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# **TABLE OF CONTENTS**

	List of tables and figures	4
1.	INTRODUCTION	5
2.	THE PETROLEUM SECTOR IN TANZANIA	6
	Territorial boundaries	6
	Geology and reserves	8
	Legal framework, policies and public institutions	10
	Exploration, development and extraction	11
	Pipelines	12
	Gas processing plants and gas fueled power plants	13
	LNG processing	14
	Operating companies and institutions	14
3.	NATIONAL ECONOMIC CONTRIBUTION OF THE GAS RESOURCE	16
	Investment	16
	GDP – and GDP by sector	16
	Imports and exports - balance of payments	18
	Employment	19
	State revenue, expenditure and financing	19
	Social and welfare issues	20
	Political and governance issues	20
	The environment	20
	The future	21
4.	IMPROVING STATISTICS FOR MANAGEMENT OF THE PETRO ECONOMY	23
	The role of good data	23
	Tanzanian statistics and statistical development	24
	Norway's experience – relevant to Tanzania?	25
5.	A DATA BASE FOR A PETRO FUTURE	28
	Petroleum industry statistics – general issues	28
	Territory, Geology and Reserves	30
	Legal framework, policies, public institutions	30
	Exploration, drilling	31
	Extraction	31
	Production, sales	32
	Construction, rigs, platforms	32
	Pipelines	33
	Foreign trade	33
	Industry	34
	Investment	34
	Energy National Assounts	34
		30
	Government infance	30
	Social issues – incomes – poverty	30
	Environment	27
	Environment	37
	Analysis and models	37
6	CONCLUSIONS	<b>20</b>
0.	REFERENCES	
		-+0
Anne	x 1: Oil and gas companies in Tanzania	44
Anne	ex 2: UN Fundamental Principles of official statistics	48
Anne	x 3: Some Useful International Databases	49

# LIST OF TABLES AND FIGURES

# **Tables**

A: Gas production in Tanzania 2011–2015	
(quantities and values on production and consumption also available quarterly)	13
B: Electricity Generation and Capacity in Tanzania	14
C: Detailed Industrial composition of GDP,	
selected years (current prices) million Tshs	17
D: Natural Gas composition of GDP selected years	
(constant 2007 and current prices) million Tshs	17
E: Role of Mineral Fuels in external Trade 2010–2014, million Tshs	18
F: State Revenue, Expenditure and Finance, million Tshs	19
G: Composition of Revenue 2010–2015 million Tshs	20
Figures:	
Figure 1: UNCLOS Concepts applied to Tanzania's Coastal waters	7
Figure 2: Continental Shelf Tanzania	7
Figure 3: Indian Ocean Territorial Claims	8
Figure 4: Main basins with petroleum Potential	9
Figure 5: Exploration Activity June 2016 Tanzania	15
Figure 6: Tanzania: International Natural Gas Price	21

#### **Boxes:**

Box 1: Key years for petroleum development in Tanzania	11
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# **1. INTRODUCTION**

This paper deals with needs and availability of data, statistics and information in Tanzania. It relates to a five-year (2014–19) research programme on prospects and challenges for the petroleum sector<sup>1</sup>.

The main objectives are

- a. to present a brief analysis based on data which is accessible at present and
- b. to sketch a structure for the *Tanzania Petro Data Hub* (http://data. tanpetstate.org).

The Data Hub will supply data, statistics and information of specific relevance for research on petroleum related issues in Tanzania. It forms one part of a two pronged web portal. The web site (http://www.tanpetstate.org/) will present information about research and the petroleum sector in Tanzania. The Petro Data Hub, presented below, will compile and present data related to Tanzania's transition into the "petro" age which is not easily available from other sources. The Hub will focus on the data needs of four kinds of audiences: (a) researchers working under the various research components<sup>2</sup> of the programme, (b) the wider research community, (c) civil society and (d) other individuals taking a special interest in the petroleum sector and its social and economic effects in Tanzania.

We will work closely with Tanzania's National Bureau of Statistics (NBS). Also other institutions will assist the Petro Data Hub establish baselines. These will be used for tracking development during the five-year programme period and beyond. The Hub will also collate, compile and store data produced by the research components of the programme. It will make such data accessible for researchers outside the programme.

Sections 2 and 3 below provide information on the current state of the petroleum industry in Tanzania. We thus illustrate the present availability of data on the industry and its economic and social effects. We start (in section 2) by briefly sketching various aspects of the resource base and its exploitation. Section 3 looks at the economic contribution of the gas resource. We consider GDP, investment, external trade and balance of payments, employment and fiscal contribution.

Section 4 deals with statistical needs and challenges and section 5 sketches a proposed structure for the Petro Data Hub. We use experience from Norway to exemplify some of the challenges of supplying data for policymaking in Tanzania. Section 6 briefly summarizes. We stress the importance of cooperation between programme partners and other stakeholders.

I The objectives of the programme are to enhance the empirical understanding of key prospects and challenges facing Tanzania as a new petro-state, and to provide contextualized, evidence based policy analysis in order to contribute to avoiding a resource curse situation. Funded by the Norwegian Embassy, Dar es Salaam the programme is implemented by the REPOA programme for Policy Research on Development, Dar es Salaam and the Chr. Michelsen Institute (CMI), Bergen, Norway in collaboration with the National Bureau of Statistics of Tanzania (NBS).

<sup>2</sup> These are, in addition to "Data for policymaking and public engagement": "Revenue and Expenditure Management in the Petrostate", "Local content for the Petroleum industry in Tanzania" and "Governance in the petro state".

# 2. THE PETROLEUM SECTOR IN TANZANIA

In section 2 and 3 we outline salient facts about the petroleum sector in Tanzania and its effects on the economy. The descriptive exercise helps us pinpoint where data are presently easily available or where they are missing or difficult to access. We show that, in general, information on all aspects of the petroleum sector in Tanzania is not readily available. Efforts will be needed to build up a good database.

To assess the petroleum resource and its impact on the Tanzanian economy and society we need information beyond statistics in the conventional sense. Territorial boundaries e.g. frame the areas where Tanzania can exploit its natural resources. Information on laws and institutions define the legal and social frame within which the industry will have to work.

Statistics in the conventional sense cover exploration and extraction, operation of pipelines and processing plants, including Liquefied Natural Gas (LNG). We enumerate and briefly describe (In Annex 1) companies, which are active in the petroleum sector in Tanzania. Section 3 sketches the economic contribution of petroleum as seen through the lens of national accounts. We include investment, GDP by sector, external trade, employment and public finance. We make brief references to social and welfare data, political and governance data, and environmental data. Finally, we include a forecast of future development of revenues from the petroleum sector.

#### **Territorial boundaries**

International agreements on territorial boundaries determine where countries may exploit offshore oil and gas. The United Nations Convention on the Law of the Sea (UNCLOS) defines rights and responsibilities regarding the world's oceans. It establishing guidelines for environment and the management of marine natural resources.

The UNCLOS<sup>3</sup> rules for different types of zones provide for different types of rights. We list the main concepts and territorial types below:

**Baseline** is the line along the coast that determines the point from which the other zones are measured. This line is normally the low water line along the coast. (See the *landside* of the 12 nautical miles (nmi) band in Figure 1). **Internal waters** are the waters *landward* of the baseline.

**The territorial sea** extends from the internal waters to an adjacent belt of sea. If this overlaps with other states' territorial seas, the border will be the median point between the states' baselines. Tanzania's territorial sea extends 12 nmi (22.2 km). This is the 12 nmi band, Figure 1.

**Contiguous zone**, in UNCLOS (Article 33), is a band of water extending from the outer edge of the territorial sea to up to 24 nmi (44.4 km) from the baseline. Within this border, a state can exert controls to prevent infringement of its customs, fiscal, immigration, or sanitary rights. This is a band on the *seaward* side of the territorial sea, of approximately same width as the territorial sea. (Not shown in Figure 1)

<sup>&</sup>lt;sup>3</sup>United Nations Convention on the Law of the Sea

http://www.un.org/depts/los/convention\_agreements/texts/unclos/closindx.htmhttp://www.un.org/depts/los/convention\_agreements/texts/unclos/closindx.htm



the continental margin. The extended continental shelf of Tanzania encloses an area of  $61000 \text{ km}^2$  and extends beyond 200 m from the baseline. (See arrow, figure 2)

Conflicts over EEZ and continental shelf borderlines may arise between countries. Figure 3 shows EEZ borderlines for East African and Indian Ocean islands, including contested EEZs. Tanzania has overlapping claims with other nations, namely Kenya to the north and Seychelles to the East. Solutions have been found for possible conflicts.

With Kenya, a single line is delimiting the Territorial Sea and EEZ boundary between the two countries. An agreement also defines the extension of the maritime boundary to the outermost limits of the continental shelf. An agreement with Seychelles defines the delimitation of the maritime boundary and

Figure 2 Continental shelf Tanzania. Source: Partial Submission on the Continental Shelf beyond 200 Nautical Miles to the Commission on the limits of the Continental shelf Pursuant to Part VI of and Annex II to the United Nations Convention on the law of the sea 1982 URT-DOC-001\_18-01-2012 **Exclusive economic zone (EEZ)** – according to UNCLOS (Part V) is a zone beyond and adjacent to the territorial sea. Here, a coastal state has sovereign rights to explore and exploit, conserve and manage natural resources. The outer limit of the exclusive economic zone shall not exceed 200 nautical miles from the baseline. Tanzania's exclusive economic zone (EEZ) extends 200 nmi (370.4 km) from the coast line marked and is illustrated as the borderline to the right in Figure 1.

**Continental shelf**, according to UNCLOS (Article 76), is the continental shelf of a coastal state. This comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea to the outer edge of





boundaries overlap. (See UNCLOS 2012)



Figure 3, Indian Ocean territorial claims. Source: Sellström, T. 2015. "Africa in the Indian Ocean : Islands in ebb and flow", Boston Brill, 2015, African social studies series.

# **Geology and reserves**<sup>4</sup>

Within the Tanzanian territory, geological characteristics indicate the types and extent of petroleum and other natural resources. Knowledge of geological features is important in determining the location of resources. Such information is often monopolized by exploring companies. Official public information is held by the Geological Survey of Tanzania.

The potential areas of petroleum resources consist of the following areas (See Figure 4 below):

**Selous Basin,** which extends for almost 400km southwestwards from the Rufiji Trough. The area has a sparsely distributed population with Liwale, on the eastern side of the basin, the only town of any size. All acreage formerly held by Shell in this basin was relinquished in September 1985 and the entire area is now open.

**Rufiji Trough** is a major east-west basin on land in the centre of the coastal area of Tanzania. It has considerable potential for the discovery of hydrocarbons. However, it yet remains unexplored. The Songo Songo gas field immediately offshore and the Wingayongo oil seep indicate potential for both liquid and gaseous hydrocarbons.

<sup>&</sup>lt;sup>4</sup> Information in this section from MBENDI website: Extraction of Crude Petroleum in Tanzania: Geology. https://www.mbendi.com/indy/oilg/ogus/af/ta/p0010.htm



**Ruvu Basin** extends in a southwesterly direction from Tanga on the northern coast of Tanzania to the Ruvu River. It covers an area of about 15,000 sq.km, which is almost entirely onshore.

Figure 4 Main basins with petroleum Potential and location of oil and gas wells, discoveries and boreholes: Source Mbendi

**The Dar-es-Salaam Platform** is situated onshore between the mouth of the Ruvu River in the north and the Rufiji Delta to the south. It covers an area of about 18,000 sq.km. Five wells have been drilled in the area.

**Coastal Basin - Pemba & Zanzibar Basins** represent the northern part of the Tanzanian Coastal Basin complex; together they cover an area of approximately 12,000 sq.km extending from the Kenyan border in the north to south of Dar-es- Salaam.

**Coastal Basin - Mafia Basin** is the part of the Coastal Basin complex that is located in the central offshore area south of Dar-es-Salaam and north of the Songo Songo shelf. The Mafia Basin lies beneath the broad continental shelf and islands that are developed to the east of the Rufiji River delta. Agip began an exploration campaign in the coastal basins in 1969. This led to the discovery in 1974 of the Songo Songo gas field to the south of the Mafia Basin.

**The Mandawa Basin** underlies the coastal plain in southeastern Tanzania approximately 250km south of Dar-es-Salaam. It covers an area of about 15,000 sq.km, most of which is onshore. Only three deep wells have been drilled. These wells failed, but prove the existence of excellent and

mature oil-prone source rocks. Shell relinquished the acreage in 1991 and the whole area is available for licensing.

**Ruvuma Basin** is situated in the southeastern coastal zone of Tanzania adjacent to the Mozambique border. The basin covers some 16,000 sq.km. Several onshore seismic campaigns were conducted during the 1980s and in 1990; Texaco drilled the first onshore well in the basin. This well was located over a shallow basement and was dry.

**Modern Rift Basins** includes the Lake Tanganyika, Lake Rukwa, Lake Nyasa and Ruhuhu Basins. These are located along the western arm of the system between the Tanzania / Burundi border in the west and the borders with Malawi and Mozambique in the south. Geological and geophysical investigations have been conducted in the rift valleys. It was however not until results of seismic data were collected that the oil industry took a serious interest in the area.

# Legal framework, policies and public institutions

Legal frameworks and policies are instruments for management of the petroleum industry. They set the rules of the game for the players in the industry and provide directions for the use of revenues from the industry. Future research and policy work must examine not only the implementation and effects of Tanzania's petroleum legislation. It must also take into account how the larger institutional framework interacts with petroleum institutions and influences petroleum governance in the country (Lee and Dupuy, 2016). Furthermore, legal frameworks should comprise regulations for transparency of the sector.

In Tanzania, the Petroleum Upstream Regulatory Authority (PURA) has the option to make contracts and licenses available to the public. This includes also information from the Petroleum Registry and the National Petroleum and Gas Information System. Tanzania Extractive Industries (Transparency and Accountability) Committee (TEIAC) is responsible for implementing the global Extractive Industries Transparency Initiative (EITI) standards on revenue transparency. The Tanzania Extractive Industries Transparency and Accountability (TEITA) Act makes revenue disclosures mandatory.

A number of documents spell out rules and policies related to the petroleum sector and are available on government websites, the most important being:

- Petroleum Exploration and Production Act, 1980 (repealed by 2015 Petroleum Act)
- Petroleum Act 2008 (repealed by 2015 Petroleum Act)
- Natural Gas Policy, 2012 (repealed by Tanzania Natural Gas Policy of 2013) http://www.tanzania.go.tz/egov\_uploads/documents/Natural\_Gas\_Policy\_-\_Approved\_sw.pdf
- National Petroleum Policy, 2014. http://www.tpdc-tz.com/wp-content/uploads/2015/04/National-Petroleum-Policy.pdf
- Local Content Policy, 2014 https://mem.go.tz/wp-content/uploads/2014/05/07.05.2014local-content-policy-of-tanzania-foroil-gas-industry.pdf
- Petroleum Act, 2015 (replacing previous acts) provides for comprehensive regulatory frameworkhttps://mem.go.tz/wp-content/uploads/2014/02/17.06.15A-BILL-PETROLEUM-ACT-2015-Updated-version-15.6.15.pdf
- Oil and Gas Revenues Management Act, 2015 http://parliament.go.tz/polis/uploads/bills/acts/1452057603-ActNo-22-2015-Book-21-25.pdf
- Extractive Industries Transparency and Accountability Act, 2015 http://faolex.fao.org/docs/pdf/tan153762.pdf

Key public institutions, most of which have their legal basis from the above acts are:

- The *Petroleum Upstream Regulatory Authority* (PURA) advises the Minister on agreements and licenses as well as on development plans and processes. It manages license applications and monitors license holders. It also promotes local content, maintains petroleum data, and performs overall monitoring and auditing of upstream operations and activities.
- The *Commissioner for Petroleum Affairs* is responsible for advising the Minister on both daily administrative and regulatory issues within the sector
- The *Oil and Gas Advisory Bureau* is placed in the Office of the President and is responsible for advising the Cabinet on strategic matters relating to the oil and gas economy.
- *Tanzania Petroleum Development Corporation* (TPDC) is the country's national oil company. Government has a 51% ownership stake. TPDC is the vehicle for Government's commercial participation in petroleum projects, either directly or through subsidiary companies. A number of its other tasks are outlined in Art 5 of the law.
- The *Petroleum Registry* will be established and maintained by PURA, and contains data on petroleum agreements, licenses, permit authorizations.
- The Energy and Water Utilities Water Regulatory Authority (EWURA) regulates the mid- and downstream petroleum and natural gas sectors. It grants operational and construction licenses and monitors petroleum quality, standards and safety. It also charges and collects revenues and promotes access and affordability of petroleum products and services. EWURA manages the National Petroleum and Gas Information System.
- The Oil and Gas Revenues Fund contains revenues accruing to Government through royalties, profit shares, participation in operations, corporate income tax, and returns on Fund investment. The Fund will guarantee transparency and accountability in the collection, allocation, expenditure and management of oil and gas revenues. It will also ensure that funds are used for sustainable development purposes and benefit present and future generations. The law describes the relations and functions between the Fund and other Tanzanian institutions such as the Bank of Tanzania, Tanzania Revenue Authority and TPDC.
- The Decommissioning Fund is designed to cover costs related to implementing a decommissioning plan for petroleum operations.
- Extractive Industries Transparency Initiative (EITI) is institutionalised in Tanzania through Extractive Industries Transparency and Accountability Act (EITAA).
- Tanzania Extractive Industries (Transparency and Accountability) Committee (TEIAC), is an independent entity composed of 15 persons from civil society, extractive industry companies and Government. It ensures the implementation of EITI rules for Tanzania.

# Exploration, development and extraction

Exploration activities entail investment and production that may contribute to GDP. Development comprises preparation of a well for the start of extraction. It may require considerable investment. The activity of extraction the "pumping" of oil and gas - contributes to investment, production, employment and government revenue in the local and national economy. Data on all these

# Box 1: Key years for petroleum development in Tanzania

- 1974 Songo Songo was discovered
- 1980 The Petroleum (Exploration and Production) Act was passed
- 1991 Agreement signed by Ocelot International Inc. with TDPC to develop Songo Songo
- 2001 Aminex entered the country
- 2004 Gas production commenced in June
- 2005 The third licensing round was closed
- 2007 Statoil signed a production sharing agreement with TPDC.
- 2010 BG Group entered Tanzania
- 2010 The Pweza-1 gas discovery and the Chewa-1 gas discovery was made
- 2011 The Chaza-1 gas discovery was made
  - 2012 The Zafarani Gas Field and Lavani Gas Field discovered

activities are at present collected by Tanzania Petroleum Development Corporation (TPDC) and the National Bureau of Statistics for use in the national statistical system, for example in terms of National Accounts.

Exploration of oil and gas in Tanzania has taken place since 1952. The the first natural gas discovery was made in 1974 in Songo Songo, Kilwa district in Lindi Region. Until the concessionary system was abolished in 1964, British Petroleum (BP) and Shell were awarded concessions along the coast including Mafia, Pemba and Zanzibar. During this period there was no discovery of commercially viable hydrocarbons.

After the establishment of TPDC in 1969, TPDC and AGIP (Azienda Generale Italiana Petroli – General Italian Oil Company) signed the first Production Sharing Agreement (PSA). From 1978, TPDC ventured into exploration, conducting onshore and offshore seismic programmes. The onshore programmes covered Ruvu, Kimbiji/Bingwa, Pemba, and Mafia and Ruvuma area while the offshore included Songo Songo, Pemba and Zanzibar.

The Petroleum (Exploration and Production) Act became law in 1980. Soon after, gas was discovered in Mnazi Bay. Most of the drilling occurred in the eighties, following the enactment of the Petroleum Act and spurred on by high oil prices in the early 1980s.

The first years of the 1990s were characterised by sparse exploratory activities. TPDC and TANESCO (Tanzania Electric Supply Company), in collaboration with the Canadian companies Ocelot and Trans-Canada Pipelines, were actively engaged in the Songo Songo gas field (development, transmission and utilization). Exploration licenses for the coastal basins were issued in 1995 to international companies including Tanganyika Oil Company, Exxon Mobil, Shell, KUFPEC (Kuwait Foreign Petroleum Exploration Company), and Amoco. Exploration agreements were signed between TPDC, the Canadian companies Antrim Resources (now Atrim Energy Limited), Canop World-wide, and Ndovu Resources of Australia.

The first decade of the 21<sup>st</sup> century was characterised by the licensing of several international companies. These include Petrobras (Block - 5, 2001), Ophir Energy (Block - 1, 2005), Ophir Energy (Blocks - 3, 4, 2006), Statoil (Block - 2, 2007), Dominion (Block - 7, 2006), Petrobras (Block - 8, 2006). Significant discoveries of gas were made in blocks 1, 2, 3 and 4. In March 2012, Statoil and Exxon Mobil made the biggest offshore gas reserve discovery (Zafarani field) off the coast of Indian Ocean.

#### **Pipelines**

Pipelines play a large role in the petroleum industry. They transport crude petroleum and gas from the sources at sea to on-land processing plants. They also transport various products from processing plants to consumer areas. They are of key importance for distribution networks in consumer areas like Dar-es-Salaam. Construction and operation of pipelines contribute to national economic activity. In some countries (e.g. Norway), they are important providers of information for tax authorities. In Tanzania, pipeline-data from individual companies are collected by TPDC and NBS.

Songas Ltd has developed the Songo Songo gas field in Kilwa District, Lindi Region, by constructing gas-processing facilities on Songo Songo Island and a pipeline to transport the natural gas. The gas goes from Songo Songo to Somanga Funga, and through a 207km pipeline from Somanga Funga to Ubungo, Dar es Salaam. The existing pipeline between Somanga Funga and Dar es Salaam is being expanded.

The Mtwara - Dar pipeline was commissioned in October 2015. It entails an investment of USD 1.5 billion undertaken by the China National Petroleum Corporation financed by a USD 1.2 billion loan

from China's Exim Bank and USD 275 million from TPDC. The pipeline has an initial capacity of 350 millions of cubic feet per day (MMCFD), with the numbers doubling, at optimal production, to 750 MMCFD of gas. The project involves the construction of a 24 - 36 inch diameter pipeline from Madimba Village in Mtwara through Somanga to Dar es Salaam.

More pipelines are under consideration: A 530 km long natural gas pipeline from Dar es Salaam to Tanga in Tanzania and Mombasa in Kenya was planned as a cooperative project between Kenyan and Tanzanian governments. The proposed gas pipeline would include gas supply terminals in Tanga and Mombasa. Attention has lately shifted to Uganda that has shown interest in building a pipeline from Hoima to connect with Tanga<sup>5</sup>. The 1443-kilometer pipeline at an estimated cost of USD 3.55 billion would transport crude oil from the Albertine basin in Uganda to Tanga.

# Gas processing plants and gas fueled power plants

Natural gas processing is an industrial process that cleans raw natural gas by separating impurities and various non-methane hydrocarbons and fluids to produce what is known as pipeline quality dry natural gas. In Tanzania, nearly all of the natural gas produced is used for generation of electricity. At present (2017), and perhaps for some years to come, this will be the major use of natural gas in Tanzania, LNG processing becoming a main product somewhat further down the line.

Table A shows production of natural gas at Mnazi Bay and Songo Songo. Since 2012 the annual increase has been modest, around 0,7% annually. Most of Tanzania's gas is produced at Songo Songo. As Mnazi Bay started production in 2015 the share from Songo Songo dropped from near 100% to 84.4%.

Table A: Gas production in Tanzania 2011-2015				
Year	Gas produced (MMsft3)	Gas Value (USD million)	Of which Songo Songo % of volume	
2011	31 636	84,1	97,9	
2012	36 934	107,3	98,2	
2013	35 937	119,0	98,0	
2014	33 845	103,5	97,7	
2015	37 176	105,9	84,4	

**Processing of gas** from the Songo Songo gas field takes place on the island at Songas' processing facility where water and other hydrocarbon condensates are removed.

Two gas-processing plants at Madimba and Somanga Funga are run by the Tanzania Electric Supply Company (TANESCO).

In June 2016 TPDC commissioned an expansion at Songo Songo to process production from the Aminex PLC subsidiary, Ndovu Resources Ltd.'s Kiliwani North field on Songo Songo.

Source: National Bureau of Statistics. Monthly data from 2007 available

**Electric power generation based on gas** in Tanzania takes place mainly in Dar-es-Salaam. The processed gas from Songo Songo is used in Dar es Salaam power plants. Songas' Thermal Power Station is the largest gas-fired power station in East Africa with installed capacity 189 MW. Its electricity is supplied to the national electricity grid and distributed to end users by TANESCO. Another Independent Power Producer (IPP), Symbion, runs a power plant in Dar-es-Salaam; Ubungo II Thermal (120 MW). Government owned TANESCO runs five gas driven plants: Ubungo I (100 MW) and Tegeta (45 MW) situated in Dar es Salaam and three stations situated outside Dar es Salaam: Mtwara Thermal Power Station (18 MW), Somanga Thermal Power stations (7,5 MW) and Kinyerezi I Thermal Power Station (150 MW).

<sup>&</sup>lt;sup>5</sup> Source: http://www.eastafrikadaily.com/2016/11/magufuli-wants-uganda-tanzania-oil-pipeline-divided-into-sections-for-quick-completion/

Table B shows the development in electricity capacity and generation in Tanzania and the role of thermal (mostly gas based) power. The *capacity* for thermal electricity generation has increased by 35% between 2011 and 2015 and has taken the share of thermal capacity up from 52,8% to 59,9% of

						Cap	acity	
		Gene	erated (G	Wh)		(M	<b>W</b> )	
	2011	2012	2013	2014	2015	2011	2015	Increase %
Total- Hydro	1 992,6	1 766,5	1 717,3	2 590,6	2 107,6	561,8	561,8	0,0
<b>Isolated Stations</b>	129,0	159,7	178,5	191,7	273,0	70,0	78,3	11,8
<b>Total Thermal</b>	3 031,9	3 774,0	4 043,0	3 337,1	4 077,0	705,6	954,4	35,3
Pct of Overall Total	58,8	66,2	68,1	54,5	63,1	52,8	59,9	
Thermal - Government	957,0	1 203,8	1 374,7	1 292,0	1 523,8	193,6	472,4	144,0
Pct of Overall Total	18,6	21,1	23,1	21,1	23,6	14,5	29,6	
Thermal - Private	2 074,9	2 570,2	2 668,3	2 045,1	2 553,2	512,0	482,0	-5,9
Pct of Overall Total	40,3	45,1	44,9	33,4	39,5	38,3	30,2	
Overall Total	5 153,4	5 700,2	5 938,8	6 119,5	6 457,6	1 337,4	1 594,5	19,2

#### Table B: Electricity Generation and Capacity in Tanzania

Source: NBS: Disaggregated data by plant and producer available at http://data.tanpetstate.org/dataset/elctric-pover-generation-in-tanzania

total capacity. The expansion has only taken place in Government run plants. The capacity for thermal electricity production in the private sector has decreased by nearly 6% over the period shown

Electricity *generation* has increased by some 25% over the period, mostly caused by government thermal power generation, which increased with nearly 60%. Private thermal power generation increased by some 23%.

#### LNG processing

The investment in a Liquid Natural Gas (LNG) plant in Tanzania has lately been estimated at US\$30 billion<sup>6</sup>. Participants in the project, besides Statoil of Norway and the Tanzanian state-owned TPDC, are Shell, ExxonMobil and Ophir Energy. Their joint operation could become the first in the country. Tanzania at present (late 2016) has recoverable natural gas estimates of 57 tcf. An exact timeline to build the LNG facility is not yet clear; analysts have estimated a period of seven years<sup>7</sup>. The plant would be located in the area of Likon'go, Mchinga in Lindi region and have a lifespan of 40 years following the start-up.

Tanzania appears impatient to realize the project. Developments in Mozambique will compete with Tanzania's LNG exports. President Magufuli has been quoted as saying the development of the project is taking too long<sup>8</sup>. He has urged the Ministry of energy and mines to cooperate with the project participants through Tanzania Petroleum Development Corporation (TPDC) and partners from other relevant ministries to accelerate the start of construction.

#### **Operating companies and institutions**

There are some 20 private companies directly active in the petroleum sector in Tanzania. (See Annex

<sup>&</sup>lt;sup>6</sup> http://www.reuters.com/article/tanzania-gas-idUSL4N1DH4D6

<sup>&</sup>lt;sup>7</sup> According to Statoil Tanzania's operations manager interviewed Thursday , 4th December 2014

<sup>&</sup>lt;sup>8</sup> http://www.reuters.com/article/tanzania-gas-idUSL4N1DH4D6

1) An additional number of companies supply goods and services to the sector. However, little information exists on such activities.

State owned institutions most active in the petroleum sector are Tanzania Electric Supply Company Limited (TANESCO), Tanzania Petroleum Development Corporation (TPDC), Tanzanian Ministry of Energy and Minerals, the Energy and Water Utilities Authority (EWURA) and the Tanzania Minerals Audit Agency(TMAA). Figure 5 below shows licenses for the Petroleum sector as at June 2016.



Figure 5 Exploration Activity June 2016 Tanzania. Source: TPDC

# 3. NATIONAL ECONOMIC CONTRIBUTION OF THE GAS RESOURCE

The physical and institutional structures described above contribute to production, wealth and welfare for the people of Tanzania. Below, we look at this contribution through the lens of economic statistics. National accounts include investment, GDP, external trade and state revenue. Also included in this section is a brief look to the future. For the description in the present section, we use official economic statistics. These build on the Tanzania economic surveys reports, the Integrated Labour Force Survey and Household Budget Surveys. In cases when the role of the petroleum sector could not be measured by means of regular statistical sources, we used estimates, in particular from the MACMOD projection work (see below).

In general, the relatively high activity levels in the Tanzanian petroleum sector since the early years of the 2000s seem to have abated. One important reason for this is the drop in the international markets for petroleum around 2008, which caused a downward slide. The development shale gas, hydraulic fracking and horizontal drilling in the US as well as the slower growth of the Chinese economy have been important factors in subsequent development. In Tanzania, some companies have taken a wait-and-see attitude, also exacerbated by delays in important pieces of legislation, tax regulations and other decisions on further infrastructure development. After a nadir in March 2016, prices have strengthened somewhat.<sup>9</sup> As gas prices move up from the nadir there are major uncertainties at play. However, the already sunk capital would indicate that in the medium term (barring catastrophic price collapses) investment activities will pick up.

So far, we have a rather poor statistical basis for gauging the economic importance of petroleum sector development and its repercussions in terms of investment. Based on the wealth accounting work by the World Bank (2011), rents from resources in Tanzania are estimated to be more than 8 percent of GDP. The mineral rents have grown quite rapidly in the past ten years. As this does not include the newly discovered offshore gas reserves, one may expect that the size of the total resource rents in Tanzania will grow quickly in the future.

#### Investment

According to EWURA's 2014/15 annual report, there has been some progress in the level of investment in gas infrastructure development. The Mtwara to Dar es Salaam pipelines has been commissioned. The contractor has finalized the installation works of two gas-processing plants at Madimba in Mtwara and Songo Songo Island in Lindi. The combined capacity of two processing plants is 350MMscfd. In addition, TPDC had commissioned the low-pressure gas distribution pipeline from Ubungo to Mikocheni light industrial area.

#### **GDP** – and **GDP** by sector

Based on the national accounts data from NBS, the gas and mining sectors altogether constituted about 2.2 percent of GDP in 2011. According to the Second Extractive Industries Transparency Initiative (EITI) Payment Reconciliation Report for FY2010/11 (TEITI 2013), total government revenue from gas and mining companies was equivalent to 1.5 percent of GDP. While this is a significant size, if we compare it with the sectors' share in GDP it is only one quarter of the estimated rents from those sectors.

<sup>&</sup>lt;sup>9</sup>U.S. National Average Natural Gas Price. End of day Commodity Futures Price Quotes for Natural Gas (NYMEX). see: http://www.nasdaq.com/markets/natural-gas.aspx#ixzz4LdFj9FAJ

Table C shows the GDP contribution of crude oil and natural gas for recent years compared with the contribution of other sectors. Within industry, the biggest contribution to GDP is attributed to manufacturing and construction. Mining and Quarrying includes underground or surface extraction of minerals occurring naturally in the form of solids, liquids or gases. The sub categories of Mining and Quarrying combined contributed up to 4.2 % of GDP in 2013. The GDP share of crude oil and natural gas was at its highest in 2013 at 1%.

Economic Activity	2007	2010	2013	2014	2015
Industry and construction	5,406,038	8,900,127	16,108,617	18,240,277	22,093,681
	20.2%	20.3%	22.7%	23.0%	24,3%
Mining and quarrying	935,412	1,779,711	2,986,466	2,923,420	3,659,599
	3.5%	4.1%	4.2%	3.7%	4,0%
Mining of coal and lignite	17,323	95	74,603	161,043	98,395
	0.1%	0.0%	0.1%	0.2%	0.1%
Crude oil and natural gas	143,729	301,222	727,481	626,093	832,165
	0.5%	0.7%	1.0%	0.8%	0,9%
Mining of metal ores	508,485	1,120,108	1,766,416	1,622,193	2,196,351
	1.9%	2.6%	2.5%	2.0%	2.4%
Other mining, quarrying	265,875	358,286	417,966	514,092	532,689
	1.0%	0.8%	0.6%	0.6%	0.6%
Manufacturing	1,880,032	3,021,536	4,575,334	4,445,568	4,768,917
	7.0%	6.9%	6.4%	5.6%	5.3%
Electricity supply	232,622	406,272	546,670	598,390	898,681
	0.9%	0.9%	0.8%	0.8%	1.0%
Water supply, sewage and	240,898	261,294	325,969	373,549	392,560
waste management	0.9%	0.6%	0.5%	0.5%	0.4%
Construction	2,117,074	3,431,314	7,674,179	9,899,350	12,374,188
	7.9%	7.8%	10.8%	12.5%	13.6%
GDP at market prices	26,770,432	43,836,018	70,953,227	79,442,499	90,863,681

#### Table C: Detailed Industrial composition of GDP, selected years (current prices) in million Tshs

Source: NBS, MACMOD FEB, 2016

Table D shows the output, intermediate consumption and value added of *natural gas subsector* for selected years.

# Table D: Natural Gas composition of GDP selected years (constant 2007 and current prices) in million Tshs

Constant Price	2005	2007	2008	2010	2011	2012	2013
Output	177,326	240,756	246,091	338,728	381,525	445,419	433,394
Intermediate Consumption	71,464	97,027	99,177	136,510	153,758	179,508	174,662
Value Added	105,862	143,729	146,914	202,217	227,767	265,911	258,733
Current Price	2005	2007	2008	2010	2011	2012	2013
Output	160,177	240,756	276,756	458,668	667,267	849,254	959,483
Intermediate Consumption	61,837	97,027	108,141	157,446	190,180	226,324	232,002
Value Added	98,340	143,729	168,615	301,222	477,087	622,929	727,481

Source: NBS, National Accounts Department 2015

The natural gas subsector output at current prices showed a six-fold output increase from 2005 to

2013. Intermediate consumption increased less than fourfold during the same period, leading to a more than seven fold increase in value added.

#### Imports and exports - balance of payments

Primary data for Tanzania's trade statistics<sup>10</sup> are collected by the Tanzania Revenue Authority (TRA). The automated customs clearance process uses the ASYCUDA++<sup>11</sup> system at 33 major customs stations across the country. These account for 99 percent of all international trade transactions. On a monthly basis, data from ASYCUDA++ are transferred and loaded into a Eurotrace<sup>12</sup> database. They are validated and disseminated to the NBS for compilation and publication of the foreign trade statistics. Other statistics, e.g. on trade in services, are collected by the Bank of Tanzania.

	2010	2011	2012	2013	2014
Export of goods of which	6 075 758,0	7 952 792,1	9 256 365,1	8 403 257,4	8 811 048,3
Domestic Exp min fuels etc	32 601,0	52 309,0	98 326,0	159 063,0	158 346,8
Imports of goods of which	10 021 852,1	15 383 304,1	16 218 291,3	17 628 318,7	18 055 467,1
Imp min fuels	3 064 661,0	5 536 990,0	5 970 925,0	7 721 418,0	5 894 076,3
Balance goods of which	-3 946 094,1	-7 430 512,0	-6 961 926,2	-9 225 061,3	-9 244 418,8
Min fuels etc	-3 032 060,0	-5 484 681,0	-5 872 599,0	-7 562 355,0	-5 735 729,5
Export of services	2 863 284,3	3 591 895,9	4 379 307,3	5 118 917,6	5 645 488,2
Import of services	2 641 741,0	3 452 223,9	3 707 399,9	3 976 562,1	4 409 286,0
<b>Balance Services</b>	221 543,3	139 672,0	671 907,4	1 142 355,5	1 236 202,2

#### Table E: Role of Mineral Fuels in External Trade 2010 – 2014 Million Tshs

Source: BOT balance of payments statistics

Table E shows that Tanzania has a net import of petroleum. According to EWURA's 2014/15 Annual report, 4.60 billion litres of petroleum products were imported into the country through Dar es Salaam port and Sirari border. That included 2.99 billion litres for the local market and 1.61 billion litres as transit to neighbouring countries. Total imported volume for the financial year 2014/15 decreased by two percent (2%) when compared to 4.71 billion litres that were imported in 2013/14.

Over the last decade, there has been a continuous rise in both exports and imports. The faster rise of imports have led to a growing import gap. The table shows that the trade balance of mineral fuel trade constitutes a major part of the overall trade balance in goods. The domestic exports of petroleum and products (including gas) has been minuscule and has not benefited the balance of payment directly. However, the increase in production of petroleum products has benefitted the balance of payments in an indirect way.

The EWURA 2014/15 Annual report (EWURA, 2016) noted that 28,346.58MMscf of natural gas was consumed by the gas-based thermal power generation plants which constituted 882.325 million litres

<sup>&</sup>lt;sup>10</sup>A description of collection definitions etc. is given in the compendium *"Trade and Transport Statistics, and Water Supply, Sewerage, Waste Management Sector Compendium" NBS June 2016* 

<sup>&</sup>lt;sup>11</sup> ASYCUDA is a computerised customs management system, which covers most foreign trade procedures. The system handles manifests and customs declarations, accounting procedures, and transit and suspense procedures. ASYCUDA generates trade data that can be used for statistical economic analysis

<sup>&</sup>lt;sup>12</sup> EUROTRACE is an application for collection, compilation and dissemination of external trade data at national and regional level. It is a generic and open system able to be adapted to national, regional requirements and to most types of statistics.

of oil equivalent. In addition, 6280.42MMscf of natural gas, equal to 149.933 million litres of oil equivalent were consumed by industry. This constituted an estimated total saving (cost avoided) of USD 843.9 million during the period.

#### Employment

In Tanzania, the Integrated Labour Force Survey (ILFS) is the main source of information on employment. Neither the latest ILFS (2014) published early 2015, nor earlier issues, published employment numbers for the petroleum industry separately. We are therefore given to guesses as to the employment numbers in this industry. The petroleum industry is mainly hidden under the sector mining and quarrying that in 2014 employed 218,024 persons on the Tanzania mainland (173,926 men and 44,098 women)

#### State revenue, expenditure and financing

An overview of concepts and definitions for government finance statistics are given in NBS (2016). Tanzania complies with the IMF's Government Finance Statistics (GFS) system described in the GFS Manual<sup>13</sup>. Here, details of definitions and concepts are set out. Table F presents revenue, expenditure and financing between 2010 and 2015. The NBS does not publish data on gas revenue. The gas revenue figures shown in the tables below are the result of a special analysis done by the MACRO modelling team (Ministry of Finance and the Bank of Tanzania) to prepare the base data for the MACMOD forecasting model.

Item	2010	2011	2012	2013	2014	2015
Total Domestic Revenue	5,153,937	6,410,098	7,768,305	9,280,598	10,541,126	12,540,711
Tax Revenue	4,861,712	5,888,034	7,105,232	8,512,201	9,593,049	11,117,965
Non Tax Revenue	255,184	469,894	600,397	693,148	870,294	1,182,793
Total Gas Revenue, Gross (after saving)	37,041	52,171	62,675	75,248	77,783	239,953
Total Expenditure	8,786,541	10,081,931	11,739,382	13,336,199	14,280,938	17,008,160
Recurrent Expenditure	6,106,370	6,820,051	8,016,565	9,537,721	10,462,803	12,198,519
Development Expenditure	2,680,172	3,261,879	3,722,818	3,798,478	3,818,135	4,809,641
Financing	2,165,919	2,235,515	2,441,161	2,651,099	2,652,199	3,395,364
Foreign (net)	1,187,297	966,435	804,962	874,306	2,138,939	2,278,985
Domestic (net)	901,649	791,466	704,055	648,032	513,259	1,116,380

#### Table F: State Revenue Expenditure and Finance, Million Tshs

Source: MACMOD FEB, 2016

There has been growth in both government revenue and expenditure, nearly a doubling between 2010 and 2015. The main source of revenue is taxation, while expenditure is dominated by recurrent expenditure. Financing by foreign and domestic borrowing are both important. The observed deficits, which are financed by grants, are not shown in the above table. Table F shows that although the gas revenue is small as a share of total domestic revenue (less than 1% in 2015) it has grown by 45% p.a. as an average over the five years from 2010 up to 2015, with a major jump from 2014 to 2015. Table G shows that most of the gas revenue over the five years up to 2015 has come from the profit gas share, through Production Sharing Agreements (PSAs). Royalties render about a third of the total. Although both royalties and the profit gas share have increased strongly up to 2014, the main jump took place from 2014 to 2015. Part of the increase would be connected to the commissioning of the

<sup>&</sup>lt;sup>13</sup> https://www.imf.org/external/Pubs/FT/GFS/Manual/2014/gfsfinal.pdf

Mtwara – Dar es Salaam pipeline second half of 2015.

	2010	2011	2012	2013	2014	2015
Tot. Gas Revenue Gross	37,041	52,171	62,675	75,248	77,783	239,953
	0.7%	0.8%	0.8%	0.8%	0.7%	1.9%
Royalties	11,949	16,829	20,218	24,274	25,091	75,107
	0.2%	0.3%	0.3%	0.3%	0.2%	0.6%
Profit Gas Share (PSA)	25,092	35,342	42,458	50,975	52,692	164,846
	0.5%	0.6%	0.5%	0.5%	0.5%	1.3%

#### Table G: Composition of Revenue 2010 – 2015, Million Tshs

Source: MACMOD FEB, 2016

#### Social and welfare issues

The ultimate goal for the exploitation of Tanzania's natural resources is the sustainable maximization of the benefits to the Tanzanian citizens. Two issues make it difficult to measure the magnitude of such benefits. a) the lack of reliable welfare indicators but most fundamentally b) the causality problem: in which way will a given increase in gas extraction affect the living standards of the citizens?

The basis for measuring the material living standards in Tanzania and most other countries are the regular household budget surveys conducted by official statistical bureaus. Other surveys on welfare are Censuses, Demographic and Health Surveys, Labour force Surveys and Agricultural Surveys. These surveys are available in the Central Data Catalogue of the NBS. However, to unravel the link between petroleum revenues and welfare we will need sophisticated methods and economic models using these data. It is not possible at present to trace these connections directly from available statistics. It is expected that the petro state programme will make progress, both in collecting relevant statistics and in performing analyses that addresses social and welfare issues in the context of Tanzania as a petro state.

#### Political and governance issues

The links between welfare and petroleum exploitation "runs both ways". On the one hand, the socially just use of petroleum revenues is largely a matter of governance and political decisions. On the other, the major natural resources will have an effect on politics in the country and on governance. Very little information on these phenomena are collected by the national statistical system in a regular way. Exceptions may be election statistics and certain demographic data. Most relevant data on politics and governance are likely to come from surveys undertaken by researchers. Such data are not included in the regular statistical system in Tanzania. Notable information has been collected by e.g. the Afrobarometer survey and field work done by local institutes like (e.g. REPOA ).

#### The environment

All human activity has some effect on the environment. It is however only lately that such effects have been included in official statistics such as the National Accounts. In Tanzania, the latest set of environmental statistics was published by the NBS (National Bureau of Statistics, 2015a). The dataset, according to NBS, in principle includes most of the variables collected in countries such as USA and UK. Some data are however not available due to technological and resource constraints. It is

envisaged that eventually most of the data will be collected. A complete set of environmental quality data will in the future come from a number of sectors and institutions in addition to the NBS.

The most relevant data related to petroleum are available in the "Environment Statistics for Tanzania Mainland, 2014". The energy section in the report presents data on capacity and generation of electricity, quantity of electricity sold by Tanesco (by region and by type of user) and number of imported vehicles. Data may also be found for imports of petroleum and petroleum products and sources of energy for households' lighting and cooking (2012 mainland only). The chapter on environmental quality presents a number of tables on pollutants and air/water quality, some by location. It is not possible yet to judge the environmental impact of the petroleum industry directly from available statistics.

# The future<sup>14</sup>

The extraction of petroleum resources that are at present proven may give rise to a considerable economic growth in Tanzania. The following considerations build on the IMF country report no 14/121 (2014).

The price situation on the international gas markets looks more encouraging than the oil prices. In particular, prices in the Japanese gas market, which is assumed a key market for Tanzanian gas, do seem to be pointing upwards (note that the data series end only in 2012).



Figure 6 Tanzania: International Natural Gas Price

It is premature to project the revenue impact of the offshore natural gas fields given the significant uncertainty. IMF however attempts to evaluate the fiscal impact under specific production, price and fiscal assumptions. This is referred to below for two different sized projects (using common assumptions about project design and cost). The first is built on a two-train LNG plant (with 10 million metric tons per annum (mmtpa) LNG capacity) using 12 tcf in gas resources. The second reflects a four-train LNG plant (with 20 mmtpa LNG capacity) using 24 tcf in gas resources.

<sup>&</sup>lt;sup>14</sup> The below draws heavily on the IMF Country report no 14/121, 2014.

IMF assumes a fiscal regime that reflects broadly the existing regime. They use the four train idea implemented in phases starting with a two-train LNG plant. Two LNG trains are added as production is scaled up. IMF presents the fiscal effects in graphs showing respective overall revenues, upstream and downstream. The paper illustrates that upstream revenues will be the highest, some 5 billion USD compared to roughly 1 billion USD from downstream revenue at the highest point in 2043-44. After 2044 the revenue flows will decline and be phased out as an important fiscal flow by the mid-2050s.

The cost of exploration and development will be considerable, peaking at some 10-20 % of total GDP in the three years before the first train starts producing in 2021-22. The costs will fall slightly, to somewhat lower than 5% to 10 % of GDP<sup>15</sup> before the second train goes into action some 8-9 years later. The clearly biggest capital expenditure element will be the cost of the LNG plant.

The analysis also presents a graphical illustration of the possible long-term revenue situation. A notable feature is that the gas revenue does not seem to "dwarf" other fiscal revenue. This is so even though Tanzania's most significant benefits from the gas resources are likely to be fiscal. The fiscal situation will be negatively affected by an expected phase out of development grants in the early 2020s.

The IMF concludes that the character of the resource flows means that a set of fiscal rules will have to be introduced in order to manage the fiscal revenue flow in a way that genuinely benefits the country and its citizens (both current and future generations).

A macro-fiscal framework should achieve multiple objectives: (a) preserve macro- fiscal stability, (b) save some revenue for future generations, and (c) finance scaling- up of development spending.

The scaling up of growth-enhancing expenditure may need to be gradual if absorption and institutional capacity constraints are large. Adequate accumulation of financial assets for stabilization and/or savings purposes will have to be ensured while preserving macro-fiscal stability. Finally, the fiscal framework has to be operationally simple to implement.

<sup>&</sup>lt;sup>15</sup> Partly because GDP will have grown in the meantime

# 4. IMPROVING STATISTICS FOR MANAGEMENT OF THE PETRO ECONOMY

It is likely that Tanzania's petroleum development will bring dramatic changes to the country. Section 3 above indicates that even at the present level, gas-based activities influence the economy. Extraction and processing of natural gas, energy production, field development and the use of gas are important. Availability of data for analysis, projections and policymaking are important now but will be even more so in the future.

#### The role of good data

The effects on policy making in Africa from poor statistics, as well as from poor *use* of statistics are often stressed. Different authors focus different angles. Comments come from the Center for Global Development (CGD) 2014, Sandefur and Glassman 2015, Jerven 2013 and Kiregyera 2015. Challenges for the production of adequate statistics appear to be many. Inadequate funding, diffuse responsibilities, administrative bottlenecks, and working conditions are key. Political "vetting" of data before dissemination occurs frequently. These factors have led to a weak capacity to collect, manage and publish data.

The lack of resources for statistics tends to start a *vicious circle*. Minimal budget allocations for statistics lowers quality and accessibility of statistics. The resulting poorer data lowers the NSO's standing, resulting in still lower budget allocations. This leads to even poorer statistics, a concomitant greater lack of trust by users and so on in a downward spiral. Donors often work outside the system to secure data needed for their own reports, thus exacerbating the widespread feelings that NSOs are "useless".

The Center for Global Development (CGD) 2014, has pointed out key challenges for sub Saharan African countries:

- National statistics offices have limited autonomy and unstable budgets
- Misaligned incentives contribute to inaccurate data
- Donor priorities dominate national priorities
- limited access to and usability of data

The CGD has suggested, as important areas of improvement:

- More and different forms of funding
- Building of institutions that can produce accurate, unbiased data
- Priority to the core attributes of data Focus accuracy, timeliness, relevance and availability.

The launch of the Millennium Development Goals (MDG) and the Sustainable Development Goals (SDG) are important. They have emphasized measurement of progress and intensified the debate about data quality. The political and financial importance of statistics have drawn scholars, international financial institutions, journalists and public officials into the debate. There is consensus that a significant data quality and availability problem exists in Africa. For further information, see Jerven and Johnston (2015).

There is some disagreement about the state of affairs in African statistics and future development. World Bank Chief Economist Devarajan (2013) declared an *African statistical tragedy*. However, Ben Kiregyera, a leading African (Ugandan) statistician has a different view. He talks about a *statistical renaissance* and an "Emerging Data Revolution in Africa" (Kiregyera, 2015). He debunks the negative myths spread by Afro-statistical pessimists. The challenge is laid at the door of African statisticians and authorities.

There is a body of evidence showing that better statistics can improve social and economic development. Some examples follow.

- A recent IMF Working paper, Neere et al (2016), says that better statistics can improve budget forecasting. Statistical capacity building leads to a reduction in fiscal pro-cyclicality. This is a particular problem for a resource rich country that Tanzania is likely to become. *Successful efforts to build statistical capacity will help improve fiscal policy performance*.
- Jerven, Duncan and Nyoni (2015) outline the need for good macroeconomic statistics. They also point out the various costs of producing such statistics. They stress the importance of good macro management and the improvement of fiscal management. This is particularly important when growth relies on a vulnerable income source threatening to lead to a "resource curse".
- The use of western concepts in African settings cause statistical problems. Randall and Coast (2015) for example argue the *need to reconsider aspects of statistical definitions of households*. Rizzo, Kilama and Wuyts (2015) explore how key employment categories are translated from English into Swahili. The translation biases respondents' answers with regard to 'self-employment'. They show how this, in turn, leads to statistical invisibility of wage labour in an informal economy.
- The particular approach of our programme on "Tanzania as a new petro state" includes a statistics component. This aims to break down the wall so often present between official statistics and data collection for academic purposes. Good relations between the statistical bureaus ant the researchers may be of great value for strengthening the quality of statistics. *It is important to compare «official» data with data from independent research* (Sandefur and Glassman 2015). One reason for this is that that some official statistics systematically exaggerate progress in development. Also, statistical service providers sometimes mislead governments.

#### Tanzanian statistics and statistical development

Compared to other African countries, Tanzanian statistics are fairly well developed. A statistical capacity Indicator for 2013-2016<sup>16</sup> shows that Tanzania, compared to e.g. Kenya, Uganda and Zambia, continuously has had a high score. Tanzania also does well in the sub-components "Methodology", "Source Data" and "Periodicity".

Still, Tanzania has many statistical challenges in common with African Sub-Saharan countries. The national and international institutions below have launched remedial measures.

In the forefront of statistical capacity building, we find the *National Bureau of Statistics*. The bureau coordinates the Tanzania Statistical Master Plan. The plan aims to improve and strengthen the production and use of official statistics in the country. Socio-economic statistics in Tanzania follow principles and classifications of international guidelines. (See Annex 2)

<sup>&</sup>lt;sup>16</sup> The World Bank's Statistical Capacity Indicator provides individual country scores for the overall SCI average as well as for the 3 categories, i.e. Methodology, Source Data, and Periodicity. Accessed November 2016 http://databank.worldbank.org/data/reports.aspx?source=Statistical-capacity-indicators&savedlg=1&l=en#

*IMF'S Regional Training Centres in sub-Saharan Africa* include capacity building in statistics. Tanzania belongs to the *East AFRITAC* in Dar es Salaam whose focus is the building of macroeconomic capacity in East Africa. Assistance and capacity building efforts include statistics on the economy as well as private and public finance statistics. A more recent venture, the Africa Training Institute set up in June 2014 was co-located with the *AFRITAC South*.

The Special Data Dissemination Standard (SDDS) was established in 1996. SDDS will improve transparency and openness. It will also set standards for dissemination of economic and financial data. A *General Data Dissemination System (GDDS)* was established in 1997 for member countries with less developed statistical systems. The GDDS serves as a framework for evaluating such countries' needs for data improvement and set priorities. Since 2015, the enhanced GDDS (*e-GDDS*) has replaced GDDS.

Members that take part in the e-GDDS commit to several actions, such as the following: Using the e-GDDS as a framework for statistical development. Designating a country coordinator. Preparing descriptions of current statistical practices and preparing plans for improvement that would be posted on the *IMF's Dissemination Standards Bulletin Board* (DSBB). As a member of the e-GDDS, Tanzania (on the DSBB) has listed plans for improvement. Plans comprise the Bank of Tanzania, the Ministry of Finance and the NBS. The last (ninth) Review of IMF's Data Standards Initiative took place in 2015. Plans are to hold the next Review in 2020.

The Trust Fund for Statistical Capacity Building (TFSCB) is a multi-donor trust fund. It aims to improve the capacity of developing countries to produce and use statistics. The overall objective is to support effective decision-making for development. The TFSCB works closely with the Partnership in Statistics for Development in the 21st Century (PARIS21). It advances coordinated international efforts to improve statistics globally. It a) supports the preparation of a National Strategy for the Development of Statistics (NSDS); b) performs statistical capacity building (SCB) activities in priority areas as identified in the country's NSDS; c) gives support to Data Production (DP) in key; d) implements innovations in development data (IDD) with the aim to improve production, dissemination and use of data.

*The Accelerated Data Program (ADP)* is a partnership between the PARIS21 at the (OECD), the *World Bank* and other technical and financial partners. The ADP/IHSN Secretariat supplies Global hosted by PARIS21 and the World Bank.<sup>17</sup>

# Norway's experience – relevant to Tanzania?

Tanzania and Norway are very different countries. All the same, some of the problems and opportunities they face are similar. This is particularly the case if we compare the situation today in Tanzania with that prevailing in Norway in the late 1960s. At that time the exploration for oil and gas

<sup>&</sup>lt;sup>17</sup> The implementation of ADP benefits from the contribution of many partners. International Household Survey Network (IHSN) provides tools and guidelines; African Development Bank: implements ADP in selected countries; Economic and Social Commission for Asia and the Pacific (UN-ESCAP) implemented the pilot ADP (first phase) in selected countries in Asia and the Pacific; conducts regional training and capacity building at the Statistical Institute for Asia and the Pacific (UNSIAP); Observatoire Économique et Statistique d'Afrique Subsaharienne (AFRISTAT): provides training on microdata archive and technical assistance on microdata management to selected countries in francophone Africa; Secretariat of the Pacific Community (SPC): implements ADP in selected countries; (UNICEF) provides training and technical support to documentation and dissemination of (MICS) datasets; United Nations World Food Program (WFP): support to documentation and dissemination of food security surveys datasets.

on the Norwegian continental shelf had started and had shown some results. Building up the statistical system that is now in place in Norway has taken both time and resources. Going back in time to see "where it all started" may be of some use to Tanzania.

Norway has managed the incorporation of development of petroleum data into the main body of national statistics well. The report of the UN Secretary-General Statistical Commission (2006) was authored by Norway. It brought into focus national oil statistics as a key to the quality of international oil statistics. The report analysed quality challenges. It made recommendations for improvement at governance and technical levels.

The integration of the petroleum sector in the statistical system of Norway gave rise to many problems. First, they arose because the sector became such a major one. Second, the sector had some unusual features e.g. because of its location offshore. This forced re-considerations of definitions and concepts. Statisticians had to make practicable decisions for adhering to international standards. At the same time, concepts and definitions had to keep their usefulness in a Norwegian context. The recent history of Norway's national statistical system may be interesting for Tanzania that now enters its own petro age.

Below we look at some general features of statistical development experience in Norway. We deal with specific *sectoral* features in Section 5 as part of the plan for the structure of the **Petro Data Hub**.

Statistics Norway ("Statistisk Sentralbyrå", SSB or in English, "Statistics Norway" (SN)) was established in 1876. At present, the Statistics Act of 1989 provides the legal framework for SN's activities. SN has developed its own style and function related to specific Norwegian settings.

*First*, SN is a more centralized organisation than what is customary worldwide. Sweden has e.g., put greater emphasis on the various *users* of statistics. E.g., ministries produce data and perform analysis in line with their *own* needs. This style would keep analysis within the remit of the various institutions. It would thus limit the independence of the research focus and the statistical/analytical work. *Second*, and in line with the SN's stronger emphasis on analysis and research, Norway built up a research department in the post WWII years. The department worked with policy makers, in particular the Ministry of Finance of which SN was part. The SN built and maintained mathematical models for economic management used for analysis by the Ministry of Finance. The research department is still a powerful centre for policy analysis. It performs a role that in other countries have been undertaken by more independent organisations. The close relations between statisticians and policy makers included participation of SN staff in policy work. The teams preparing the macro economic base for annual budgets up to 1970 comprised high-level statistical officials.

*Thirdly*, a feature that deserves particular mention is (since 1967) the "Technical Committee for Income Settlements". Its main function has been to prepare a wide range of statistics used during the Norwegian wage bargaining process. The head of the committee is an official from the Norwegian Central Statistics Office. It reviews recent developments in prices and incomes and prepares price forecasts for the following year. It also forecasts the country's competitive power. The report presents reviews of the Norwegian economy in relation to the international economy.

While important in other respects, the close relations between the policy makers and SN caused limited data access for outsiders. According to some researchers, the statistics produced by SN was irrelevant to important societal issues. To remedy the situation, the Norwegian Centre for Research Data (NSD) was established in 1971. At first, its main task was to facilitate access to data held by the SN (Lie and Roll-Hansen 2001). Over time, the NSD has developed. It is today a resource centre for researchers on data gathering and analysis. It also deals with issues of methodology, privacy and research ethics. The main goal of NSD is to improve prospects and working conditions for empirical

researchers. The NSD works to reduce financial, technical, legal and administrative barriers.

At present, the economy of Norway is a mature - or even declining - petro state. The country has done well in managing the petro sector and its revenues in such a way that it has benefited all citizens. An important pillar has been the availability of data delivered by the SN. The information has included the sector's operation, its economic effects, the fiscal revenue flows and a wide variety of other issues. This has contributed to making the policy debate in Norway based on facts rather than feelings.

# 5. A DATA BASE FOR A PETRO FUTURE

Sections 2 and 3 above illustrate the need for statistics to analyse the petroleum sector and its effect on the Tanzanian society. Below, we look at the structure and content of a database designed to cover important data needs. The **Petro Data Hub** (http://data.tanpetstate.org) based on "open data" software (CKAN) has already an address on the web and is being tested with data input.

The **Petro Data Hub** will consist of some 20 data *groups* aimed to cover the interests of our key target audiences. For each data group, we set out below, as clearly as possible, the kind of statistics needed. We also outline whether and how they are produced at the present time and the perceived needs for the future. We take into consideration the plans of the NBS, as e.g. expressed in the Tanzania Statistical master Plan. We draw on a brief survey on demand of users in Tanzania<sup>18</sup> as well as the needs of researchers in the "Petrostate" programme. We take into account international experience and advice from international statistical organizations. In a few cases, we suggest or recommend consideration of strengthened or new measures.

In building a **Petro Data Hub** several challenges must be handled. *First*, the demand for data from policy-oriented databases will depend policy questions and research needs of the *future*. *Second*, the selection of data content for the **Petro Data Hub** will have to balance between two extremes. On one hand, selection of a narrow data range may restrict rather than enhance research. On the other hand, selection of a wide data range may overload the system and include data that will not be in demand. *Third*, the **Hub** will change and grow in response to expressed needs. In deciding the coverage of the **Petro Data Hub** at the outset, we try to limit the database. We aim at areas that display links between the petroleum resources, economic growth and use of petroleum revenues.

The Petro Data Hub will have several functions. On the one hand, it may help build government capacity by gathering data that are not included in any official database. It may supplement existing data. Relying on government data collection, the **Hub** will make data for analysis of "petro state" issues more easily available. An advantage of the Hub will be that it makes statistics available *in one place*. It may, in specific areas, improve on accuracy of other data but should never be seen as an alternative to government data.

In each of the below sections, we sketch out broadly the types of data that will go into the Petro Data Hub. It is not the intention at this stage to write a codebook for the eventual dataset. Many decisions will have to be made later, when building the Hub. What, specific variables will be included under each of your sub-sections? How will they be defined/measured? From where will the data will come? What will be the years of coverage, geo-location etc., etc?

#### Petroleum industry statistics – general issues

Statistical definitions and classifications should aim at utility for local use. It is also important that statistics are in line with recommendations by the relevant international organisations. The UN Statistics Division, the International Energy Agency (IEA), the World Bank and the IMF give advice on various aspects. Adherence to international recommendations will make it easier to compare Tanzanian statistics internationally. It will also enable international stocktaking and assessment of developments in international markets.

The character of the petroleum sector makes it important to build the statistics on clear definitions.

<sup>&</sup>lt;sup>18</sup> Survey instrument, see Annex xx. Unfortunately the response to the call for interviews was so low that results were limited to a few basic impressions.

The prevalence of IOCs makes the definition of the distinction between *domestic and foreign* an important issue. *Pricing* of products relate to international prices but also depend *which stage* of the production process pricing takes place. If gas produced outside the Tanzanian customs territory and is brought directly to a foreign country, is it then Tanzanian exports?

Another example is the question of the *domicile*. A decision has e.g. to be taken about the (statistical) domicile of an establishment servicing the petroleum sector outside Tanzania's borders. The petroleum sector is likely to be very large compared to the rest of Tanzania's economy. Contracts for exploration and drilling rigs will therefore also be large and affect value added and balance of payments numbers. Decisions may also be important for determination of tax liability. Statistical decisions on pipelines that cross national borders present the same type of problem. If not clearly explained, the statistician's definitions may lead to misunderstandings. (See subsector on pipelines below)

Collection, production and dissemination of petroleum related data in Tanzania present challenges. Some of the firms and institutions in the sector do not seem to appear in official statistics. Formerly most foreign investors in Tanzania were active in mining and manufacturing activities. Major fuels were imported. The NBS did not have to deal with petroleum companies. This meant that the bureau's insight into the workings of the petroleum industry was lagging behind. Knowledge of industrial structures and processes are necessary for producing good and relevant statistics.

It is important that the NBS starts planning for a build-up of petroleum sector expertise among its staff. Brief courses, longer postings in other statistical bureaux would help. Also, brief secondments to relevant parts of some of the major IOCs could be useful.

Progress is however being made. NBS conducts Annual Surveys of Industrial Production (ASIPs) on a sample basis between each comprehensive Census of Industrial Production (CIP). The CIP 2013 (published September 2016) is the fourth Industrial Census to be conducted in Tanzania Mainland since independence. The first, second and the third were conducted in 1963, 1978 and 1989 respectively. At the time of the -89 census, oil and gas production values were minute in comparison to the total mining sector. Data from the 2013 census is included in the next revision of national economic statistics such as the national accounts. The effects of the petroleum industry is now being shown separately in the official statistical publications and made available to policy makers.<sup>19</sup>

As the "oil age" in Norway dawned, SN produced a number of internal reports on the statistical handling of the industry. The reports are now available on the SN website, but unfortunately mostly in Norwegian. These reports illustrate considerations made and decisions taken in various area of the oil and gas statistics. The earliest note on petroleum statistics was published by Bjørnland 1974 shortly after the pumping of oil had started. The analysis and decisions suggested in this note and others have been drawn on in the sector-by-sector consideration below.

The note recommended a sectoral sub structure of the sector. The sector was divided into exploration, extraction, transport, infrastructure and "all other services". The latter covered a multitude of activities including production and reparation of drilling ships, drilling platforms,

<sup>&</sup>lt;sup>19</sup> Methodological Report:

http://www.nbs.go.tz/nbs/takwimu/Industry/2013\_Census\_of\_Industrial\_Production-Methodology\_Report.zip Analytical Report:

http://www.nbs.go.tz/nbs/takwimu/Industry/2013\_Census\_of\_Industrial\_Production\_Analytical\_Report.zip Summary Report: http://www.nbs.go.tz/nbs/takwimu/Industry/Census\_of\_Industrial\_Production\_2013-Summary\_Report.zip Statistical Tables:

http://www.nbs.go.tz/nbs/takwimu/Industry/2013\_Census\_of\_Industrial\_Production\_Statistical\_Report.zip

production platforms and parts; Building and reparation of oil pipes, supply ships, pipe layers; Support activities like divers, helicopter services, offices storage space and "Other services" including hi-tech services, seismographic exploration as well as rentals of drilling platform without crew.

The industry was new and fast moving, the registration apparatus slow or absent and the lack of primary data was a considerable problem. Documents from SN for this early stage show that a vast amount of detailed knowledge must have built up in the SN. This also goes for other relevant sectors, e.g. the supply sectors. Precise knowledge of the nature of exploration and extraction was important, as it will be in Tanzania.

A later report (Statistisk Sentralbyrå 1980) re-examined the system in the light of changes and newly won information. The annexes of the study included the detailed statistical instruments that were used at the time.

#### Territory, Geology and Reserves

Knowledge of territorial rights are important for analysing Tanzania's natural resource potential. Relations to neighbouring states also depends on territorial clarity. Geological data, including reserves estimation form the basis for decisions on exploration. Types of data include cadastral data, geographic coordinates, information on geology and structures, territory and boundaries.

Data on territorial rights, geology and natural resource stocks are generally not included in official statistics. Sources for data on territorial rights might include the Ministry of Foreign Affairs. In Tanzania TPDC has its own database concentrating on exploration issues, geology and surface information, magnetic and gravity surveys and seismic surveys. The Geological Survey of Tanzania (http://www.gst.go.tz/) also supply data on geology and reserves through its web based Geological and Mineral Information System (http://www.gmis-tanzania.com/). The Geological survey also supplies various specific services and information at cost<sup>20</sup>.

In Norway, the continental shelf was defined as part of Norway. Some exceptions were made in respect of contract drilling, pipe systems and fields stretching over borders. The Norwegian Mapping Authority (Statens Kartverk), formerly the Norwegian Geological Survey (Norges Geografiske Oppmåling) cooperated with the Norwegian Petroleum Directorate (NPD). They have built up an extensive database on geology and reserves. Much of the information is available in English on http://www.npd.no/en/About-us/Available-data/.

TPDC, Geological Survey and NBS might cooperate on building a database with adequate coverage of petroleum and other resources. There is a need for NBS staff to gain more insight into databases for other countries such as Mozambique, Botswana or Norway. An 'MoU' between NBS and the TPDC and Geological Survey on electronic or web data sharing could be established.

# Legal framework, policies, public institutions

Research and analyses of the effects of the petroleum industry on the Tanzanian economy and society are not only dependent on quantitative information. Information about the "system" that generates such data is also important. The **Petro Data Hub** would therefore not only include statistics as commonly understood. We would include information from various parts of the legal system. We would also include Government policy documents. The **Hub** would also comprise descriptions of relevant institutions in the public and private domain.

<sup>&</sup>lt;sup>20</sup> Laboratory Services, Geophysical Digital Data, Geochemical Data, Geo Publications, Map preparation

Such information could also be found elsewhere on the internet. However, the advantage of disseminating it from the **Petro Data Hub** would be that correct current information is displayed. When laws, rules, regulations, policies and institutions change over time it is seldom reflected systematically on the net. When several versions or drafts of various documents are available on the web it is easy to end up with wrong information.

Keeping up to date such information is not among the roles of NBS. The sources for such data will mainly be the various ministries as the Ministry of Energy and Minerals (MEM), the Office of the President and TPDC. The website of the Parliament of Tanzania (http://www.parliament.go.tz/acts-list) has an extensive register of acts. It also includes laws, bills, resolutions, subsidiary legislation and other parliamentary papers.

# **Exploration**, drilling

Hydrocarbon exploration (or oil and gas exploration) is the search by petroleum geologists and geophysicists for hydrocarbon deposits beneath the earth's surface, such as oil and natural gas. Oil and gas exploration are depend on petroleum geology. A significant amount of geological, structural and seismic investigation must be completed to redefine the potential hydrocarbon drill location from a lead to a prospect. The **Petro Data Hub** will contain as much information as possible about these activities as well information on explorative and extractive drilling.

Exploration costs are inputs like chemicals, cost of drilling, site clearing etc. Upstream cost includes lifting and finding costs. The EIA defines finding costs as "the costs of exploring for and developing reserves of oil and gas and the costs to purchase properties or acquire leases that might contain oil and gas reserves."

TPDC is the official data source on exploration in Tanzania. The Information center at the TPDC web page contains a selection of data on seismic surveys (2000 – 2013) and on the status of deep sea wells (including name of well, operator, location, depth, formation, age , date and current status). A list of gas discoveries is planned but not implemented (end November 2016). A number of documents, mostly with legal / regulatory content may be downloaded from the site. For other types of information concerning exploration, information will have to be sought directly from the companies. In Norway, the Norwegian Petroleum Directorate's (NPD) databases contain extensive and open information on exploration and results by field.

TPDC has a responsibility for furnishing data to the NBS and has its own database concentrated around hard technical data like exploration, geology and surface information, magnetic and gravity surveys and seismic surveys. In the future, data needs will comprise also extraction, investment, transport, production of basic energy raw materials and the use of such materials for generation and transmission of energy.

# Extraction

Oil and gas extraction are parts of the mining, quarrying and oil / gas extraction sector. This sector comprises establishments that extract naturally occurring mineral solids. These will be coal and ores; liquid minerals and crude petroleum and gases, such as natural gas. *Extraction* includes lifting, by (EIA) defined as the costs to operate and maintain oil and gas wells. This includes also related equipment and facilities to bring oil and gas to the surface. The influence of IOCs and shared ownerships may obscure the nationality of ownership. One may statistically need practical decisions on the nationality of companies. The **Petro Data Hub** should contain information on extraction of

natural gas and its use after extraction, in physical and economic terms.

Data on extraction of natural gas has only recently been made available from the NBS. Formerly, data on production volumes of gas and petroleum were made available from TPDC and MEM on an informal basis. This has worked well. However, formal agreements between the parties were needed. This would be necessary to learn more about database maintenance and reporting criteria. Data should also be made available through the open data initiatives now appearing in Tanzania.

Many of the enterprises working in the North Sea and on land were owned jointly by Norwegian and foreign companies. Borderline cases like the "Frigg" field covering both Norwegian and foreign continental shelves needed pragmatic solutions. International conventions and Norwegian practical problems had to be balanced. In some cases the statistical concepts used in Norway were to depart slightly from international norms:

- Decisions were needed with respect to "statistical" nationality when the nationality of the various components of a company group were unclear. In some cases where *territorial* criteria were suggested by the UN, Norway used *ownership* criteria. This was in line with the treatment of the sizeable shipping sector in Norway where all ships registered in Norway were defined as domestic.
- Ownership criteria were needed for pipes crossing territorial borders. When a field stretched across territorial borders, the share owned by Norway was deemed to be Norwegian.
- Oil from a Norwegian owned field was considered exported when the flow crossed the border of the field from which it was pumped.
- Investments were valued and registered in national statistics *when delivered* to the oil field. Internationally they are frequently regarded to be delivered *at completion* of the investment.
- There were also problems with 'rented or contract' refining of oil. Export would statistically take place when oil went out of the territory to a contract refiner but would become import when the refined product came back.
- Finally, there were difficulties with determination of *valuation* of exports and production. For valuation in Norway the *norm price for taxation purposes* was used but adjusted for terminal and transport cost.

#### **Production**, sales

Transformation of petroleum into usable products are statistically classified under manufacturing division. Products comprise e.g. petroleum refining and manufacture of gases such as ethane, propane and butane.

In Tanzania the Annual Survey of Industrial Production (ASIP) records most types of petroleum products in terms of quantity/volume, unit price and hence value of manufactured items. These are now available at ISIC rev 4 and reported at 4 digits level. However, the current coverage depending on the last revised national accounts series based on 2007 prices will be expanded during the next revision. It will then incorporate recent changes in petroleum industry and the use data from Census of Industrial Production 2013 with figures calibrated to ISIC rev.4. More disaggregated statistics on manufactured products including petroleum will be extracted. Relevant tables from the CIP 2013 will be integrated in the **Petro Data Hub**.

#### **Construction, rigs, platforms**

The construction of rigs and platforms may be a significant contribution to investment and production in Tanzania. This will take place in the near term in an initial phase of the build-up of the petroleum industry. Statistical decisions on how to treat territorial and ownership definitions will

have to be made. The **Petro Data Hub** will aim at providing detailed record of the production of the local construction and metal working industry and the imports and exports of the relevant capital goods.

In Norway, investment statistics was of great importance, particularly in the buildup period in the North Sea. The SN had to look carefully at basic problems of definition. What was investment and what not? Many shortcuts had to be taken, one example being the Frigg field<sup>21</sup> where investment costs were not used but real investment estimated.

In addition, some inconsistencies between the various sets of statistics collected by different institutions arose. For example, there were major differences between the foreign exchange statistics collected by the Central Bank of Norway (Norges Bank, NB) and the investment statistics. These had to be sorted out so as not to give different signals to private sector, the public and public economy managers.

#### Pipelines

Oil pipelines are made from steel or plastic tubes, which are usually buried. The oil is moved through the pipelines by pump stations along the pipeline. Natural gas (and similar gaseous fuels) are lightly pressurised into liquids known as Liquefied Natural Gas (LNGs). Pipes are also used for transport of refined gas and distribution to the final consumers of gas. Much of the information planned for the **Petro Data Hub** will be sourced from the CIP 2013 and earlier CIPs. Local production and imports/exports of pipes and production in domestic industries that produces pipes and machinery may be important. Pipe transport of natural raw and refined gas will be registered from the production statistics. Most data would be from the NBS but possibly supported by data from establishments in the relevant sectors.

Transportation systems, like petroleum fields, stretch across national borders. The question then arises whether the services performed and the value of investment into infrastructure are decided from the point of view of territory or by ownership. Apart from the disagreement that this may lead to between neighbouring states, the magnitude of these flows may have large effects on the macro variables of the economy. If not clearly defined and properly explained this may lead to misunderstandings.

In Norway, one had to decide on whether to use ownership criteria or territorial criteria. Practical considerations caused "Norpipe" to be defined as Norwegian despite 50-50 split ownership with international company Phillips Petroleum. As the extraction of petroleum grows, also a major part of the raw products may, at a given time, lie in pipes. In Norway, as the amount of oil and gas transport in pipes rose and became an important part of inventories, such information was collected. In Tanzania this will depend on whether pipe transport will be the predominant type of transport used in the petroleum industry

#### Foreign trade

Trade figures comprise imports and exports of gas and oil. Presently the foreign trade data are compiled by NBS in collaboration with BOT and TRA. It is important to distinguish between total exports and domestic exports. The latter is netted out for products formerly imported. The **Petro Data Hub** will contain these trade flows as disaggregated as possible. It will also provide trade data for a selection of goods and service closely connected with exploration, extraction and production in the petroleum sector.

<sup>&</sup>lt;sup>21</sup> See http://www.norskolje.museum.no/en/frigg-2/

In Norway, it became necessary to create practical rules for statistical treatment of oil storage taking place outside the customs area. A number of price issues arose depending on where and when oil flows and stores were measured. For instance, the price index used early made it impossible to decide on the price of domestic use of raw oil and gas.

#### Industry

Industry statistics for the **Petro Data Hub** will comprise data on the production, employment, enterprises and capital formation in the petroleum industry itself. Besides, it should contain information on industries positively or negatively affected by repercussions from the petroleum industry. In Tanzania, the main vehicle for collection of such data is the Annual Survey of Industrial Production.

From the recorded data of sector 06 "Extraction of crude petroleum and natural gas" (for 2009) it appears that there could have been a number of companies actually operating in the country that were missed in the recording process. The official statistics 2009 shows that the sector comprises only one establishment having started operations in 2000-2004, located in Dar es Salaam, the entire sector comprising some 19 employees. From the companies listed by TPDC it however appears that some 10 or 11 companies were engaged in activities within the sector in Tanzania before 2009. Analysis of the 2013 Industrial Census may however change this impression.

Looking ahead to the major developments that are expected in LNG production and exports, we believe that an extra effort is needed to ensure that the petroleum sector is properly included. A base line survey of the 20-25 companies now involved in the sector could be undertaken. One would not duplicate the data required for the CIP 2013 but attempt to further explore production linkages, ownership details and also include forward looking questions e.g. on investment plans. In addition, the survey would include opportunities for the companies to discuss with the NBS their needs and their particular problems in supplying data to the NBS.

#### Investment

The investment data group of the **Hub** will trace values of the various components and their financing and ownership. In addition to drilling rigs, platforms, pipelines and refinery plants, investment linked to the petroleum industry will also include others such as power plants and various industrial plants using products from the industry. These are important to include in analysis on the overall effects of the petroleum resource.

As also mentioned above, in Norway there were early inconsistencies between the various sets of statistics collected by different institutions. For example, there were major differences between the foreign exchange statistics collected by the Central Bank of Norway (Norges Bank (NB)) and the investment statistics coming from industry data.

# Energy

Much of the gas used domestically is likely to be inputs to the energy industry. Gas /petroleum driven generation of power and investment in plant will be part of the **Petro Data Hub**. Data should show the importance of the specific petroleum generated power in relation to the rest of the energy sector, for example by IEA type flowcharts<sup>22</sup>. It is important to record both the investment and operation of this industry.

<sup>&</sup>lt;sup>22</sup> https://www.iea.org/Sankey/#?c=United Republic of Tanzania&s=Balance

The Ministry of Energy and Minerals facilitates the development of energy and mineral sectors. It is also the official source of energy and mineral statistics. Various institutions and agencies, which deal with the energy and mineral sector are also under the overall guidance of the Ministry of Energy. These include Tanzania Minerals Audit Agency (TMAA), Tanzania Electric Supply Company Limited (TANESCO), the Rural Energy Agency (REA), Tanzania Petroleum Development Corporation (TPDC), Geological Survey of Tanzania (GST), State Mining Corporation (STAMICO) and The Energy and Water Utilities Regulatory Authority (EWURA).

NBS handles harmonisation and dissemination of official energy statistics. The bureau maintains statistical compendia that present collection rules, methods, concepts and definitions regarding all official statistics.

International Recommendations for Energy Statistics (IRES) addresses the internationally agreed standards and other necessary guidance for purpose of comparability. These recommendations include relevant concepts and definitions, classifications, data sources, data compilation methods, institutional arrangements, data quality assurance, metadata and dissemination policies.

#### **National Accounts**

The National Accounts is a system of integrated and mutually consistent data that draw information from a number of sources. Tanzania's National Accounts Statistics classify extractive industries under Mining and Quarrying.

The national accounts of "Mining", classify figures on oil and gas together with those of minerals. E.g. gold, diamond and tanzanite. LNG production, industrial gas and electricity come under "Electricity, gas, steam and air conditioning supply". As the petroleum sector becomes more important extracted crude petroleum has to be separately reported.

In the **Petro Data Hub** It will be important to show the effects of the petroleum industry separately for production accounts, income accounts and expenditure accounts. The financial accounts (acquisition of assets and liabilities) and capital accounts (accumulation and financing of real assets) should also be included. Both current and constant prices will be relevant.

An important feature of the Norwegian national accounts after the beginning of the "oil age" has been the concept of "Mainland Norway". The concept, which had previously been used informally, was introduced and defined in the national accounts of 1989. With this concept, SN aimed to *exclude* from GDP, the petroleum activities (See Halvorsen and Skoglund 2011). "Mainland GDP" is the sum of the gross products of all production sectors *excluding* extraction of crude oil and natural gas. Excluded activities include services linked to the extraction of crude petroleum and natural gas. It also includes pipe-transport of crude oil and gas. Shipping in foreign waters, including shipping supplying ocean based industry is also excluded. Note that the definition is not strictly spatially based. "Mainland" also includes activities in Svalbard<sup>23</sup> as well as at Norwegian Embassies abroad. Main offices of OICs on Norwegian soil are excluded.

Several factors led to the use of the "mainland" concept. An extraordinarily high level of natural resource rent from the petroleum industry was important. The sector's dominant position in the economy and its vulnerability to price variations could skew economic analysis. Today the "mainland" concept is a standard concept for analyses of the Norwegian economy. As the Tanzanian

<sup>&</sup>lt;sup>23</sup> Svalbard is not part of any Norwegian county, but forms an unincorporated area administered by a governor appointed by the Norwegian government. See https://en.wikipedia.org/wiki/Svalbard

petroleum industry grows, the use of a "mainland" concept may also be considered for Tanzania. This could complement the present use of the concept regarding the Tanzanian mainland and Zanzibar.

#### **Government finance**

Government finance statistics include data on revenue, expenditure and budget balance at the central government level. For some countries, second and third tier government data are included. Since government accounts are often produced with major delays, budget data are sometimes temporarily substituted for accounting data.

Government accounts are usually disaggregated by purpose, by economic or administrative category. They may be used for a wide variety of analyses. Classification schemes differ from country to country and from year to year within the same country. Government finance data are an important part of the national accounts and is therefore reclassified to comply with national accounts categories. Internationally comparable data for a large number of categories are disseminated by the IMF (2016) through the IFS Government Finance (2016) database. IMF (2014) also presents recommendations for classifications and definition of concepts.

In Tanzania, the Executive's budget proposals as submitted and as passed by the National Assembly are available on the Ministry of Finance and Planning website<sup>24</sup>. End year reports are not publicly available but a good deal of detailed data on the government *accounts* are available on Auditor General Website. The National Bureau of Statistics (2015b) supplies detailed accounts data on revenue and some aggregated data on expenditure, debt and budget balance (2002-2015) and sets out concepts and definition for the tax statistics.

Data to be included in the **Petro Data Hub** would comprise two major categories. Firstly, revenue figures related to the petroleum sector and expenditure data for government contribution to the petroleum and energy industry. Secondly, and importantly, the database would contain information that could reveal the use of government expenditure for living standards improvement for Tanzanian citizen e.g. in terms of housing, nutrition, education and health. Government finance data may be used for a large number of different purposes that are difficult to pre guess. The **Data Hub** will also provide links to detailed data from the sources mentioned above.

#### Social issues - incomes - poverty

NBS has maintained a good database on socio-economic statistics such as household expenditure, labour, demography, trade and environment. The **Petro Data Hub** will partly link to the NBS data to guide researchers and partly supply important data series directly in the database for easy access.

Tanzania Socio Economic Database (http://www.devinfo.org/tanzania/) contains easily accessible data on demography, economy, education, environment, health, HIV/AIDS, nutrition land and labour force. Census information is also searchable by topic and by area in the database and will be linked to the **Petro Data Hub**. The Tanzania National Data Archive (TNADA) contains reports on series like business registers, construction industry and cash transfer data. Surveys on demography and health, employment and earnings as well as household budgets are included. The TNADA also contains integrated labour surveys and national panel surveys. Several of these data series are in pdf format but the plan is to convert a selection of them to Excel. They can then be included in the **Petro data Hub** so that they are easily accessible for modelers and analysts.

#### **Political and Governance issues**

<sup>&</sup>lt;sup>24</sup> http://www.mof.go.tz/index.php?option=com\_content&view=category&layout=blog&id=20&Itemid=560

Official sources do not provide extensive data on political and Governance issues but some important contributions may be found in the Population and Housing Census.

The Governance component and other components of the petro state project will be collecting relevant data. These will be included in the **Petro Data Hub** and, if possible, among the databases of the NBS. The **Petro Data Hub** will also have links to international databases with relevant political and governance data.

#### Environment

As the petroleum sector grows, the environmental effects of oil and gas extraction and refining need to be taken into account. These comprise a number of phenomena that may be registered in the data systems of the country. Data on toxicality and climate changes caused by petroleum production processes, oil spills and the consumption of petroleum-based products are important.

Recommendation for the full range of environmental statistics have been issued in the UN Framework for the Development of Environment Statistics. (See UN Department of Economic and Social Affairs Statistics Division 2016).

In Tanzania, the latest set of environmental statistics was published by the NBS (National Bureau of Statistics, 2015a). The data set, according to NBS, in principle includes most of the variables collected in countries such as USA and UK. Some data are however not available due to technological and resource constraints. A complete set of environmental quality data will in the future come from a number of sectors and institutions in addition to the NBS.

The most relevant data related to petroleum are available in "Environment Statistics for Tanzania Mainland 2014" (National Bureau of Statistics 2015a). The energy section in the report presents data on capacity and generation of electricity, quantity of electricity sold by Tanesco (by region and by type of user) and number of imported vehicles. Data may also be found for imports of petroleum and petroleum products and sources of energy for households' lighting and cooking (2012 mainland only). The chapter on environmental quality presents a number of tables on pollutants and air/water quality, some by location.

The **Petro Data Hub** may also draw on data from the Human settlement reports (2012 and 2009) and the population census 2012.

#### International comparisons – international statistical sources

A number of international organisations focusing on a variety of issues, from economic development, energy etc. to various social and political issues, operate databases on the web. Many are free of charge, open to all users and easily accessible, based on attractive software for graphing etc. The data may be standardized in terms of classification and concepts to be comparable across countries, but the overwhelming part of them are based on national official statistical sources. Annex 4 lists a selection of potentially useful databases, noting briefly what kinds of data they hold, coverage, frequency and most recent availability.

#### Analysis and models

In Tanzania, there are two national expert groups dealing with economic modeling and forecast. These are the 'Tanzania MACMOD' group and the 'Financial Programming' group. The closely working groups comprise expert economists and statisticians from the Bank of Tanzania, Ministry of Finance, National Bureau of Statistics, Tanzania Revenue Authority, TPDC and others. The groups meet routinely to assess the economic performance of the country and forecast future economic trends.

The macroeconomic model for Tanzania (MACMOD) will include a line of indicators tracking the production of gas as separate from the general mining activity. TPDC and TRA require such data for tax estimation and NBS for its reporting on industrial performance. Most significantly, with this development, NBS will be able to use detailed data on production costs right from the firms for estimating the cost of inputs as part of national accounts statistics. The input-output ratios currently used were generated in 1992 (slightly modified in 2001) at a time when production of gas was not separated from general mining activity.

A joint mineral modeling project is being coordinated by Tanzania Revenue Authority and NBS with a shared database. The project is funded by Norway. Study tour visits have been received from experienced countries in mineral production, including Botswana. Challenges in the project development will in future be reported by the Petrostate program web site and the **Petro Data Hub**.

The **Petro Data Hub** will be able to supply data for further modelling attempts. Model analysts will benefit from the econometrics training within the Petrostate programme. It is the ambition that such analytical efforts by a wider range of persons and institutions be made accessible to policy makers through the **Petro Data Hub**.

In Norway, the development of large-scale models (Leontief /Keynesian style) started in the late 1950 and continued in the sixties with additional CGE type models. Later also part-year (quarter) based models were used. The SN Research Department runs and maintains a system of models for policy analysis in conjunction with the Ministry of Finance, which is the predominant user. Other users may however also "rent" model runs. The model system contains both micro and macro models. The former (e.g. on taxation, household consumption and the state budget) feed in to the latter (macro models like KVARTS, MODAG, MSG) which again deliver input to models for pollution, use of natural resources and regional integration. At the time of discovery of petroleum resources in Norway, the SN undertook considerable statistical work to include petroleum sector in these models. Several internal (now available) notes were produced, mostly in Norwegian.

# 6. CONCLUSIONS

This paper has indicated the range of data needed to track and make forecast for the petro sector and its effect on the economy of Tanzania. Improvement of petroleum related statistics in Tanzania will entail collection, presentation and dissemination. The data are important to inform the decision makers and researchers.

The Petrostate programme aims at improving the empirical understanding of key challenges facing Tanzania. It will provide evidence based policy analysis to avoid a resource curse situation. The programme needs disaggregated data to answer its core questions. The programme will train data users and analysts. It will share the different findings through the programme website and the **Petro Data Hub**.

It is clear from the above that much information on the petroleum industry in Tanzania is lacking or not accessible. An important focus for the Petro programme is to create good relations with national producers of official data. NBS e.g. holds the main responsibility for official statistics and will be a key source of data for the programme. The Bureau will however need support and input from the programme and other sources. It will be important for public, private and multinational company stakeholders to work closely with the NBS.

NBS also has a particular role in ensuring that all data reported follow internationally agreed standards. These standards are stated generally by the United Nation's guideline (see Annex II) and, for specific data will comply with recommendations of the UNSD.

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#### ANNEXES

# Annex 1: Oil and gas companies in Tanzania

Company	Contacts	History/area/block
Afren Tanzania	Jeremy Martin Country Manager East Africa Exploration (Kenya Ltd) P.O.Box 38925-00623 Nairobi, Kenya Mob: +254 (0) 72 9943249 Email: jeremy.matrin@ea-x.com	Afren entered the country's fast growing gas and oil sector in 2011 after it bought a 74 per cent working interest in the Tanga Block, and then wholly owned by Petrodel Resources that now retains a 26 per cent interest in the company.
Beach Petroleum	Marcus Mng'ong'o Beach Petroleum (Tanzania) Ltd Plot No. 34A, First Floor Norconsult Building Winding Avenue/Zambia Road Oysterbay P.O. Box 33353 Dar es salaam Tel/Fax: +255222667770 Website: beachpetroleum.com.au	In June 2013, we announced that our subsidiary Petrobras International Bras petro B.V. ("PIBBV"), together with the investment vehicle owned and managed by BTG Pactual ("BTG Pactual Vehicle"), entered into an agreement to form a joint venture (at the ratio of half each), for oil and gas exploration and production in Africa ("E&P"), which includes Tanzania
BG International	Mr. Derek Hudson President and Asset General Manager BG East Africa BG International, Tanzania Branch Plot 369, 1st Floor Kilwa House Toure Drive, Oysterbay P. O. Box 105833 Dar es salaam E-mail:pcatanzania@bg-group.com	BG Group came to Tanzania in 2010 when it farmed in to Ophir Energy held assets by taking a 60 per cent working interest acquiring an interest in offshore Blocks 1, 3 and 4. had by the third year (2013) of operations hit nine natural gas discoveries
Dodsal	Samir Kilachand Dodsal Hydrocarbons & Power Ltd, 9th Floor, Extelecoms House, Samora Avenue, P.O. Box 12049, Dar es Salaam, Tanzania +97143431515 Email: rajenk@dodsaldxb.ae	Dodsal, a Dubai based company through Dodsal Hydrocarbons and Power (Tanzania) Pvt Ltd in October 2007 signed a production sharing agreement with Ministry of Energy and Minerals and Tanzania Petroleum Development Corporation for exploration of oil and gas for the RUVU block which lies approximately 15,300 square kms towards the eastern part of Tanzania. Ruvu
Dominion	Doug Rycroft: General Manager Dominion Oil & Gas Limited, Hamza Aziz Road, Plot 1676, P.O. Box 23184, Dar es Salaam. Fax: +255 22 260 2532 Email: info-tan@ophir-energy.com	In 2006, Dominion Oil and Gas Limited, a 100 per cent subsidiary of Dominion Petroleum Limited was awarded an exploration permit for (part) of the Selous basin. [1] Dominion holds three Production Sharing Agreements (PSAs) in onshore Tanzania, namely Mandawa, Kisangire and Selous DeepSea

Heritage Rukwa (TZ) Ltd	James Baban VP and Managing Director Heritage Rukwa Tanzania Limited 4th Floor Amverton Towers 1127 Chole Rd Masaki Dar es salaam, Tanzania P.O.BOX 38022 Tell: +255-22-292 7800 Fax: +255-22-292 7801	Entered Tanzania 2008 or 2009. Heritage completed 3D seismic acquisition in offshore Tanzania Heritage has licensed virtually the entire Rukwa Rift Basin split into two separate areas; Rukwa North Basin and Rukwa South Basin.
Maurel & Prom	Christophe Maitre: Country Manager Maurel et Prom (T) Ltd. 1124 Chole Road, Msasani peninsular, Dar es Salaam Tel: +255 22 260 214 +255 782 444 352 Email: cmaitre@tanzaniamp.com	Maurel and Prom entered Tanzania in July 2004 with the Bigwa-Rufiji-Mafia exploration license, which it operates with a 60 percent interest, while PetroQuest and Hollick each hold 20 percent. Mnazi Bay Gas Development Bigwa - Mafia Channel

Motherland Homes	The Managing Director Motherland Industries Ltd B-214 Morya House Plot No. B-66/67, New Link Road Andheri (West) Mumbai 400053 INDIA Email:vksmhl@yahoo.com	Signed a PSA with TPDC in january 2012. Malagarasi Basin
Ndovu/Aminex	Thierry Murcia: Country Manager Kenyatta Drive Plot 5.15, Oysterbay P.O. Box 179, Dar es Salaam Tel. +255 784 600674 Fax: +255 22 266 7284 Email: tmurcia@ndovuresources.com	Aminex has been working in Tanzania since 2001. Four exploration wells have been drilled, two of which encountered commercial quantities of natural gas. Kiliwani North-1 tested gas at 40 million cubic feet/day and is being developed for commercial production.
Open Acreage	Managing Director Tanzania Petroleum Development Corporation Plot No. 2390/12 &2392/12 Azikiwe/ Jamhuri Street P.O.Box 2774 Da-es-Salaam Tanzania Tel:+255-22-2200103/4 Email: tpdcmd@tpdc-tz.com	Kisangire - Lukurilo Mandawa Selous West Songo Songo
Ophir East Africa Ventures Limited	Doug Rycroft Ophir East Africa Ventures Limited Hamza Aziz Road, Plot 1676, P.O.Box 23184 Dar es Salaam, Tanzania Tel +255 22 221 5526 Email: info-tan@ophir-energy.com	Ophir entered Tanzania in October 2005, when it signed a PSA for Block-1 and holds an 80 per cent stake in Block-7 located to the north of areas with major gas discoveries in Blocks 1, 2, 3 and 4 in the deep offshore basin of Tanzania Pande East
Orca Exploration Group	David K. Roberts: Oyster Plaza Building, 5th Floor Ohio Street, P. O. Box 80139 Dar es Salaam Tel. + 255 (0) 22 2138 737 Fax: + 255 (0) 22 2138 938 Email: droberts@panafricanenergy.com	Present in Tanzania since before 2004. Orca Exploration Group operates one license in Tanzania, which comprises two blocks known as the Discovery Blocks.

Pan African Energy	David K. Roberts: Oyster Plaza Building, 5th Floor Ohio Street, P. O. Box 80139 Dar es Salaam Tel. + 255 (0) 22 2138 737 Fax: + 255 (0) 22 2138 938 Email: droberts@panafricanenergy.com	Pan African Energy Tanzania Ltd. Tanzania's first natural gas producer, active in planning the development of Tanzania's Songo Songo gas field since 1991. Supplies gas for power generation at the Ubungo Power Plant in Dar es Salaam and to 38 industrial and commercial customers in the Dar es Salaam The company also supplies Compressed Natural Gas (CNG) for use in vehicles. Production Sharing Agreement (PSA) with the Government of Tanzania.
Petrobras	Marcio Paulo Naumann Managing Director Petrobras Tanzania Ltd Plot 1403/1A Msasani Peninsula P.O. Box 31391 Dar Es Salaam - Tanzania Tel: +255 22 2165604/70 Mob: +255 (0) 682000118 Email: petantz@pogbv.com	In June 2013, Petrobras International Bras petro B.V. with the investment vehicle owned and managed by BTG Pactual ("BTG Pactual Vehicle"), entered into an agreement to form a joint venture for oil and gas exploration and production in Africa including Tanzania. Petrobras Tanzania Limited, is now the operator of Blocks 5,6 in deep-water Tanzania in a JV with Shell (DeepSea Block-8?)
Petrodel	Mr. Imtaz Kassam Petrodel Resources Ltd C/o MM Industries, P.O. Box 3030, ITV Road, Dar es Salaam, Tanzania Email: ikassam@hotmail.com	In May 2006 Petrodel was awarded rights for the Tanga block winning a public tender held by the TPDC. Petrodel was also later invited to negotiate a PSA with TPDC for the Latham - Kimbiji block

Solo Oil	With Ndovu/Aminex?? Kenyatta Drive Plot 5.15, Oysterbay P.O. Box 179, Dar es Salaam Tel. +255 784 600674 Fax: +255 22 266 7284 Email: tmurcia@ndovuresources.com	Solo Oil (since about 2013 with Aminex) has the Ruvuma PSA which covers 12.360 square kilometers in the extreme south- east of Tanzania of which roughly 80% is onshore and 20% offshore.
Songas Limited	Mr. Christopher Ford The Managing Director 4th Floor, Plot No. 179/180 Msasani Bay, Msasani Village Block "B" Kinondoni District P.O.Box 6342, Dar es Salaam Tel: +255222124181 Fax: +255222124186	SONGAS Limited commenced its operations in July 2004. The company generates electricity, using gas from the Songo Songo Island gas fields, off the coast of southern Tanzania. SONGAS conducts gas processing, transportation and power generation Songo Songo Gas Pipeline

Statoil /Exxon Mobile	Mr. Bjorn Albert Holbaek Rasmussen Country Manager Statoil Tanzania As P.O.Box 713 79Haile Selassie Rd Oysterbay, Dar es Salaam, Tel: +255 767 303677 Email: bras@statoil.com	In 2007, Statoil signed a Production Sharing Agreement (PSA) for Block 2 with Tanzania Petroleum Development Corporation (TPDC). Statoil Tanzania (AS) is the operator with 65 per cent working interest with ExxonMobil as a partner with 35 per cent interest of Block 2 in water depths of between 400 and 3000 meters. So far (to end 2014) the company has made seven finds which combined constitutes 21tcf in block 2: Zafarani-1, Lavani-1, and Tangawizi-1, Mronge-1, Lavani-2- and latest two the Piri-1- well of 2-3 tcf and Giligilian well of 1.2 tcf. Exxon Mobile entered Tanzania 2010 as
Swala Energy	Country Director Swala Oil and Gas (Tanzania) Limited P.O.Box 8258 Hillbrook Cottage, Kwale Road Oysterbay Dar-es-Salaam Tanzania	First registered in the British Virgin Islands in 2010, Swala became an Australian public limited company in 2013.[7] Swala holds assets in Kenya, Tanzania and Zambia, with a particular interest in the East African Rift System Kilosa- Kilombero Basin Pangani Basin
Wentworth	Wentworth Gas Limited P.O. Box 203 2nd Floor Coco Plaza 254 Toure Drive, Oyster Bay Dar Es Salaam, Tanzania Phone: +255 222 601 139 Phone: +255 222 601 140 Facsimile: +255 222 601 130 info.tz@wentworthresources.com	In 2004, Wentworth signed a Production- Sharing Agreement (PSA) for the Mnazi Bay Concession. In 2005 when Wentworth bid for and won concessions in three Rovuma Basin blocks. At that time the Company was partnered with Anadarko and the Mozambique national oil company in the Onshore and Offshore Rovuma Concessions and held an 80% participation interest in the Mnazi Bay Concession in southern Tanzania with that TPDC.Work began in all three concession areas in 2006 and by 2008 new seismic data had been acquired in Mnazi Bay, Tanzania and Onshore and Offshore Rovuma, Mozambique

Sources:

TPDC Website

Tanzania Oil and gas Almanac Company Websites

# **Annex 2: UN Fundamental Principles of official statistics**

Principle 1: Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honor citizens' entitlement to public information.

Principle 2: To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.

Principle 3: To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.

Principle 4: The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.

Principle 5: Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.

Principle 6: Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.

Principle 7: The laws, regulations and measures under which the statistical systems operate are to be made public.

Principle 8: Coordination among statistical agencies within countries is essential to achieve consistency and efficiency in the statistical system.

Principle 9: The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.

Principle 10: Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries. 1.16 Importance of developing energy statistics as official statistics. Energy is a necessary.

# Annex 3: Some Useful International Databases

Source	Variables	Coverage, Frequency, and Most Recent Available
	GOVERNANCE	
Afrobarometer (AFR) http://afrobarometer.org/data	Public attitude surveys on democracy and governance in Africa	More than 35 countries, periodic rounds, latest 2015
QOG from the Quality Of Government Institute, Gothenburg http://qog.pol.gu.se/data	QoG Standard Data QoG OECD Data QoG Expert Survey Data structure and behavior of public administration QoG EU Regional Data three levels of European region governance QoG EQI Data novel survey data on corruption and governance	QoG Standard Data 2500 variables 100 data sources QoG OECD Data 1300 variables from 75 data sources. QoG Expert Survey Data covers 159 countries. QoG EU Regional Data 450 variables QoG EQI Data 207 regions within the EU
Global Integrity Index. Africa Integrity Indicators	114 indicators divided between two main categories	54 countries, every two years, 2012 - 2015
- map?stringId=transparency_accou ntability&year=2016	Social Development	
	FCONOMY	
		205 countries undeter and
http://country.eiu.com/tanzania	Country Analysis Political analysis Risk Analysis Industry analysis	205 countries, updates and forecasts Extensive subscription services Free subscription gives limited free data, graphs and projections Trials possible
Clabel Competitiveness Depart	114 indicators Main groups	The Clabel Competitiveness
Downloads page http://reports.weforum.org/global- competitiveness-index/downloads/	Institutions, infrastructure, macroeconomic environment, health, education, and training, market efficiency, technology, market size, business sophistication and innovation	Report 2016-2017 assesses the competitiveness landscape of 138 economies.
IMF. IFS	Exchange rates by country	
http://data.imf.org/?sk=5DABAFF 2-C5AD-4D27-A175- 1253419C02D1	External sector current, financial account and international investment position by country	
World Bank	The open data website points to	243 data bases

Stores a wide variety of data. Best access probably directly to the World Bank Open Data website http://datacatalog.worldbank.org /	243 data sites. A catalogue is downloadable. Not all data sets will have data for Tanzania.	
UNCTAD Data center http://unctadstat.unctad.org/wds /ReportFolders/reportFolders.asp x?sCS_ChosenLang=en	International trade, goods and services Economic trends Foreign Direct investment External Financial resources Population and Labour force Commodities Information Economy Creative Economy Maritime transport	150 time series covering a wide range of topics. Built upon common rules and harmonized production processes. Most time series cover long periods for countries as well as some 150 analytical country groupings
	Kay acapamia statistics by	
http://unctadstat.unctad.org/Cou ntryProfile/en-GB/index.html	country. International indicators for country comparisons. Most of the selected indicators are available in <b>Data Center</b>	
ILO Statistics start page http://www.ilo.org/ilostat/faces/ home/statisticaldata/new_link_10 ?_afrLoop=98521372783041#!%40 %40%3F_afrLoop%3D9852137278 3041%26_adf.ctrl- state%3D13tgs0kj62_699 Database http://www.ilo.org/ilostat/faces/ help_home/data_by_subject?_adf .ctrl- state=13tgs0kj62_154&_afrLoop= 98317251898442#!	Populations and labour force Employment Public sector employment Unemployment and labour underutilization Woking time Earnings Labour cost Consumer prces Occupational health and safety Industrial relations Labour productivity Working poor Informal sector and informal employment	The database for year 2015 Includes 193 countries. Estimates for reference period 1990-2014 Projections for 2015-2050
COMTRADE	Popository of official	
https://comtrade.un.org/	international trade statistics and relevant analytical tables. All data also accessible through Application programming Interface (API)	largest depository of international trade data. It contains well over 1.7 billion data records for 45 years and is available on the internet! Access is free but COMTRADE may charge for exceptionally big downloads.
EITI	Country data and reports on	56 countries

l

https://eiti.org/data	Extractive industries:	
	Revenues	
	Tax and legal frameworks	
A Barrel full	Oil and gas fields	Database on oil and gas fields.
http://abarrelfull.wikidot.com/oil-	Oil and gas pipelines	Under construction but partly
and-gas-field-database	Oil refineries	useful.
IFΔ	Energy balance flow charts	Coverage for an extensive range
https://www.iea.org/statistics/	Energy atlas serves maps/graphs	of energy information (including
	on Emissions, coal, electricity,	Natural gas)for IEAs 29 member
	energy balance, energy	countries. Also good coverage for
	indicators, natural gas, oil and	the 102 nonmember countries
	renewables.	e.g. Tanzania. Extensive data free
	Country balance pages display	of charge but IEA also charge for
	products hydrocloctricity	some databases and publications.
	geothermal biofuels and natural	
	gas from 1990 to 2014	
USGS	A large number of statistical	US government website. USGS is
https://www.usgs.gov/products/d	series and study reports on	also active worldwide and covers
ata-and-tools/overview	mainly geological topics.	all countries as eg Tanzania
	An integrated data finder	
	provides access to data which is	
	largely nee of charge.	
	SOCIAL	
Living Standards Measurement	Wide range of household data.	Data for 1993, 2008-09, 2010-11
Study (LSMS) World Bank	Survey documentation contains	and 2012-13. Regional data also
www.worldbank.org/lsms	complete listing.	for Kagera 1991-94, 2004 and
Direct to data for Tanzania:	Access to data free but requires	2010.
nttp://econ.worldbank.org/wBSI	filling application form with full	
RCH/EXTISMS/0 contentMDK:21	information on user identity.	
485765~menuPK·4196952~nageP	purpose etc.	
K:64168445~piPK:64168309~theS		
itePK:3358997~isCURL:Y,00.html#		
TanzaniaNational		
Click ASD for survey		
documentation		
The DHS program, USAID	Demographic and Health Surveys	For Tanzania 12 datasets are
http://dnsprogram.com/data/ava	health family planning	to 2014-15 Source NBS
hable-datasets.clm	Access to data requires	to 2014-13. Source NBS
	registration and login.	
	<u> </u>	·
RANKINGS		
Cingranelli Richards Human Rights	Quantitative information on 15	202 countries, annual, 1981 -
0	•••••••••••••••••••••••••••••••••••••••	· · ·

http://www.humanrightsdata.com /p/data-documentation.html	rights variables.	
Freedom House https://freedomhouse.org/reports	Downloadable databases with FH rankings re: Freedom in the world political rights and civil liberties Freedom of the Press Freedom on the Net	Freedom in the world 195 countries latest 2015 Freedom of the Press 199 countries latest 2015 Freedom on the net 65 countries latest may 2016
Social Watch http://www.socialwatch.org/node/ 14365	Gender equity index	168 countries, annual, latest 2012
Trade unions rights violations survey http://www.ituc-csi.org/annual-	Trade unions rights violations	143 countries, annual, latest 2012
of.271?lang=en		
Transparency International Corruption Perception Index http://www.transparency.org/cpi2 015#downloads	Corruption Perception Index	177 countries, annual, latest 2015
Worldwide Governance Indicators http://info.worldbank.org/governa nce/wgi/index.aspx#home	Voice and Accountability Political Stability and absence of Violence Government Effectiveness Regulatory quality Rule of law Control of Corruption	215 countries, annual, latest 2015. 30 individual data sources
	VARIOUS	1
Gallup World Poll (GWP) http://www.gallup.com/services/1 70945/world-poll.aspx	Topical coverage varies but GWP covers e.g. items under Business and Economics Citizen Engagement Environment Government and politics Communications and Technology Law and order Well-Being and Work	Gallup conducts nationally representative surveys face to face or via telephone in more than 160 countries and over 140 languages, covering the emerging and developed world
GAP minder https://www.gapminder.org/data /	Gap foundation is a non profit organization working with the UN. Mostly socio economic data. Easy search download and particularly the (bubble) charts gives quick impressions of how series move over time.	519 data time series

This paper deals with needs and availability of data, statistics and information in Tanzania. It relates to a five-year (2014–19) research programme on prospects and challenges for the petroleum sector.

The main objectives are

- a. to present a brief analysis based on data which is accessible at present and
- b. to sketch a structure for the *Tanzania Petro Data Hub* (http://data. tanpetstate.org).

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