during the review period is as shown in **Table 20.**

Table 20: Distribution network way leave management

S/N	Name of operator	Length (km)	Number of way leave patrol performed	Number of interruption/ erosions affected pipeline	Number of encroachments within the way leave
1.	TPDC	39	12	1	4
2.	PAET	53	365	3	2
3.	M&P	0	0	0	0
Total		**92**	**377**	**4**	**6**

Gas distribution and supply in general complied with all aspects, except encroachments within hazardous area posed high risk of explosion due to cooking activities along the pipeline. A number of distribution pipeline and markers have been encroached. Example of the area affected by encroachments was ALAF Industrial area (TAZARA) where petty traders continued conducting their economic and social activities within gas mains as shown in **Figure 14**.

The list of transmission and distribution pipelines way leave interferences noted during the period under review are as shown in **Annex 11**.

Figure 14: Encroachment by petty traders at ALAF

Source: EWURA

4.4 Health Safety and Environmental Performance

During the period under review, the Authority continued to carry out Health, Safety and Environmental (HSE), monitoring of midstream and downstream activities in the natural gas sub-sector. Periodic inspections were carried out as per the approved action plan to assess the level of compliance with HSE requirements of natural gas infrastructures 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 and PRS;
(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.

Generally, during the period under review, with an exception of gas leak incident at MLV 20 located at Somanga Fungu on 3rd November 2019 due to failure of line stopper sealing element, the natural gas sub-sector had no serious HSE issues **Table 21** while **Table 22** outline the integrity of PSV, meter and chromatography.

4.4.1 Environment performance indicator

Table 21: Environment performance indicators

S/N	Operator	Requirements	Type of facility	Recorded (MMscf/ppm)
1.	TPDC-MADIMBA	Hydrocarbon spills to the environment	Gas plant	0
		Controlled/influents discharges to water(max ppm	Gas plant	40
		Flared gas (MMscf)	Gas plant	0.114
2.	TPDC-SSI	Hydrocarbon spills to the environment	Gas plant	0
		Controlled/influents discharges to water(max ppm	Gas plant	34.7
		Flared gas (MMscf)	Gas plant	13.895
3.	SONGAS	Hydrocarbon spills to the environment	Pipeline	0
		Controlled/influents discharges to water(max ppm	Pipeline	0
		Flared gas (MMscf)	Pipeline	0
4.	M&P	Hydrocarbon spills to the environment	Gas plant	0
		Controlled/influents discharges to water(max ppm	Gas plant	0
		Flared gas (MMscf)	Gas plant	1.03
5.	PAET	Hydrocarbon spills to the environment	Gas distribution (PRS 2)	300L MEG
		Controlled/influents discharges to water (max ppm	Gas plant	1
		Flared gas (MMscf)	Gas plant	35.3

4.4.2 PSV, Meter and Chromatography Integrity

Table 22: Outline of PSV, Meter and Chromatography integrity

S/N	Operator	Type of devices	No. of device available	No. of device re-calibrated	No. of device re-calibrated in %	Target %
1.	TPDC	PSV	320	320	100	100
		Meter	19	NA	NA	NA
		Chromatography	3	3	100	100
2.	SONGAS	PSV	2	2	100	100
		Meter	2	2	100	100
		Chromatography	0	0	Nil	100
3.	M&P	PSV	16	16	100	100
		Meter	2	2	100	100
		Chromatography	2	2	100	100
4.	PAET	PSV	93	93	100	100
		Meter	78	78	100	100
		Chromatography	3	2	66.67	100

4.4.3 Near miss, incidents, accidents and lost time injury

During the period under review, the natural gas processing facilities recorded No Lost Time Injuries (LTI), meaning that there was no occurrence of any injuries sustained by employees that ultimately caused loss of productive work time in the form of worker delays or absenteeism, fatality, or permanent disability as shown in **Table 23** below.

Table 23: Number of near miss, incidents, accidents and lost time injury

S/N	Service provider	Reported	Natural Gas Processing	Transmission Pipeline	Distribution Pipeline	No. of occurrence
1.	TPDC	Near miss	50	36	0	86
		Incidents	10	0	0	10
		Accidents	0	0	0	0
		Lost Time Injury	0	0	0	0
		No. of injuries Occurred	0	0	0	0
2.	SONGAS	Near miss	-	0	-	0
		Incidents	-	1	-	1
		Accidents	-	0	-	0
		Lost Time Injury	-	0	-	0
		No. of injuries Occurred	-	0	-	0
3.	M&P	Near miss	2	0	0	2
		Incidents	12	0	0	12
		Accidents	9	0	0	9
		Lost Time Injury	0	0	0	0
		No. of injuries Occurred	3	0	0	3

S/N	Service provider	Reported	Natural Gas Processing	Transmission Pipeline	Distribution Pipeline	No. of occurrence
4.	PAET	Near miss	0	0	1	1
		Incidents	3	0	4	7
		Accidents	0	0	0	0
		Lost Time Injury	0	0	0	0
		No. of injuries Occurred	2	0	0	2

4.4.4 Gas Leaks monitoring

Table 24: Gas Leak monitoring

S/N	Operator	Type of gas release/leak	GP	TP	DP	Total No. of occurrence
1.	TPDC	Number of Gas Leaks Survey conducted	102	48	52	202
		Number of Significant Gas Leaks occurred	0	0	0	0
		Number of unplanned Gas Release	0	0	0	0
2.	SONGAS	Number of Gas Leaks Survey conducted	-	12	-	12
		Number of Significant Gas Leaks occurred	-	3	-	3
		Number of unplanned Gas Release	-	1	-	1
3.	M&P	Number of Gas Leaks Survey conducted	52	0	0	52
		Number of Significant Gas Leaks occurred	0	0	0	0
		Number of unplanned Gas Release	0	0	0	0
4.	PAET	Number of Gas Leaks Survey conducted	379	0	365	744
		Number of Significant Gas Leaks occurred	0	0	0	0
		Number of unplanned Gas Release	0	0	0	0

4.4.5 HSE Emergency Response Drill

Table 25: HSE Emergency Response Drill

S/N	Operator	HSE Emergency drills	Gas Processing plant	Transmission Pipeline	Distribution Pipeline	Total No. of Occurrence
1.	TPDC	Planned	8	8	4	20
		Conducted	8	7	0	15
		Performed within time	7	6	0	13
		Performance in (%)	100	87.5	0	
		Response Rate (%)	87.5	85.7	0	
		Target 100%	100	100	100	
2.	SONGAS	Planned	0	2	-	2
		Conducted	0	2	-	2
		Performed within set time	0	2	-	2
		Performance in (%)	0	80	-	
		Response Rate (%)	0	85	-	
		Target (%)	100	100	100	
3.	M&P	Planned	6	0	0	6
		Conducted	3	0	0	3
		Performed within set time	0	0	0	0
		Performance in (%)	50	0	0	
		Response Rate (%)	50	0	0	
		Target 100%	100	100	100	
4.	PAET	Planned	12	NA	2	14
		Conducted	8	NA	1	9
		Performed within set time	8	NA	1	9
		Performance in (%)	100	NA	100	
		Response Rate (%)	90	-	98	
		Target (%)	100	100	100	

Table 26: HSE Emergency Response Plan

S/N	Operator	Emergency Response Process	GP	TP	DP	Total No. of occurrence
1.	TPDC	No. of emergency occurred	0	0	0	0
		No. of emergency	0	0	0	0
		responded within set time				
		Emergency Response Rate (%)	0	0	0	
		Response Target (%)	100	100	100	
2.	SONGAS	No. of emergency occurred	-	1	-	1
		No. of emergency responded within set time	-	1	-	1
		Emergency Response Rate (%)	-	95	-	
		Response Target (%)	100	100	100	
3.	M&P	No. of emergency occurred	1	0	0	1
		No. of emergency responded within set time	1	0	0	1
		Emergency Response Rate (%)	1	0	0	
		Response Target (%)	100	100	100	
4.	PAET	No. of emergency occurred	13	-	3	16
		No. of emergency responded within set time	13	-	3	16
		Emergency Response Rate (%)	100	-	100	
		Response Target (%)	100	100	100	

4.5 Local Content Performance

During the period under review, local content performance by regulated service providers was encouraging in its entirety. Essentially, local content performance 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.

During the bidding process for execution of works or provision of various goods and services, preference should be given to eligible Tanzanian nationals and firms in respect of employment, supply of goods, execution of works and provision of services. In case capable local suppliers and services providers are not available, foreign bidders are required to have local participation of not less than 25% shares. Furthermore, in an event of formation of eligible joint ventures is not possible, the EWURA has the mandate to approve any other business arrangement which will guarantee local value creation such as technology transfer.

Table 27: Local Content Performance

S/N	Requirements	TPDC		PAET		SONGAS	
		x/y	%	x/y	%	x/y	%
1.	Number of local employees out of total employees	28/28	100	99/101	98	71/73	97.26
2.	Number of local staff trained out of total employees	72/72	100	134/154	98	12/73	16.44
3.	Number of technology transfer programmes implemented	NIL	NIL	12/12	100	12/73	16.44
4.	Number of local financial services utilized out of total financial services	8/8	100	8/12	67	6/6	100
5.	Number of local insurance policies utilized out of all insurance service awarded	4/4	100	4/5	80	8/8	100
6.	Number of local engineering services utilized out of engineering services awarded	NIL	NIL	8/12	90	4/6	67
7.	Number of procurements awarded to nationals out of total number of procurements	89/90	99	423/524	80.7	82/88	93
	x = local element; y = total						

4.6 Financial Performance

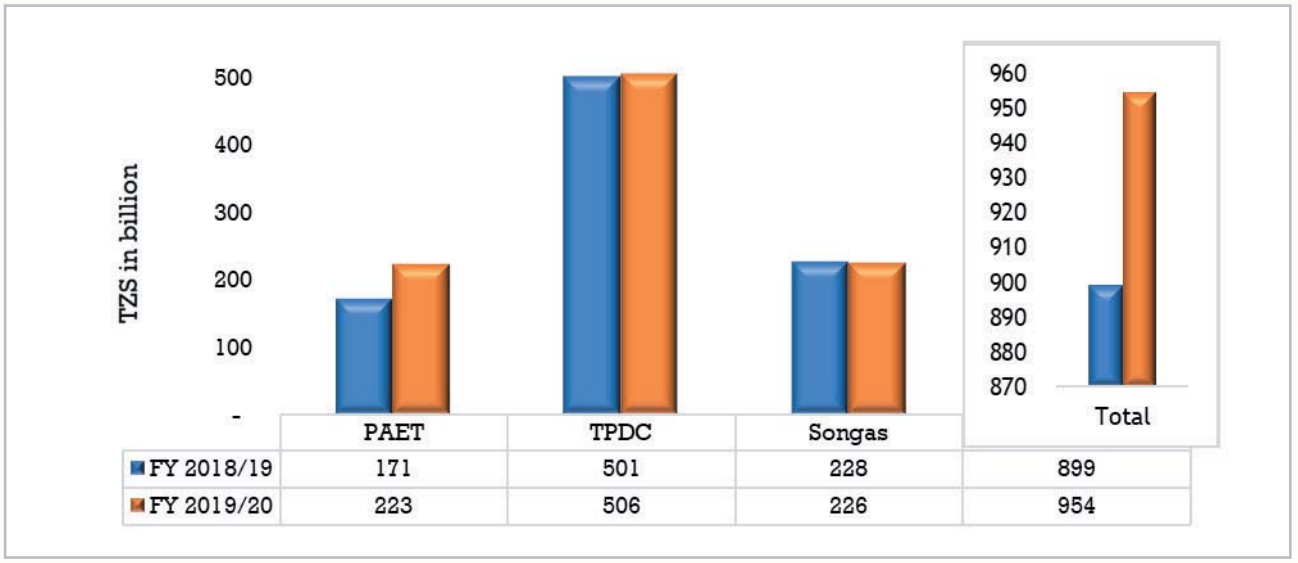
This section briefly highlights financial performance of three (3) natural gas utilities from FY 2018/19 to 2019/20. These utilities are PAET, TPDC and SONGAS.

Financial performance for Songas and PAET reported on calendar years (2018 and 2019) whilst TPDC's performance has been assessed based on its financial years (2018/19 and 2019/20). Thus, the analysis of financial performance for Songas and PAET are based on the audited financial statements of the year 2019 and TPDC on draft financial statements FY 2019/20.

4.6.1 Revenue Generation

During the period under review, gross revenue generation of PAET, TPDC and Songas increased by 6%. In addition, PAET recorded significant increase of 31% and TPDC recorded the increase of 1%. However, Songas revenue dropped by 1% due to net loss resulted due to write off-of five (5) engines in year 2019. **Figure 15** shows revenue generation by companies.

Figure 15: Revenue Generation



	PAET	TPDC	Songas	
FY 2018/19	171	501	228	899
FY 2019/20	223	506	226	954

Source: Audited Financial Reports of TPDC, SONGAS and M&P

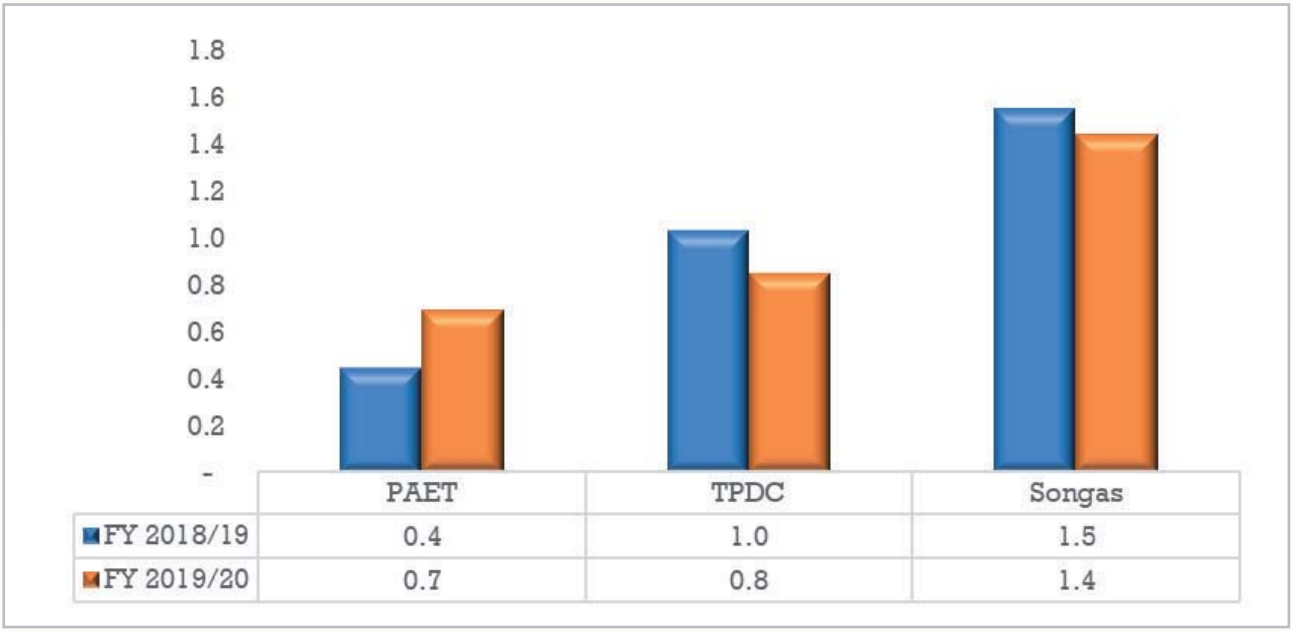
4.6.2 Ratio Analysis

This section highlights financial performance of regulated utilities by analysing selected financial performance indicators including current ratio, net profit margin, return on assets as well as collection efficiency. The analysis is geared at assessing the extent to which financial performances of regulated utilities have improved or deteriorated.

4.6.3 Current Ratio

The current ratio is a liquidity ratio that measures a company's ability to pay short-term obligations whose maturity fall within one year. The ratio highlights the extent to which the utility's current assets can cover its current debt and other payables. In principle, a favourable current ratio ranges from one (1) to two (2), which means that the business has two times more current assets than liabilities to covers its debts. A current ratio below one (1) means that the company does not have enough liquid assets to cover its short-term liabilities. **Figure 16** shows two years current ratios.

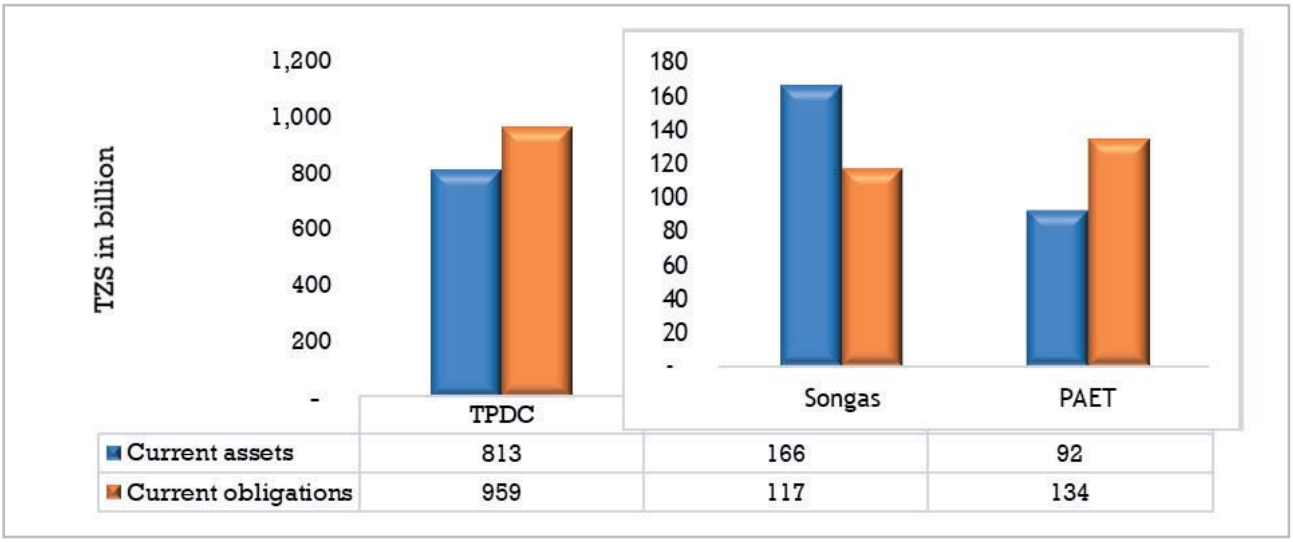
Figure 16: Current Ratio



Source: Analysis of data from Audited Financial Reports of TPDC, SONGAS & M&P

The analysis showed that, during the period under review, PAET and TPDC recorded current ratios of less than 1:1 that implied that the company were not in better position to meet short-term obligation. However, Songas, recorded good ratio of 1:1.4 which indicated that, there were good utilization of current assets in working capital management. **Figure 17** shows current assets and current obligation.

Figure 17: Current assets and obligations



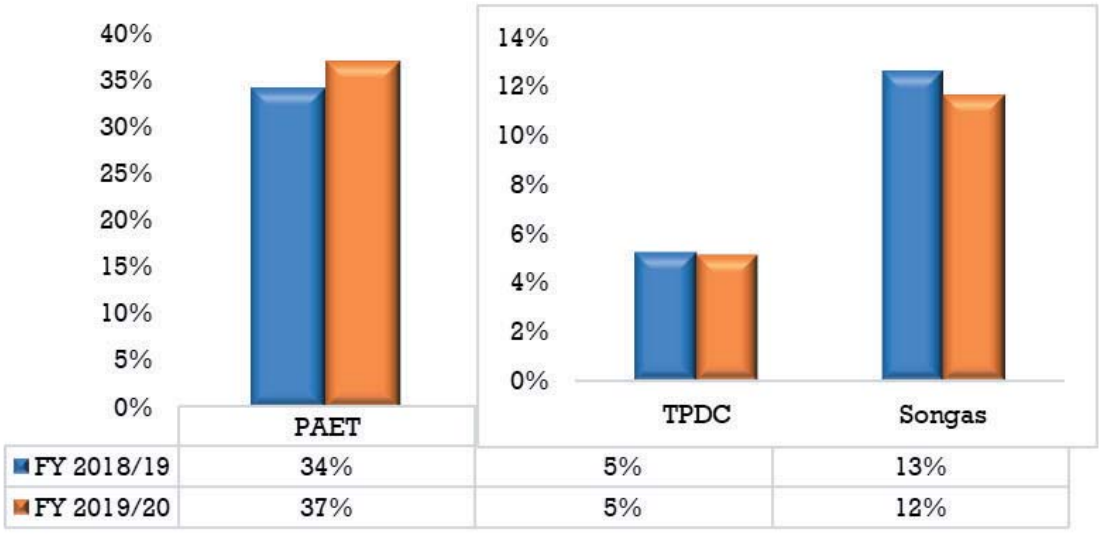
Source: Audited Financial Reports of TPDC, SONGAS & M&P

4.6.4 Net Profit Margin

During the year under review, PAET attained good margin, Songas realized average margin and TPDC got low margin

Net profit margin indicates how much net income a company makes with total sales achieved. A good margin as a general rule of thumb considers 10% net profit margin as average, a 20% margin as good and a 5% margin is low.

Figure 18: Net Profit Margin Ratio



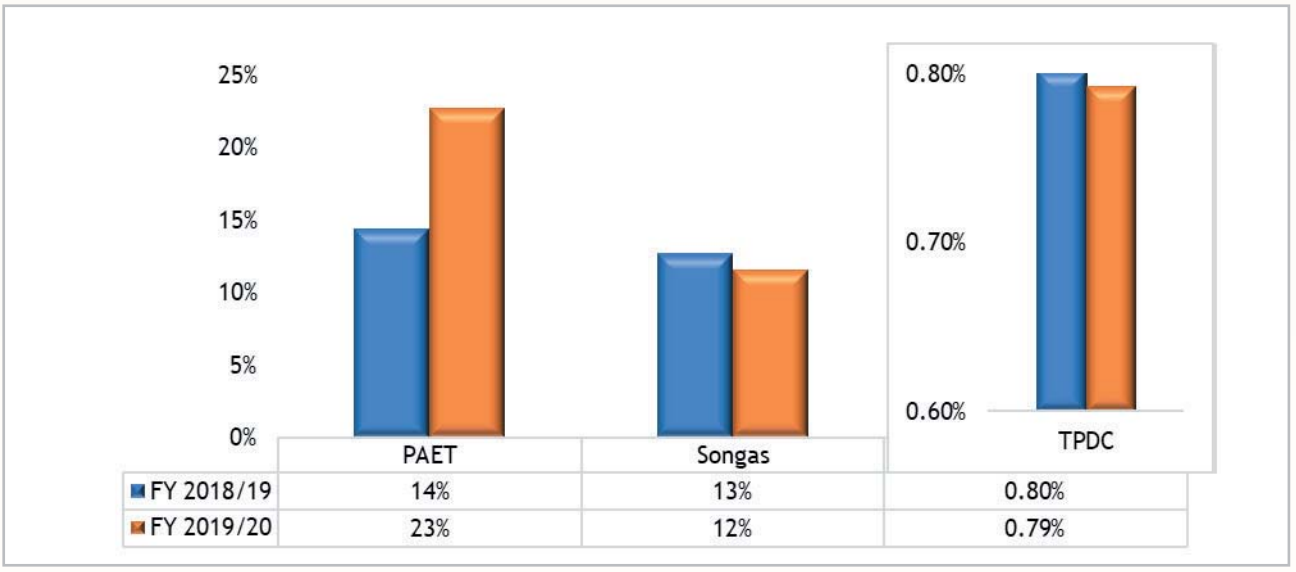
Source: Analysis of data from Audited Financial Reports of TPDC, SONGAS & M&P

4.6.5 Return on Assets

During the year under review, PAET attained a higher return on assets compared to Songas, while TPDC recorded the lower return on asset.

Return on assets (ROA) is an indicator which assesses how profitable a company is relative to its total assets. It explains how efficient a company's management is at using its assets to generate revenues. Return on assets is calculated as a percentage of net income in total assets; the higher the ROA the better.

Figure 19: Return on Asset

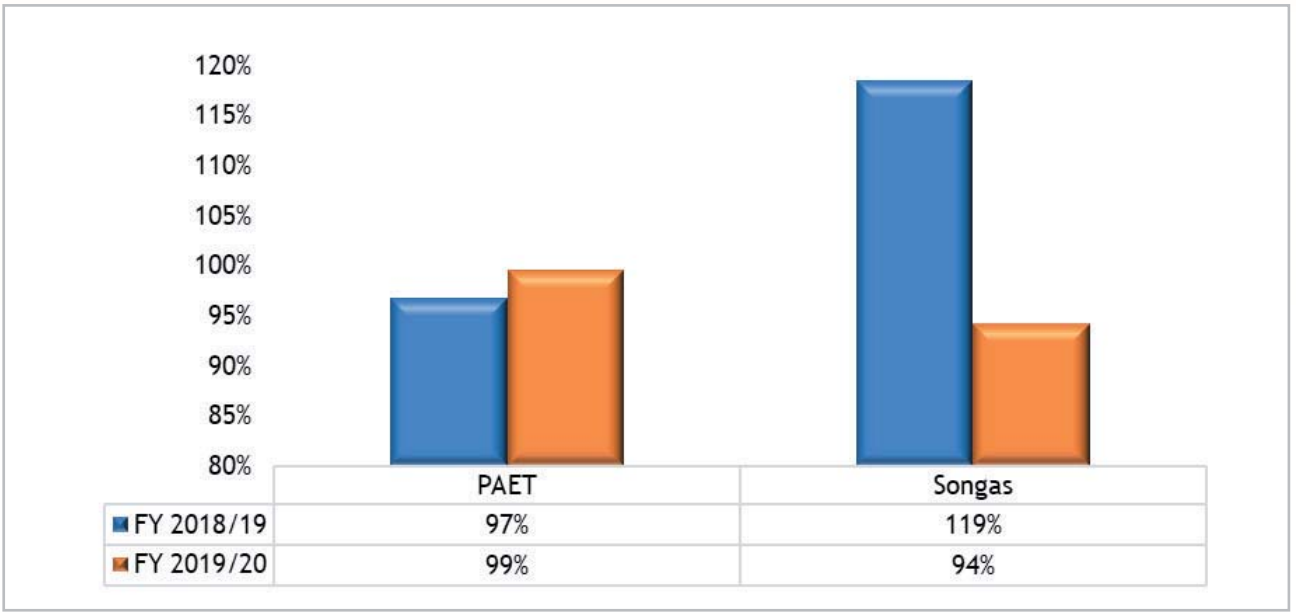


Source: Analysis of data from Audited Financial Reports of TPDC, SONGAS & M&P

4.6.6 Collection Efficiency

During the period under review, PAET and Songas recorded remarkable achievement in collection of 99%. However, these collections included arrears of the previous years collection efficiency is a ratio of total revenue realized to the total revenue billed during the same financial year.

Figure 20: Collection Efficiency



Source: Analysis of data from Audited Financial Reports of TPDC, SONGAS & M&P

5. 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 18**.

The natural gas sub-sector is growing very fast. The demand for natural gas is expected to increase due to a upsurge in power generation, industrial heating, households and CNG 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 development new exploration wells in the upstream. An incentive mechanism by the Government in collaboration with other key stakeholders should be put in place for upstream investors.

5.1 Natural Gas Supply in FY 2019/20

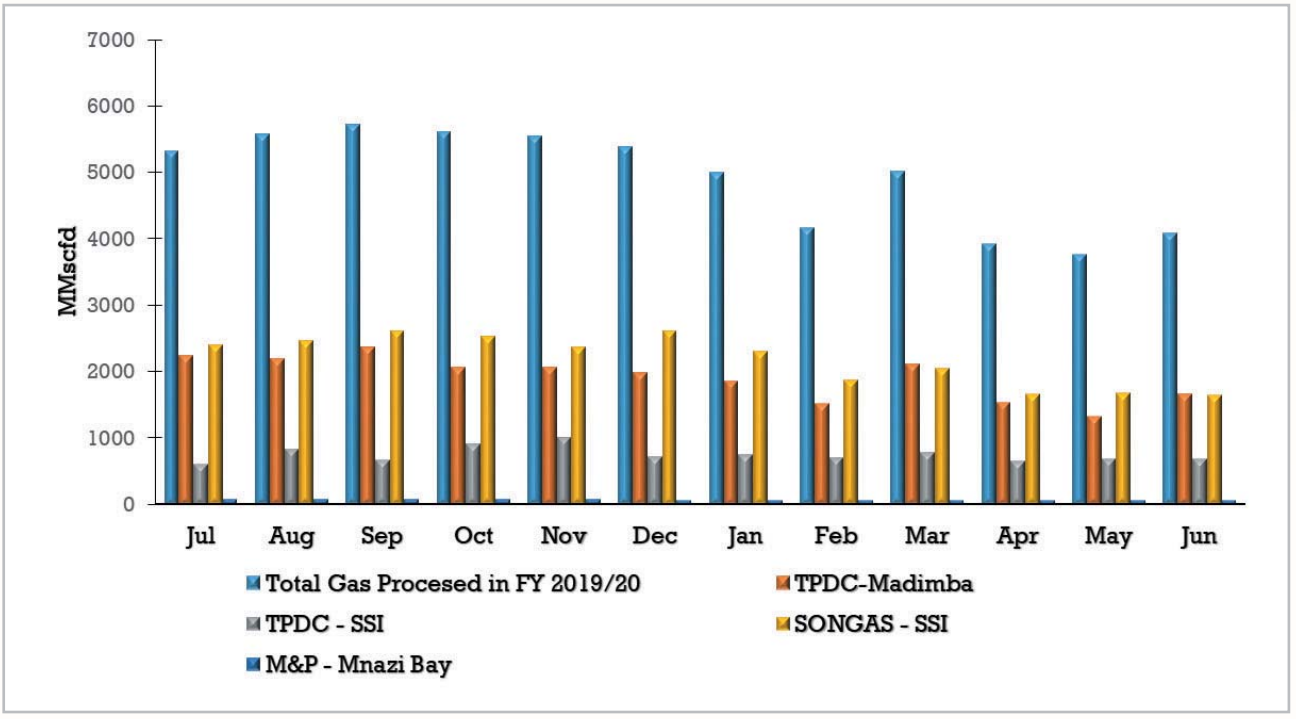
During the period under review, the overall gas processing from both gas fields Songo Songo Island (SSI) in Lindi and Mnazi Bay in Mtwara was **59,831.43**, compared to **60,911.87 MMscf** gas processed in 2018/19. This decrease in gas processing was prompted by TANESCO opting to dispatch more of least cost hydropower generation at the expense of power generation from gas fired engines.

Also the outbreak of COVID-19 in the second half of FY 2019/2020 slowed the demand of industrial products, which slowed the industrial activities.

The quantity of natural gas processed at Songas gas plant was **26,342.00 MMscf** in year 2019/20, compared to **28,910.20 MMscf** produced in year 2018/19 which indicated a decrease of **2,568.20 MMscf**. Natural gas processed at TPDC gas processing plants in Madimba and Songo Songo Island was **32,608.64 MMscf** in year 2019/20 compared to **31,096.02 MMscf** in year 2018/19. The figures indicate that there was an increase of **1,512.62 MMscf**. 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."

More-over, M&P gas processing plant supplied natural gas to Mtwara TANESCO power plant was 881.09 MMscf in FY 2019/20, compared to 905.65 MMscf in the previous year 2018/19, a decrease of natural gas consumption for the past year was due to re- allocation of some of the customers of Mtwara TANESCO to National Grid. For more details see **Figure 21**.

Figure 21: Total natural gas processed (MMSCF) for FY 2019/20

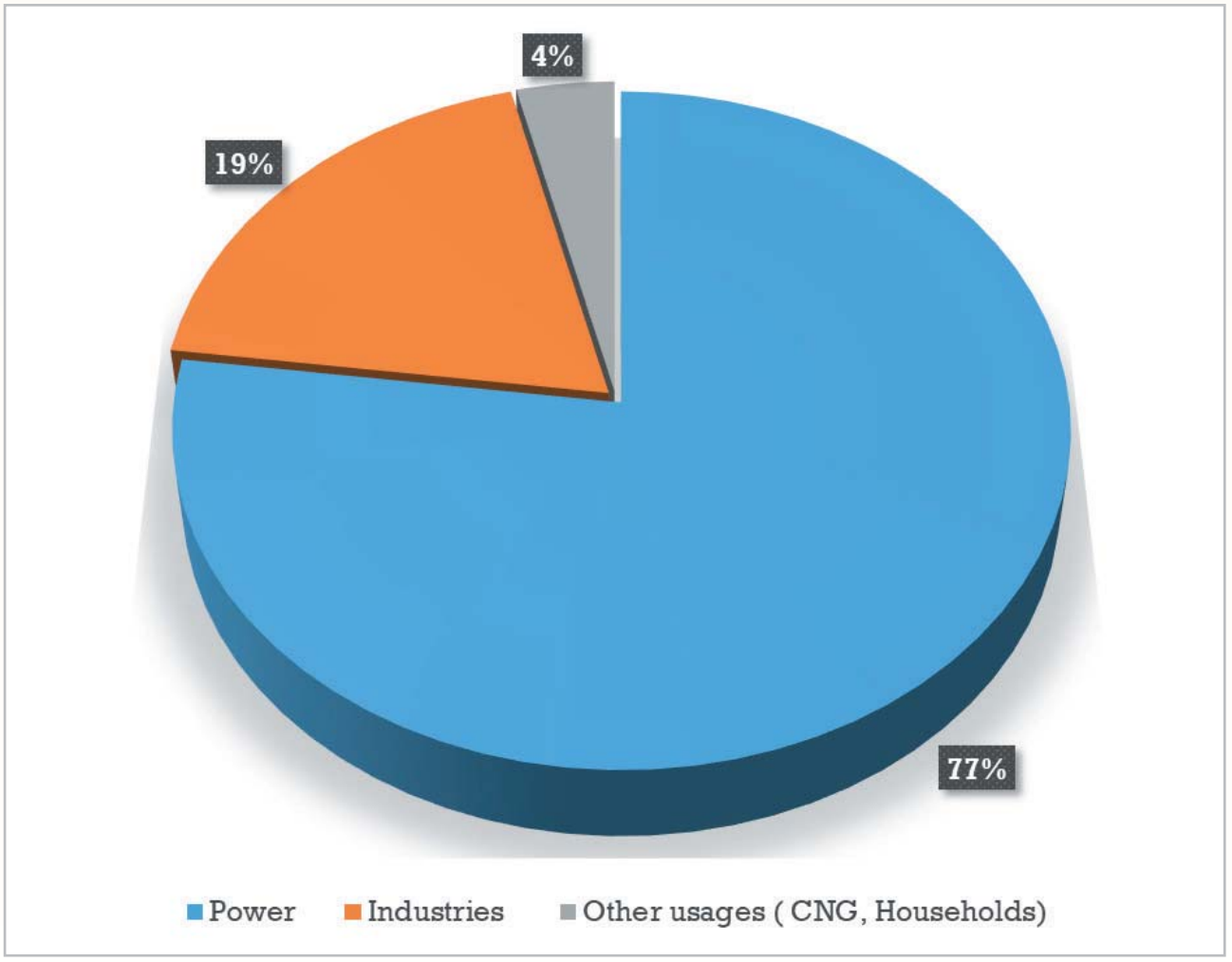


Source: TPDC, PAET & M&P

5.2 Natural Gas Sales in FY 2019/20

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 **59,831.43 MMscf** in FY 2019/20 compared to **60,911.87 MMscf** of similar period in previous year. During the period under review, a total of **59,831.43 MMscf** of natural gas was sold to power generation, industrial, commercial, domestic and CNG Vehicles customers. **Figure 22** indicates natural gas sales to various customer categories.

Figure 22: Natural Gas supplied to Power, Industrial and other customers



Source: TPDC, PAET, SONGAS & M&P

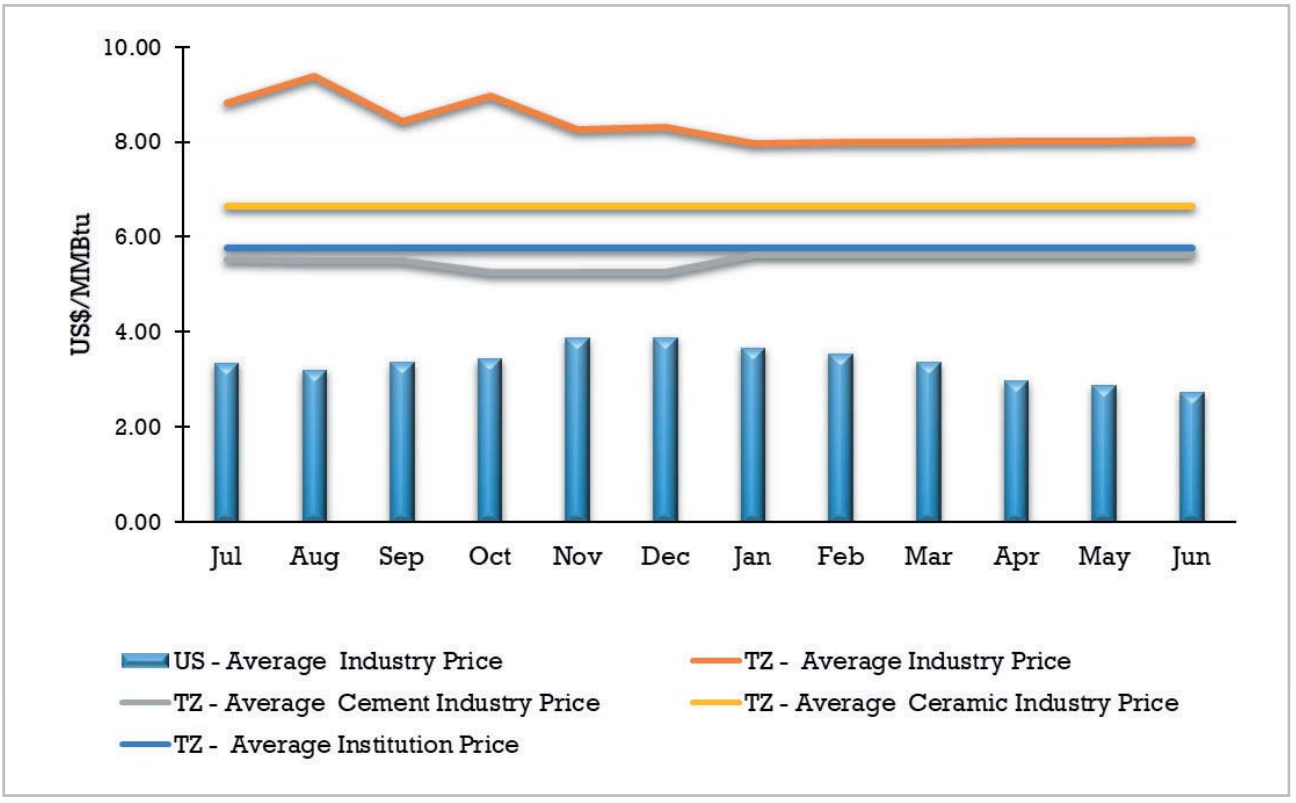
5.3 Natural Gas Prices

The commercialization of natural gas in Tanzania commenced in 2004. At that time, the pricing of natural gas was governed by individual contracts between natural gas producers and customers. 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, 2016 were developed by the Minister responsible for petroleum affairs to operationalize the Petroleum Act in respect of natural gas pricing. However, the pricing of natural gas through mechanisms provided in the Petroleum (Natural Gas Pricing) Regulations, 2016 were based on alternative fuel for industrial customers which was bound to change at any time depending on the change of circumstances in the world market.

As a result, the Petroleum (Natural Gas Pricing) Regulations, 2020 were developed which repealed the Petroleum (Natural Gas Pricing) Regulations, 2016.

The average natural gas price for industrial customers during the period under review was 8.35$/MMBtu. The average price for cement industries was 5.50$/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 23**. The average gas price in the country for small gas consumer industries is too high compared to the large gas consumer industries, which in one way or the other contributes to high-energy cost hindering their growth in comparison to the larger ones.

Figure 23: Natural Gas Prices for different industrial customers

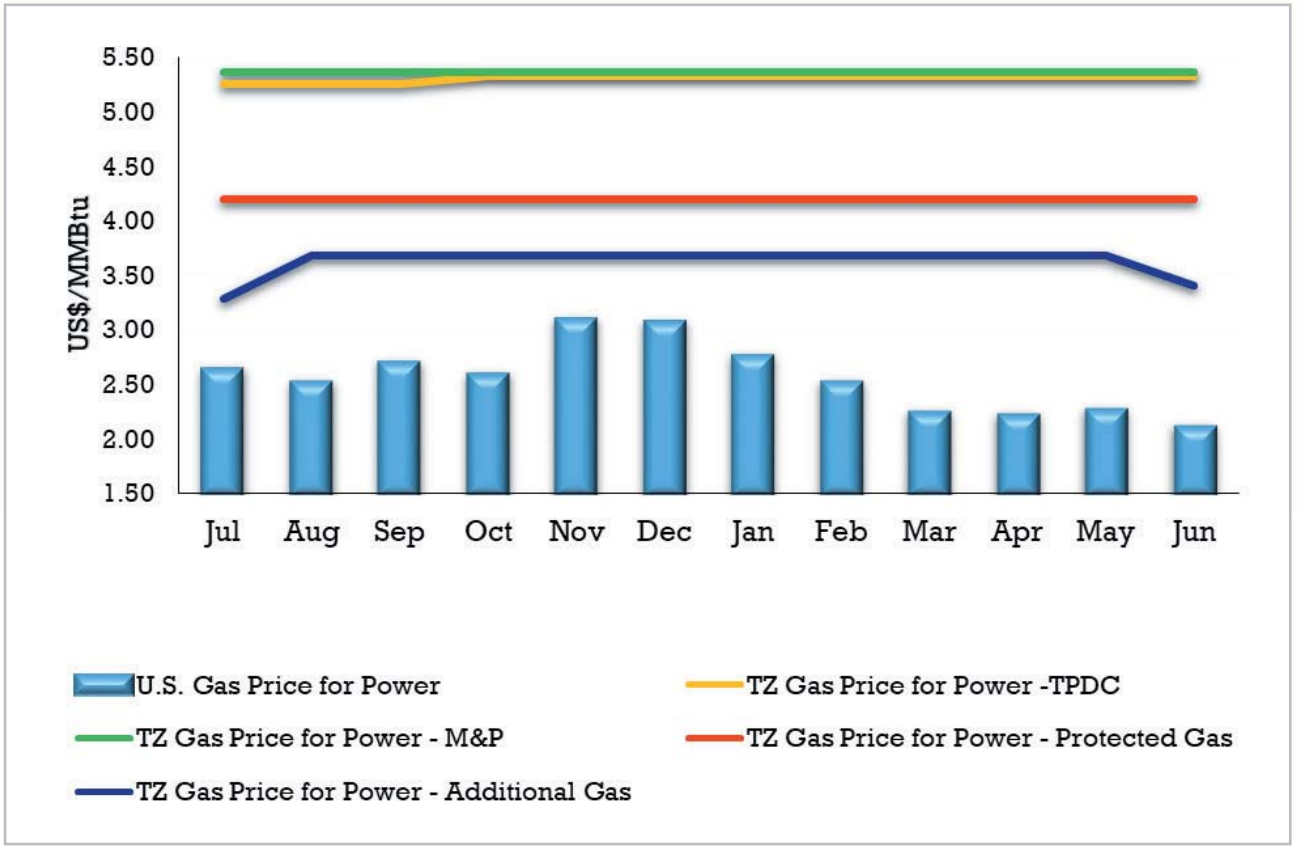


Source : TPDC, PAET, SONGAS & M&P

5.4 Benchmarking of Natural Gas Prices Vs USA Market Prices

During the period under review, the average monthly natural gas price for thermal power plants supplied as protected gas was 4.2U$/MMBtu while the prices for thermal power plants supplied as additional gas, remained at an average of 3.62U$/MMBtu. Other gas prices included the price for Mnazi Bay gas sold to TANESCO power plant in Mtwara was 5.36U$/MMBtu and the average price for TPDC gas sold to TANESCO power plant at Ubungo was 5.31U$/MMBtu. The Authority benchmarked the natural gas prices for thermal power generation and industrial use in Tanzanian market to the US market as shown in **Figure 23**. The average USA prices for power generation and industrial use were 2.54U$/MMBtu and 3.35U$/MMBtu respectively over the same period under review.

Figure 24: Natural Gas Prices for Power Benchmarked to US prices



Source: TPDC, PAET, SONGAS & M&P

6. ACHIEVEMENTS AND CHALLENGES

During the period under review, EWURA recorded various achievements and challenges in the natural gas sub-sectors as detailed below:-

6.1 Achievements

(a) The Authority through performance monitoring and quarterly inspections, ensured the integrity of natural gas processing, transmission, distribution and supply infrastructures maintained by the service providers to the required standards;

(b) The Common Qualification System (CQS) for local content management was developed and installed;

(c) EWURA developed MoU between way leaves owners and way leaves users to coordinate activities along the Shared Right of Ways;

(d) The Authority established the Local Suppliers and Service Providers Database and registered 470 Local Suppliers and Service Providers (LSSP 2018) by the end of 30th June 2020;

(e) The Authority effectively continued to monitor the local content compliance performance by various operators. These efforts has resulted into promotion of Tanzanian staffs to be the chief executive officer and deputy managing director of Songas and PAET respectively; and

(f) The Authority developed various natural gas regulatory tools to guide the industry.

6.2 Challenges and Way Forward

The following were some of the major challenges encountered in the natural gas sub sector during the period under review as detailed below: -

(a) Lack of coordination between way leave owners (TANROADS, TARURA, TRC, TAZARA and TANESCO) and way leave users (TPDC, PAET and M&P) which has caused incidents in the shared way leaves. The Memorandum of understanding among parties have been signed to jointly collaborate while working in shared wayleaves.

(b) Inadequate gas distribution network to meet the natural gas demand and future markets (industries, households, commercial, and transport),

(c) Risks posed by third party activities and encroachment along the way leaves, The Authority in collaboration with way leaves owners and users have set up the Joint Technical Committee to draft the guidelines of working in shared way leaves to ensure safety to the public and protect the underground infrastructures

(d) Inadequate investment in Compressed Natural Gas (CNG) dispensing units for vehicles; EWURA will continue to encourage TPDC to give consents to private investors with appetite to invest in this business segment.

(e) Low capacity utilization of processing and transmission natural infrastructure due to inadequate investment in the downstream segment. There is a need for the Government intervention by availing funds to enable TPDC to create more natural markets by extending the transmission and distribution networks not only in Dar es Salaam but also in other regions.

7. CONCLUSION

From regulatory perspective, operations of the natural gas sub sector were within required standard. The sub sector's infrastructure operated with high compliance of the governing rules and regulations in regard to economic, safety and security. EWURA will continue to play its regulatory role to ensure that natural gas sub sector activities meet regulatory standards and requirements, for sustainability of the national economy.

ANNEXES

Annex 1: Natural Gas Regulatory Tools

S/N	Citation / Title	GN Number	Date Published
1.	The Energy and Water Utilities Regulatory Authority (Tariff Application and Rate Setting) Rules, 2017	GN 452/2017	November 17, 2017
2.	Petroleum (Natural Gas) (Transmission and Distribution Activities) Rules, 2018	GN 176/2018	May 4, 2018
3.	Petroleum (Natural Gas)(Licensing Fees) Rules, 2020	GN 301/2020	May 1, 2020
4.	Petroleum (Natural Gas)(Supply and Marketing Services) Rules, 2019	GN 219/2019	March 25, 2019
5.	Petroleum (Compressed Natural Gas) (Supply And Marketing Services) Rules, 2019	GN 220/2019	March 22, 2019
6.	Petroleum (Natural Gas) (Processing) Rules, 2019	GN 221/2019	March 22, 2019
7.	The Petroleum (Natural Gas) (Storage) Rules, 2019	GN 182/2019	March, 15 2019
8.	The Petroleum (Natural Gas) (Regulatory Accounting and Reporting Standards) Rules, 2019	GN 183/2019	March, 15 2019
9.	The National (Petroleum and Natural Gas) (Information System) Rules, 2019	GN 184/2019	March, 15 2019
10.	Petroleum (Natural Gas) Customer Services Charter Guidelines, 2019	N/A	2019
11.	Petroleum (Natural Gas Pricing)Regulations, 2020	GN 353/2020	May, 15 2020
12.	The Petroleum (Natural Gas Midstream and Downstream) General Regulations, 2020	GN 270/2020	April, 17 2020
13.	The Petroleum (Corporate Integrity Pledge) Regulations, 2019	GN 782/2020	November, 1 2019
14.	The Energy And Water Utilities Regulatory Authority (Compounding Of Offences) Regulations, 2020	GN 397/2020	May, 29 2020
15.	The Petroleum (Local Content) Regulations, 2017	GN 197/2017	May, 5 2017

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

Annex 3: List of Service Providers and their scope of operations

Regulated service provider	Scope of regulated service	Location	Year commenced service
PAET	Distribution line	DSM region	2004
PAET for SONGAS	Processing Plant	Lindi region	2004
Songas (T) Ltd	Transmission line	Lindi - SSI to DSM region	2004
M&P	Processing Plant	Mtwara - Mnazi Bay area	2009
M&P	Transmission line	Mtwara – Mnazi bay to city centre	2009
GASCO for TPDC	Processing plant	Mtwara - Madimba area	2016
GASCO for TPDC	Transmission line	Mtrwara - Lindi- Coast- DSM	2016
GASCO for TPDC	Distribution line	Mtwara, Mkuranga, DSM	2016

Annex 4: Number of Cathodic protection test points installed

Transmission Pipeline Segment	Number of cathodic protection (CP) test points installed	Range of Voltage reading of CP test points	Number of CP test points inspected	Number of CP test points complied	Number of CP test points reported mal-functioned	Number of CP test points complied in (%)	Compliance Target 100%
TPDC (From SS/Madimba to Wazo hill)	542	850mV-1200mV	542	542	0	100	100
M&P	11	-2.0mV-2.5mV	11	11	11	0	100
SONGAS	5	850mV-1200mV	5	4	1	80	100

Annex 5: 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

Annex 6: 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	Chang'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	Chang'ombe	PAET
9.	MM Integrated Steel (MM1)	0.11	Heating	Ok	Mikocheni	PAET
10.	MM Integrated Steel (MM2)	0.15	Heating	Ok	Mikochezi	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	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

SN	Name of customer	Average Consumption (Mmscfd)	Usage	Gas odorization status	Location	Supplier
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 Manufacturer Ltd	0.01	Heating	Ok	Chang'ombe	PAET
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
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	Trgeta - Wazo	PAET

Annex 7: 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 8: List of Natural Gas Pipelines Way Leave Interferences

SN	Type of facility	Encroachment/ Erosion	Location	Way leave owner	Marker posts visibility	Supplier
1.	Distribution Network	Petty traders	ALAF	Temeke	Ok - visible	PAET
2.	Distribution Network	Petty traders	Tanpack and Mikocheni	Kinondoni	Ok - visible	TPDC
3.	Distribution Network	Petty traders	Toyota	TRL-railway	Ok - visible	PAET
4.	Transmission line	River Erosion	Kinyerezi river at Katanga area	Songas	Ok - visible	Songas
5.	Transmission line	River Erosion	Kinyerezi river at Katanga area	TPDC	Ok - visible	TPDC
6.	Transmission line	Sand Mining activities	Kinyerezi river	TPDC	Ok - visible	TPDC
7.	Distribution Network	Petty traders	Buguruni area	TRL-railway	Ok - visible	PAET
8.	Distribution Network	Tyre Burning	Toyota boundary wall	TRL-railway	Ok - visible	PAET
9.	Distribution Network	Petty traders	Majumba sita area	TRL-railway	Ok - visible	PAET